"Bridging Clinical Ultrasound Research and Practice for a Healthier Future"

ISCU 2025

International Symposium of Clinical Ultrasound

in Conjunction with KACU Spring Annual Symposium

June 28-29, 2025 | COEX MAGOK, Seoul, Korea

www.iscu.or.kr

The Korean Association of Clinical Ultrasound
E-mail: iscu@kacu.or.kr

ISCU 2025

International Symposium of Clinical Ultrasound

Invitation

Dear Colleagues,

It is our great pleasure to welcome you to the International Symposium of Clinical Ultrasound (ISCU) 2025, hosted by the Korean Association of Clinical Ultrasound (KACU). We are delighted to have you join us here at COEX Magok, Seoul, from June 28 to 29, 2025, under the theme: "Bridging Clinical Ultrasound Research and Practice for a Healthier Future."

ISCU 2025 brings together leading experts, clinicians, and researchers from around the world to share knowledge, explore the latest advancements, and translate innovations into real-world clinical practice. Throughout the symposium, you will have the opportunity to engage in keynote lectures, hands-on workshops, and dynamic scientific sessions designed to foster interdisciplinary learning and meaningful collaboration.

We hope this symposium will not only be intellectually stimulating, but also provide a valuable opportunity to reconnect with colleagues and build new professional relationships.

Thank you for being part of ISCU 2025. We wish you an inspiring and rewarding experience over the next two days.

Warm regards,

Soonkoo Baik

President
The Korean Association of
Clinical Ultrasound & ISCU 2025

Saturday, June 28, 2025

ROOM 1

ROOM 2

Technologic Update in Ultrasound (*K) (Basic & Company Lecture)

Associate Course 1 (*K): Ultrasound in Cardiac

State-of-the-Art Lecture 2

Cardiac Ultrasound

Sunday, June 29, 2025

ROOM 1

ROOM 2

Associate Course 2 (*K): Ultrasound in Upper and Lower Abdomen

Musculoskeletal Ultrasound

State-of-the-Art Lecture 4

Advances in Breast Ultrasound

ROOM 3

Liver Fibrosis Assessment Certification Session (*K)

Oral Poster Presentation

[Breast]

[Cardiac]

[Liver-Upper & Lower]

Poster Exhibition

[Breast]

[Cardiac]

[Liver - Upper & Lower]

[Musculoskeletal]

[Thyroid]

[Vascular]

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Bridging Clinical Ultrasound Research and Practice for a Healthier Future

ROOM 1

Liver Ultrasound 1

Liver Fibrosis, Steatosis, and Portal Hypertension

***Chairs:* Moon Young Kim** *(Yonsei Univ. Wonju),* **Seung Up Kim** *(Yonsei Univ.)*

1. **Ultrasound-Based Noninvasive Assessment of Hepatic Fibrosis and Steatosis**
   Seung-Seob Kim (Yonsei Univ.)
2. **Liver Stiffness for the Evaluation of Portal Hypertension and Cirrhotic Complications**
   Huapeng Lin (Shanghai Jiao Tong Univ., China)
3. **Up-to-Date Clinical Application of Spleen Stiffness Measurement**
   Jeong-Ju Yoo (Soonchunhyang Univ.)

Curriculum Vitae

Seung-Seob Kim *(Yonsei Univ.)*

Brief Introduction of Yourself

Prof. Kim graduated from Yonsei University College of Medicine in 2010 and completed his residency in Radiology at Severance Hospital in 2015. From 2018 to 2020, he completed a fellowship training in abdominal radiology at the same institution. Since 2020, he have been serving as an assistant professor in the Department of Radiology at Severance Hospital.

He is actively engaged in academic activities as a member of various committees of the Korean Society of Radiology, Korean Society of Abdominal Radiology, Korean Society of Ultrasound in Medicine, and Korean Society of Magnetic Resonance in Medicine. He also serves as an associate editor for the Korean Journal of Abdominal Radiology.

Research Interests

Artificial Intelligence (Large Language Model, Medical Vision)
Abdominal Radiology, Liver Disease, Pancreatobiliary Disease

Representative Publications

1. Artificial Intelligence Model for Detection of Colorectal Cancer on Routine Abdominopelvic CT Examinations: A Training and External-Testing Study. AJR Am J Roentgenol 2025;224:e2432396
2. KASL Clinical Practice Guidelines for Noninvasive Tests to Assess Liver Fibrosis in Chronic Liver Disease. Clin Mol Hepatol 2024
3. Large Language Models: A Guide for Radiologists. Korean J Radiol 25(2): 126-133.
4. Magnetic resonance imaging improves stratification of fibrosis and steatosis in patients with chronic liver disease. Abdom Radiol (NY). 2022;47(11):3733-45.
5. Retrospective Evaluation of Treatment Response in Patients with Nonmetastatic Pancreatic Cancer Using CT and CA 19-9. Radiology. 2022;303(3):548-56.

Ultrasound-Based Noninvasive Assessment of Hepatic Fibrosis and Steatosis

Seung-Seob Kim

Yonsei Univ.

1. Hepatic Fibrosis

Chronic damage to the liver leads to the progressive development of hepatic fibrosis. As fibrosis advances, distortion of liver architecture occurs, accompanied by a decline in hepatic function, and the condition progresses to cirrhosis. Ultimately, this may result in liver failure or the development of hepatocellular carcinoma (HCC). Therefore, in the diagnosis and staging of liver disease, the degree of fibrosis serves as a critical factor.

The current gold standard for the assessment of hepatic fibrosis remains liver biopsy. However, biopsy has two major limitations: it samples only a very small portion of the entire liver volume, and it is an invasive procedure. Patients with liver disease require lifelong management and repeated assessment of the degree of fibrosis. However, it is not feasible to perform invasive procedures repeatedly. In this context, there has been growing interest in noninvasive diagnostic methods that can serve as alternatives to liver biopsy.

The simplest noninvasive method is serologic testing; however, its diagnostic accuracy is limited. Magnetic resonance (MR) elastography offers high diagnostic accuracy; however, its high cost and limited availability pose challenges for repeated use. Ultrasound (US) elastography, which demonstrates acceptable diagnostic performance, is currently considered the most practical alternative due to its lower cost and relative ease of use.

There are two main types of US elastography. One is vibration-controlled transient elastography (VCTE), which utilizes a mechanical pulse, and the other is shear wave elastography (SWE), which employs acoustic radiation force impulse (ARFI). Unlike VCTE, which requires a dedicated device such as FibroScan (Echosens), SWE is integrated into most of newly released US machines, offering greater availability. Furthermore, SWE allows real-time visualization of the patient's anatomical structures during the examination, enabling more precise measurements.

2. Hepatic Steatosis

Among the various etiologies of liver damage, metabolic dysfunction-associated steatotic liver disease (MASLD) has emerged as the most significant concern. In contrast to the declining prevalence of viral hepatitis due to advances in antiviral therapies and vaccination, the prevalence of MASLD continues to rise in parallel with the increasing incidence of metabolic syndrome. When simple steatosis progresses to accompany inflammation referred to as metabolic dysfunction-associated steatohepatitis (MASH) it can lead to fibrosis, which may eventually progress to cirrhosis, liver failure, and/or HCC.

Historically, lifestyle modification through dietary intervention and increased physical activity has been the mainstay of treatment for MASLD. Fortunately, the recent Food and Drug Administration approval of resmetirom, a thyroid hormone receptor beta-selective agonist, marks a significant advancement in pharmacologic therapy. This drug has shown significant improvement in steatosis, hepatocyte ballooning, lobular inflammation the three key histopathologic features of MASH activity as well as fibrosis. Consequently, as more patients begin treatment with resmetirom, the importance of accurate, noninvasive assessment of changes in hepatic steatosis is becoming increasingly emphasized. As with fibrosis, the gold standard for evaluating steatosis remains liver biopsy or MR proton density fat fraction (PDFF); however, due to considerations of noninvasiveness, lower cost, and greater availability, US-based approaches are regarded as the most practical alternatives.

US-based assessment of hepatic steatosis is primarily conducted by quantifying the degree of ultrasound signal attenuation. Examples include the controlled attenuation parameter (CAP) in FibroScan, attenuation imaging (ATI) by Canon, and US-guided attenuation parameter (UGAP) by GE. Some manufacturers, such as Samsung and Siemens, employ approaches that consider both attenuation and scatter. Additionally, Supersonic offers a method based on the speed of sound.

3. Limitations

Both 2D SWE and attenuation-based quantification have many limitations. Among the most critical are the high level of technical difficulty, low reproducibility particularly across different vendors and the lack of standardized cutoff values.

(1) High Level of Technical Difficulty

Both 2D SWE and attenuation-based imaging require careful consideration of multiple factors to obtain reliable measurements, and operator expertise is crucial. Even minor deviations from established protocols can result in suboptimal imaging maps, and slight misplacement of the region of interest (ROI) can significantly alter the measured values. At present, accurate measurement depends heavily on the operator's thorough understanding of the technique and proper ROI placement. However,

future technological advancements should aim to provide simpler, more accurate, and consistently reproducible measurements, regardless of operator variability.

(2) Low Intersystem Reproducibility

At present, both liver stiffness values and attenuation coefficients measured using devices from different vendors are not interchangeable. For example, when evaluating the therapeutic response to resmetirom in patients with MASH, it is currently mendatory to perform all assessments using the same device. Therefore, it is essential to establish standardized criteria that allow for cross-vendor comparability.

(3) Lack of Srandardized Cutoff Values

Because measurement values are not interchangeable across different vendors, cutoff values naturally vary between systems. While international guidelines have attempted to propose vendor-neutral thresholds, technical limitations have led to a shift away from precise staging toward broader clinical categories. For instance, rather than specifying stages like F1 or F2, guidelines often refer to more generalized classifications such as compensated advanced chronic liver disease or clinically significant portal hypertension. Such broader categories are typically accompanied by qualitative descriptors such as “probable,” “can help rule out,” “likely,” or “highly suggestive, but further testing is needed.” Close collaboration between US manufacturers and the academic community is essential to gradually overcome these limitations.

Curriculum Vitae

Huapeng Lin *(Shanghai Jiao Tong Univ., China)*

Brief Introduction of Yourself

Prof. Huapeng Lin completed his Ph.D. at CUHK, where he focused on advancing the understanding and management of metabolic dysfunction-associated steatotic liver disease (MASLD) and related liver complications. He evaluated the Agile scores in predicting liver-related events (LREs) in patients with MASLD. This study demonstrated that these scores provide superior accuracy compared to conventional non-invasive tests and are comparable to histological methods. Their stability over time and dynamic changes correlating with LRE risk have made them valuable tools for disease monitoring and management in both clinical practice and trials. Published in JAMA, this work has been widely cited and incorporated into European guidelines for MASLD management, representing a significant advancement in non-invasive diagnostics.

He developed predictive models addressing critical needs in hepatology, including the AI-Safe-C score, a machine learning-based tool to assess liver-related event risks in patients without cirrhosis, and a liver stiffness-based, etiology-independent algorithm to predict hepatocellular carcinoma (HCC). These models demonstrated high accuracy and robustness, offering valuable tools for personalized patient management. These significant findings were published in Journal of Hepatology and Clinical Gastroenterology and Hepatology.

In 2025, he became a Professor at Shanghai Jiao Tong University School of Medicine, where he continues to contribute significantly to the field of hepatology, focusing on innovative approaches to liver disease diagnosis, monitoring, and personalized treatment strategies.

Research Interests

Non-Invasive Assessment and Treatment of MASLD

Representative Publications

1. Lin H#, Lee HW#, Yip TC#, Tsochatzis E#, Petta S, Bugianesi E, Yoneda M, Zheng MH, Hagström H, Boursier J, Calleja JL, Goh GB, Chan WK, Gallego-Durán R, Sanyal AJ, de Lédinghen V, Newsome PN, Fan JG, Castéra L, Lai M, Harrison SA, Fournier-Poizat C, Wong GL, Pennisi G, Armandi A, Nakajima A, Liu WY, Shang Y, de Saint-Loup M, Llop E, Teh KK, Lara-Romero C, Asgharpour A, Mahgoub S, Chan MS, Canivet CM, Romero-Gomez M, Kim SU*, Wong VW*; VCTE-Prognosis Study Group. Vibration-Controlled Transient Elastography Scores to Predict Liver-Related Events in Steatotic Liver Disease. JAMA. 2024;331(15):1287-1297.
2. Lin H#, Cheuk-Fung Yip T#, Lee HW, Meng X, Che-To Lai J, Ahn SH, Pang W, Lai-Hung Wong G, Zeng L, Wai-Sun Wong V*, de Lédinghen V*, Kim SU*. AI-Safe-C Score: Assessing Liver-Related Event Risks in Non-Cirrhotic Patients after Successful Direct-Acting Antiviral Treatment. J Hepatol. 2024;82(3):456-463.

3. Cheuk-Fung Yip T#, Lee HW#, Lin H#, Tsochatzis E, Petta S, Bugianesi E, Yoneda M, Zheng MH, Hagström H, Boursier J, Calleja JL, Boon-Bee Goh G, Chan WK, Gallego-Durán R, Sanyal AJ, de Lédinghen V, Newsome PN, Fan JG, Castéra L, Lai M, Fournier-Poizat C, Lai-Hung Wong G, Pennisi G, Armandi A, Nakajima A, Liu WY, Shang Y, de Saint-Loup M, Llop E, Jun Teh KK, Lara-Romero C, Asgharpour A, Mahgoub S, Sau-Wai Chan M, Canivet CM, Romero-Gomez M, Kim SU*, Wai-Sun Wong V*. Prognostic performance of the two-step clinical care pathway in metabolic dysfunction-associated steatotic liver disease. J Hepatol. 2025:S0168-8278(25)00021-2.
4. Lin H#, Yip TC#, Zhang X, Li G, Tse YK, Hui VW, Liang LY, Lai JC, Chan SL, Chan HL, Wong GL, Wong VW*. Age and the relative importance of liver-related deaths in nonalcoholic fatty liver disease. Hepatology. 2023;77(2):573-584.
5. Lin H#, Li G#, Delamarre A, Ahn SH, Zhang X, Kim BK, Liang LY, Lee HW, Wong GL, Yuen PC, Chan HL, Chan SL, Wong VW, de Lédinghen V*, Kim SU*, Yip TC*. A Liver Stiffness-Based Etiology-Independent Machine Learning Algorithm to Predict Hepatocellular Carcinoma. Clin Gastroenterol Hepatol. 2024;22(3):602-610.e7.

Liver Stiffness for the Evaluation of Portal Hypertension and Cirrhotic Complications

Huapeng Lin

Shanghai Jiao Tong Univ., China

This lecture explores the application of liver stiffness measurement (LSM) as a non-invasive tool for evaluating portal hypertension (PHT) and related complications in patients with chronic liver disease. It highlights the potential of LSM to enhance clinical decision-making in the management of chronic liver diseases, particularly in the context of portal hypertension.

Portal Hypertension and Its Clinical Relevance

Portal hypertension is a common and serious complication of cirrhosis, which can lead to life-threatening events such as variceal bleeding, ascites, and hepatic encephalopathy.[1,2] The condition arises primarily from increased resistance in the portal venous system due to liver fibrosis.[3]

Liver Stiffness and Its Association with Portal Hypertension

Liver stiffness, measured through non-invasive methods like transient elastography (FibroScan), correlates strongly with hepatic venous pressure gradient (HVPG), a traditional invasive measure of portal hypertension.[4] LSM has been proven to be an effective tool in predicting clinically significant portal hypertension (CSPH) and can help identify patients at risk for portal hypertensive complications.[5]

Advantages of Non-Invasive Testing

Compared to the traditional HVPG measurement, LSM is non-invasive, easy to perform, and repeatable. This makes it a suitable option for routine clinical practice, particularly for screening and monitoring patients with chronic liver diseases, reducing the need for invasive procedures in most cases.[6,7]

Clinical Application and Future Prospects

Liver stiffness measurement not only helps assess liver fibrosis but also serves as a prognostic tool for predicting portal hypertensive complications.[8] The combination of LSM with other clinical parameters, such as platelet count and spleen size, offers a robust approach to diagnosing and risk-stratifying patients.[9]

With ongoing advancements, LSM is expected to become an integral part of liver disease management, providing critical insights into disease progression and guiding treatment decisions.

LSM has emerged as a powerful non-invasive tool in the evaluation of portal hypertension in patients with cirrhosis. It provides accurate, reliable, and prognostic information that is essential for clinical decision-making. As technology continues to advance, LSM is expected to play a central role in the management of liver disease, offering new opportunities for early detection, risk stratification, and personalized treatment strategies.

References

1. Bosch J, Abraldes JG, Berzigotti A, García-Pagan JC. The clinical use of HVPG measurements in chronic liver disease. Nat Rev Gastroenterol Hepatol. 2009;6(10):573-82.
2. Berzigotti A, Seijo S, Reverter E, Bosch J. Assessing portal hypertension in liver diseases. Expert Rev Gastroenterol Hepatol. 2013;7(2):141-55.
3. Roccarina D, Best LM, Freeman SC, Roberts D, Cooper NJ, Sutton AJ, Benmassaoud A, Plaz Torres MC, Iogna Prat L, Csenar M, Arunan S, Begum T, Milne EJ, Tapp M, Pavlov CS, Davidson BR, Tsochatzis E, Williams NR, Gurusamy KS. Primary prevention of variceal bleeding in people with oesophageal varices due to liver cirrhosis: a network meta-analysis. Cochrane Database Syst Rev. 2021;4(4):CD013121.
4. Reiberger T. The Value of Liver and Spleen Stiffness for Evaluation of Portal Hypertension in Compensated Cirrhosis. Hepatol Commun. 2022;6(5):950-964.
5. Lee JG, Sohn JH, Jeong JY, Kim TY, Kim SM, Cho YS, Kim Y. Combined effect of hepatic venous pressure gradient and liver stiffness on long-term mortality in patients with cirrhosis. Korean J Intern Med. 2020;35(1):88-98.
6. Colecchia A, Marasco G, Taddia M, Montrone L, Eusebi LH, Mandolesi D, Schiumerini R, Di Biase AR, Festi D. Liver and spleen stiffness and other noninvasive methods to assess portal hypertension in cirrhotic patients: a review of the literature. Eur J Gastroenterol Hepatol. 2015;27(9):992-1001.
7. Rajakannu M, Coilly A, Cherqui D, Cunha AS, Castaing D, Adam R, Samuel D, Vibert E. Liver stiffness-based model predicts hepatic venous pressure gradient in patients with liver disease. HPB (Oxford). 2022;24(10):1796-1803.
8. Jindal A, Sharma S, Agarwal S, Kumar M, Saraya A, Sarin SK. Liver stiffness can predict decompensation and need for beta-blockers in compensated cirrhosis: a step beyond Baveno-VI criteria. Hepatol Int. 2022;16(1):89-98.
9. de Franchis R, Bosch J, Garcia-Tsao G, Reiberger T, Ripoll C; Baveno VII Faculty. Baveno VII - Renewing consensus in portal hypertension. J Hepatol. 2022;76(4):959-974.

Curriculum Vitae

Jeong-Ju Yoo *(Soonchunhyang Univ.)*

Brief Introduction of Yourself

Prof. Jeong-Ju Yoo, currently an Associate Professor in the Department of Hepatology, Internal Medicine, at Soonchunhyang University College of Medicine, Soonchunhyang University Bucheon Hospital, Korea.

She completed her medical education at Seoul National University College of Medicine, earning her M.D. degree in 2009, followed by a Master's (2015) and Ph.D. (2019) in Internal Medicine from the same institution.

Her professional career includes medical internship (2009-2010) and residency in Internal Medicine (2010-2014) at Seoul National University Hospital. She was also a Research Fellow at the Department of Internal Medicine and Liver Research Institute at Seoul National University College of Medicine (2014-2015). In 2016, she joined Soonchunhyang University Bucheon Hospital as an Assistant Professor, and she has been serving as an Associate Professor since 2024.

Her clinical and research interests primarily focus on hepatology, particularly viral hepatitis, liver cirrhosis, hepatocellular carcinoma, liver fibrosis, and metabolic liver diseases. She has published numerous peer-reviewed articles and have received multiple awards for excellence in research and presentations, including Best Presentation Awards at major academic conferences.

Currently, she actively participates in several academic societies, serving on various committees, including the Korean Association for the Study of the Liver, Korean Liver Cancer Association, and Korean Society of Gastroenterology.

Research Interests

- Hepatocellular Carcinoma (HCC): Pathogenesis, Therapeutic Strategies, and Prognostic Factors
- Metabolic Liver Diseases: Non-Alcoholic Fatty Liver Disease (NAFLD) and Metabolic-Associated Fatty Liver
- Disease(MAFLD)
- Liver Fibrosis and Portal Hypertension: Non-Invasive Diagnostic Methods and Clinical Management
- Clinical Applications of Ultrasound and Elastography in Liver Disease
- Prognostic Modeling and Biomarkers for Chronic Liver Diseases
- Viral Hepatitis Management and Antiviral Therapies
- Microbiome Studies in Liver Cirrhosis and Related Complications

Representative Publications

1. Jeong-Ju Yoo et al. "Estimation of renal function in patients with liver cirrhosis: Impact of muscle mass and sex." Journal of Hepatology, 2019;70:847-854.
2. Jeong-Ju Yoo et al. "Validation of the Texas Hepatocellular Carcinoma Risk Index Predictive Model for Hepatocellular

Carcinoma in Asian Cohort." Clinical Gastroenterology and Hepatology, 2024 Mar 13; S1542-3565(24)00255-6.
3. Jeong-Ju Yoo et al. "Risk of dyslipidemia in chronic hepatitis B patients taking tenofovir alafenamide: a systematic review and meta-analysis." Hepatology International, 2023 Apr 26.
4. Jeong-Ju Yoo et al. "Efficacy of antiviral prophylaxis in HBsAg-negative, anti-HBc positive patients undergoing hematopoietic stem cell transplantation." Liver International, 2015 Dec;35(12):2530-2536.
5. Jeong-Ju Yoo et al. "Long-term prognosis and the need for histologic assessment of chronic hepatitis B in the serological immune-tolerant phase." Clinical and Molecular Hepatology, 2023 Apr;29(2):482-495.

Up-to-Date Clinical Application of Spleen Stiffness Measurement

Jeong-Ju Yoo

Soonchunhyang Univ.

Background: Portal hypertension (PH) is the primary driver of complications in patients with chronic liver disease (CLD). While hepatic venous pressure gradient (HVPG) measurement is the gold standard for assessing PH, its invasiveness and limited availability necessitate reliable non-invasive alternatives. Liver stiffness measurement (LSM) is useful but has limitations in advanced disease. Spleen stiffness measurement (SSM) has emerged as a powerful tool that directly reflects the hemodynamic changes of PH, which cause splenic congestion, fibrosis, and structural remodeling.

Summary of Content: This lecture will provide a comprehensive overview of the current clinical applications of SSM. We will begin by reviewing the pathophysiology of splenic changes in CLD and the various elastography modalities used for measurement, including Transient Elastography (TE), Shear Wave Elastography (SWE), and Magnetic Resonance Elastography (MRE).

The core of the presentation will focus on the validated clinical utility of SSM in several key areas:

- **Diagnosis of Clinically Significant Portal Hypertension (CSPH):** SSM is recognized in the Baveno VII guidelines as a non-invasive tool for ruling out (SSM < 21 kPa) and ruling in (SSM > 50 kPa) CSPH.
- **Prediction of Esophageal Varices (EV):** SSM is used to identify patients at low risk of high-risk varices (HRVs), thereby safely avoiding unnecessary endoscopies (e.g., SSM < 40 kPa).
- **Risk Stratification for Decompensation:** Elevated SSM has been shown to be a strong predictor of future clinical decompensation, offering prognostic value beyond other non-invasive tests.
- **Monitoring Treatment Response:** Unlike LSM, SSM dynamically reflects hemodynamic changes and is effective for monitoring response to non-selective beta-blockers (NSBBs), TIPS placement, and liver transplantation.

Furthermore, this lecture will explore emerging roles for SSM, including the prediction of late hepatocellular carcinoma (HCC) recurrence and its potential as an early marker of portal inflammation

in chronic hepatitis, even preceding significant fibrosis. Finally, we will address the current limitations, such as a lack of standardization and confounders, and present practical algorithms for integrating SSM into clinical practice.

Conclusion: SSM is a validated, non-invasive tool that provides crucial information on the hemodynamic status of patients with CLD, often outperforming LSM in advanced stages. Its broad applications in diagnosis, risk stratification, and treatment monitoring have established it as a powerful addition to the non-invasive toolkit for managing portal hypertension and its complications.

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ROOM 1

Point of View in Emergency Ultrasound

Chairs: ***Young Soon Cho*** *(Soonchunhyang Univ.),* ***Young Rock Ha*** *(Yonsei Univ.)*

1. **Optimal Approach to Managing Shock Patients with Multi-Organ Point-of-Care Ultrasound**
   Young Rock Ha (Yonsei Univ.)
2. **Effective Use of Point-of-Care Ultrasound for Evaluating Acute Abdomen**
   Toru Kameda (Saiseikai Utsunomiya Hospital, Japan)
3. **To What Extent Have You Performed Ultrasound-Guided Procedures in Emergency Settings?**
   Kuo-Chih Chen (Taipei Medical Univ., Taiwan)

Curriculum Vitae

Young Rock Ha *(Yonsei Univ.)*

Brief Introduction of Yourself

Dr. Ha is an emergency physician, board-certified in critical care and echocardiography in Korea. He serves on the Board of Directors of WINFOCUS and is a former president of the Society of Emergency and Critical Care Imaging (SECCI). He has played a leading role in developing numerous POCUS workshops, research initiatives, and education programs focused on emergency and critical care imaging in Korea.

Internationally, he has been actively involved in various ultrasound workshops, including USLS, WBE, WMTBE, and WBLUS by WINFOCUS, as well as AACES in Singapore. Since 2011, he has developed and regularly led the SEARCH 9Es ultrasound workshop in Korea, and since 2023, he has extended the program to Singapore, where it is held twice annually.
He has also contributed as a chapter author for textbooks published by the Korean Society of Emergency Medicine (KSEM), the Korean Society of Critical Care Medicine (KSCCM), the Korean Society of Traumatology (KST), and the Korean Society of Echocardiography (KSE).

Research Interests

Emergency and Critical Care Imaging

Representative Publications

1. Role of point-of-care ultrasound in critical care and emergency medicine: update and future perspective W Choi, YS Cho, YR Ha, JH Oh, H Lee… - Clin Exp Emerg Med, 2023
2. Clinical guidance for point-of-care ultrasound in the emergency and critical care areas after implementing insurance coverage in Korea WJ Choi, YR Ha, JH Oh, YS Cho… - Journal of Korean Medical Science, 2020
3. Review of simulation model for education of point-of-care ultrasound using easy-to-make tools KC Shin, YR Ha, SJ Lee, JH Ahn - World Journal of Clinical Cases, 2020
4. SEARCH 8Es: A novel point of care ultrasound protocol for patients with chest pain, dyspnea or symptomatic hypotension in the emergency department …, HC Toh, VE Noble, JS Kim, YS Kim, HH Do, YR Ha - PLoS One, 2017
5. Clinically integrated multi-organ point-of-care ultrasound for undifferentiated respiratory difficulty, chest pain, or shock: a critical analytic review YR Ha, HC Toh - Journal of intensive care, 2016
6. A chapter author for textbooks published by the Korean Society of Emergency Medicine (KSEM), the Korean Society of Critical Care Medicine (KSCCM), the Korean Society of Traumatology (KST), and the Korean Society of Echocardiography (KSE).

Optimal Approach to Managing Shock Patients with Multi-Organ Point-of-Care Ultrasound

Young Rock Ha

Yonsei Univ.

In patients presenting with shock, clinicians can utilize multi-organ point-of-care ultrasound (POCUS) to identify the underlying type of shock. Differentiating between obstructive, cardiogenic, and hypovolemic (absolute or relative) shock is the critical first step in initiating appropriate treatment. Among these, obstructive shock is relatively rare but requires rapid, condition-specific interventions. Fortunately, POCUS offers higher specificity for obstructive shock compared to other shock types, making it a rational first target to rule in.

A qualitative multi-organ POCUS protocol, performed in the sequence of lung–IVC–cardiac ultrasound, enables rapid identification of major causes of obstructive shock, including tension pneumothorax, pericardial tamponade, and massive pulmonary embolism. This approach also facilitates the stepwise differentiation of cardiogenic and hypovolemic shock. Once the type of shock is identified, immediate initiation of targeted therapy can improve patient outcomes. In suspected hypovolemic shock, prompt fluid resuscitation should be accompanied by focused ultrasound examinations, including abdominal scans, to identify sources of bleeding or infection.

To distinguish absolute from relative hypovolemia (i.e., distributive shock), additional quantitative analysis such as LVOT VTI is recommended. Quantitative assessments are also essential for ongoing hemodynamic monitoring during treatment. Volume responsiveness can be evaluated using LVOT VTI or Vmax, while signs of congestion may be assessed through mitral inflow patterns, E/e´ ratio, and VExUS grading.

In cases of septic shock complicated by sepsis-induced cardiomyopathy, measuring ventriculo-arterial coupling (VAC) may help guide fine-tuning of inotropes and vasopressors to optimize cardiac function.

Curriculum Vitae

Toru Kameda *(Saiseikai Utsunomiya Hospital, Japan)*

Brief Introduction of Yourself

Educational Background

1996	School of Medicine, Hokkaido University
1998	Residency (Emergency and Critical Care Medicine), Sapporo City General Hospital
2000	Residency (Anesthesiology and Intensive Care Medicine), National Children's Hospital
3004	Residency (Ultrasound Medicine), Saiseikai Utsunomiya Hospital

Certification

Senior Fellow of the Japan Society of Ultrasonics in Medicine
Certified Emergency Physician (Japanese Medical Specialty Board)
Certified Intensivist (The Japanese Society of Intensive Care Medicine)

Society

Former Chair, Emergency and Point-of-Care Ultrasound Committee, Japanese Association for Acute Medicine
President, Japan Society of Point-of-Care Ultrasound (JPOCUS)

Research Interests

Ultrasound Education, Tele-Ultrasound, Lung Ultrasound

Representative Publications

1. Kameda T, et al. Guidance for clinical practice using emergency and point-of-care ultrasonography. Acute Med Surg. 2024; 11: e974.
2. Kameda T, et al. The effect of attenuation inside the acoustic traps on the configuration of vertical artifacts in lung ultrasound: an experimental study with simple models. J Med Ultrason. 2022; 49: 545-53.
3. Kameda T, et al. Simple experimental models for elucidating the mechanism underlying vertical artifacts in lung ultrasound: tools for revisiting B-lines. Ultrasound Med Biol. 2021; 47: 3543-55.
4. Kameda T, et al. Ultrasonic B-line-like artifacts generated with simple experimental models provide clues to solve key issues in B-Lines. Ultrasound Med Biol. 2019; 45: 1617-26.
5. Kameda T, et al. Transabdominal ultrasound-guided urethral catheterization with transrectal pressure. J Emerg Med. 2014; 46: 215-9.

Effective Use of Point-of-Care Ultrasound for Evaluating Acute Abdomen

Toru Kameda

Saiseikai Utsunomiya Hospital, Japan

Point-of-care ultrasound (POCUS) performed by bedside clinicians has been increasingly utilized in the initial assessment of patients presenting with acute abdomen. Findings obtained through POCUS are interpreted in conjunction with the patient's history, vital signs, and physical examination. Clinical studies have demonstrated the utility of POCUS in evaluating acute cholecystitis, ureterolithiasis, intra-abdominal hemorrhage, and ruptured abdominal aortic aneurysms, and it is now widely adopted in the emergency setting. Although the evaluation of choledocholithiasis a differential diagnosis of biliary colic has not yet been standardized in POCUS, it may be considered an advanced application. In cases of suspected ureteral stones, POCUS is typically used to assess for hydronephrosis; however, stones located at the ureteropelvic junction and ureterovesical junction are relatively amenable to ultrasound detection. The detection with POCUS may be incorporated into the diagnostic algorithm to facilitate definitive diagnosis. Abdominal pain may occasionally be the presenting symptom of aortic dissection, and identification of abdominal aortic dissection using POCUS may aid in clinical decision-making. In recent years, there has been growing interest in gastrointestinal applications of POCUS. The diagnosis of bowel obstruction using POCUS is relatively straightforward, and its implementation has been associated with reduced time to diagnosis. While several ultrasonographic findings have been proposed to suggest strangulated bowel obstruction, the diagnostic accuracy of these findings has not been fully elucidated. POCUS has also been the subject of extensive investigation in the diagnosis of acute appendicitis, with numerous studies reporting high diagnostic accuracy, particularly in pediatric populations. Furthermore, the ability to evaluate differential diagnoses of acute appendicitis, such as diverticulitis and bacterial enteritis, may further enhance the clinical utility of POCUS. A variety of other gastrointestinal disorders responsible for acute abdominal pain can also be visualized using ultrasound. Clinicians with an interest in this area are encouraged to actively employ POCUS. By understanding the limitations of POCUS and applying it appropriately, clinicians can improve diagnostic accuracy during the initial evaluation, reduce time to diagnosis, and minimize patient exposure to ionizing radiation. In light of its expanding applications, the emerging role and future perspectives of POCUS in the evaluation of acute abdomen warrant further attention. Advancements in abdominal POCUS, including

the systematic assessment of differential diagnoses and incidental findings are anticipated to broaden its clinical impact. Appropriate integration of POCUS with comprehensive ultrasound, computed tomography (CT), and other imaging modalities is essential for accurate diagnosis and effective patient management. Furthermore, the development of a structured educational system for abdominal POCUS is crucial to ensure its safe, effective, and consistent use in clinical practice.

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Curriculum Vitae

Kuo-Chih Chen *(Taipei Medical Univ., Taiwan)*

Brief Introduction of Yourself

Kuo-Chih Chen graduated from Taipei Medical University in 1999 and practiced in emergency medicine for more than 25 years.

He was the chairman of emergency ultrasound committee of Taiwan Society of Emergency Medicine from 2012 to 2016. He had been responsible for critical ultrasound training, education and workshops for Taiwan Society of Emergency and Critical Care Medicine from 2015 to 2022. He is responsible for emergency ultrasound section in Taiwan Emergency Medicine Bulletin since 2018 till now. He is the first emergency physician in Taiwan to have both CIPS and pain specialist. In addiction to diagnostic applications in emergency and critical care ultrasound, his current practice also include US-guided acute pain management and advanced interventional procedures.

Research Interests

Emergency and Critical Ultrasound, US-Guided Acute Pain Management,
US-Guided Advanced Intervention

Representative Publications

1. Su, E.-H., Chen, C.-C., Chen, K.-C., Chau, S.W., Lee, Y.-K. and Tsai, T.-Y. (2025), Regional anesthesia for clavicle fractures in emergency medicine: A scoping review. Hong Kong J Emergency Med, 32: e12078. https://doi.org/10.1002/hkj2.12078.
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3. Tsai TY, Cheong KM, Su YC, Shih MC, Chau SW, Chen MW, Chen CT, Lee YK, Sun JT, Chen KF, Chen KC, Chou EH. Ultrasound-guided femoral nerve block in geriatric patients with hip fracture in the emergency department. J Clin Med 2022;11:2778.
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To What Extent Have You Performed Ultrasound-Guided Procedures in Emergency Settings?

Kuo-Chih Chen

Taipei Medical Univ., Taiwan

Emergency physicians endorse clinical ultrasound as an important diagnostic tool in emergency care for more than 2 decades. Nowadays, more and more emergency physicians and critical care intensivists are delivering holistic ultrasound in various challenging emergency and critical care settings. In 2023 revised ACEP policy statement, the scope of practice of emergency ultrasound includes 15 core application for 5 domains, including resuscitative, diagnostic, procedural guidance, symptom- or sign-based and therapeutic.

Procedural guidance has been used for many common emergency procedures, such as central vascular access, arthrocentesis, paracentesis, thoracentesis and lumbar puncture. Moving unstable patients to CT room or examination labs for interventions is challenging and dangerous. In this section, I will share our experience about emergency physician performed advanced ultrasound-guided procedures in emergency settings, such as percutaneous gallbladder drainage, liver abscess drainage, percutaneous nephrostomy, percutaneous cystotomy, intra-abdominal and retroperitoneal abscess drainage and pericardiocentesis. Advanced vascular applications, such as REBOA and ECMO, and integrated acute pain management will also be mentioned.

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ISCU 2025

International Symposium of Clinical Ultrasound

in Conjunction with
2025 KACU Spring Annual Symposium

Bridging Clinical Ultrasound Research and Practice for a Healthier Future

ROOM 1

State-of-the-Art Lecture 1

Chair: Young-Suk Lim *(Univ. of Ulsan)*

Navigating Healthcare Systems: Lessons from the U.S. and Implications for Korea's Medical Landscape

W. Ray Kim (Mayo Clinic, USA)

Curriculum Vitae

W. Ray Kim *(Mayo Clinic, USA)*

Brief Introduction of Yourself

After earning his medical diploma at Seoul National University, Dr. Kim established his academic career at Mayo Clinic, where he achieved the rank of Professor of Medicine in 2012. In 2013, he became Chief of Gastroenterology and Hepatology at Stanford University. After serving 11 years in the post, he returned to Mayo Clinic in 2024 to found and direct the Center for Policy and Outcomes Research in Transplant (CPORT) and continue his research and mentorship.

Dr. Kim has been a leading figure in the American Association for the Study of Liver Disease. He has served on the boards of AASLD and AASLD Foundation, culminating as President for the society in 2024. Currently, he serves on its Governing Board as Past President.

His research interest has been in prognostication in chronic liver disease. His research accomplishments include development of the Model for End Stage Liver Disease (MELD) and the Steatosis-Associated Fibrosis Estimator (SAFE) score. His research has produced >250 original publications to date with an h-index of >90.

Navigating Healthcare Systems: Lessons from the U.S. and Implications for Korea's Medical Landscape

W. Ray Kim

Mayo Clinic, USA

The Current State of US Health and Healthcare

According to the current UN report, Monaco leads the world in life expectancy at 86.5 years. Korea is ranked 5th at 84.4 years, and the US is 61st at 79.5 years. On the other hand, the US has the highest healthcare expenditure by far – the per capita spending is $12,914, accounting for 16.6% of its gross domestic product (GDP). Korea spends much less at $3,124 per capita, or 9.7% of its GDP. By this comparison, the Korean healthcare system is much more efficient in providing health to its citizens.

These statistics do not capture the investments the US has made and the rewards it enjoys as a global leader in scientific research, technological innovation, and new drug development. In addition, the US remains an authority in medical education, setting rigorous global standards for training and accreditation of students, residents, and fellows. These strengths have translated into cutting-edge technology in healthcare and leadership in the management of complex conditions.

A 'System' without a Systematic Design

US healthcare remains fundamentally in the private sector, with public programs (Medicare, Medicaid, and Veterans' Affairs) accounting for approximately 50% of US healthcare funding. The remaining portion is largely administered by for-profit health insurance companies. Similarly, the general attitude of US healthcare is that it relies on market-based incentives compared to other advanced systems, which tend to balance competition and regulation.

When healthcare is run on market-based principles, incentivization involves using financial or other rewards to encourage desired behaviors among participants in healthcare. For example, incentives for providers can be used to ensure they meet quality of care standards. On a larger scale, health insurance companies may be encouraged to take on less healthy patients by risk adjustment of their premiums. These incentive systems, however, may have unintended consequences, resulting in behaviors that maximize their income at the expense of increased total costs to the larger system.

A Case Example of Healthcare Delivery for Liver Disease

The current healthcare delivery model for liver disease may serve as an example of the pros and cons of how the US healthcare system addresses an important public health problem. Chronic liver disease and liver cancer are the 9th leading cause of death in the US. This is in part a result of the epidemic of obesity and diabetes, which cause metabolic dysfunction-associated steatotic liver disease (MASLD), and the pandemic and post-pandemic rise in excessive alcohol use, leading to alcohol-associated liver disease (ALD, including met-ALD, the combination of MASLD and ALD). The US has made critical contributions to basic and clinical research in these disorders, including the first-in-the-world approval of a product for fibrotic MASH, namely resmetirom. Similar to many other breakthrough products, however, resmetirom carries a high price tag, exceeding 50,000 US dollars for a month's supply.

In contrast to these cutting-edge achievements in complex, specialty care for MASLD, the US has not made significant progress in tackling its public health threat. To truly mitigate the long-term impact of MASLD, the healthcare system needs to have a comprehensive approach to address the underlying problem, including obesity and unhealthy lifestyle of the population. While the healthcare system alone is unable to solve the underlying socioeconomic drivers of the epidemic (i.e., primary prevention), it should certainly strive to early diagnose and prevent the progression of MASLD and other chronic liver diseases (secondary and tertiary prevention).

Evidence-Based Incorporation of Clinical Ultrasound in Liver Disease Care Model

One of the challenges in addressing MASLD is that it is not only extremely common, but also difficult to diagnose early before patients become symptomatic with complications of cirrhosis. While a systematic approach is clearly needed to diagnose these patients early, evidence-based recommendations are scarce. Practically all of the society guidelines recommend that patients at risk of MASLD are evaluated with a risk score to identify patients who may benefit from further assessment. The target for the assessment is moderate-stage fibrosis, which can progress over time but may also regress with effective therapy. The prevalent recommendation for this two-step approach is to use a risk score known as FIB-4 followed by vibration-controlled transient elastography (VCTE). In lieu of a liver biopsy, liver fibrosis can be measured by elastography such as VCTE, shear wave elastography (SWE), and MR elastography (MRE). Of the options, VCTEs are performed by liver specialists, which may potentially be an incentive for them to preferentially utilize the technology, whereas revenues from SWE and MRE would belong in radiology.

Although VCTE is widely studied and advocated for, it is available in a limited number of hepatology practices. MRE remains the most accurate technique to measure liver stiffness, but it is the most expensive and available on a limited basis. By far, SWE, in conjunction with liver imaging, is widely

available and largely affordable in community radiology practices. As liver elastography data accumulate, particularly in patients with MASLD, SWE is increasingly recognized as a legitimate alternative to VCTE. For example, when shear wave velocity (m/sec) is mathematically converted to stiffness (kPa), the threshold values are nearly identical.

Based on these data, a new paradigm for the evaluation of liver disease is emerging. Instead of linking two imperfect tests for the detection of fibrotic liver disease, a one-step approach of a limited liver ultrasound with SWE may be more cost-effective, depending on the target population. In settings where SWE is available as a part of point-of-care liver ultrasound, there is no potential conflict between public health interest and physician/health system incentives. By simultaneously using regulatory measures, such as requiring patients with type 2 diabetes to be screened for fibrotic MASH and allowing incentives for specialists to generate revenues from POCUS SWE, a synergistic strategy may be created to address this important public health threat.

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Bridging Clinical Ultrasound Research and Practice for a Healthier Future

ROOM 1

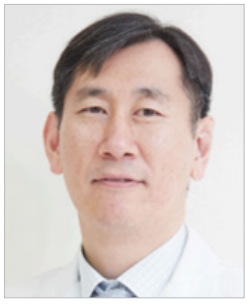
Korea-Japan Ultrasonography Joint Symposium

Advancing Ultrasound Frontiers

Chairs: ***Katsutoshi Sugimoto*** *(Tokyo Medical and Dental Univ., Japan),*
Sang Gyune Kim *(Soonchunhyang Univ.)*

1. **Contrast-Enhanced Ultrasound: Expanding Applications in Oncology and Beyond**
   Joo Ho Lee (CHA Univ.)
2. **Ultrasound Imaging Guidance of Ablation Therapy: Experience and Perspectives from Japan in Clinical Practice**
   Yasunori Minami (Kindai Univ., Japan)
3. **Magnetomotive Ultrasound Imaging with Magnetic Nanomaterials for Detecting Changes in Organoids and Tissue Stiffness**
   Sungjin Min (Sungkyunkwan Univ.)
4. **Ultrasound Education and Quality Improvement Programs**
   Hitoshi Maruyama (Juntendo Univ., Japan)

Curriculum Vitae



Joo Ho Lee *(CHA Univ.)*

Brief Introduction of Yourself

Prof. Joo Ho Lee is currently a professor in the Division of Hepatology at CHA Bundang Hospital and is the director of the Liver Transplantation Center. After graduating from Pusan National University School of Medicine, he obtained a doctorate in hepatology at Ulsan University Asan Medical Center. He did a short-term training at Keio University Tumor Immunology Institute in Japan and served as an advisory member of the Japanese New Regenerative Medicine Committee. In addition, he is currently in the leader of clinical research on advanced regenerative medicine for liver cancer at CHA Bundang Medical Center.

He is a member of the Korean Association for the Study of the Liver and the Liver Cancer Society and has been trained under Professor Masatoshi Kudo of Kindai University in Japan, who is a worldwide master of liver cancer treatment. His main research interest is immunotherapy for chronic hepatitis and liver cancer, early detection of liver cancer using contrast-enhanced ultrasound, and locoregional treatment of liver cancer. Now, he is an also a member of 'The Korean Association of Clinical Ultrasound'.

Research Interests

- Immune Cell Therapy of Hepatocellular Carcinoma
- NK Cell Immune Signature and Its Functional Role in Hepatocellular Carcinoma
- Immunologic Biology and Cancer Signaling of Hepatocellular Carcinoma
- Contrast-Enhanced Ultrasonography in Hepatocellular Carcinoma
- Artificial Intelligence in Contrast Enhanced Sonography

Representative Publications

1. Sorafenib vs. Lenvatinib in advanced hepatocellular carcinoma after atezolizumab/bevacizumab failure: A real-world study. Chon YE, Kim DY, Kim MN, Kim BK, Kim SU, Park JY, Ahn SH, Ha Y, Lee JH, Lee KS, Kang B, Kim JS, Chon HJ, Kim DY. Clin Mol Hepatol. 2024 Jul;30(3):345-359. doi: 10.3350/cmh.2023.0553. Epub 2024 Mar 12. PMID: 38468561
2. Immune signature and therapeutic approach of natural killer cell in chronic liver disease and hepatocellular carcinoma. Shin SK, Oh S, Chun SK, Ahn MJ, Lee SM, Kim K, Kang H, Lee J, Shin SP, Lee JH, Jung YK.J Gastroenterol Hepatol. 2024 May 27. doi: 10.1111/jgh.16584. Online ahead of print.PMID: 38800890
3. Extrahepatic Malignancies Are the Leading Cause of Death in Patients with Chronic Hepatitis B without Cirrhosis: A Large Population-Based Cohort Study. Chon YE, Park SJ, Park MY, Ha Y, Lee JH, Lee KS, Yoon EL, Jun DW.Cancers (Basel). 2024 Feb 7;16(4):711. doi: 10.3390/cancers16040711.PMID: 38398102
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Contrast-Enhanced Ultrasound: Expanding Applications in Oncology and Beyond

Joo Ho Lee

CHA Univ.

Contrast-Enhanced Ultrasound (CEUS) is a diagnostic imaging modality that enhances conventional ultrasound (US) using microbubble contrast agents. These microbubbles are gas-filled and confined to the vascular space, making CEUS particularly useful in oncology for assessing vascularity and perfusion of lesions. CEUS plays a crucial role in the diagnosis and treatment of hepatocellular carcinoma (HCC). With the development of second-generation contrast agents and advancement in contrast harmonic imaging, CEUS now has the capacity to show tumor vascularity sensitively and accurately. Also, contrast agents of CEUS have a better safety profile compared to contrast agents of CT or MRI. CEUS can show real-time images without nephrotoxicity or radiation hazard and can be used as guidance for loco-regional treatment and estimation of treatment response in HCC patients. CEUS is valuable in detecting tumor recurrence after surgery or ablation, particularly in the liver, where residual or recurrent tumor often shows arterial hyperenhancement. CEUS is especially effective in differentiating benign (e.g., hemangioma, focal nodular hyperplasia) from malignant (e.g., HCC, metastases) liver lesions by evaluating enhancement patterns during arterial, portal venous, and late phases.

CEUS is also useful for lesion characterization in kidney, pancreas, and spleen, particularly in patients contraindicated for CT or MRI contrast. CEUS can delineate tumor margins and detect involvement of adjacent vascular structures, aiding in staging and surgical planning. CEUS improve the visualization of blood flow and tissue vascularity, providing clearer and more detailed images compared to conventional US. In tumor detection and characterization, CEUS helps differentiate benign from malignant lesions based on their vascular patterns. CEUS enhances targeting accuracy during minimally invasive procedures in guidance for biopsies and interventions of malignant lesions.

CEUS also allows real-time evaluation of tumor perfusion changes following therapies. Neoangiogenesis is an important target for novel anticancer treatments and many new anti-angiogenesis or anti-vascular treatments aim at destroying or limiting the growth of tumor vessels. Dynamic contrast enhanced US (DCEUS) has emerged for monitoring the response to these drugs. Initially, such monitoring relied on qualitative analyses only. More recently, robust and quantitative features have been developed. To

achieve successful results, standardization and strict control of scanner settings are needed. Background subtraction is necessary to compensate for attenuation effects and extract reliable time-based features, such as time to peak, mean transit time, etc. Since antiangiogenic treatments frequently induce necrosis without causing tumor shrinkage, functional imaging techniques are particularly suitable for the early assessment of response, a task for which both the RECIST and World Health Organization (WHO) size criteria are unsatisfactory. Studies of various types of tumors such as HCC, gastrointestinal stromal tumor (GIST) or renal cell carcinoma treated with antiangiogenic therapies have confirmed that DCEUS may allow early prediction of response to treatment.

In the future, CEUS will be a versatile and expanding imaging modality that enhances the diagnostic and therapeutic landscape in oncology and other medical fields, offering detailed vascular information with safety and efficiency. To this end, broader clinical adoption for routine diagnostics of CEUS and integration with other modalities for comprehensive assessment will be necessary.

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2. Contrast-enhanced ultrasonography with Sonazoid in hepatocellular carcinoma diagnosis. Yasunori Minami, Masatoshi Kudo. Hepatoma Res 2020; 6:46.
3. Contrast-enhanced Ultrasonography: The Third Modality for Differentiation of Liver Mass. J Liver Cancer 2019;19:91-96.
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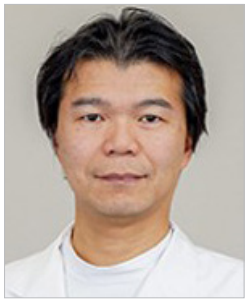
Curriculum Vitae



Yasunori Minami *(Kindai Univ., Japan)*

Brief Introduction of Yourself

Yasunori Minami, MD, is Clinical Associate Professor of Gastroenterology and Hepatology at Kindai University Faculty of Medicine in Japan. He trained in Medicine at Kindai University Hospital since 1997, practiced on imaging diagnosis of focal liver lesions and ablation therapy/transcatheter arterial chemoembolozation (TACE) for HCC and completed a PhD in Surgery about TACE response assessment in CEUS in 2003. He undertook a visiting fellowship in liver disease at University of California, San Diego (UCSD) Hospital (2008-2009), before returning to Kindai University Hospital.

He is now a director board member of Asian Conference on Tumor Ablation (ACTA), a panel member of the Japan Society of Hepatology (JSH)-HCC guideline. In addition, he is an expert panel member for the liver CEUS guideline sponsored by the Japan Society of Ultrasonics in Medicine (JSUM), Asian Federation of Societies for Ultrasound in Medicine and Biology (AFSUMB), and World Federation for Ultrasound in Medicine and Biology (WFUMB). He has authored more than 160 original manuscripts in peer-reviewed journals in the field of liver disease, with an H-index of 50 (Google Scholar) and 8,268 citations (January 2025).

Research Interests

Imaging Diagnosis on Liver (US, CT, MRI, etc.), Contrast-Enhanced Sonography & Fusion Imaging,
Thermal Ablation for Liver Cancer (RFA, MWA, etc.)

Representative Publications

1. Minami Y. Precise liver tumor ablation: the clinical potential of US-US overlay fusion guidance. Ultrasonography 2024;23:407-412.
2. Minamai Y, Aoki T, Hagiwara S, Kudo M. Tips for Preparing and Practicing Thermal Ablation Therapy of Hepatocellular Carcinoma. Cancers 2023 15, 4763.
3. Minami Y, Nishida N, Kudo M. Imaging Diagnosis of Various Hepatocellular Carcinoma Subtypes and Its Hypervascular Mimics: Differential Diagnosis Based on Conventional Interpretation and Artificial Intelligence. Liver Cancer 2022 6; 12(2): 103-115.
4. Minami Y, Nishida N, Kudo M. Radiofrequency ablation of liver metastasis: potential impact on immune checkpoint inhibitor therapy. Eur Radiol 2019;29(9):5045-5051.
5. Minami Y, Minami T, Hagiwara S, Ida H, Ueshima K, Nishida N, Murakami T, Kudo M. Ultrasound-ultrasound image overlay fusion improves real-time control of radiofrequency ablation margin in the treatment of hepatocellular carcinoma. Eur Radiol 2018;28(5):1986-1993.

Ultrasound Imaging Guidance of Ablation Therapy: Experience and Perspectives from Japan in Clinical Practice

Yasunori Minami

Kindai Univ., Japan

Percutaneous thermal ablation including radiofrequency ablation (RFA) is a minimally invasive treatment that is being increasingly performed because it achieves good clinical outcomes with a lower risk of complications. The success of percutaneous ablation therapies primarily depends on correct targeting through an imaging technique and the suitable placement of the needle electrode into the target tumor thereby optimizing local tumor control. However, poorly conspicuous hepatocellular carcinoma (HCC) is not easily targeted on B-mode US guidance and accounts for 5.2–38.8% of planning US for ablation therapy. Therefore, an image-guided RFA can be challenging in such cases. Various imaging techniques can help to overcome the problem of poor conspicuity on US, and contrast-enhance US and fusion imaging is powerful imaging technologies for the detection of poor conspicuous HCC. We will discuss associated challenges and how they may be overcome using optimized techniques.

Curriculum Vitae

Sungjin Min *(Sungkyunkwan Univ.)*

Brief Introduction of Yourself

Prof. Sungjin Min received his Ph.D. in Biotechnology from Yonsei University, with a focus on stem cells and tissue engineering. His research centers on developing advanced 3D tissue models using adult stem cells and induced pluripotent stem cells (iPSCs).

He has addressed key limitations of organoid technology, including low efficiency, structural simplicity, and limited functionality, by integrating bioengineering platforms including microwells, nanomaterials, microfluidic chips, and hydrogels. His innovative approaches have enabled the fabrication of advanced organoid models of the stomach, intestine, liver, lung, and heart, supporting a range of applications in disease modeling, drug screening, and regenerative medicine. In recognition of his contributions, Prof. Min has received multiple awards and currently leads an independent research group at Sungkyunkwan University.

Research Interests

Organoids, Bioengineering, Tissue Engineering, Disease Modeling, Regenerative Therapy

Representative Publications

1. Park YG*, Kim S*, Min S*, Kim E*, Kim D, Cho YH, Kim S, Joo H, Jeong I, Lim JA, Lee S, Cho SW*, Park JU*. Soft 3D Bioelectrodes for Intraorganoid Signal Monitoring in Cardiac Models. Nano Letters 2025;25(16):6481-6490
2. Min S*, Kim S*, Sim WS*, Choi YS, Joo H, Park JH, Lee SJ, Kim H, Lee MJ, Jeong I, Cui B, Jo SH, Kim JJ, Hong SB, Choi YJ, Ban K, Kim YG, Park JU, Lee HA, Park HJ*, Cho SW*. Versatile human cardiac tissues engineered with perfusable heart extracellular microenvironment for biomedical applications. Nature Communications 2024;15:2564
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5. Kim S*, Min S*, Choi YS, Jo SH, Jung JH, Han K, Kim J, Ji YW, Kim YG, Cho SW. Tissue extracellular matrix hydrogels as alternative to Matrigel for culturing gastrointestinal organoids. Nature Communications 2022;13(1):1692

Magnetomotive Ultrasound Imaging with Magnetic Nanomaterials for Detecting Changes in Organoids and Tissue Stiffness

Sungjin Min

Sungkyunkwan Univ.

Human tissues exhibit dynamic alterations in mechanical properties during embryonic development, regeneration, and pathological progression. Among these processes, fibrosis is particularly associated with tissue stiffening due to the excessive accumulation of extracellular matrix (ECM) components, such as collagen. For instance, the stiffness of healthy lung tissue (~2 kPa) can increase to approximately 17 kPa under fibrotic conditions, while liver tissue stiffness may rise from below 1 kPa to as much as 22 kPa. Quantitative assessment of tissue stiffness thus serves as a critical biomarker for diagnosing and monitoring fibrotic disease progression.

Although several techniques, including atomic force microscopy, optical tweezers, and traction force microscopy, have been developed to measure tissue mechanical properties with high precision, these methods are limited to ex vivo applications and hard to capture local mechanical heterogeneity. Consequently, there is a need for non-invasive, real-time approaches to assess the mechanical properties of 3D living tissues.

Magneto-motive ultrasound (MMUS) imaging has emerged as a promising technique for real-time mechanical sensing by utilizing magnetic nanoparticles (MNPs) as contrast agents. However, the inherently low acoustic scattering of MNPs limits MMUS sensitivity and resolution, necessitating high particle doses and bulky magnetic setups. While gas-filled microbubbles can enhance ultrasound contrast, their instability and size heterogeneity restrict their applicability in precision sensing.

To overcome these limitations, a novel hybrid nanomaterial, magneto-gas vesicles (MGVs), was developed by conjugating MNPs with acoustically active gas vesicles (GVs). MGVs demonstrated sensitivity to environmental stiffness in agarose gels of varying rigidity and were subsequently validated in lung and liver organoid models. Organoids, as self-organized three-dimensional structures that mimic human tissues, allowed evaluation of MGV stability and mechanical responsiveness under fibrotic conditions. Induction of fibrosis in organoids led to a marked reduction in MMUS signal intensity,

which was restored upon treatment with antifibrotic agents, confirming the capability of MGVs to monitor tissue stiffening and therapeutic response. Further validation in a murine liver fibrosis model substantiated the translational potential of this platform.

These findings highlight MGVs as a promising nanomaterial-based tool for real-time, non-invasive assessment of tissue mechanics. This approach offers a novel diagnostic modality for detecting and monitoring fibrotic pathologies and holds potential for broader applications in mechanically dynamic disease states.

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Curriculum Vitae

Hitoshi Maruyama *(Juntendo Univ., Japan)*

Brief Introduction of Yourself

Current Appointments

Associate Professor, Department of Gastroenterology, Graduate School of Medicine, Juntendo University (since Apr. 2019)
Active Member of Editorial Boards: iLIVER (Elsevier) / Portal Hypertension & Cirrhosis (Wiley)

Education & Training

2008	M.D., Showa University School of Medicine
2014	Ph.D. (Medical Science), Showa University

Postdoctoral & Research Roles:

2017-2019	Program-Specific Researcher, Institute of Medical Science, Univ. of Tokyo
2014-2020	Assistant Professor, Division of Gastroenterology & Hepatology, Showa University

Academic Career

2017-2019	Research Associate, Division of Gastroenterology & Hepatology, Showa University
2020-Present	Lecturer, Division of Gastroenterology & Hepatology, Showa Universit)
Since 2018	Adjunct Professor, Chiba University Division of Gastroenterology

Research Interests

Hepatocellular Carcinoma
Portal Hypertension & Liver Elastography
Ultrasound Imaging & Liver Fibrosis
Local Ablation Therapy

Ultrasound Education and Quality Improvement Programs

Hitoshi Maruyama

Juntendo Univ., Japan

Experience has indicated that ultrasound (US) is a considerable motivating factor for trainees when introduced into the medical curriculum. US should be taught as an adjunct diagnostic tool to the physical examination. Assessment of US competency can be performed using different methods, including written exams, clinical observation, video review or clinical simulation. There is a growing demand to standardize US training, to establish structured clinical courses and to assess competency according to well-defined and reproducible criteria. However, US training and education programs are only halfway through. Standardization and establishment of structured clinical courses for US education which can assess competency according to well-defined and reproducible criteria, and introduction of widely applicable educational programs may be final goal.

ISCU 2025

International Symposium of Clinical Ultrasound

in Conjunction with
2025 KACU Spring Annual Symposium

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Bridging Clinical Ultrasound Research and Practice for a Healthier Future

ROOM 1

Expanding Role of Ultrasound

Chairs: ***Young Seok Kim*** *(Soonchunhyang Univ.),*
Young Kul Jung *(Korea Univ.)*

1. **The Expanding Role of Ultrasound in Vascular Access Procedures**
   Jackie Pei Ho (National Univ. of Singapore, Singapore)
2. **The Expanding Role of Endoscopic Ultrasound in Pancreatobiliary Disease**
   Se Woo Park (Hallym Univ.)
3. **The Expanding Role of Ultrasound in Cardiovascular Disease**
   Kang Un Choi (Yeungnam Univ.)

Curriculum Vitae

Jackie Pei Ho *(National Univ. of Singapore, Singapore)*

Brief Introduction of Yourself

Prof. Jackie Pei Ho is a Consultant Vascular and Endovascular Surgeon with the Department of Cardiac, Thoracic & Vascular Surgery in National University Health System. She is also the Director Endovascular Therapy of Vascular Surgery Division.

She graduated from the University of Hong Kong in year 1995. Obtained her fellowship of College of Surgeons in 2002. Jackie has strong interest in hemodialysis access and revascularization for chronic limb threatening ischemia CLTI, limb salvage. She and few collaborators published "Practical Guide to Surgical & Endovascular Hemodialysis Access Management. Case Based Illustration" in 2015. She had 81 peer review journal papers published with many of these focused on hemodialysis access and limb salvage. She is the President of the Society of Dialysis Access Specialists. And director of Dialysis Access Synergy in year 2017, 2019, 2022, 2023 and 2024.

Research Interests

Hemodialysis Access, Ultrasound Guided Hemodialysis Access Intervention, Revascularization for Chronic Limb Threatening Ischemia

Representative Publications

1. Pei Ho, M Lu, L Meng, K Hongsakul. Ultrasound guided percutaneous sharp recanalization for restoring patency from peripheral chronic total occlusions of hemodialysis accesses. J Vasc Access. 2024 Aug 24:11297298241273610. doi: 10.1177/11297298241273610. Online ahead of print.
2. L Meng, Pei Ho. A systematic review of prediction models on arteriovenous fistula: Risk scores and machine learning approaches. J Vasc Access. 2024 Apr 24:11297298241237830. doi: 10.1177/11297298241237830. Online ahead of print.
3. Bi R, Zhang R, Meng L, Du Y, Low J, Qi Y, Rajarahm P, Lai AYF, Tan VSY, Ho Pei, Olivo M. A portable optical pulsatile flowmetry demonstrates strong clinical relevance for diabetic foot perfusion assessment. APL Bioeng. 2024 Feb 21;8(1):016109. doi: 10.1063/5.0182670. eCollection 2024 Mar
4. Meng L, Tan P, Ali Khan B, Liao J, Lou L, Chen S, Teo BW, Guo W, Ho Pei. Dialysis nurses' knowledge, attitude, practices, and self-efficacy regarding vascular access care: A multicenter cross-sectional survey in Singapore. J Vasc Access. 2024 Feb 12:11297298241228816. doi: 10.1177/11297298241228816. Online ahead of print.
5. Meng L, Ng JJ, Choong AMTL, Dharmaraj RB, Menon R, Wong JCL, Ching S, Wong YF, Kong J, Ho Pei. Effectiveness of a native vein arteriovenous fistula tracking system. Semin Dial. 2023 Sep 25. doi: 10.1111/sdi.13179.

The Expanding Role of Ultrasound in Vascular Access Procedures

Jackie Pei Ho

National Univ. of Singapore, Singapore

Ultrasound is becoming an essential imaging tool for hemodialysis vascular access service. Ultrasound artery and vein mapping was found to benefit surgeons to make favourable surgical decision of vascular access creation location more than a decade ago. Currently this has been a standardized practice in most of the reputable access centres. Beyond pre-operative planning and post-operative evaluation of fistula maturation, Ultrasound is also used to guide vascular access intervention for dysfunctional or thrombosed accesses.

In the recent years, many clinicians utilize Ultrasound as the sole imaging modality or combining with fluoroscopic imaging to guide vascular access intervention. Ultrasound also provide lots of valuable information during open surgical procedures for accesses. Ultrasound guidance is good for simple straight forward access lesion treatment. It is also an important guidance for complex access procedures. The advantages of using Ultrasound for access procedures include:

- Assessment of access lesions characteristics (eg intimal hyperplasia, sclerotic wall etc)
- An additional perspective of the vessel condition (eg mural hematoma, dissection, etc)
- Frequent reassessment of the treated lesions during the procedure to detect early recoil
- Volume flow assessment to evaluate the functional performance of the access
- Imaging less affected by blood flow direction
- Visualize wire and catheter inside the lumen of thrombosed access
- No contrast reagent require
- No radiation to psatient or operator,
- Lower cost, less facility set up requirements

Nonetheless, clinicians also need to aware the limitations and potential pitfalls of ultrasound imaging during access procedures. These include:

- Less accurate imaging in highly calcified, acute angle and very tortuous accesses
- Potential of missing some echo-lucent lesions

- Could not evaluate fully the thoracic central veins
- Image quality may deteriorate in situation of bleeding
- Might miss out complication over remote site (eg wire perforation of a side branch)
- Steep learning curve and operator dependent

Clinicians have to understand the advantages as well as the limitations of Ultrasound in order to maximise the benefit of Ultrasound guided access procedures, and minimize its complications. Over the presentation, several cases will be shared to illustrate the effectiveness of Ultrasound imaging in vascular access treatment either on its own or combine with fluoroscopy.

Curriculum Vitae

Se Woo Park *(Hallym Univ.)*

Brief Introduction of Yourself

Professional Activities

2004-2009	Intern & Resident Trainee in Department of Internal Medicine, Hanyang University Hospital, Hanyang University College of Medicine, Seoul, Korea
2012-2013	Clinical Fellowship, Division of Gastroenterology, Department of Internal Medicine, Yonsei University College of Medicine, Seoul, Korea
2014-2015	Clinical Assistant Professor, Division of Gastroenterology, Department of Internal Medicine, Hallym University Dongtan Sacred Heart Hospital, Hallym University College of Medicine, Gyeonggi-do, Korea
2015-2020	Assistant Professor, Division of Gastroenterology, Department of Internal Medicine, Hallym University Dongtan Sacred Heart Hospital, Hallym University College of Medicine, Gyeonggi-do, Korea
2020-2025	Associate Professor, Division of Gastroenterology, Department of Internal Medicine, Hallym University Dongtan Sacred Heart Hospital, Hallym University College of Medicine, Gyeonggi-do, Korea
2025-Present	Professor, Division of Gastroenterology, Department of Internal Medicine, Hallym University Dongtan Sacred Heart Hospital, Hallym University College of Medicine, Gyeonggi-do, Korea

Research Interests

- Interventional EUS and ERCP for Pancreatic Cancer and Bile Duct Cancer
- Development of Medical Device for Interventional EUS and ERCP
- Clinical Research and Trials in Pancreatic Cancer and Bile Duct Cancer

Representative Publications

1. Lee KJ, Park SW, Park DH, Cha HW, Koh DH, Lee J, Cho E. Preliminary feasibility study of a novel spiral-designed plastic stent for endoscopic management of malignant hilar biliary obstruction: a multicenter prospective study (with videos). Gastrointest Endosc. 2025 Jun 11:S0016-5107(25)01725-0.
2. Lee KJ, Cho E, Park DH, Cha HW, Koh DH, Lee J, Park CH, Park SW. Identification of risk factors associated with post-ERCP pancreatitis in patients with easy cannulation: A prospective multicenter observational study. Gastrointest Endosc. 2024 Nov 16:S0016-5107(24)03728-3. doi: 10.1016/j.gie.2024.11.018.
3. Moon JH, Park SW, Lee YN, Lee SH, Kim SH, Lee DW, Cho CM, Kim SB, Park CH. A comparison of novel electrocautery-enhanced lumen-apposing metal stents and plastic stents in endoscopic ultrasound-guided drainage of infected walled-off necrosis: a multicenter randomized study. Endoscopy. 2024 Aug 7. doi: 10.1055/a-2342-1140. Online ahead of print.
4. Lee KJ, Park SW, Park DH, Cha HW, Choi A, Koh DH, Lee J, Lee JM, Park CH. Gallbladder perforation in acute acalculous vs. calculous cholecystitis: a retrospective comparative cohort study with 10-year single-center experience. Int J Surg. 2024 Mar 1;110(3):1383-1391
5. Chung MJ, Park SW, Lee KJ, Park DH, Koh DH, Lee J, Lee HS, Park JY, Bang S, Min S, Park JH, Kim SJ, Park CH. Clinical impact of pancreatic steatosis measured by computed tomography on the risk of post-endoscopic retrograde cholangiopancreatography pancreatitis: A multicenter prospective trial. Gastrointest Endosc. 2024 Feb;99(2):214-223.e4.

The Expanding Role of Endoscopic Ultrasound in Pancreatobiliary Disease

Se Woo Park

Hallym Univ.

Endoscopic ultrasound (EUS) has evolved from a purely diagnostic modality into a powerful interventional platform, revolutionizing the management of complex pancreatobiliary diseases. The development of dedicated devices such as electrocautery-enhanced lumen-apposing metal stents (EC-LAMS) has further expanded its therapeutic frontier, enabling minimally invasive alternatives to conventional surgery or percutaneous approaches.

This lecture provides an overview of the expanding clinical applications of interventional EUS, with a focus on the following five major domains:

(1) drainage of pancreatic fluid collections (PFCs), including walled-off necrosis (WON) and direct endoscopic necrosectomy (DEN);
(2) EUS-guided biliary drainage (EUS-BD), including hepaticogastrostomy (HGS) and choledochoduodenostomy (CDS);
(3) EUS-guided gallbladder drainage (EUS-GBD);
(4) EUS-guided pancreatic duct (PD) drainage;
(5) EUS-guided entero-enterostomy for malignant gastrointestinal obstruction.

1. EUS-Guided Drainage of Pancreatic Fluid Collections (PFCs)

The management of pancreatic fluid collections, particularly walled-off necrosis, has been transformed by EUS guidance. EUS enables precise access and drainage of these collections using transluminal techniques. The addition of EC-LAMS allows for efficient internal drainage with a reduced risk of leakage, migration, or infection. For collections containing significant necrotic debris, direct endoscopic necrosectomy (DEN) can be safely performed through the stent tract, reducing the need for surgical debridement. Timing, wall maturity, and symptom correlation remain critical considerations for intervention.

2. EUS-Guided Biliary Drainage (EUS-BD)

In cases where ERCP is unsuccessful or anatomically inaccessible, EUS-guided biliary drainage offers a reliable alternative. The two main approaches hepaticogastrostomy (HGS) and choledochoduodenostomy (CDS) enable internal drainage without the need for external catheters. Technical success and clinical outcomes of EUS-BD have been shown to be comparable to percutaneous drainage, with added benefits of improved patient comfort and reduced infection risk. However, procedural expertise and appropriate patient selection are essential to minimize adverse events.

3. EUS-Guided Gallbladder Drainage (EUS-GBD)

EUS-guided gallbladder drainage has emerged as a viable option for patients with acute cholecystitis who are poor surgical candidates. Internal drainage using LAMS can achieve effective gallbladder decompression and infection control, serving as a definitive therapy in high-risk patients. Compared to percutaneous cholecystostomy, EUS-GBD has demonstrated superior outcomes in terms of clinical success, fewer reinterventions, and shorter hospital stay. Long-term stent management and standardization of indications remain topics of ongoing study.

4. EUS-Guided Pancreatic Duct (PD) Drainage

EUS-guided PD drainage is indicated in cases of obstructive chronic pancreatitis or postsurgical ductal obstruction where conventional transpapillary access is not feasible. Techniques include rendezvous, antegrade, or transmural stenting, each requiring high technical skill. While technically demanding, EUS-PD drainage can provide significant symptomatic relief and ductal decompression in selected patients. Dedicated accessories and greater procedural standardization are needed to support wider adoption.

5. EUS-Guided Entero-Enterostomy

In patients with surgically altered anatomy or malignant gastric outlet obstruction, EUS-guided entero-enterostomy (e.g., gastrojejunostomy) using EC-LAMS enables the creation of a bypass route, offering rapid symptom relief. This approach is especially useful when traditional enteral stenting is not feasible due to strictures or distorted anatomy. The minimally invasive nature, rapid recovery, and low reintervention rate make EUS-guided entero-enterostomy an attractive palliative option. Ongoing research aims to refine patient selection and procedural techniques.

Conclusion

The interventional capabilities of EUS continue to expand, positioning it as a cornerstone modality in the management of pancreatobiliary diseases. With advancements in device technology, procedural safety, and growing clinical experience, EUS-based interventions now offer definitive treatment in many situations where conventional endoscopy, surgery, or radiology would previously be required. Continued innovation, training, and standardization will be critical to fully realizing the potential of this transformative technology.

Curriculum Vitae

Kang Un Choi *(Yeungnam Univ.)*

Brief Introduction of Yourself

Educational Background

2004-2011	M.D., Yeungnam University College of Medicine
2016-2019	Ph.D., in Medicine, Yeungnam University Graduate School

Professional Experience

2016-2018	Clinical Fellow, Division of Cardiology, Yeungnam University Hospital
2018-2019	Clinical Research Instructor, Severance Cardiovascular Hospital, Yonsei University
2019-2021	Assistant Professor, Division of Interventional Cardiology, Dongguk University Gyeongju Hospital
2022-Present	Assistant Professor, Department of Cardiology, Yeungnam University College of Medicine

Research Interests

- Heart Failure Pathophysiology and Management
- Artificial Intelligence Applications in Echocardiography (Automated Image Acquisition, Quantification)
- Cardiovascular Imaging Modalities (PET-MR, PET-CT)

The Expanding Role of Ultrasound in Cardiovascular Disease

Kang Un Choi

Yeungnam Univ.

Over the past decade, ultrasound has become an indispensable tool in cardiovascular medicine, evolving from operator-dependent imaging into an AI-augmented modality that delivers reproducible, high-quality data at the point of care. Real-time, AI-guided acquisition engines now empower even novice users to capture diagnostic-grade cardiac views: on-screen prompts optimize probe position, adjust imaging parameters automatically, and offer feedback on image quality, democratizing echocardiography across emergency departments, outpatient clinics, and primary-care settings.

Equally transformative are AI-driven automated quantification modules, which extract key hemodynamic and structural metrics with minimal human input:

- **Border Detection & Volume Measurement:** Deep-learning CNNs segment endocardial and epicardial borders in B-mode loops, calculating left and right ventricular volumes and ejection fraction within seconds (e.g., EchoGo® by Ultromics).
- **Myocardial Strain Analysis:** Speckle-tracking algorithms compute global longitudinal strain (GLS), detecting subclinical systolic dysfunction earlier than conventional ejection fraction assessments.
- **Doppler & Flow Quantification:** Automated recognition of spectral and color-flow Doppler signals yields peak velocities, pressure gradients, and cardiac output even quantifying aortic stenosis severity to within 5 ml/s precision.
- **Atrial Function & Volume:** Three-dimensional volume rendering automates left atrial volume indices and peak atrial longitudinal strain (PALS), enhancing risk stratification in atrial fibrillation and valvular disease.
- **Workflow Integration:** Seamless PACS/HIS interoperability populates structured reports automatically, while AI flags suboptimal frames or contour inconsistencies, prompting immediate reacquisition to ensure data fidelity.

Clinical studies report 70–90% reductions in measurement time and interobserver variability below 5%, with particular benefit for heart failure monitoring, post-infarction remodeling, and valve disease

surveillance. Looking ahead, integration of contrast perfusion and real-time 3D volumetrics promises even deeper diagnostic insight.

By combining AI-guided acquisition and automated analytics, cardiovascular ultrasound is poised to extend its reach bringing early detection, personalized monitoring, and streamlined workflows to a broader patient population than ever before.

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Bridging Clinical Ultrasound Research and Practice for a Healthier Future

ROOM 2

Technologic Update in Ultrasound

(Basic & Company Lecture)

Chairs: ***Chulhong Kim*** *(POSTECH),*
Soung Won Jeong *(Soonchunhyang Univ.)*

1. **Ultrafast, Multimodal, and AI Driven Ultrasound Innovations**
   Chulhong Kim (POSTECH)
2. **Progress in Quantitative Ultrasound for Chronic Liver Disease**
   Seungho Choi (Siemens)
3. **Utilization of the Latest AI-Powered Ultrasound Device**
   Junsung Park (Samsung Medison)
4. **Updates on New Technology for Fatty Liver Quantification**
   Naohisa Kamiyama (GE Healthcare)

Curriculum Vitae

Chulhong Kim *(POSTECH)*

Brief Introduction of Yourself

Educational Background

2006.8-2009.5 Ph.D., Department of Biomedical Engineering, Washington University

1997-3-2004.2 B. Sc., Department of Electrical, Electronic and Computer Engineering, Kyungpook National University, Daegu, Republic of Korea

Professional Experience

2024.9-Present Head of School of Convergence Science and Technology

2023.6-Present Vice-Director of POSTECH-CATHOLIC BioMed Engineering

2023.6-Present Namgo Chair Professorship

2013.2-Present Professor of Department of Electrical Engineering, Convergence IT Engineering, and Mechanical Engineering, Pohang University of Science and Technology (POSTECH)

2010.8-2013.1 Assistant Professor of Department of Biomedical Engineering, University at Buffalo, The State University of New York

2009.5-2010.8 Postdoctoral Training, Department of Biomedical Engineering Washington University

Research Interests

- Multimodal Imaging: Photoacoustic/Ultrasound/Optical/AFM/RF/Magnetic
- High Performance Computing (CPU/GPU/DSP), Processing, and Artificial Intelligent in Healthcare
- Digital Healthcare and Medical Device Commercialization

Representative Publications

1. J. Kim,..., [C. Liu*, C. Kim*, and Y. Ahn*], "Non-invasive Photoacoustic Cerebrovascular Monitoring of Early-stage Ischemic Strokes In Vivo", Advanced Science, Vol. 12, 2409361 (2025) IF: 14.3
2. E. Park,..., [J. Jang*, and C. Kim*], "Unsupervised inter-domain transformation for virtually stained high-resolution mid-infrared photoacoustic microscopy using explainable deep learning", Nature Communications, 15, 10892 (2024) IF: 16.6
3. J. Kim, ...,[H. Kim*, H. Kim* and C. Kim*], "Enhanced Dual-Mode Imaging: Superior Photoacoustic and Ultrasound Microendoscopy in Live Pigs Using a Transparent Ultrasound Transducer", Science Advances, Vol. 10, pp. eadq9960 (2024) IF: 11.7
4. C. Yoon,..., [C. Jung*, and C. Kim*], "Deep learning-based virtual staining, segmentation, and classification in label-free photoacoustic histology of human specimens", Light: Science and Applications, Vol. 13, 226 (2024) IF: 20.6
5. S. Cho, ..., C. Kim*, "An ultrasensitive and broadband transparent ultrasound transducer for ultrasound and photoacoustic imaging in-vivo", Nature Communications, Vol. 15, pp. 1444 (2024) IF: 16.6

Ultrafast, Multimodal, and AI Driven Ultrasound Innovations

Chulhong Kim

POSTECH

Trans-energy imaging modalities have been significantly explored to overcome existing problems in conventional imaging modalities with respect to spatial/temporal resolutions, penetration depth, signal-to-noise ratio, contrast, and so on. Among them, photoacoustic imaging, an emerging hybrid modality that can provide strong endogenous and exogenous optical absorption contrasts with high ultrasonic spatial resolution, has overcome the fundamental depth limitation while keeping the spatial resolution. The image resolution, as well as the maximum imaging depth, is scalable with ultrasonic frequency within the reach of diffuse photons. In this presentation, the following topics will be discussed; (1) multiscale and multiparametric trans-energy imaging systems, (2) novel deep-learning powered image processing, (3) recent clinical study results in pathology, endocrinology, oncology, cardiology, dermatology, and radiology, (4) label-free ultrafast ultrasound Doppler imaging, and (5) efforts to commercialization.

Curriculum Vitae

Seungho Choi *(Siemens)*

Brief Introduction of Yourself

Seungho Choi majored in Biomedical Engineering at KonKuk University and has 17 years of experience in the ultrasound industry, working at GE and Siemens-healthineers. His career has covered a wide range of ultrasound sales, including Radiology and Cardiology and OB&GYN.

Currently, he is a ultrasound product manager at Siemens Healthineers ultrasound division.

Research Interests

- Medical Ultrasound Imaging
- AI-Assisted Image Analysis in Diagnostic Ultrasound
- Ultrasound Technology Development

Progress in Quantitative Ultrasound for Chronic Liver Disease

Seungho Choi

Siemens

Introduction

Chronic liver disease (CLD), particularly non-alcoholic fatty liver disease (NAFLD), is an escalating global health issue driven by rising obesity and metabolic disorders. Early and accurate diagnosis of liver conditions is critical to managing disease progression and improving patient outcomes. Ultrasound imaging remains a cornerstone in liver diagnostics due to its non-invasiveness, accessibility, and cost-effectiveness. However, Traditional ultrasound often varies by operator and lacks clear cut-off values, making diagnosis difficult.

Main Contents

This lecture explores recent advancements in ultrasound technology focused on improving the quantitative evaluation of chronic liver diseases. Key topics include:

- Measurement of hepatic fat percentage (Fat %)
- Liver stiffness quantification for fibrosis staging
- Solutions for difficult-to-scan patients (e.g. Pediatrics)

We will show how our system supports simple and accurate liver assessment with UDFF & Auto pSWE. Additionally, we will compare our technology with competing solutions in terms of diagnostic accuracy, ease of use, and clinical efficiency. Case studies and performance comparisons will be shown to illustrate the practical benefits.

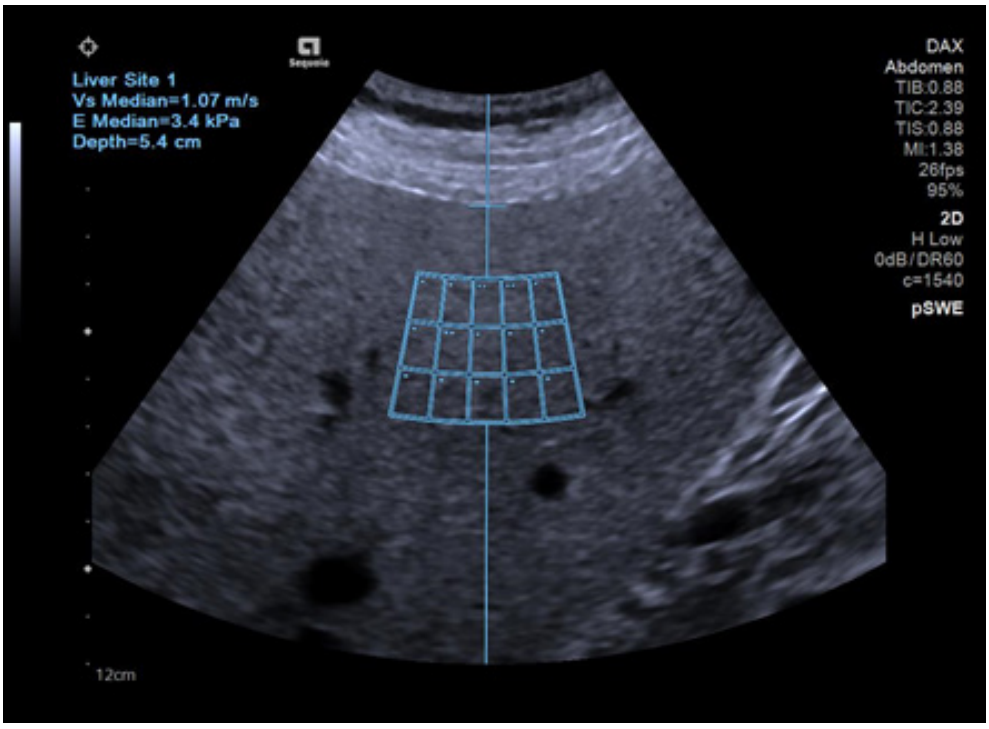


Figure 1. Picture of UDFF & Auto pSWE quantification results.

Conclusion

Liver quantitative ultrasound technology represents a significant step forward in the assessment of chronic liver diseases. UDFF & Auto pSWE can support earlier detection, better monitoring, and more informed treatment decisions. As the technology continues to advance, it is expected to enhance user convenience and improve diagnostic accuracy, contributing to earlier detection of liver disease.

Curriculum Vitae

Junsung Park *(Samsung Medison)*

Brief Introduction of Yourself

Dr. Junsung Park is leading the product managing part of Radiology ultrasound products at Samsung medison.

He received Ph.D. in 2014 from the Department of Biomedical Engineering, Hanyang University.

Research Interests

Ultrasound Imaging, AI Assistant for Ultrasound

Utilization of the Latest AI-Powered Ultrasound Device

Junsung Park

Samsung Medison

As global healthcare systems face an increasing imbalance between the number of physicians and patients, the demand for medical AI has grown rapidly. This is especially critical in ultrasound imaging, where repetitive tasks and high workload often result in human error, inter- and intra-observer variability, and work-related strain. Samsung has been at the forefront of addressing these clinical challenges through AI.

Since 2010, Samsung has developed and commercialized more than 33 AI-powered solutions for ultrasound (US) and digital radiography (DR), with its first AI-embedded US system released in 2016. These innovations stem from a dual-track collaboration between Samsung's medical institutions and its in-house AI research centers, as well as with Intel, optimizing both performance and efficiency for a wide range of systems, including those without GPUs.

Samsung's AI development designed to help clinicians: simplifying clinical workflow and supporting clinical decisions. Key clinical decision-support tools include S-Detect for lesion detection in breast and thyroid scans, and Live BreastAssist, which provides real-time lesion localization to assist screening accuracy. Live LiverAssist further supports hepatic lesion detection with over 80% accuracy across nine lesion types.

For the quantification of hepatic steatosis, Samsung has developed a suite of quantitative ultrasound (QUS) tools including EzHRI, TAI, TSI, and the upcoming Deep USFF. These tools provide reproducible, real-time fat fraction assessments that correlate strongly with MRI-PDFF, the gold standard. Deep USFF, trained with raw RF data from global multicenter studies, delivers simplified, reliable assessments, streamlining the workflow with minimal operator intervention.

Samsung's Intelligent Assist Series automates anatomical recognition and measurements enhancing consistency and reducing workload across operator skill levels. Tools like Auto Measure support consistent organ measurements in follow-up imaging, and Live ViewAssist will further reduce dependency on manual operations by guiding OB anatomy surveys in real-time.

In musculoskeletal applications, NerveTrack identifies 11 key nerves in real-time, aiding in nerve block procedures and education. It also enables automatic measurement of the median nerve for carpal tunnel diagnosis. By reducing variability and increasing confidence during scanning, NerveTrack extends AI's benefits into procedural domains.

In summary, Samsung's medical AI solutions empower physicians to focus more on patient care by relieving cognitive and procedural burdens. With a robust pipeline of AI-driven innovations grounded in clinical needs and technological excellence, Samsung continues to advance precision, efficiency, and confidence in medical imaging.

Curriculum Vitae

Naohisa Kamiyama *(GE Healthcare)*

Brief Introduction of Yourself

Career

1993	PhD., Electronics Engineering, Hokkaido University, Sapporo, Japan
1993-2012	Toshiba Medical Systems Corp.
2012-Present	Global Manager of New Clinical Technology of Ultrasound General Imaging, GE HealthCare

Awards

2018.5	Invention Award for The Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology. Japan Institute of Invention and Innovation
2021.5	The 20th Society Achievement Award (Matsuo Prize), Japan Society of Ultrasound in Medicine
2023.4	Minister of Education, Culture, Sports, Science and Technology Award in the Field of Science and Technology
2025.5	Best Paper Award 2024 (Ito Award), Japan Society of Ultrasound in Medicine (Deep Learning for Descrimination of Liver Tumor)

Research Interests

- Investigate Clinical Solutions Utilizing New Technologies in Ultrasound Diagnostic Imaging
- Nonlinear Imaging with Microbubble-Based Contrast Agent
- Tissue Characterization for Chronic Liver Disease

Representative Publications

1. Hidekatsu Kuroda, Tamami Abe, Naohisa Kamiyama, et al. Novel Subharmonic-aided Pressure Estimation for Identifying High-risk Esophagogastric varices. Journal of Gastroenterology, Feb;60(2):187-196, 2024.
2. Tatsuya Kakegawa, Katsutoshi Sugimoto, Naohisa Kamiyama et al. Washout-parametric imaging with Sonazoid for enhanced differentiation of focal liver lesions. Ultrasonography, 43(6) 2024.
3. Naohisa Kamiyama, Katsutoshi Sugimoto, Ryuichi Nakahara, Tatsuya Kakegawa, Takao Itoi. Deep learning approach for discrimination of liver lesions using nine time-phase images of contrast-enhanced ultrasound. Journal of Medical Ultrasonics, Jan;51(1):83-93, 2023.
4. Hidekatsu Kuroda, Takuma Oguri, Naohisa Kamiyama, Hidenori Toyoda, Satoshi Yasuda, Kento Imajo,…Takashi Kumada. Multivariable Quantitative US Parameters for Assessing Hepatic Steatosis. Radiology. 309(1) 2023.
5. Katsutoshi Sugimoto, Kazuhiro Saito, Natsuhiko Shirota, Naohisa Kamiyama, Kentaro Sakamaki, Hiroshi Takahashi, et al. Comparison of modified CEUS LI-RADS with sonazoid and CT/MRI LI-RADS for diagnosis of hepatocellular carcinoma. Hepatol Res. Vol.5 (8), 730-738 Aug 2022.

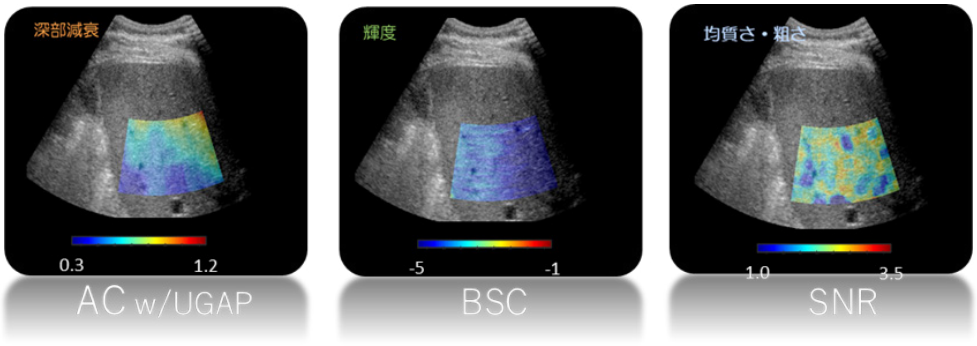
Updates on New Technology for Fatty Liver Quantification

Naohisa Kamiyama

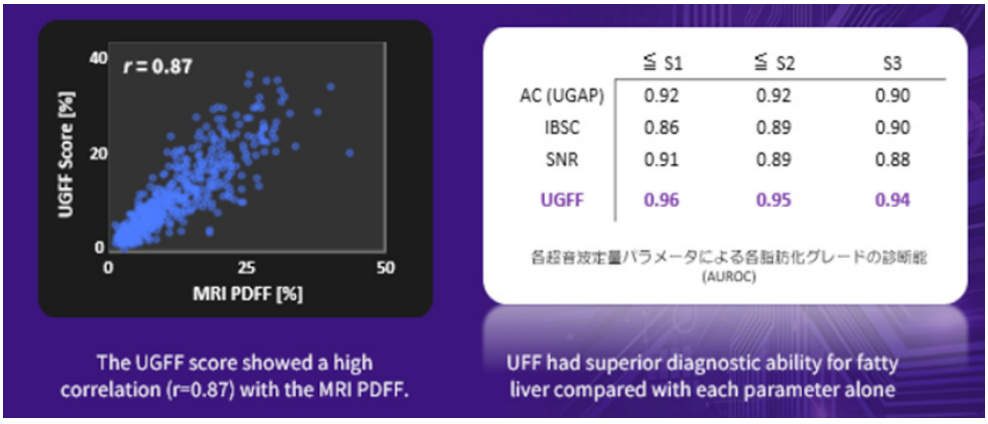
GE Healthcare

Improvement of fat quantification using Multi-Parameter analysis

1. Sound Attenuation : Attenuation Coefficient; AC
2. Liver Brightness : Integrated Backscatter Coefficient; IBSC
3. Liver Texture : Image Signal-to-Noise Ratio; SNR



Result of Ultrasound-Guided Fat Fraction (UGFF)



Summary

Analysis using multiple acoustic parameters may enable more accurate estimation of liver fatty changes.

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Bridging Clinical Ultrasound Research and Practice for a Healthier Future

ROOM 2

Associate Course 1

Ultrasound in Cardiac

Chairs: ***Kee Sik Kim*** *(Daegu Medical Center),*
Jangwon Son *(Yeungnam Univ.)*

1. **Thickened Ventricular Wall: Which Conditions Should Be Differentiated?**
   Moon-Seung Soh (Ajou Univ.)
2. **Assessment of Enlarged Atrium: Left Atrial Strain**
   Jihoon Kim (Sungkyunkwan Univ.)
3. **Echocardiographic Evaluation of Stress-Induced Cardiomyopathy: From Diagnosis to Management of Complications**
   Jino Park (Inje Univ.)
4. **Application of 3D Echocardiography and Strain Echocardiography**
   Dae-Young Kim (Inha Univ.)

Curriculum Vitae

Moon-Seung Soh *(Ajou Univ.)*

Brief Introduction of Yourself

Dr. Moon-Seung Soh is an Assistant Professor of Cardiology at Ajou University School of Medicine in Korea. He received his medical degree from Ajou University in 2013 and completed his residency in Internal Medicine and fellowship in Cardiology at Ajou University Hospital. He also earned a master's degree in medicine during his training.

His clinical and research interests include echocardiography, cardiomyopathy, valvular heart disease, heart failure, and the integration of genetics and artificial intelligence into cardiovascular diagnostics. He has published extensively in peer-reviewed journals, contributing to both clinical trials and AI-enabled cardiac imaging studies. His current research explores the role of multimodal imaging and digital biomarkers in the diagnosis and management of structural heart disease.

Research Interests

Echocardiography, Cardiomyopathy, Valvular Heart Disease, Heart Failure, Genetics/AI

Representative Publications

1. Moon-Seung Soh, Kyung-Heon Won, Jae-Joong Kim, Sung Yun Lee, Min Su Hyon, Ho-Joong Youn, Seung-Woon Rha, Doo-Il Kim, Youngkeun Ahn, Byung Jin Kim, Dong-Ju Choi, Jong-Seon Park, Dae-Kyung Kim, Woo-Jung Park, Hong-Seok Lim, Seung-Jea Tahk. Phase III randomized clinical trial of efficacy and safety of amlodipine and candesartan cilexetil combination for hypertension treatment. Sci Rep. 2024 Oct 3;14(1):22940. doi: 10.1038/s41598-024-74003-5.
2. Yoo Jin Choi, Min Ji Park, Youngjin Cho, Joonghee Kim, Eunkyoung Lee, Dahyeon Son, Seo-Yoon Kim, Moon Seung Soh. Screening for RV Dysfunction Using Smartphone ECG Analysis App: Validation Study with Acute Pulmonary Embolism Patients. J. Clin. Med. 2024 Aug 13(16):4792. doi: 10.3390/jcm13164792.
3. Moon-Seung Soh, Jae-Hyuk Jang, Jin-Sun Park, Joon-Han Shin. Effects of high-gravity acceleration forces and anti-gravity maneuver on the cardiac function of fighter pilots. Sci Rep. 2024 Apr 16;14(1):8749. doi: 10.1038/s41598-024-59274-2.
4. Moon-Seung Soh, Hangyul Kim, Min Gyu Kang, Hyo Jin Lee, Seung Do Lee, Seok-Jae Hwang, Jin-Yong Hwang, Kyehwan Kim, Jeong-Rang Park, Hye-Ree Kim, Seung-Jea Tahk, Myeong-Ho Yoon, Hong-Seok Lim, Jin-Sin Koh. Impact of height difference between coronary ostium and location of intracoronary pressure sensor on fractional flow reserve measurements. PLoS One. 2023 Aug 24;18(8):e0289646. doi: 10.1371/journal.pone.0289646. eCollection 2023.
5. Moon-Seung Soh, Jin-Sun Park, Kyoung-Woo Seo, Hyoung-Mo Yang, Hong-Seok Lim, Byoung-Joo Choi, So-Yeon Choi, Myeong-Ho Yoon, Gyo-Seung Hwang, Seung-Jea Tahk, Joon-Han Shin. Visit-to-visit systolic blood pressure variability in patients with ST-elevation myocardial infarction predicts long-term cardiovascular outcomes. J Hum Hypertens. 2019 Apr;33(4):259-266. doi: 10.1038/s41371-019-0176-0.

Thickened Ventricular Wall: Which Conditions Should Be Differentiated?

Moon-Seung Soh

Ajou Univ.

Thickening of the ventricular wall is a common yet diagnostically challenging finding in transthoracic echocardiography. It may represent a physiological adaptation, such as in highly trained athletes, or a manifestation of pathological remodeling due to pressure overload, infiltrative processes, or genetic cardiomyopathies. Accurate differentiation is essential, as the underlying etiologies carry profoundly different prognostic and therapeutic implications. In clinical practice, misinterpretation can lead to unnecessary testing or missed opportunities for therapy.

Hypertrophic cardiomyopathy (HCM) remains a primary consideration, especially when asymmetric septal hypertrophy, dynamic left ventricular outflow tract obstruction, and abnormal strain patterns are present. However, hypertensive heart disease can mimic HCM, often displaying concentric remodeling with preserved global longitudinal strain and gradually impaired diastolic function. In contrast, athlete's heart typically shows balanced wall thickening, normal or borderline diastolic function, and absence of late gadolinium enhancement (LGE) on cardiac MRI. Valvular diseases, most notably aortic stenosis, also contribute to concentric hypertrophy through chronic pressure overload and must be distinguished by careful Doppler assessment.

A particularly challenging subset includes infiltrative diseases such as cardiac amyloidosis, which may present with relatively modest hypertrophy accompanied by abnormal diastolic dysfunction, low voltage on ECG, and the pathognomonic apical sparing pattern on strain imaging. Fabry disease often affects the basal inferolateral wall and may show reduced T1 values on cardiac MRI, with strain impairment preceding overt hypertrophy. Rare but high-impact differential diagnoses include storage diseases such as Danon disease and PRKAG2 syndrome, as well as mitochondrial disorders and endomyocardial fibrosis conditions that may require genetic testing, histological confirmation, or multimodal imaging to confirm.

An integrated echocardiographic approach should begin with accurate measurement of wall thickness, followed by evaluation of hypertrophy pattern (asymmetric vs. concentric), myocardial texture, strain

Genetic testing should be considered when phenotypic features suggest a heritable cardiomyopathy, or when there is a family history of sudden cardiac death or early-onset heart failure.

This presentation will provide a comprehensive overview of how to differentiate the major etiologies of a thickened ventricular wall using echocardiographic criteria. By recognizing imaging signatures and applying them within a structured diagnostic framework, clinicians can enhance diagnostic precision and avoid both over- and under-diagnosis of cardiomyopathies and related disorders.

Curriculum Vitae

Jihoon Kim *(Sungkyunkwan Univ.)*

Brief Introduction of Yourself

Current Position

Clinical Associate Professor,
Division of Cardiology, Heart Vascular and Stroke Institute, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, Republic of Korea

Career

2003-2009	Sungkyunkwan University School of Medicine
2009-2010	Internship, Samsung Medical Center
2010-2014	Residency, Internal Medicine, Samsung Medical Center
2014-2017	Military Doctor for a Military Service
2017-2019	Fellowship, Department of Cardiology, Samsung Medical Center
2020-2023	Clinical Assistant Professor, Samsung Medical Center
2023-Present	Clinical Associate Professor, Samsung Medical Center

Honor and Awards

2019	Young Investigator Award Grant, 12th Congress of Asia-Pacific Society of Atherosclerosis and Vascular Diseases
2020	Young Investigator Award, Korean Society of Echocardiography

Research Interests

- Cardiovascular Imaging
- Cardiovascular Hemodynamics

Assessment of Enlarged Atrium: Left Atrial Strain

Jihoon Kim

Sungkyunkwan Univ.

Curriculum Vitae

Jino Park *(Inje Univ.)*

Brief Introduction of Yourself

Prof. Park completed his residency in Internal Medicine and fellowship in Cardiology at Asan Medical Center. He obtained both his Master's and Ph.D. degrees from the University of Ulsan College of Medicine.

Currently, he is serving as an Assistant Professor at Haeundae Paik Hospital, Inje University.

Research Interests

- Heart Failure
- Valvular Heart Disease
- Cardiomyopathy
- Genetics
- Ischemic Heart Disease

Representative Publications

1. Park J, Kim HR, et al. Bovine pericardial versus porcine bioprosthetic mitral valves: results from a Korean Nationwide Cohort Study Eur J Cardiothorac Surg. 2023 Jun 1;63(6):ezad165.
2. Park J, Nam SH, et al. Long-term outcomes and prognostic factors after aortic valve surgery in patients with Takayasu arteritis Gen Thorac Cardiovasc Surg. 2022 Nov 22.
3. Park J. et al. Spontaneous Resolution of Extensive Iatrogenic Type A Aortic Dissection After Transcatheter Aortic Valve Replacement. JACC Case Rep. 2022 Apr 20;4(8):464-469.
4. Park J, Kim JH, Jeong YJ, et al. Different Clinical Features between Definite and Possible Takotsubo Syndrome in a Tertiary Referral Hospital. Cardiology. 2022;147(2):154-164
5. Park J, et al. Geographic and demographic variabilities of quantitative parameters in stress myocardial computed tomography perfusion. Korean J Intern Med. 2017 Sep;32(5):847-854

Echocardiographic Evaluation of Stress-Induced Cardiomyopathy: From Diagnosis to Management of Complications

Jino Park

Inje Univ.

Stress-induced cardiomyopathy (SCMP), also known as Takotsubo syndrome (TTS), is an acute, reversible form of heart failure that predominantly affects postmenopausal women following intense emotional or physical stress. It is characterized by transient regional wall motion abnormalities (RWMA) of the left ventricle (LV) that extend beyond the distribution of a single coronary artery, with no evidence of obstructive coronary artery disease on angiography. Although initially considered benign, TTS can be associated with serious complications including cardiogenic shock, arrhythmias, thromboembolism, and even death. This presentation focuses on the echocardiographic features of TTS, highlighting its diagnostic value, prognostic implications, and utility in guiding treatment strategies.

Clinical Presentation and Diagnostic Approach

Patients with TTS often present with acute chest pain or dyspnea, mimicking acute coronary syndrome. Electrocardiographic changes are present in the majority of cases and include ST-segment elevations, T-wave inversions, and QTc prolongation. Cardiac biomarkers such as troponins are typically mildly elevated, while natriuretic peptides are significantly increased. However, definitive diagnosis relies on cardiovascular imaging. Transthoracic echocardiography (TTE) serves as the first-line tool due to its availability, non-invasiveness, and ability to assess wall motion abnormalities, LV function, and hemodynamic complications.

Echocardiographic Patterns and Variants

The classic apical ballooning pattern, found in over 80% of cases, features akinesis or dyskinesis of the mid to apical LV segments with compensatory basal hyperkinesis. Atypical variants such as midventricular, basal, and focal types must also be recognized, particularly as their clinical presentations and prognoses may differ. Right ventricular (RV) involvement, present in approximately one-quarter of cases, is associated with worse outcomes and should be routinely assessed.

In addition to visual wall motion analysis, echocardiographic strain imaging by speckle-tracking technology offers quantitative evaluation of regional myocardial deformation and aids in the diagnosis of subtle or atypical forms. 3D echocardiography and contrast-enhanced imaging can improve the detection of apical thrombi and refine volumetric analysis, especially in technically difficult cases.

Complications and Risk Stratification

Echocardiography is essential in the early detection and monitoring of complications. One of the most important is dynamic LV outflow tract obstruction (LVOTO), typically resulting from hyperdynamic contraction of the basal LV segments in the setting of apical akinesis. This can lead to systolic anterior motion (SAM) of the mitral valve and provoke significant mitral regurgitation (MR). In such cases, the hemodynamic profile differs from typical heart failure, and treatment strategies must be tailored accordingly often requiring volume resuscitation and avoidance of inotropic agents.

Mitral regurgitation in TTS is often transient and reversible but may result from leaflet tethering due to LV and annular dilatation or SAM-related LVOTO. Identification of the underlying mechanism through echocardiography is key for appropriate therapeutic planning. Thrombus formation in the LV apex is another potential complication due to severe regional akinesis and reduced flow velocities. Use of contrast agents or 3D echocardiography can enhance thrombus visualization.

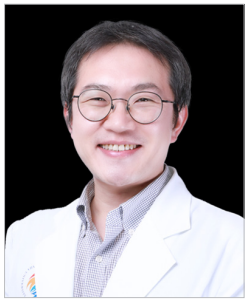
Follow-up and Prognosis

Recovery of LV function typically occurs within days to weeks but may take up to six weeks in some patients. Serial echocardiography is critical to confirm recovery, exclude persistent RWMA, and guide long-term heart failure therapy, including initiation of beta-blockers or renin-angiotensin system inhibitors. Echocardiographic normalization of systolic function does not always equate to full clinical recovery, and some patients may experience recurrent episodes.

Conclusion

Stress-induced cardiomyopathy is a unique and increasingly recognized syndrome that requires a high index of suspicion and careful imaging assessment. Echocardiography provides comprehensive information not only for diagnosis but also for monitoring complications and recovery. From the detection of wall motion abnormalities to the assessment of LVOTO, MR, thrombus, and RV involvement, echocardiography is the cornerstone modality in the management of TTS. As TTS is not always benign, prompt diagnosis and risk-adapted treatment based on echocardiographic findings are essential to improve outcomes.

Curriculum Vitae



Dae-Young Kim *(Inha Univ.)*

Brief Introduction of Yourself

Graduate

1999-2005	Degree of Bachelor, Hongik University, Seoul, Korea
2009-2013	Degree of Master, Jeonbuk National University, Jeonju, Korea

Postdoctoral Training

2013-2014	Internship, Soonchunhyang University Hospital, Bucheon, Korea
2015-2019	Residencies, Inha University, Incheon, Korea
2019-2021	Clinical Fellowships, Yonsei university, Seoul, Korea
2021-2021	Clinical Assistant Professor, Yonsei University, Seoul, Korea

Representative Publications

1. Long term prognosis of short QT interval in Korean patients: a multicenter retrospective cohort study : BMC cardiovascular disorders 21:17(2021)
2. Malignant pericardial mesothelioma: diagnostic clues in multimodality imaging : Int J Cardiovasc Imaging 36/1385(2020)
3. Korean Multicenter Registry study of EPIC stents for the reatment of Iliac Artery Disease: (K-EPIC Registry) : Korean Circulation Journal 2021 Apr;51(4):e21
4. Predictors of Subsequent Heart Failure After Left Atrial Appendage Closure. Circulation Journal (202, 86.7: 1129-1136).
5. Left Ventricular Global Longitudinal Strain Is Associated With Cardiovascular Outcomes in Patients Who Underwent Permanent Pacemaker Implantation. Frontiers in cardiovascular medicine (2021, 9:705778)
6. Impact of aortic atheroma and distensibility on diastolic function and prognosis in patients with ischemic stroke. Rev. Cardiovasc. Med 23.1 (2022: 010).
7. Prognostic Implications of Biventricular Global Longitudinal Strain in Patients Undergoing Tricuspid Valve Surgery for Severe Isolated Tricuspid Regurgitation. Frontiers in cardiovascular medicine (2022, 9.)
8. Factors Associated With the Occurrence of Significant Mitral Regurgitation After Tricuspid Valve Surgery for Severe Isolated Tricuspid Regurgitatio. American Society of Echocardiography (2023, 36.1: 118-121. e1).

Application of 3D Echocardiography and Strain Echocardiography

Dae-Young Kim

Inha Univ.

Three-dimensional (3D) echocardiography is a transformative imaging technique that offers enhanced anatomical visualization and accurate volumetric assessment compared to traditional two-dimensional (2D) echocardiography. It enables comprehensive evaluation of cardiac chambers and valves, improving diagnostic accuracy and guiding clinical decision-making. This lecture will cover the principles of 3D image acquisition, reconstruction, and interpretation, with a focus on practical applications in ventricular and atrial quantification, valvular assessment, and procedural guidance. Real-world cases and comparisons with 2D imaging will highlight the added clinical value, while also addressing technical limitations, interpretation challenges, and future directions such as automation and AI integration.

Additionally, echocardiographic strain imaging, especially speckle-tracking echocardiography (STE), has emerged as a sensitive tool for detecting subclinical myocardial dysfunction. Unlike left ventricular ejection fraction (LVEF), strain imaging quantifies myocardial deformation, offering earlier detection of myocardial impairment. Global longitudinal strain (GLS) has demonstrated strong prognostic value in heart failure particularly HFpEF as well as in valvular disease, cardiomyopathies, and arrhythmic risk stratification. Strain measurements of the right ventricle and left atrium are also gaining attention for their role in specific clinical contexts such as pulmonary hypertension and atrial fibrillation.

In summary, 3D and strain echocardiography represent major advancements in cardiac imaging, enhancing early diagnosis and personalized risk assessment across various cardiovascular conditions.

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Bridging Clinical Ultrasound Research and Practice for a Healthier Future

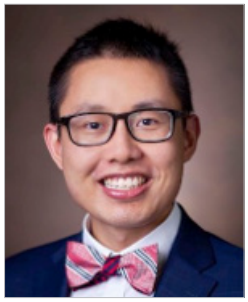
ROOM 2

State-of-the-Art Lecture 2

Chair: Kyung-Hee Kim *(Incheon Sejong Hospital)*

Role of Artificial Intelligence in Echocardiography and Clinical Ultrasound
Jiun-Ruey Hu (Cedars-Sinai Medical Center, USA)

Curriculum Vitae



Jiun-Ruey Hu *(Cedars-Sinai Medical Center, USA)*

Brief Introduction of Yourself

Jiun-Ruey Hu, MD, MPH is a cardiovascular outcomes researcher and cardiologist board-certified in cardiovascular medicine, echocardiography, and internal medicine at Cedars-Sinai Medical Center in Los Angeles, California. Hailing from Canada, he completed his AB in molecular biology and applications of computing at Princeton University, MPH in epidemiology and biostatistics at the Johns Hopkins School of Public Health, MD and internal medicine residency at Vanderbilt University, and cardiovascular medicine fellowship at Yale School of Medicine, and interventional cardiology fellowship at Cedars-Sinai Medical Center. He specializes in designing digital tools for evidence-based medicine, enhancing clinical decision support to improve uptake of national society guidelines. His research has been published in leading journals including JAMA, BMJ, JACC: EP and Annals of Internal Medicine.

He is a two-time winner of the NKF National Young Investigators' Forum. His digital tools have been recognized with multiple national innovation awards from STAT News, the Aspen Ideas: Health Festival, the American Society of Nuclear Cardiology, and the American Heart Association.

Research Interests

Digital Tools, Digital Health, Cardiovascular Medicine, Interventional Cardiology, Clinical Decision Support

Representative Publications

1. Hu J-R, Power JR, Zannad F, Lam CSP. Artificial intelligence and digital tools for design and execution of cardiovascular clinical trials: State of the Art Review. European Heart Journal. 2024;0:1-13. https://doi.org/10.1093/eurheartj/ehae794
2. Park DY*, Hu J-R*, Jamil Y, Kelsey MD, Jones WS, Frampton J, Kochar A, Aronow WS, Al Damluji A, Nanna MG. Shorter Dual Antiplatelet Therapy for Older Adults After Percutaneous Coronary Intervention A Systematic Review and Network Meta-Analysis. JAMA Network Open. 2024;7(3):e244000. https://doi.org/10.1001%2Fjamanetworkopen.2024.4000
3. Juraschek SP, Hu J-R, Cluett JL, Ishak AM, Mita C, Lipsitz LA, Appel LJ, Beckett NS, Coleman RL, Cushman WC, Davis BR, Grandits G, Holman RR, Miller ER 3rd, Peters R, Staessen JA, Taylor AA, Thijs L, Wright JT Jr, Mukamal KJ. Orthostatic Hypotension, Hypertension Treatment, and Cardiovascular Disease: An Individual Participant Meta-Analysis. JAMA. 2023;330(15):1459-1471. https://doi.org/10.1001/jama.2023.18497
4. Hu J-R, Coresh J, Inker LA, Levey AS, Zheng Z, Rebholz CM, Tin A, Appel LJ, Chen J, Sarnak MJ, Grams ME. Associations Between the Serum Metabolome and All-Cause Mortality in Chronic Kidney Disease. Kidney International. 2018;94(2):381-389. https://doi.org/10.1016/j.kint.2018.03.008

Role of Artificial Intelligence in Echocardiography and Clinical Ultrasound

Jiun-Ruey Hu

Cedars-Sinai Medical Center, USA

Artificial intelligence (AI) is rapidly transforming the practice of clinical ultrasound, offering new avenues for enhancing image acquisition, diagnostic precision, workflow efficiency, and patient access. A new generation of ultrasound platforms can guide probe positioning, automate Doppler measurements, quantify valvular disease severity, detect subclinical disease, and assist in report writing. In some domains of ultrasound, AI has matched or surpassed the ability of human experts to perform specific tasks. This State-of-the-Art Lecture provides a comprehensive and practical roadmap for clinicians seeking to understand the spectrum of what is possible with AI in ultrasound today, with a focus on echocardiography. We will cover several domains, including (1) Image acquisition and reconstruction – including real-time probe guidance, quality control, beamforming optimization, and denoising algorithms. (2) Image analysis and diagnosis – highlighting deep learning models for segmentation, classification, and view recognition in echocardiography, vascular, fetal, and musculoskeletal imaging. (3) Risk stratification and quantification – using AI to automate scoring systems, predict adverse events, and differentiate benign from malignant lesions. (4) Workflow and reporting – showing how AI streamlines clinical tasks such as structured reporting, regional anesthesia guidance, and triage in urgent care. We will also explore emerging challenges, including variability in image quality across users and devices, risks of automation bias, gaps in regulatory oversight, and unresolved questions around liability and algorithmic fairness. By the end of this session, participants will be equipped with a standardized vocabulary to converse about AI in ultrasound, an understanding of the current landscape of AI tools in ultrasound, considerations for evaluating AI technologies for integration into clinical workflows, and an awareness of ongoing pitfalls and biases.

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Bridging Clinical Ultrasound Research and Practice for a Healthier Future

ROOM 2

Cardiac Ultrasound

Chairs: ***Hyun Seung Kim*** *(Samsung Top Internal Medicine),*
Jae Hyeong Park *(Chungnam National Univ.)*

1. **Diastolic Dysfunction Measurement and Its Clinical Significance**
   Raja Ezman Faridz Bin Raja Shariff (Universiti Teknologi MARA, Malaysia)
2. **Which Echocardiography Findings Can Be Treated with Cutting-Edge Structural Interventions?**
   Minjung Bak (Sungkyunkwan Univ.)
3. **How Should We Evaluate Tricuspid Valve Regurgitation That Arise from Different Etiologies?**
   Ario Soeryo Kuncoro (Heartology Cardiovacular Center, Indonesia)

Curriculum Vitae

Raja Ezman Faridz Bin Raja Shariff
(Universiti Teknologi MARA, Malaysia)

Brief Introduction of Yourself

Education and Certifications

2023	Certification in Adult Transthoracic Echocardiography – EACVI ESC, Europe
2022	Certificate of Specialist Registration in Internal Medicine & Cardiology – NSR Malaysia (NSR No. 137201)
2022	Examination of Special Competence in Adult Echocardiography (Testamur) – NBE, U.S.A
2021	Certification in Heart Failure – Heart Failure Association ESC, Europe
2021	European Exam in Core Cardiology – ESC & UEMS-CS, Europe
2016	Malaysian Medical Council (MMC) Full Registration (MMC No. 70261)
2016	Good Clinical Practice (Malaysia) – Certified
2016	Post-Graduate Certificate with Merit in Clinical Education – University of Edinburgh, U.K.
2016	Membership of the Royal College of Physicians (U.K.) – Royal College of Physicians, U.K.
2013	MBChB (Bachelor of Medicine, Bachelor of Surgery) – University of Manchester, U.K.

Research Interests

General Cardiology, Heart Failure, Cardiology Education, Clinical Trials & Research, National Lead Investigator Roles

Representative Publications

1. Raja Ezman Raja Shariff, Haowen Jiang, Jonathan Yap, Shyn Yi Tan, Lucky Cuenza, Bambang Dwiputra, Faisal Habib, Wei-Ting Chang, Misato Chimura, Ganchimeg Ulziisaikhan, Derek Pok Him Lee, Vorn Malis , Uditha Indika Hewarathna, Kang-Un Choi, Dong-Hyuk Cho, F Aaysha Cader, Gary Gan , Akmal Arshad, Purich Surunchupakorn, Quang Ngoc Nguyen, Tazeen Hasan Jafar, Paul Pronyk , Badai Tiksnadi, Mayank Dalakoti, Kenny Sin & Jack WC Tan. Overview of the Burden and Challenges of Hypertension in Asia-Pacific. JAPSC.
2. Kasim S, Tang J, Malek S, Ibrahim KS, Shariff RER, Chima JK. Enhancing regional wall abnormality detection accuracy: Integrating machine learning, optical flow algorithms, and temporal convolutional networks in multi-view echocardiography. PLoS One.
3. Kasim S, Amir Rudin PNF, Malek S, Aziz F, Wan Ahmad WA, Ibrahim KS, Muhmad Hamidi MH, Raja Shariff RE, Fong AYY, Song C. Data analytics approach for short- and long-term mortality prediction following acute non-ST-elevation myocardial infarction (NSTEMI) and Unstable Angina (UA) in Asians. PLoS One.
4. Raja Ezman Raja Shariff, Amiliana M. Soesanto, Gregory M. Scalia, et al. Echocardiographic Imaging in Transcatheter Structural Intervention. JACC Asia.
5. Chong B, Jayabaskaran J, Ruban J, Goh R, Chin YH, Kong G, Ng CH, Lin C, Loong S, Muthiah MD, Khoo CM, Shariff E, Chan MY, Lajeunesse-Trempe F, Tchernof A, Chevli P, Mehta A, Mamas MA, Dimitriadis GK, Chew NWS. Epicardial Adipose Tissue Assessed by Computed Tomography and Echocardiography Are Associated With Adverse Cardiovascular Outcomes: A Systematic Review and Meta-Analysis. Circ Cardiovasc Imaging 2023;16(5):e015159.
6. Raja Ezman Raja Shariff, Hui Beng Koh, Maizatu Akma Sulong, et al. Acute Decompensated Heart Failure with Preserved Ejection Fraction: Do the Asian Phenotypes Fit? Journal of Asia Pacific Society of Cardiology.
7. Raja Ezman Raja Shariff, Koh Hui Beng, Azmee Mohd Ghazi. The Great Asian Mismatch – Training Versus Care in Heart Failure. Journal of Cardiac Failure.

Diastolic Dysfunction Measurement and Its Clinical Significance

Raja Ezman Faridz Bin Raja Shariff

Universiti Teknologi MARA, Malaysia

Diastolic dysfunction (DD) is often associated with impaired relaxation, loss of restoring forces, reduced compliance during diastole and/or elevated filling pressures within the left ventricular cavity. Various conditions have been linked to the development of DD, and evaluation for DD is most commonly performed to help with the evaluation of heart failure with preserved ejection fraction. Although the 'gold standard' for assessment of diastolic function remains to be invasive haemodynamic studies, these are often inaccessible or unpragmatic in most clinical settings. Thus, sonography, specifically echocardiography, has become the first-line investigation in its assessment. This lecture will discuss in detail on the WHAT (i.e., WHAT is diastolic function and dysfunction), WHEN (i.e., WHEN should we measure diastolic function, and WHEN should we be cautious) and HOW (i.e., HOW should we measure diastolic function) of DD assessment through the use of sonography. For the sake of pragmatism and familiarity, the American Society of Echocardiography / European Association of Cardiovascular Imaging 2016 algorithms will be discussed in this lecture.[1] However, clinicians should familiarize themselves with the limitations of these algorithms, such as in patients with a highly suggestive clinical history for heart failure, specifically that of HFpEF, with unremarkable diastolic function parameters, there is increasing evidence to support the use of diastolic exercise stress testing, as such patients may simply have abnormal e' velocity with grade 1 pattern but ultimately be classified as being 'normal'.[2,3] There have also been some limitations in the use of the ASE/EACVI 2016 algorithms, including heavy focus on averaging e' velocity values when little evidence exists to suggest its reliability, as well as the use of largely discordant parameters like LAVI, all of which are better addressed in updated guidelines like that of the BSE.[4]

Diastolic function assessment is an integral part of modern-day echocardiography. It provides both diagnostic and prognostic value, particularly in the assessment of conditions that lead to raised left ventricular filling pressures, such as HFpEF. Through advancements in the field including the use of strain imaging among others, assessment of diastolic function will continue to grow to be more inclusive and comprehensive. What exciting times to be living in!

References

1. Nagueh SF, Smiseth OA, Appleton CP, et al. Recommendations for the Evaluation of Left Ventricular Diastolic Function by Echocardiography: An Update from the American Society of Echocardiography and the European Association of Cardiovascular Imaging. J Am Soc Echocardiogr 2016; 29(4):277-314.
2. Pieske B, Tschöpe C, de Boer RA, et al. How to diagnose heart failure with preserved ejection fraction: the HFA-PEFF diagnostic algorithm: a consensus recommendation from the Heart Failure Association (HFA) of the European Society of Cardiology (ESC). Eur Heart J 2019; 40(40):3297-3317.
3. Kittleson MM, Panjrath GS, Amancherla K, et al. 2023 ACC Expert Consensus Decision Pathway on Management of Heart Failure With Preserved Ejection Fraction: A Report of the American College of Cardiology Solution Set Oversight Committee. J Am Coll Cardiol 2023; 81(18):1835-1878.
4. Robinson S, Ring L, Oxborough D, et al. The assessment of left ventricular diastolic function: guidance and recommendations from the British Society of Echocardiography. Echo Res Pract 2024; 11(1):16.

Curriculum Vitae

Minjung Bak *(Sungkyunkwan Univ.)*

Brief Introduction of Yourself

Educational Background

2020-2022	Master Degree, Medical School of Sungkyunkwan University
2010-2014	Medical School of Sungkyunkwan University
2004-2009	Korea Advanced Institude of Sience and Technology (KAIST)
2002-2004	Korea Science Academy of KAIST (KSA)

Graduate Training

2014.3-2015.2	Internship, Samsung Medical Center, Seoul, Republic of Korea
2016.3-2020.2	Residency in Internal Medicine, Samsung Medical Center, Seoul, Republic of Korea
2020.2-2023.2	Cardiology Fellow, Division of Cardiology, Samsung Medical Center
2023.3-2025.2	Clinical Assistant Professor, Division of Cardiology, Samsung Medical Center
2025.3-Present	Clinical Assistant Professor, Division of Cardiology, Korea University Guro Hospital

Honors & Awards & Patents

2020, 2021, 2022, 2024	The Korean Society of Echocardiography, Young Investigator's Award Final List
2021, 2022, 2024	The Korean Society of Cardiology, Young Investigator's Award Final List
2023	Heart Failure Seoul, Best Oral Presentation, 1st Grade

Representative Publications

1. MJ Bak*, SJ P, DS Jeong, et al. Predictor of Atrial Fibrillation Recurrence in Patients Who Underwent a Tricuspid Valve Operation With Modified Cox Maze procedure. Echocardiography Journal. 2022. Accepted (first-author).
2. KH Choi*, YB Song, DS Jeong, MJ Bak, et al. Differential effects of dual antiplatelet therapy in patients presented with acute coronary syndrome vs. stable ischaemic heart disease after coronary artery bypass grafting. Eur Heart J Cardiovasc Pharmacother. 2021 Nov 3;7(6):517-526.
3. Min-Jung Bak, Kyoung-Min Park, et al. Clinical Significance of Ventricular Premature Contraction Provoked by the Treadmill Test. Medicina 2022, Volume 58, Issue 4, 556.
4. Minjung Bak, Darae Kim et al. Prognostic implication of longitudinal changes of left ventricular global strain after chemotherapy in cardiac light chain amyloidosis. Front. Cardiovasc. Med., 24 June 2022.
5. MJ Bak*, SJ P et al. Risk factors and clinical effects of subclinical leaflet thrombosis after transcatheter aortic valve replacement. Front. Cardiovasc. Med., 14 Nov. 2022.

Which Echocardiography Findings Can Be Treated with Cutting-Edge Structural Interventions?

Minjung Bak

Sungkyunkwan Univ.

The evolution of structural heart interventions has transformed the management of valvular and structural cardiac diseases, particularly in patients at high or prohibitive surgical risk. Echocardiography plays a central role in identifying intervention-worthy findings, assessing anatomical feasibility, and guiding procedures in real time.

This lecture will focus on key echocardiographic findings that inform and support transcatheter structural interventions, including:

- **Aortic Stenosis:** Assessment of severity using velocity, gradient, and valve area, as well as annular sizing crucial for transcatheter aortic valve replacement (TAVR).
- **Mitral Regurgitation:** Identification of leaflet pathology, flail segments, coaptation gaps, and posterior leaflet length to determine candidacy for transcatheter edge-to-edge repair (TEER).
- **Paravalvular Leaks and Septal Defects:** Localization and quantification of defects using 2D and 3D transesophageal echocardiography (TEE) to facilitate device closure.

Special emphasis will be placed on the role of **3D transesophageal echocardiography** and **multiplanar reconstruction**, which are essential for procedural planning and intraprocedural guidance. The integration of multimodality imaging particularly cardiac CT will also be discussed for preprocedural planning and anatomical assessment.

This session will illustrate how echocardiographic findings directly guide structural interventions, enabling tailored, patient-centered treatment strategies in contemporary cardiology.

Curriculum Vitae

Ario Soeryo Kuncoro *(Heartology Cardiovacular Center, Indonesia)*

Brief Introduction of Yourself

Educational Background and Professional Experience

Senior cardiologist consultant with subspecialty in echocardiography. Teaching students, cardiology residents and supervisor in fellowship program in advance echocardiography training.

Structural heart disease consultant for interventional procedural related to congenital heart disease device closures. Valves intervention, surgical procedures and EP procedures.

Head of national board exam team under Indonesia National Health College of Cardiology.

Member of Indonesia Society of Echocardiography (immediate past president) and Working Group of Echocardiography - Indonesia Heart Association.

Research Interests

- Strutural Heart Disease, Intervention for Valves Disease
- Screening for Rheumatic Heart Disease (Collaboration of World Heart Federation- Indonesia Heart Foundation)

Representative Publications

1. Characteristics and Problems of Rheumatic Heart Disease in Indonesia: The Ina-RHD Multicenter Study.Soesanto AM, Almazini P, Ariani R, Rudiktyo E, Ardini TW, Mumpuni H, Lefi A, Ghaznawie AF, Sari NMAW, Yanni M, Purwaningtyas N, Harjoko RP, Hasan M, Nauli SE, Laitupa FS, Muchtar N, Karolina W, Puspita I, Haezer Reppi GE, Syahlul DE, Rahmianti ND, Minaswary R, Hanifah Y, Kuncoro AS.JACC Asia. 2025 Apr 25:S2772-3747(25)00199-1. doi: 10.1016/j.jacasi.2025.03.010. Online ahead of print.PMID: 40366320
2. The Influence of Special Military Training on Left Ventricular Adaptation to Exercise in Elite Air Force Soldiers; Junianto I, Soesanto AM, Radi B, Yonas E, Kuncoro AS, Atmadikoesoemah CA, Sakti DDA. J Cardiovasc Echogr. 2023 Apr-Jun;33(2):69-75. doi: 10.4103/jcecho.jcecho_67_22. Epub 2023 Aug 14. PMID: 37772047
3. Post-Bentall procedure 'pseudo' pulmonary embolism, cardiac tamponade in disguise: a case report. Kuncoro AS, Wijaya R, Wartono DA, Adiarto S. Eur Heart J Case Rep. 2023 Mar 2;7(3):ytad071. doi: 10.1093/ehjcr/ytad071. eCollection 2023 Mar. PMID: 37006800 Chronic kidney disease is independently associated with alterations in left atrial function; Kadappu, K.K, Spicer, S.T., Xuan, W., ... Suryanarayanan, G., Kuncoro, A.S. Echocardiography, 2014, 31(8), pp. 956–964
4. Two Barricades in a Row Mixed Lesion of Dynamic Left Ventricular Outflow Tract Obstruction and Aortic Stenosis: Finding the Culprit for Decision Making. Putra BE, Sukmawan R, Ariani R, Soesanto AM, Kuncoro AS. J Cardiovasc Echogr. 2020 Apr-Jun;30(2):104-109. doi: 10.4103/jcecho.jcecho_58_19. Epub 2020 Aug 17. PMID: 33282649

How Should We Evaluate Tricuspid Valve Regurgitation That Arise from Different Etiologies?

Ario Soeryo Kuncoro

Heartology Cardiovacular Center, Indonesia

Tricuspid valve is valve which play important role in cardiac hemodynamic as important as other valve. For many years tricuspid valve was deemed "less" important or not much crucial in roles compare to mitral or aortic valve. In the recent years, tricuspid is no longer consider insignificant.

Defect or impairment of tricuspid valve cause death and disability. Tricuspid regurgitation is considered independent predictor of death. Isolated management to tricuspid therefore can be a major aim in selected patients to prevent mortality and reduce morbidity. Decision making in type of tricuspid management rely on accurate diagnostic approach. Echocardiography therefore is the main diagnostic tool for screening.

Tricuspid valve has complex anatomy and unique subvalvular apparatus configuration. In certain disease mechanism, transtorachic echocardiography may not be sufficient to detect pathological etiology. Transesophageal echocardiography , preferably with 3D capability maybe important.

this lecture will explain more about how echocardiography can visualized tricuspid valve and its supporting apparatus. 3D echocardiography and conventional 2D echocardiography will also be discussed.

Mechanism of tricuspid valve disease can be vary , therefore this lecture will also explain and show cases of Tricuspid valve for learning purposes. Echocardiography technique required to evaluate will also be discussed in this part of lecture. Tricuspid regurgitation as one of the most common impairment will be thoroughly discussed.

Etiology of tricuspid regurgitation can be classified as primary , secondary and regurgitation associated with pacemaker/defibrillator lead. Echocardiography assessment both 2D and 3D will be explained , including role of transesophageal echocardiography. Some parameters from echocardiography (or other imaging modalities) is important to define atrial functional from ventricular functional Tricuspid regurgitation. The management strategy of these 2 etiology can be different therefore role of echocardiography is important.

The current emerging Transcatheter intervention for tricuspid realizing the importance of echocardiography for pre procedural screening , guidance tool (intra procedural) and evaluation. Severity evaluation of both stenosis and regurgitation will also be discussed especially quantification criteria for objective severity of the disease. Newer classification for regurgitation will be the main point since successful criteria solely rely on these measurement .

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2. Muraru D, Hahn RT, Soliman O et al . 3-Dimensional echocardiography Imaging the Tricuspid Valve . JACC Imaging vol 12 no 3
3. Ancona F,Agricola E,Stella S et al .Interventional imaging of the Tricuspid Valve. Intervent Cardiol Clin 7 (2018) 13-29
4. Muraru D, Badano LP, Hahn RT et al .Atrial secondary tricuspid regurgitation: pathophysiology, definition, diagnosis, and treatment. European Heart Journal 2024;45:895-911
5. Badano LP, Tomaselli M, Muraru D et al. Advances in the Assessment of Patient with

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Bridging Clinical Ultrasound Research and Practice for a Healthier Future

ROOM 1

Thyroid Ultrasound

Chairs: ***Young Sik Choi*** *(Samsung Internal Medicine MRI Image Informatics),*
Ho-Cheol Kang *(Chonnam National Univ.)*

1. **Current Role of Ultrasound in Thyroid Clinics**
   Tsukasa Murakami (Noguchi Thyroid Clinic and Hospital Foundation, Japan)
2. **Role of Ultrasonography in the Active Surveillance of Papillary Thyroid Microcarcinoma**
   Bo Hyun Kim (Pusan National Univ.)
3. **Decision in Indeterminate Thyroid Nodules Using Ultrasonography**
   Dong Yeob Shin (Yonsei Univ.)

Curriculum Vitae

Tsukasa Murakami
(Noguchi Thyroid Clinic and Hospital Foundation, Japan)

Brief Introduction of Yourself

Educational Background and Professional Experience

1982 Graduated from Ehime University School of Medicine
1982- The Affiliated Hospital Ehime University School of Medicine
1985- Noguchi Thyroid Clinic and Hospital Foundation
1990- The Affiliated Hospital Ehime University School of Medicine
1996- Noguchi Thyroid Clinic and Hospital Foundation
2017- President, Noguchi Thyroid Clinic and Hospital Foundation
2024- Honorary President, Noguchi Thyroid Clinic and Hospital Foundation

Research Interests

Thyroid Ultrasonography, Hyperthyroidism, Thyroid Eye Disease

Representative Publications

1. Nishijima Y, Murakami T, Higaki N, et al. The prognosis of severe subclinical hyperthyroidism with TSH below 0.1 μU/mL due to Graves' disease in the Japanese population. Endocrine J 2025. https://doi.org/10.1507/endocrj.EJ24-0424
2. Murakami T, Higaki N, Nishijima Y, et al. An easy approach to ultrasonographic volumetry of the thyroid. Endocr J. 2024; 71: 617-621.
3. Arimitsu H, Nishijima Y, Higaki N, Noguchi H, Uchino S, Murakami T. A case report of anaplastic thyroid carcinoma transformed from small papillary carcinoma successfully detected by ultrasonography in its early stage with review of literature. Endocrine J 2023; 70: 1097-1101.
4. Shimura H, Matsumoto Y, Murakami T, et al. Diagnostic Strategies for Thyroid Nodules Based on Ultrasonographic Findings in Japan. Cancers 2021, 13, 4629. https://doi.org/10.3390/cancers13184629.

Current Role of Ultrasound in Thyroid Clinics

Tsukasa Murakami

Noguchi Thyroid Clinic and Hospital Foundation, Japan

1. Ultrasound Diagnostic Criteria in Japan

By accumulation of detailed observations of many patients with thyroid nodules in our hospital, we revealed that calcification, irregular shape, solid structure, lack of marginal hypoechoic zone, and low echogenicity are significant signs indicative of papillary thyroid cancer (PTC) 1-3) by the 1990s. Around 2003 to 2005, we participated in a multicenter study conducted to establish diagnostic criteria for ultrasonographic examination of PTC4). Based on the results of this study, the Japan Society of Ultrasonics in Medicine (JSUM) released ultrasound diagnostic criteria for thyroid nodules5) in 2011. The JSUM criteria included irregular shape, ill-defined and jagged border, low and heterogeneous internal echo, multiple fine strong echoes, and irregular marginal hypoechoic zones or lack of marginal zones as findings of malignant nodules5). Logistic regression analysis applied to our patients with benign nodules or PTC revealed that multiple fine strong echoes, irregular shape, low echogenicity, and lack of marginal hypoechoic zones were significant findings for PTC. When nodules with three or four findings out of these were diagnosed as malignant, sensitivity and specificity for diagnosing PTC was 82.5% and 93.5%, respectively.

2. Anaplastic Thyroid Cancer Found during Observation of Small PTC

Active surveillance for low-risk papillary microcarcinoma (PMC) without immediate surgery is now well established strategy around the world. Ultrasound (US) plays a very important role in active surveillance. Small PTC, which is strictly not indication of active surveillance, also may be observed without surgery by various reasons. Recently we encountered an 82-year-old woman who developed anaplastic thyroid cancer (ATC) transformed from small PTC6). She had preferred observation without surgery because of her advanced age and concomitant chronic kidney disease. We found the apparent change in shape and size of her nodule during observation by US and ATC was diagnosed by immediate fine-needle aspiration cytology (FNAC). When patients with PTC are observed without surgery, change in shape as well as diameter of the nodule should be carefully evaluated. Also FNAC should be performed immediately in this situation.

3. Easy Volumetry of Diffuse Goiter

In Japan, no common methods for volumetry of diffuse goiter are shared among endocrinologists and general practitioners. We reported that the products of depth and width of the right thyroid lobe were well correlated with the weight obtained from operative records in the patients with Graves' disease7). This easy approach to ultrasonographic volumetry of the thyroid might contribute as common tools to describe size of the thyroid among doctors. Estimated upper limit of the products of depth and width of the healthy subjects was 3.8 cm2. This index can be used to discriminate between normal thyroid and diffuse goiter during medical check-ups.

References

1. Murakami T, et al. Ultrasonographic diagnosis of solitary thyroid nodule. Jpn J Med Ultrasonics 1987;14:126-33. (in Japanese)
2. Murakami T, et al. Ultrasonographic diagnosis of nodular goiter. Jpn J Med Ultrasonics 1988;15:264-72. (in Japanese)
3. Murakami T. Ultrasonography. In: Clark OH and Noguchi S (eds.), Thyroid Cancer –Diagnosis and Treatment- pp.209-25. St. Louis: Quality Medical Publishing Inc. 2000.
4. Shimura H, et al. Distinct diagnostic criteria for ultrasonographic examination of papillary thyroid carcinoma: A multicenter study. Thyroid 2005;15:251-8.
5. Terminology and diagnostic criteria committee, Japan Society of Ultrasound in Medicine. Draft of ultrasound diagnostic criteria for thyroid nodule. Jpn J Med Ultrasonics 2011;38:669-70.
6. Arimitsu H, et al. A case report of anaplastic thyroid carcinoma transformed from small papillary carcinoma successfully detected by ultrasonography in its early stage with review of literature. Endocr J 2023;70:1097-101.
7. Murakami T, et al. An easy approach to ultrasonographic volumetry of the thyroid. Endocr J 2024;71:617-21.

Curriculum Vitae

Bo Hyun Kim *(Pusan National Univ.)*

Brief Introduction of Yourself

Educational Background & Professional Experience

1996	Pusan National University School of Medicine, Medicine, Bachelor's Degree
1999	Pusan National University School of Medicine, Medicine, Master's Degree
2010	Pusan National University School of Medicine, Internal Medicine, Ph.D.
2007-2008	Department of Endocrinology and Metabolism, Pusan St. Mary's Hospital
2009-Present	Professor, Endocrinology and Metabolism, Pusan National University Hospital

Current Academic Activities

Training Director, Korean Thyroid Association
Member, Examination Committee, Korean Endocrine Society
Member, Neuroendocrine Research Group, Korean Endocrine Society
Vice President, Busan-Ulsan-Gyeongnam Endocrine Society, Korean Endocrine Society
Academic Committee Member, Korean Society of Clinical Ultrasound

Research Interests

Thyroid Cancer, Molecular Targeted Therapy

Representative Publications

1. Preoperative controlling nutritional status score for patients with medullary thyroid cancer. Endocrine. 2025 May 10. doi: 10.1007/s12020-025-04233-8. Online ahead of print. (*corresponding author)
2. Use of Glucagon-Like Peptide-1 Receptor Agonists Does Not Increase the Risk of Cancer in Patients with Type 2 Diabetes Mellitus. Diabetes Metab J. 2025 Jan;49(1):49-59. (*corresponding author)
3. Association of the Preoperative Controlling Nutritional Status (CONUT) Score with Clinicopathological Characteristics in Patients with Papillary Thyroid Carcinoma. Endocrinol Metab (Seoul). 2024 Dec;39(6):856-863. (*corresponding author)
4. The role of the tumor microenvironment in papillary thyroid microcarcinoma nodal metastasis. Endocr Relat Cancer. 2024 Jun 18;31(8):e240040. (*corresponding author)
5. Potential impact of obesity on the aggressiveness of low- to intermediate-risk papillary thyroid carcinoma: results from a MASTER cohort study. Endocrine. 2023 Oct;82(1):134-142. (*corresponding author)

Role of Ultrasonography in the Active Surveillance of Papillary Thyroid Microcarcinoma

Bo Hyun Kim

Pusan National Univ.

The landscape of papillary thyroid microcarcinoma (PTMC) management has undergone a significant shift in recent years, with active surveillance (AS) emerging as a widely accepted alternative to immediate surgery for carefully selected low-risk patients. PTMC, defined as papillary thyroid carcinoma 1 cm or less in maximal diameter, often exhibits an indolent biological course, making AS a favorable option to avoid potential surgical complications while maintaining excellent oncologic outcomes. In this evolving paradigm, ultrasonography (US) plays an absolutely central and indispensable role, guiding decisions from initial diagnosis through ongoing monitoring and, if necessary, conversion to active treatment. This summary outlines the critical roles of US in PTMC active surveillance, drawing insights from consensus statements and recent guidelines.

1. US in Initial Diagnosis and Patient Selection

At the outset of the AS pathway, US is the primary diagnostic tool. It's crucial for the initial detection and precise characterization of thyroid nodules, allowing clinicians to identify those highly suspicious for PTMC. Beyond mere detection, US is instrumental in determining a patient's eligibility for active surveillance, a decision that hinges on a meticulous assessment of the tumor's characteristics and the absence of high-risk features. Recent guidelines emphasize a detailed US evaluation. This includes accurate measurement of the tumor's size, meticulous assessment of its morphology (e.g., shape, margins, internal echoes), and the presence or absence of microcalcifications, which are common indicators of malignancy. Furthermore, US allows for a thorough evaluation of surrounding structures to rule out extrathyroidal extension (ETE) even if microscopic or any close proximity to critical structures such as the trachea or recurrent laryngeal nerve, which could complicate future surgery or indicate a higher risk. Crucially, US is also used to screen for suspicious cervical lymphadenopathy and any signs of distant metastasis, which would typically exclude a patient from AS. Only patients with unifocal, low-risk PTMCs, without these concerning features identified by US, are considered suitable candidates for active surveillance.

2. US in Ongoing Monitoring and Progression Assessment

Once a patient is enrolled in an AS program, serial US examinations become the cornerstone of their management. The primary goal of these regular scans is to vigilantly monitor the PTMC for any signs of progression, allowing for timely intervention if the tumor's behavior changes. Guidelines typically recommend a structured follow-up schedule, often starting with US examinations every 6 months, and then potentially extending to annual scans if the tumor remains stable. During these follow-up visits, the sonographer meticulously re-evaluates the previously identified PTMC. The most significant criterion for defining disease progression is a size increase of the tumor. This is commonly defined as an increase in the maximal diameter by 3 mm or more, a 50% or greater increase in its volume or diameter, or growth exceeding the 1 cm threshold. Beyond size, clinicians also vigilantly watch for the appearance of new suspicious US features. This includes any new evidence of definite ETE, the development of new suspicious LN metastases, or the emergence of other suspicious nodules within the thyroid gland. If any of these progression criteria are met, or if significant patient anxiety prompts a change in management, the decision to convert from AS to active treatment (typically surgery) is carefully considered.

3. Broader Impact and Key Considerations

The profound impact of US in PTMC active surveillance extends beyond just diagnostic and monitoring capabilities. It plays a pivotal role in patient safety by preventing unnecessary surgical procedures, thereby avoiding the associated risks of general anesthesia, voice changes due to recurrent laryngeal nerve injury, or hypoparathyroidism. By demonstrating the stability of the PTMC visually, US also provides crucial psychological reassurance to patients, fostering confidence in the AS approach and alleviating the anxiety often associated with an untreated cancer diagnosis. Its non-invasive nature further minimizes patient burden and discomfort.

However, the effectiveness of AS heavily relies on high-quality, standardized US examinations performed by experienced sonographers. The ability to accurately measure minute changes in tumor size and to consistently identify subtle suspicious features is paramount. While highly effective, some guidelines acknowledge the ongoing need for further research to refine US measurement techniques, such as the reliability of tumor volume assessment, and to better understand the long-term implications of very slow growth rates.

In conclusion, guided by the robust frameworks provided by recent guidelines of medical societies, ultrasonography has cemented its position as the indispensable cornerstone of active surveillance for PTMCs. Its unparalleled ability to precisely diagnose, meticulously monitor, and accurately assess the progression of PTMCs enables individualized patient care, significantly reduces the burden of overtreatment, and ensures optimal oncologic outcomes. The continued success of AS programs worldwide is inextricably linked to the rigorous and expert application of US throughout the patient's journey.

Curriculum Vitae

Dong Yeob Shin *(Yonsei Univ.)*

Brief Introduction of Yourself

Educational Background

1994.3-2001.2	Bachelor Degree, Yonsei University College of Medicine, Seoul, Korea
2007.3-2009.2	Master's Degree of Medical Science, Yonsei University College of Medicine, Seoul, Korea
2016	Ph.D. in Medicine, Yonsei University College of Medicine, Seoul, Korea

Training and Employment

2004.3-2005.2	Internship, Severance Hospital, Yonsei University College of Medicine, Seoul, Korea
2005.3-2009.2	Residency, Severance Hospital, Department of Internal Medicine, Yonsei University College of Medicine, Seoul, Korea
2009.3-2010.2	Clinical and Research Fellowship, Severance Hospital, Division of Endocrinology, Department of Internal Medicine, Yonsei University College of Medicine, Seoul. Korea
2010-2016	Assistant Professor, Division of Endocrinology, Department of Internal Medicine, Yonsei University College of Medicine, Seoul. Korea
2016-2024	Associate Professor, Division of Endocrinology, Department of Internal Medicine, Yonsei University College of Medicine, Seoul. Korea
2024-Present	Professor, Division of Endocrinology, Department of Internal Medicine, Yonsei University College of Medicine, Seoul. Korea

Research Interests

Thyroid Diseases, Thyroid Cancers, Endocrinology, Dyslipidemia

Representative Publications

1. Prognostic Roles of Inflammatory Biomarkers in Radioiodine-Refractory Thyroid Cancer Treated with Lenvatinib. Kim CA, Kim M, Jin M, Kim HK, Jeon MJ, Lim DJ, Kim BH, Kang HC, Kim WB, Shin DY, Kim WG. Endocrinol Metab (Seoul). 2024 Apr;39(2):334-343.
2. Phase 3 Trial of Selpercatinib in Advanced RET-Mutant Medullary Thyroid Cancer. Hadoux J, Elisei R, Brose MS, Hoff AO, Robinson BG, Gao M, Jarzab B, Isaev P, Kopeckova K, Wadsley J, Führer D, Keam B, Bardet S, Sherman EJ, Tahara M, Hu MI, Singh R, Lin Y, Soldatenkova V, Wright J, Lin B, Maeda P, Capdevila J, Wirth LJ; LIBRETTO-531 Trial Investigators. N Engl J Med. 2023 Nov 16;389(20):1851-1861.
3. Inflammatory biomarkers predict outcomes of patients with radioactive iodine refractory thyroid cancer treated with sorafenib. Jin M, Kim M, Jeon MJ, Kim EY, Shin DY, Kim BH, Kim WB, Shong YK, Lim DJ, Kim WG. Endocrine. 2023 Aug;81(2):298-305.
4. Lenvatinib Compared with Sorafenib as a First-Line Treatment for Radioactive Iodine-Refractory, Progressive, Differentiated Thyroid Carcinoma: Real-World Outcomes in a Multicenter Retrospective Cohort Study. Kim M, Jin M, Jeon MJ, Kim EY, Shin DY, Lim DJ, Kim BH, Kang HC, Kim WB, Shong YK, Kim HK, Kim WG. Thyroid. 2023 Jan;33(1):91-99.

Decision in Indeterminate Thyroid Nodules Using Ultrasonography

Dong Yeob Shin

Yonsei Univ.

Indeterminate thyroid nodules, often classified as Bethesda category III or IV on cytology, pose a significant diagnostic challenge due to their uncertain risk of malignancy. In recent years, ultrasonography has emerged as a critical tool in stratifying malignancy risk and guiding clinical decisions in these ambiguous cases. This lecture will explore the role of ultrasonographic features including echogenicity, margins, calcifications, shape, and vascularity in the evaluation of indeterminate thyroid nodules. We will review major ultrasound risk stratification systems such as K-TIRADS, focusing on their practical application and limitations. Case-based examples will illustrate how ultrasound findings can influence decisions regarding repeat fine-needle aspiration, molecular testing, or surgical intervention. Special attention will be given to integrating ultrasound data with cytologic, clinical, and molecular information to optimize patient management.

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Bridging Clinical Ultrasound Research and Practice for a Healthier Future

ROOM 1

Pancreatobiliary Ultrasound

Chairs: ***Jong Ho Moon*** *(Soonchunhyang Univ.),*
Sang Hyub Lee *(Seoul National Univ.)*

1. **Endoscopic Ultrasound in Differential Diagnosis of Pancreas Mass**
   Yun Nah Lee (Soonchunhyang Univ.)
2. **Transabdominal Ultrasound for the Diagnosis and Follow-Up Strategy of Pancreatobiliary Cystic Lesions**
   Song-Ee Baek (Yonsei Univ.)
3. **Advances in Endoscopic Ultrasound-Guided Therapies of Pancreatobiliary Disease**
   Min Jae Yang (Ajou Univ.)

Curriculum Vitae

Yun Nah Lee *(Soonchunhyang Univ.)*

Brief Introduction of Yourself

Educational Background

2000.3-2003.2 Premedical Course, SoonChunHyang University of College of Medicine, Korea
2004.3-2006.2 M.D., School of Medicine, SoonChunHyang University of College of Medicine, Korea
2008.9-2010.8 M.M.S., Graduate School Master Course SoonChunHyang University School of Medicine, Korea
2014.3-2018.2 Ph.D., Graduate School, Ph.D. Course SoonChunHyang University of School of Medicine, Korea

Professional Experience

2011.3-2013.2 Fellowship, Gastroenterology, SoonChunHyang University Hospital, Bucheon, Korea
2013.3-2015.2 Clinical Assistant Professor, Gastroenterology SoonChunHyang University Hospital, Bucheon, Korea
2015.3-2020.2 Assistant Professor, Division of Gastroenterology, Department of Internal Medicine, SoonChunHyang University Hospital, Bucheon, Korea
2020.3-Present Associate Professor, Division of Gastroenterology, Department of Internal Medicine, SoonChunHyang University Hospital, Bucheon, Korea
2025.3-Present Professor, Division of Gastroenterology, Department of Internal Medicine, SoonChunHyang University Hospital, Bucheon, Korea

Research Interests

ERCP, Peroral Cholangioscopy, EUS

Representative Publications

1. Lee YN, Moon JH, Choi HJ, Lee TH, Choi HJ, Itoi T, Beyna T, Neuhaus H. Prospective randomized trial of a new multibending versus conventional ultra-slim endoscope for peroral cholangioscopy without device or endoscope assistance (with video). Gastrointest Endosc 2020;91:92-101.
2. Lee YN, Moon JH, Choi HJ, JK Park, Cho SJ, Lee TH, Cha SW, Cho YD, Park SH. Preliminary study of a modified, nonflared, short, fully covered metal stent for refractory benign pancreatic duct strictures (with videos). Gastrointest Endosc 2020;91:826-33.
3. Lee YN, Moon JH, Choi HJ, Lee TH, Choi MH, Cha SW, Cho YD, Park SH. Tissue acquisition for diagnosis of biliary strictures using peroral cholangioscopy or endoscopic ultrasound-guided fine-needle aspiration. Endoscopy 2019;51:50-59.
4. Lee YN, Moon JH, Choi HJ, Kim HS, Choi MH, Kim DC, Lee TH, Cha SW, Cho YD, Park SH. A newly modified access balloon catheter for direct peroral cholangioscopy by using an ultraslim upper endoscope (with videos). Gastrointest Endosc 2016;83:240-24.

Endoscopic Ultrasound in Differential Diagnosis of Pancreas Mass

Yun Nah Lee

Soonchunhyang Univ.

Pancreatic masses represent a broad spectrum of pathologies, ranging from benign conditions such as autoimmune pancreatitis to malignant entities including pancreatic ductal adenocarcinoma (PDAC) and neuroendocrine tumors. Accurate differentiation is essential to guide appropriate management and avoid unnecessary interventions. Among imaging modalities, endoscopic ultrasound (EUS) plays a central role in the diagnostic workup of pancreatic masses due to its ability to provide high-resolution images and detailed anatomical information.

EUS offers superior resolution compared to transabdominal ultrasound, computed tomography (CT), and magnetic resonance imaging (MRI), particularly for small or isoattenuating lesions. In recent years, the addition of functional imaging techniques such as contrast-enhanced EUS (CE-EUS) and EUS elastography has significantly enhanced diagnostic accuracy. CE-EUS allows for real-time assessment of lesion vascularity, aiding in the differentiation between inflammatory and neoplastic masses. Malignant lesions typically show hypoenhancement with irregular vascular patterns, whereas inflammatory lesions may exhibit homogeneous or hyperenhanced features.

EUS elastography evaluates tissue stiffness, which can be quantified or assessed qualitatively. Malignant masses generally appear harder on elastography compared to benign conditions. This modality is particularly useful in distinguishing PDAC from focal chronic pancreatitis or autoimmune pancreatitis, which can appear similar on conventional imaging. The integration of CE-EUS and elastography provides a noninvasive, dynamic assessment of lesion characteristics, improving diagnostic confidence even in challenging cases.

Autoimmune pancreatitis, often a diagnostic mimic of PDAC, demonstrates characteristic EUS findings such as diffuse gland enlargement, hypoechoic parenchyma, and a capsule-like rim. These features, when combined with serologic and clinical findings, support a non-malignant diagnosis and can help avoid unnecessary surgery.

Beyond differential diagnosis, EUS also contributes to staging by enabling detailed assessment of

peripancreatic vasculature and lymph nodes. This is critical for surgical planning and prognosis in patients with suspected malignancy. Furthermore, EUS-guided interventions such as celiac plexus neurolysis for pain management in pancreatic cancer further extend the clinical utility of EUS.

In summary, EUS is a powerful tool for the differential diagnosis of pancreatic masses. Through detailed anatomical visualization and advanced functional techniques such as CE-EUS and elastography, EUS enhances diagnostic accuracy and supports clinical decision-making in complex pancreatic diseases. As technology evolves, the role of EUS in noninvasive diagnostic pathways is expected to grow further.

Curriculum Vitae

Song-Ee Baek *(Yonsei Univ.)*

Brief Introduction of Yourself

Prof. Baek graduated Yonsei University college of Medicine at 2004. She did internship, residency and abdominal radiology fellowship training at the Severance Hospital, Yonsei University Health System.
She also worked as research fellow at department of radiology, division of abdominal radiology of Duke in USA.

She started work as clinical assistant professor, division of abdominal imaging at Severance Hospital since 2014. She worked as clinical assistant professor in division of emergency imaging/abdominal imaging at the same hospital from 2019 to now.

Currently, She is a clinical professor in division of emergency imaging/abdominal imaging at the Severance hospital that one of the biggest tertiary hospital in Korea.

Research Interests

Hepatopancreatobiliary Imaging, Emergency Imaging, AI

Representative Publications

1. Doo Young Lee, Jaeseung Shin, Sungwon Kim, Song-Ee Baek, Suji Lee, Nak-Hoon Son, Mi-Suk Park; Radiomics model versus 2017 revised international consensus guidelines for predicting malignant intraductal papillary mucinous neoplasm, European Radiology 34:1222–1231 2024.
2. So Yeon Choi, Arom Choi, Song-Ee Baek, Jin Young Ahn, Yun Ho Roh, Ji Hoon Kim; Effect of multimodal diagnostic approach using deep learning-based automated detection algorithm for active pulmonary tuberculosis, Scientific Reports volume 13, Article number: 19794 2023.
3. Ji Hoon Kim, Song-Ee Baek, Young Jin Kim, Young Joo Suh; Coronary CTA for Acute Chest Pain in the Emergency Department: Comparison of 64–Detector-Row Single-Source and Third-Generation Dual-Source Scanners, AJR 221:80 -91 2023.
4. Chang Gon Kim, Moonki Hong, Hei-Cheul Jeung, Garden Lee, Hyun Cheol Chung, Sun Young Rha, Hyo Song Kim, Choong-kun Lee, Ji Hyun Lee, Yejeong Han, Jee Hung Kim, Seo Young Lee, Hyunki Kim, Su-Jin Shin, Song-Ee Baek, Minkyu Jung; Hyperprogressive disease during PD-1 blockade in patients with advanced gastric cancer, European Journal of Cancer 172 387-399 2022.
5. Kim, Ji Hoon; Han, Sang Gil; Cho, Ara; Shin, Hye Jung; Baek, Song-Ee; Effect of deep learning-based assistive technology use on chest radiograph interpretation by emergency department physicians: a prospective interventional simulation-based study, BMC Medical Informatics and Decision Making, 21, 1-9, 2021.

Transabdominal Ultrasound for the Diagnosis and Follow-Up Strategy of Pancreatobiliary Cystic Lesions

Song-Ee Baek

Yonsei Univ.

In this lecture, I'll focus on pancreas cystic lesions.

Incidental cysts in the pancreas are encountered in approximately 2.4%–13.5% of patients who undergo abdominal imaging for non-pancreatic related indications.[1] A challenge faced by physicians is that these lesions often have similar imaging appearances, particularly when they are small, as is often the case with the majority of these lesions. Assessing the risk of a single pancreatic cyst developing into invasive cancer can be challenging, and the presence of an IPMN may portend an increased risk of invasive pancreatic cancer at disparate sites within the pancreas. When we know the cystic lesion's subtype, we can make treatment and f/u strategy more easily. Several pathologic types of pancreatic cystic lesions ranges from benign entities (pseudocyst,inflammatory cyst) to potentially malignant neoplasms (mucinous neoplasm [MCN], intraductal papillary mucinous neoplasm [IPMN]) and frankly malignant tumors (solid pseudopapillary neoplasm [SPN], pancreatic neuroendocrine tumor [PNET], and ductal adenocarcinoma).

Expert panels have developed societal guidelines, based on a consensus, for surveillance of these lesions. However, these guidelines are often inconsistent and are constantly evolving as additional scientific data are accumulated. Identification of features associated with increased risk of malignancy is important for proper management.

High-risk features included the presence of enhancing mural nodules or solid components, dilatation of the main pancreatic duct (greater than 5 mm), abrupt change in the diameter of the pancreatic duct, cyst size larger than 3–4 cm, interval growth, and positive cytology on fluid aspiration.

When high-risk features are present, it is recommended that patients be referred to a specialty pancreatic center for further work-up, including EUS, EUS with fine-needle aspiration, or surgical resection. If high-risk features are not present and the patient is willing to undergo surveillance, follow-up imaging is prudent. Patients with advanced age or comorbidities that preclude surgical resection, or

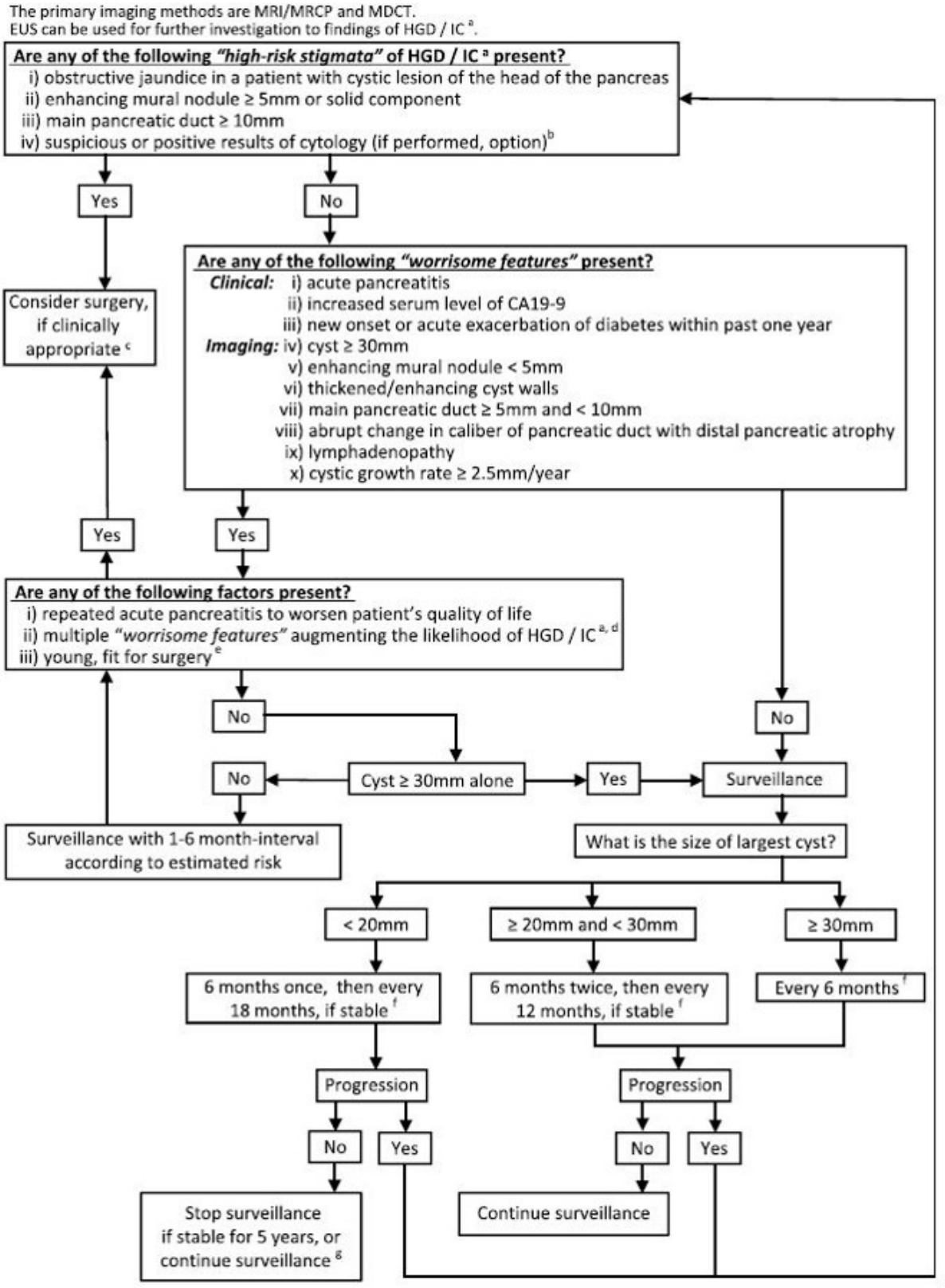
Typical Demographic, Morphologic, and Biochemical or Molecular Features of Pancreatic Cystic Lesions

Feature	SCA	MCN	SPN	Cystic PNET	IPMN
Gender	More common in females than in males	Almost exclusively in females	More common in females than in males	Equally common in males and females	Equally common in males and females
Age (decade)	Variable, usually 5th–7th decade ("grandmother" lesion)	Variable, usually 4th–5th decade ("mother" lesion)	2nd–4th decade* ("daughter" lesion)	5th–6th decade	Variable, usually 6th–7th decade
Location	More common in head than in body and tail	Body and tail	Body and tail	Body and tail	BD: all regions
Morphology	Classic microcystic or "honeycomb" appearance, lobulated	Few large cysts, cyst within cyst, thick wall with or without septa	Cystic and/or solid* (necrosis or hemorrhage), oval, large*	Cystic and solid (degeneration and/or necrosis)	BD: dilated side branch MD: segmental or diffuse dilatation of PD
Cyst size	<2 cm	>2 cm	Variable	Variable	Variable
Number of loculations or cysts	>6	<6	Unilocular, thick capsule	Unilocular, thick enhancing wall*	BD: variable
CT	Multicystic, lobulated with enhancing septa	Few cysts with occasional mural nodule and/or septa	Heterogeneous solid and/or cystic with hyperattenuating areas from hemorrhage	Cystic with smooth margins, hypervascular peripheral rim	BD: cysts communicate with PD MD: segmental or diffuse dilatation of PD
MRI	T1W: low SI T2W: high SI Central scar	T1W: usually low SI T2W: high SI; may have thick enhancing walls, septa, and/or nodules	T1W and T2W: variable owing to internal necrosis and hemorrhage*	T1W: low SI T2W: high SI Hypervascular peripheral rim	T1W: low SI T2W: high SI Enhancing nodules increase likelihood of malignancy
Calcification	30%–40% involve central scar	Up to 25%, wall or septal	Up to 30%, predominantly peripheral and punctate	May be present	Can be seen, likely related to mucin
MPD communication	No	No	No	No	Yes
Molecular analysis	*VHL* positive	*KRAS, RNF3* positive (*GNAS* negative)	*CTNNB1* positive	*MEN1, DAXX, ATRX* positive	*KRAS, GNAS, RNF43* positive
Fluid analysis	Low CEA, low amylase, high VEGF	Mucinous, high CEA,* variable amylase	Low CEA, low amylase	Low CEA, low amylase	Mucinous, high CEA,* high amylase

Sources.—References 8, 12–15.
Note.—BD = branch duct, CEA = carcinoembryonic antigen, MD = main duct, PD = pancreatic duct, SCA = serous cystadenoma, SI = signal intensity, T1W = T1-weighted MRI, T2W = T2-weighted MRI, VEGF = vascular endothelial growth factor.
*Feature is classically associated with the given tumor type.

[2]RadioGraphics 2022; 42:87–105

those who decline surgical resection, should be excluded from follow-up imaging.



[3]Pancreatology 24 (2024) 255e270

Table 3. Approach to Surveillance of Low-Risk Pancreatic Cystic Lesions

Cyst diameter	ACG	AGA	European	IAP/Fukuoka[a]	Cyst diameter	ACR[b]
<1 cm	MRI every 2 y × 4 y	MRI/CT at 1 y then every 2 y × 5 y	MRI ± EUS every 6 mo × 1 y then every 12 mo until no longer surgical candidate	MRI/CT at 6 mo then every 2 y	<1.5 cm	MRI/EUS/CT every 1 y × 5 then every 2 y × 2
1-2 cm	MRI every 1 y × 3 y then MRI every 2 y × 4 y			MRI/CT every 6 mo × 1 y then every 1 y × 2 y then every 2 y	1.5-1.9 cm With main PD communication	MRI/CT/EUS every 1 y × 5 then every 2 y × 2
2-3 cm	MRI or EUS every 6-12 mo × 3 y then MRI every 1 y × 4 y			EUS in 3-6 mo then EUS alternate with MRI every 1 y	2.0-2.5 cm With main PD communication	MRI/CT/EUS every 6 mo × 4 then every 1 y × 2 then every 2 y × 3
					1.5-2.5 cm Without main PD communication	MRI/CT/EUS every 6 mo × 4 y then every 1 y × 2 then every 2 y × 3
					>2.5 cm	MRI/CT/EUS every 6 mo × 4 then every 1 y × 2 then every 2 y × 3
>3 cm	MRI alternate with EUS every 6 mo × 3 y then MRI alt with EUS every 1 y × 4 y			MRI alternate with EUS every 3-6 mo	>2.5 cm	MRI/CT/EUS every 6 mo × 4 then every 1 y × 2 then every 2 y × 3

Abbreviations: ACG, American College of Gastroenterology; ACR, American College of Radiology; AGA, American Gastrointestinal Association; CT, computed tomography; EUS, endoscopic ultrasound; IAP, International Association of Pancreatology; MRI, magnetic resonance imaging; PD, pancreatic duct.

[a] Refers to branch duct intraductal papillary mucinous neoplasms only.

[b] Varies by age group.

[6]JAMA Surgery August 2022 Volume 157, Number 8

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4. Dong Woo Shin, International Evidence-based Kyoto Guidelines for the Management of Intraductal Papillary Mucinous Neoplasm of the Pancreas, Korean J Gastroenterol Vol. 83 No. 5, 208-215
5. Danielle E. Kruse, Erik K. Paulson, The Incidental Pancreatic Cyst: When to Worry About Cancer, Korean J Radiol 2024;25(6):559-564
6. Hassan Aziz, MD al, Comparison of Society Guidelines for the Management and Surveillance of Pancreatic Cysts, A Review, JAMA Surgery August 2022 Volume 157, Number 8

Curriculum Vitae

Min Jae Yang *(Ajou Univ.)*

Brief Introduction of Yourself

Prof. Min Jae Yang is currently an Associate Professor in the Department of Gastroenterology at Ajou University School of Medicine in Suwon, Korea. He earned his M.D. from Ajou University in 2005 and completed his Ph.D. at Ajou University School of Medicine in 2018. From August 2023 to July 2024, he served as a visiting scientist at Johns Hopkins Hospital in the United States.

His clinical and research interests focus on advanced endoscopy, with particular expertise in endoscopic ultrasound-guided interventions and enteroscope-assisted ERCP. Dr. Yang has authored 45 SCI(E)-indexed publications as either the first or corresponding author, and has contributed to five book chapters.

Research Interests

Enteroscope-Assisted ERCP, Endoscopic Ultrasound-Guided Interventions,
Percutaenous-Endoscopic Rendezvous

Representative Publications

1. Yang MJ et al. Balloon catheter-assisted rescue for misplacement of lumen-apposing stent across the pylorus in endoscopic ultrasound-guided transduodenal drainage of walled-off necrosis. Endoscopy 2024;56:E689-690.
2. Choi JI & Yang MJ et al. Bidirectional crosstalk between cancer cells and cancer-associated fibroblasts in mixed organoid system elicits transcriptomic characteristics of pancreatic cancer with potential therapeutic vulnerability. Clin Transl Med 2024;14(2):e1597.
3. Yoon SB & Yang MJ et al. Endoscopic ultrasound-rendezvous versus percutaneous-endoscopic rendezvous endoscopic retrograde cholangiopancreatography for bile duct access: Systematic review and meta-analysis. Dig Endosc 2024;36(2):129-140.
4. Kim S & Yang MJ et al. Simultaneous establishment of pancreatic cancer organoid and cancer-associated fibroblast using a single-pass endoscopic ultrasound-guided fine needle biopsy specimen. Dig Endosc 2023;35(7):918-926.
5. Yang MJ et al. Comparison between three types of needles for endoscopic ultrasound-guided tissue acquisition of pancreatic solid masses: a multicenter observation study. Sci Rep 2023;13(1):3677..

Advances in Endoscopic Ultrasound-Guided Therapies of Pancreatobiliary Disease

Min Jae Yang

Ajou Univ.

Introduction

EUS enables high-resolution, close-proximity imaging of the pancreatobiliary system, allowing for detailed evaluation of subtle structural abnormalities. Utilizing these strengths, we are able to identify a small pancreatic cancer lesion that are undetectable on CT and differentiate isoattenuating pancreatic cancer from distal bile duct cancer. Furthermore, in cases of large ampullary tumors, EUS allows for the assessment of biliary and pancreatic duct invasion before endoscopic papillectomy. Beyond visualizing lesions, EUS facilitates direct tissue acquisition for the diagnosis of pancreatic cancer, distal cholangiocarcinoma, hilar cholangiocarcinoma, intrahepatic cholangiocarcinoma, and lymph nodes around the liver hilum, along the hepatic artery, and between the IVC and aorta.

Advances in Endoscopic Ultrasound-Guided Therapies of Pancreatobiliary Disease

Interventional EUS has evolved over the past two decades, driven by advances in technology and the development of dedicated stents. In addition to diagnostic EUS and conventional EUS-FNA, the field of interventional EUS now includes EUS-FNB using advanced needles, drainage and anastomosis of the hepatobiliary and gastrointestinal tracts, as well as targeted tumor therapies.

Recent advancements in EUS-FNB using new generation end-cutting biopsy needles have further improved diagnostic accuracy by increasing tissue yield in both pancreatic and biliary cases compared to conventional FNA or first generation FNB needle. With advancements in needle design and tissue acquisition techniques, a single-pass EUS-FNB sample can now be used to establish a mixed organoid model for preclinical drug testing. This model incorporates both pancreatic cancer organoids and cancer-associated fibroblasts, which are key components of the tumor microenvironment. As a result, the role of the endoscopist is expanding into the field of precision medicine.

EUS interventions range from basic procedures such as pseudocyst drainage, to more advanced and

complex techniques including gallbladder drainage, biliary drainage, and pancreatic duct drainage. More recently, EUS-guided gastroenterostomy has emerged as a promising technique that may potentially serve as an alternative to surgery in selected patients.

Recently, with the introduction of electrocautery-enhanced lumen-apposing metal stents, the procedure has been significantly simplified in the pseudocyst and gallbladder drainage. In addition, the final stent deployment can now be performed independently by the operator without the assistance of a technician. As a result, the risk of stent misplacement has been markedly reduced.

EUS-guided hepaticogastrostomy is a technically challenging procedure performed when biliary drainage via the conventional ERCP route is not feasible. Although both the technical and clinical success rates have been reported to exceed 90%, procedure-related complications such as perihepatic biloma, liver abscess, bile peritonitis, stent migration, pneumoperitoneum, and bleeding have been reported in up to 20% of cases. Therefore, this procedure should be performed with caution by experienced endoscopists. EUS-guided pancreatic duct drainage (EUS-PD) remains one of the most technically challenging procedures due to the small diameter and limited length of the pancreatic duct. EUS-PD is typically indicated when ERCP fails or is not feasible, particularly in cases of surgically altered anatomy (SAA).

EUS-guided gastrointestinal anastomosis using a lumen-apposing metal stent (LAMS) is a minimally invasive technique for bypassing malignant or benign gastric outlet obstruction. It also enables pancreatobiliary access after Roux-en-Y gastric bypass and relieves symptoms in afferent loop syndrome. After inflating the target small bowel loop via a nasoenteric tube or balloon-occlusion catheter, free-hand insertion of the electrocautery-enhanced LAMS is performed. EUS-GE showed higher clinical success and lower rates of adverse events, reintervention, stent obstruction, and hospital stay compared to surgical gastroenterostomy and enteral stenting

Pancreatic cystic neoplasms exhibit varying degrees of malignant potential. EUS-guided cyst ablation can be performed by injecting ablative agents (ethanol or paclitaxel) or through radiofrequency ablation (RFA). Ablation is indicated for a presumed mucinous cystadenoma or intraductal papillary mucinous neoplasms (IPMNs) that are 2 to 6 cm unilocular or oligolocular without high-risk stigmata. Recent Korean data reported that the 10-year cumulative incidence rate of BD-IPMN progression was significantly lower in the EUS-ablation group than in the surveillance group.

EUS-guided RFA is a minimally invasive ablation technique used to treat neuroendocrine tumors, cystic neoplasms, inoperable pancreatic cancers, and pancreatic metastases. However, current evidence regarding its efficacy and safety remains limited. Therefore, in Korea, EUS-RFA is approved only for symptomatic insulinoma as a new medical technology.

In conclusion, translating theoretical concepts into practical methods has currently allowed EUS-guided therapies to change the management of biliopancreatic obstruction worldwide. Similarly, EUS-guided GE and local ablative therapy will also become accepted treatments over traditional approaches including surgery and endoluminal endoscopic interventions.

ISCU 2025

International Symposium of Clinical Ultrasound

in Conjunction with
2025 KACU Spring Annual Symposium

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Bridging Clinical Ultrasound Research and Practice for a Healthier Future

ROOM 1

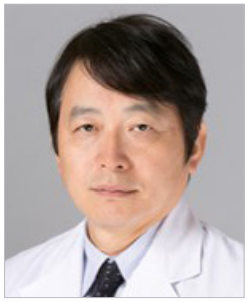
State-of-the-Art Lecture 3

Chair: Si Hyun Bae *(The Catholic Univ. of Korea)*

Hepatocellular Carcinoma Management: Integrating Ultrasound from Surveillance, Diagnosis to Treatment

Masatoshi Kudo (Kindai Univ., Japan)

Curriculum Vitae



Masatoshi Kudo *(Kindai Univ., Japan)*

Brief Introduction of Yourself

Educational Background & Professional Experience

1978	Graduated from Kyoto University
1978	Kyoto University Hospital
1979	Kobe City General Hospital
1987	University of California, Davis Medical Center
1997-Present	Professor and Chairman, Kindai University Faculty of Medicine, Department of Gastroenterology and Hepatology
2001-Present	Secretary General, JLCA
2001-Present	Representative, JLCA Head Office

Research Interests

Hepatocellular Carcinoma, Viral Hepatitis

Representative Publications

1. Kudo M†, Ren Z†, Guo Y, Han G, Lin H, Zheng J, Ogasawara S, Kim JH, Zhao H, Li C, Madccoff DC, Ghobrial RM, Kawaoka T, Gerolami R, Ikeda M, Kumada H, El-Khoueiry AB, Vogel A, Peng X, Mody K, Dutcus C, Dubrovsky L, Siegel AB, Finn RS†, Llovet JM†, and the LEAP-012 investigators: Transarterial chemoembolisation combined with Lenvatinib plus pembrolizumab versus dual placebo for unresectable, non-metastatic hepatocellular carcinoma (LEAP-012): a multicentre, randomised, double-blind, phase 3 study. Lancet 405:203-215, 2025. (†Shard 1st authors)
2. Qin S†, Chen M†, Cheng AL†, Kaseb AO†, Kudo M†, Lee HC†, Yopp AC, Zhou J, Wang L, Wen X, Heo J, Tak WY, Nakamura S, Numata K, Uguen T, Hsiehchen D, Cha E, Hack SP, Lian Q, Ma N, Spahn JH, Wang Y, Wu C, Chow PKH, for the IMbrave050 investigators: Atezolizumab plus bevacizumab versus active surveillance in patients with resected or ablated high-risk hepatocellular carcinoma (IMbrave050): a randomised, open-label, multicentre, phase 3 trial. Lancet 402:1835-1847, 2023. (†Shard 1st authors)
3. Abou-Alfa G†, Lau G†, Kudo M†, Chan SL†, Kelley RK, Furuse J, Sukeepaisarnjaroen W, Kang YK, Tu DV, De Toni E, Rimassa L, Breder V, Vasilyev A, Heurgue A, Tam V, Mody K, Thungappa SC, Ostapenko Y, Yau T, Azevedo S, Varela M, Cheng AL, Qin S, Galle P, Ali S, Marcovitz M, Makowsky M, Pharm D, He P, Kurland JF, Negro A, Sangro B: Tremelimumab plus durvalumab in unresectable hepatocellular carcinoma. New Engl J Med Evidence, 2022. (†Shared 1st authors) DOI: 10.1056/EVIDoa2100070
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5. Kudo M, Finn RS, Qin S, Han KH, Ikeda K, Piscaglia F, Baron A, Park JW, Han G, Jassem J, Blanc JF, Vogel A, Komov D, Evans TRJ, Lopez C, Dutcus C, Guo M, Saito K, Kraljevic S, Tamai T, Ren M, Cheng AL: Lenvatinib versus sorafenib in first-line treatment of patients with unresectable hepatocellular carcinoma: a randomised phase 3 non-inferiority trial. Lancet 391:1163-1173, 2018.

Hepatocellular Carcinoma Management: Integrating Ultrasound from Surveillance, Diagnosis to Treatment

Masatoshi Kudo

Kindai Univ., Japan

Background

The role of ultrasound in the management of hepatocellular carcinoma (HCC) has evolved substantially due to technological advances and novel therapeutic strategies. This presentation provides a comprehensive overview of ultrasound integration across the HCC care continuum from surveillance and diagnosis to treatment response assessment with a particular emphasis on the transformative role of contrast-enhanced ultrasound (CEUS) using Sonazoid.

Surveillance and Early Detection

Sonazoid-enhanced CEUS has emerged as a cornerstone in HCC surveillance, especially among high-risk cirrhotic patients. Its unique Kupffer-phase imaging capability allows for the detection of small lesions that conventional B-mode ultrasound may overlook. This technological innovation has significantly improved early detection rates within at-risk populations.

Diagnostic Applications

In advanced HCC, Sonazoid CEUS offers superior diagnostic performance in evaluating macroscopic tumor features such as vascular invasion and microsatellite nodules areas where contrast-enhanced CT and MRI may fall short. Enhanced diagnostic accuracy in macroscopic classification informs optimized treatment strategies, particularly in combining systemic therapies with transarterial chemoembolization (TACE).

Treatment Response Evaluation and Paradigm Shift

The therapeutic paradigm in HCC has been transformed by the combination of atezolizumab (anti-PD-L1) and bevacizumab (anti-VEGF), which has demonstrated superior efficacy compared to traditional molecular targeted agents. This systemic regimen enables the so-called "ABC therapy" (Atezolizumab

plus Bevacizumab followed by Curative conversion), facilitating the transition from intermediate or advanced HCC to curative interventions and, ultimately, drug-free remission. CEUS is pivotal in assessing treatment response throughout this process.

Drug-Free Criteria and Sonazoid CEUS:

The formulation of evidence-based "drug-off criteria" for ABC conversion therapy marks a significant milestone toward complete cure. These criteria include: (1) complete response by mRECIST; (2) sustained normalization of tumor markers (AFP, AFP-L3, DCP) over 24 weeks; and (3) complete disappearance of tumor vascularity as confirmed by Sonazoid CEUS or pathologically verified curative resection. Sonazoid CEUS is crucial for detecting residual tumor perfusion in sub-5mm lesions that escape detection on contrast CT or MRI, ensuring a more accurate assessment of complete response.

Clinical Outcomes:

Recent multicenter studies report that 17.6% of patients with intermediate or advanced HCC achieved the drug-off status via ABC conversion therapy, with significantly improved recurrence-free survival compared to conventional treatments. The high temporal and spatial resolution of Sonazoid CEUS enables precise identification of viable tumor tissue, informing appropriate discontinuation of therapy.

Future Perspectives:

The integration of artificial intelligence into ultrasound surveillance promises enhanced detection and characterization of small lesions, further improving the accuracy and efficiency of HCC management.

Conclusion:

The comprehensive integration of Sonazoid CEUS across all stages of HCC management from surveillance and diagnosis to treatment evaluation heralds a paradigm shift toward precision oncology. The establishment of drug-off criteria within curative conversion therapy, with CEUS as a cornerstone, offers new avenues for achieving a potential cure in patients previously deemed unresectable.

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Bridging Clinical Ultrasound Research and Practice for a Healthier Future

ROOM 1

Vascular Ultrasound

Chair: Woosik Kim *(National Medical Center)*

1. **Surveillance of Dialysis Fistulas and Grafts: Key Parameters for Dysfunction Detection**
   Haeng Jin Ohe (The Catholic Univ. of Korea)
2. **Leg Edema: Lymphedema vs. Lipedema vs. Venous Insufficiency**
   Sangchul Yun (Soonchunhyang Univ.)
3. **Pelvic Venous Unit and Management of Pelvic Escape Points**
   Thanh-Phong Le (Cho Ray Hospital, Vietnam)

Curriculum Vitae

Haeng Jin Ohe *(The Catholic Univ. of Korea)*

Brief Introduction of Yourself

Prof. Ohe Graduated from Dongguk University (M.D.), completed residency and fellowship in general and vascular surgery with specialization in vascular and transplant surgery.

He served as clinical professor at Seoul and Haeundae Paik Hospitals, focusing on vascular access and endovascular surgery, since joining Seoul St. Mary's Hospital, has focused on high-risk kidney transplantation.

Research Interests

- Diagnosis of Vein Reflux
- Compression Therapy of Vein Disease
- Endovascular Treatment of Vascular Disease

Representative Publications

1. Editorial member, Textbook of Surgery, The Korean Surgical Society, 2025
2. Editorial member & Chapter 21 author, Textbook of vascular and endovascular surgery, The Korean Society for Vascular Surgery, 2024
3. Development Committee Member, Guidelines for Ultrasonographic Evaluation in the Diagnosis of Varicose Veins, The Korean Society of Phlebology, 2024
4. Development Committee Member, Revised Clinical Practice Guidelines for the Management of Varicose Veins, The Korean Society of Phlebology, 2021.
5. Chapter author, Textbook of Surgical Ultrasound, The Korean Society Surgical Ultrasound, 2021.

Surveillance of Dialysis Fistulas and Grafts: Key Parameters for Dysfunction Detection

Haeng Jin Ohe

The Catholic Univ. of Korea

Key duplex parameters include:

- Arterial and venous/graft diameters and flow velocities
- Anastomosis peak systolic velocity
- Wall abnormalities, thrombosis, aneurysms
- Color Doppler signs of stenosis (e.g., aliasing, turbulent flow)

The goal of surveillance is to identify treatable lesions before thrombosis occurs. Treatment decisions must be based on clinical findings, not imaging alone. KDOQI recommends regular physical examinations by experienced practitioners to detect signs of dysfunction before using surveillance tools, such as duplex ultrasound or flow measurements.

Curriculum Vitae

Sangchul Yun *(Soonchunhyang Univ.)*

Brief Introduction of Yourself

Academic Activities

The Korean Surgical Society, Lifetime Member
The Korean Society for Vascular Surgery, Board Member
The Korean Society for Transplantation, Regular Member
The Korean Society for Dialysis Access, Regular Member
The Korean Society for Phlebology, Executive Director
The Korean Association of Clinical Ultrasound, Academic Director (Vascular)
The Korean Society of Nephrology, Regular Member

Education

1997.03-2003.02	Soonchunhyang University College of Medicine, Bachelor's Degree
2009.03-2011.02	Soonchunhyang Graduate School of Medicine, Master's Degree
2012.03-2015.02	Soonchunhyang Graduate School of Medicine, Doctor's Degree

Career

2003.03-2004.02	Internship, Soonchunhyang University Cheonan Hospital, South Korea
2004.03-2008.02	Residentship, Soonchunhyang University Cheonan Hospital, South Korea
2008.03-2010.02	Fellowship, Soonchunhyang University Seoul Hospital, South Korea
2009.08-2009.08	Visiting Fellowship, Department of Kidney Transplantation, Asan Medical Center, Seoul, South Korea
2010.03-2018.02	Assistant Professor, Soonchunhyang University Seoul Hospital,
2012.06-2012.08	Visiting fellowship, Department of vascular surgery, Asan Medical Center, Seoul, South Korea
2015.05	Visiting Fellowship, Ronald Reagan UCLA Medical Center Vascular Surgery & UCLA Gonda Venous Center, USA
2016.02	Visiting Fellowship for CHIVA Strategy, Casa Di Cura Figlie Di San Camillo, Cremona, Italy
2018.03-2023.02	Associate Professor, Soonchunhyang University Seoul Hospital
2023.03-Present	Professor, Soonchunhyang University Seoul Hospital, South Korea

Leg Edema: Lymphedema vs. Lipedema vs. Venous Insufficiency

Sangchul Yun

Soonchunhyang Univ.

Curriculum Vitae

Thanh-Phong Le *(Cho Ray Hospital, Vietnam)*

Brief Introduction of Yourself

Educational Background

1992-1998	Faculty of Medecine, Can Tho University MD
2004-2007	Faculty of Medecine, University of Medecine and Pharmacy of Hochiminh city Residency
2016-2024	University Paris XII, France Ph.D
2016.09	Cremona, Italy, Fellow of Doppler Ultrasound for Vascular Diagnosis
2016.04	Henri Mondor, University Paris XII, University Diplome of Endovascular Surgery
2015.11-2016.10	University Hopsital of Strasbourg, Vascular Surgery Department, Residency of Vascular and Endovascular Surgery
2014.10-2014.12	University hospital of Olomouc, Czech, Fellow of Endovascular Surgery
2011.03-2011.07	Orangerie Hospital Strasbourg, France, Fellow of Vascular Surgery
2010.01-2011.03	Orangerie Hospital, Strasbourg, France, Fellow of Vascular Surgery
2006.10-2007.10	University of Louis-Pasteur of Strasbourg, Hôpital Civil of Strasbourg, France Thoracic Surgery Department, Residency of Thoracic Surgery

Professional Experience

Since 2018.02	Senior Vascular Surgeon, Vascular Surgery Depratment, Cho Ray University Hospital
2012.05-2018.09	Chief of Vascular Surgery Unit, University Medical Center of Hochiminh City, Vietnam
2007-2012	Chief of Thoracic and Vascular Surgery Divison, CanTho General Hospital.
2002-2004	General Surgeon of CanTho General Hospital

Research Interests

- Hemodynamic Ultrasound in Diagnosis and Treatment of Venous Diseases: Pelvic Escape Points, Saphenous Vein-Sparing Techniques
- Vascular Malformation: Treatment of Vascular Malformation by Absolute Ethanol Embolization
- Peripheral Artery Diseases: Surgery and Endo-Vascular Intervention

Representative Publications

1. Le PT, Luong TV, Nguyen TT. Coil Embolisation Combined with Foam Sclerotherapy for Isolated Persistent Sciatic Vein. Eur J Vasc Endovasc Surg. 2023 Sep;66(3):446. doi: 10.1016/j.ejvs.2023.06.012. Epub 2023 Jun 17. PMID: 37336358.
2. Nguyen TT, Huynh ST, Lam NV, Phan HQ, Le PT. Reduced Time to Surgery and Prophylactic Fasciotomy May Result in Improved Outcomes in Popliteal Artery Injuries. Ann Vasc Surg. 2023 Oct; 96:292-300. doi: 10.1016/j.avsg.2023.03.019. Epub 2023 Mar 30. PMID: 37003357.
3. Le TP, Le AT, Huynh TND, Huynh KQ, Dao TH, Desgranges P, Bosc R. Duplex Imaging Assessment of the Internal Mammary Arteries in Women after Unilateral Mastectomy and Radiotherapy for Breast Cancer. Ann Vasc Surg. 2024 Mar;100:15-24. doi: 10.1016/j.avsg.2023.10.015. Epub 2023 Dec 16. PMID: 38110082.
4. Nguyen TT, Luong TV, Le PT. Super Selective Puncture of Feeding Arteries under Ultrasound Guidance for Treatment of Extracranial Arteriovenous Malformations of the Head by Absolute Ethanol Embolisation. Eur J Vasc Endovasc Surg. 2025 Apr;69(4):658. doi: 10.1016/j.ejvs.2024.12.006. Epub 2024 Dec 10. PMID: 39667524.
5. Nguyen TT, Le PT. Varicography Guided Foam Sclerotherapy for Symptomatic Extra-Pelvic Varices Originating from Clitoris Pelvic Escape Point. Eur J Vasc Endovasc Surg. 2025 Apr;69(4):659. doi: 10.1016/j.ejvs.2025.01.043. Epub 2025 Jan 30. PMID: 39892852.

Pelvic Venous Unit and Management of Pelvic Escape Points

Thanh-Phong Le

Cho Ray Hospital, Vietnam

Pelvic venous networks can be the origin of reflux in ~ 10% of women with varicose veins in the lower extremity, especially multiparous women. It has been estimated that ~ 17% of recurrent varicosities after surgery were related to pelvic escape points (PEPs). The accurate anatomical and hemodynamic assessment of these points have been defined by Claude Franceschi. In more detail, three PEPs originating from visceral veins: the perineal (PP), inguinal (IP) and clitoral points (CP); as well as three PEPs originating from parietal veins: obturator (OP), inferior gluteal (IGP), and superior gluteal (SGP) have been described in the literature.

1. Perineal Escape Point (PP)

Perineal veins drain the skin of the perineum then receive the anterior and posterior labial veins and pass through the superficial aponeurosis of the perineum (fascia perinalis) by an orifice that we call the perineal point. After crossing point P, the veins ascend with bulbar and cavernous veins to the vein in the Alcocks canal. In case of leakage, reflux follows the same pathway in a reversed direction, resulting in labial and perineal varicose veins, or even incompetent great saphenous vein . It can also feed contralateral varicosities through labio-labial and perineo-perineal anastomoses. Reflux in the internal pudendal vein may originate from ipsilateral and contralateral upstream genital, visceral, iliac, and ovarian vein.

2. Inguinal Escape Point (IP)

In theory, the re-opening of Nuck embryological duct during pregnancy may be the cause of reflux in the IP. The reflux in the round ligament vein of the uterus may originate from incompetent genital, visceral, iliac, ovarian veins, resulting in varicose veins in the ipsilateral or contralateral vulva, perinium, and LE.

3. Clitoris Escape Point (CP)

Is the anastomotic plexus between the vulvar vein and the superficial dorsal clitoris vein through which the external pudendal vein and dorsal clitoris vein connect to the internal pudendal vein. Veins from the clitoris area also pass through a hole in the superficial subcutaneous fascia to reach the inguinocrural area. Reflux can feed ipsilateral or contralateral perineal and anterior labial veins and the lateral

pudendal external vein to reach the great saphenous vein.

4. Obturator Escape Point (OP)

The OV is normally connected to the common femoral vein on the one side and the parietal trunk of the hypogastric vein on the other. When the OV empties into the saphenous arch instead of the common femoral vein, it can be a source of pathologic reflux into the saphenous trunk, resulting in VVs of the LE.

5. Inferior Gluteal Escape Point & Superior Gluteal Escape Point

The superior and inferior gluteal veins drain into the hypogastric vein. The inferior gluteal vein drains the venous plexus of the sciatic nerve or persistent sciatic vein and enters into the pelvis passing below the piriform muscle (IGP), while the superior gluteal vein passes above it (SGP). Reflux in the IGP may create varices of sciatic nerve which may lead to an intermittent sciatic-type pain that may occur spontaneously or by manual compression in the lateral popliteal area (pathognomonic sign). Reflux in SGP is extremely rare, in combination with venous malformation or May-Thurner syndrome.

Correct diagnosis of PEPs by hemodynamic ultrasound is essential. There are some treatment options for PEPs, and the choice may be based on the type and extent of the PEPs, the presence of pelvic vein disorders, patient's desire, operator's experience and skills, as well as the working-condition of the related medical center.

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Bridging Clinical Ultrasound Research and Practice for a Healthier Future

ROOM 1

Liver Ultrasound 2

Evolving Role of Ultrasound in Liver Mass

Chairs: In Hee Kim *(Jeonbuk National Univ.),* ***Do Young Kim*** *(Yonsei Univ.)*

1. **Transabdominal Ultrasound in the Diagnosis and Management of Hepatic Cystic Neoplasm**
   Woo Kyoung Jeong (Sungkyunkwan Univ.)
2. **Contrast-Enhanced Ultrasound Liver Imaging Reporting and Data System: Enhancing Diagnostic Accuracy of Liver Cancer**
   Stephanie Wilson (Univ. of Calgary, Canada)
3. **Diagnosis and Prognostication of Hepatocellular Carcinoma Using Ultrasound**
   Dong Ho Lee (Seoul National Univ.)

Curriculum Vitae

Woo Kyoung Jeong *(Sungkyunkwan Univ.)*

Brief Introduction of Yourself

Educational Background

1993-1995	Premedical Course, Hanyang University
1995-1999	M.D., Hanyang University
2001-2003	Master, Hanyang University
2008-2010	PhD., University of Ulsan
2008-2013	Assistant Professor, Department of Radiology Hanyang University Guri Hospital, Gyeonggi-do, Korea
2013-2015	Assistant Professor
2015-2022	Associate Professor
2023-Present	Professor, Department of Radiology, Samsung Medical Center, Sungkyunkwan Univ.

Professional Experience

Chair of Accreditation Committee, Korean Society of Radiology
Secretary General, Korean Society of Ultrasound in Medicine
Deputy Editor of Ultrasonography, the Official Journal of KSUM

Research Interests

Shear Wave Ultrasound, Sonazoid CEUS

Representative Publications

1. Kim AY, Sinn DH, Jeong WK, et al. Hepatobiliary MRI as novel selection criteria in liver transplantation for hepatocellular carcinoma. J Hepatol. 2018;68:1144-1152.
2. Kang TW, Jeong WK, Kim YY, et al. Comparison of Super-Resolution US and Contrast Material-enhanced US in Detection of the Spoke Wheel Sign in Patients with Focal Nodular Hyperplasia. Radiology. 2021;298:82-90.
3. Kang SH, Jeong WK, Baik SK, et al. Impact of sarcopenia on prognostic value of cirrhosis: going beyond the hepatic venous pressure gradient and MELD score. J Cachexia Sarcopenia Muscle. 2018;9:860-870.
4. Kim YY, Lee J, Jeong WK, et al. Prognostic significance of sarcopenia in microsatellite-stable gastric cancer patients treated with programmed death-1 inhibitors. Gastric Cancer. 2021;24:457-466.
5. Hwang JA, Jeong WK, Kang HJ et al. Perfluorobutane-enhanced ultrasonography with a Kupffer phase: improved diagnostic sensitivity for hepatocellular carcinoma. Eur Radiol. 2022;32:8507-8517.

Transabdominal Ultrasound in the Diagnosis and Management of Hepatic Cystic Neoplasm

Woo Kyoung Jeong

Sungkyunkwan Univ.

This lecture introduces the ultrasound-based diagnostic approach to hepatic cystic lesions, focusing on differentiating benign cysts from neoplastic or malignant conditions. Key hepatic cystic neoplasms include mucinous cystic neoplasm (MCN), intraductal papillary neoplasm of the bile duct (IPN-B), neuroendocrine tumors, and cystic metastases. Each entity presents with distinctive imaging features such as mural nodules, thick septations, or ductal communication. Transabdominal ultrasound serves as a frontline modality due to its non-invasive nature, and plays a critical role in early detection and management planning. Additional imaging tools like CT and MRI may support diagnosis in complex cases.

Curriculum Vitae

Stephanie Wilson *(Univ. of Calgary, Canada)*

Brief Introduction of Yourself

Educational Background and Professional Experience

Medical School Graduate, University of Alberta Canada
Radiology Residency, University of Toronto, Canada
Self taught PIONEER in Ultrasound and Contrast enhanced ultrasound (CEUS)

Current co-president of ICUS – the International Contrast Ultrasound Society (ICUS)
First female president of the Canadian Association of Radiologists
Recipient of their Gold Medal for Lifetime Contributin to Radiology in Canada

1984–2007	Department Head: Division of Ultrasound, Toronto General Hospital Professor of Radiology University of Toronto
2007-Present	Head Division of CEUS, Foothills Medical Centre Calgary CANADA Clinical Professor of Radiology and Medicine, University of Calgary
2000	Performed the first patient liver studies done I North America with CEUS in Toronto with the esteemed physicist Dr Peter Burns

Representative Publications

1. Nodules Identified on Surveillance Ultrasound for HCC. CEUS or MRI as the Initial test? Jinghui Hu, Stephanie R Wilson, et al J Ultrasound Med 2023; 9999:1–10 | 0278-4297 | www.aium.or
2. Clinical validation of contrast-enhanced ultrasound liver imaging reporting and data system in a prospective multinational study in North America and Europe. Lyshchik A, LI-RADS working group, Wilson SR et al. Hepatology August 8, 2023.
3. Portal Venous Phase Imaging Discordance: A clue to the diagnosis of Cholangiocarcinoma. Wilson SR, Burrowes DP, Merrill CD, et al. Abdominal Radiol. 2024 Jan(49) 1;11 – 20. doi: 10.1007/s00261-023-04031-8. Epub 2023 Oct 7.
4. Ancillary Ultrasound of the Bowel: Endovaginal sonography, CEUS, and Elastography. Wajahat N, Merrill C, Medellin A, Wilson SR. Radiographics April 2025.
5. Ultrasound of the bowel with a focus on IBD: the new best practice Merrill C, Wilson SR. Abdom Radiol (NY) doi: 10.1007/s00261-024-04496-1. PMID: 39141152.

Contrast-Enhanced Ultrasound Liver Imaging Reporting and Data System: Enhancing Diagnostic Accuracy of Liver Cancer

Stephanie Wilson

Univ. of Calgary, Canada

The American College of Radiology (ACR) created the Liver Imaging and Data Reporting System (LI-RADS) committee, to standardize the terminology and reporting of lesions seen on imaging in the population of patients at risk for hepatocellular carcinoma (HCC). This important population worldwide includes those with cirrhosis and chronic HBV infection.

LI-RADS provides a consistent management and classification system for imaging findings in liver lesions and the assigned score indicates the relative risk for HCC,

HCC is the most common primary liver tumor and develops from the liver hepatocytes. However. another primary tumor intrahepatic cholangiocarcinoma, arising from the biliary epithelium, is also important although less frequent. Both HCC (Hepatocellular carcinoma) and ICC (Cholangiocarcinoma) exist in the same at-risk population allowing successful surveillance.

Differentiation of identified nodules is essential because of their different prognosis and treatment.

Historically, it was believed that CEUS could not differentiate between Hepatocellular and Non-Hepatocellular malignancy.[1,2] WE KNOW NOW THIS IS NOT TRUE.[3,4] ACR CEUS LI-RADS categorizes enhancement features for classification of Hepatocellular and Non-Hepatocellular Malignancy as follows:

LR-5 – Definitely HCC, with high specificity, allowing treatment without biopsy.

LR-M – Probably or Definitely Malignant, but not HCC specific. Although LR-M category will include virtually all ICC and metastases, it will also include HCC that do not meet the stringent criteria for LR-5. Biopsy is recommended to confirm the histology for all LR-M tumors

In the LI-RADS category of LR-5, confirmatory for HCC, CEUS and MRI have the same essential requirements of Arterial Phase Hyperenhancement (APHE) and PVP Washout (WO). Therefore, HCC will generally show imaging concordance between CEUS and MRI.

In the LI-RADS category of LR-M, CEUS and MRI have different imaging requirements, all within LR-M. CEUS, with its purely intravascular microbubble contrast agent (MBCA), shows ICC (and other non-hepatocellular malignancies) to have arterial phase hyperenhancement followed by rapid marked washout, before one minute, differentiating it from HCC, having late and weak WO. Alternately, MRI, with a contrast agent with an interstitial phase, shows progressive or sustained PVP enhancement for ICC. Therefore, ICC will generally show imaging discordance between CEUS and MRI for patients with ICC. This knowledge of differing performance of CEUS and MRI within LR-M is of great practical importance in the correct designation of these tumors on imaging.

On CEUS, the appearance of a nodule within the arterial phase does not differentiate an HCC from an ICC as both will show some form of hyperenhancement. However, the ESSENTIAL ONE MINUTE IMAGE is differentiating as the HCC will remain enhanced while the ICC, with rapid washout occurring before 1 minute, will appear less enhanced than the adjacent enhanced parenchyma, and may even appear black. Over time, the HCC will slowly and weakly washout such that some bubbles remain within the nodule site while the ICC may become darker or stay the same.

Yes, CEUS is excellent for the diagnosis of HCC and for the differentiation of HCC from ICC!!

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CEUS LI

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5. Wilson SR, Burrowes D, et al. PVP Discordance Abdominal Radiology 2023,49(1):1-10.
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Curriculum Vitae

Dong Ho Lee *(Seoul National Univ.)*

Brief Introduction of Yourself

Prof. Dong Ho Lee graduated from Seoul National University College of Medicine in 2005 and obtained a Ph.D. from the same institution.

He is currently serving as a Clinical Professor in the Department of Radiology at Seoul National University Hospital.

Research Interests

- Liver Imaging
- Multi-Parametric Ultrasound
- Imaging Guided Liver Tumor Ablation

Diagnosis and Prognostication of Hepatocellular Carcinoma Using Ultrasound

Dong Ho Lee

Seoul National Univ.

Ultrasound (US) plays a central role in the management of hepatocellular carcinoma (HCC), particularly in surveillance. Routine HCC surveillance using grayscale US at six-month intervals is recommended for individuals at risk, such as those with liver cirrhosis or chronic hepatitis B infection. On B-mode imaging, HCC typically appears as a mass with altered echogenicity, and may display features such as a peripheral halo (suggesting a capsule), a nodule-in-nodule configuration, mosaic architecture, or heterogeneous echogenicity in larger lesions. Vascular invasion may also be observed. However, these sonographic features are not specific to HCC, as similar patterns can be seen in other hepatic tumors.

HCC develops through multistep hepatocarcinogenesis, transitioning from low-grade dysplastic nodules to overt carcinoma. A key feature of this process is the shift in blood supply: normal hepatic parenchyma receives most of its blood from the portal vein, but as hepatocarcinogenesis progresses, this portal supply diminishes due to loss of portal triads, and abnormal unpaired arteries become the primary source of blood flow. In advanced HCC, arterial flow predominates with minimal or no portal venous contribution. These vascular changes underlie the hallmark imaging feature of HCC arterial phase hyperenhancement followed by washout in the portal or delayed phases which necessitates contrast-enhanced imaging. Contrast-enhanced ultrasound (CEUS), like contrast-enhanced CT and MRI, enables non-invasive characterization of these vascular patterns. CEUS LI-RADS provides a standardized framework for evaluating liver nodules in at-risk patients. According to CEUS LI-RADS, a nodule ≥1 cm showing non-rim arterial phase hyperenhancement with late and mild washout is diagnostic of HCC. Major clinical guidelines, including AASLD, EASL, APASL, and KLCA-NCC, endorse CEUS for the non-invasive diagnosis of HCC.

Beyond diagnosis, liver US also contributes prognostic information for HCC patients. Both tumor characteristics and underlying liver function influence outcomes. Liver fibrosis stage is a known prognostic factor, with advanced fibrosis indicating poorer prognosis. US-based elastography, which measures liver stiffness non-invasively, is widely used to assess fibrosis and thereby provide prognostic insights. Additionally, CEUS can help predict prognosis by correlating enhancement patterns with tumor differentiation and the likelihood of microvascular invasion.

This presentation will cover the diagnostic criteria and performance of CEUS for non-invasive HCC diagnosis, as well as the prognostic utility of both liver elastography and CEUS in patients with HCC.

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Bridging Clinical Ultrasound Research and Practice for a Healthier Future

ROOM 2

Associate Course 2

Ultrasound in Upper and Lower Abdomen

Chairs: Seong Sook Hong *(Soonchunhyang Univ.),* ***Ki Tae Suk*** *(Hallym Univ.)*

1. **Differential Diagnosis and Management of Cystic Liver Diseases**
   Seul-Ki Han (Yonsei Univ. Wonju)
2. **A Step-by-Step Guide to Elastography and Ultrasound Interpretation in Chronic Liver Disease**
   Ji Won Han (The Catholic Univ. of Korea)
3. **Essentials of Kidney and Urinary Tract Ultrasound**
   Sung Bin Park (Univ. of Ulsan)

Curriculum Vitae

Seul-Ki Han *(Yonsei Univ. Wonju)*

Brief Introduction of Yourself

Educational Background

M.D.(Bachelor of Medicine), Yonsei University, Wonju College of Medicine, South Korea

2020.3-2022.2 Clinical Fellow

2022.3-2023.2 Clinical Assistant Professor

2023.3-Present Assistant Professor

Prof. Han board-certified gastroenterologist clinician and faculty member with clinical and research expertise in hepatology. She has extensive experience in managing patients with chronic liver diseases, including cirrhosis, viral hepatitis, and hepatocellular carcinoma. Her interesting lies in translational research on liver fibrosis, macrophage signaling, and steatohepatitis using both animal models and clinical data.

Research Interests

Portal Hypertension, Cirrhosis, Alcoholic Liver Disease, Chronic Liver Disease

Representative Publications

1. Han, S. K., Kim, M. Y., Kang, S. H., Suk, K. T., & Baik, S. K. (2021). Hepatopulmonary syndrome is related to the development of acute-on-chronic liver failure and poor prognosis in cirrhotic patients. Hepatology International, 15, 1207-1214.
2. Han, S. K., Kim, H., Kim, J. W., Kim, H. S., Kim, S. Y., & Park, H. J. (2021). Usefulness of a Colonoscopy Cap with an External Grid for the Measurement of Small-Sized Colorectal Polyps: A Prospective Randomized Trial. Journal of Clinical Medicine, 10(11), 2365.
3. Han, S. K., Kim, M. Y., Kang, S. H., & Baik, S. K. (2022). Application of ultrasound for the diagnosis of cirrhosis/portal hypertension. Journal of Medical Ultrasonics, 49(3), 321-331.
4. Han, S. K., Kang, S. H., Kim, M. Y., Na, S. K., Kim, T., Lee, M., ... & Baik, S. K. (2022). Outcome of Intermittent Thoracentesis versus Pigtail Catheter Drainage for Hepatic Hydrothorax. Journal of Clinical Medicine, 11(23), 7221.
5. Han, S. K., Baik, S. K., & Kim, M. Y. (2022). Non-alcoholic fatty liver disease: Definition and subtypes. Clinical and Molecular Hepatology.
6. Han, S. K., Baik, S. K., & Kim, M. Y. (2023). The New Applications of Contrast Enhanced Ultrasound for Hepatic Fibrosis and Portal Hypertension. Clinical Ultrasound.

Differential Diagnosis and Management of Cystic Liver Diseases

Seul-Ki Han

Yonsei Univ. Wonju

Cystic liver diseases (CLDs) encompass a spectrum of hepatic lesions ranging from benign developmental anomalies to neoplastic conditions. Accurate differentiation among the various subtypes is essential for proper management and to avoid unnecessary interventions.

This presentation provides an integrative review of CLDs, including simple hepatic cysts, mucinous cystic neoplasms (MCNs), polycystic liver disease (PLD), Caroli disease/syndrome, and biliary hamartomas. Morphological characteristics on ultrasonography (US), computed tomography (CT), and magnetic resonance imaging (MRI) were compared. Epidemiological data and biochemical features such as fluid composition and tumor markers (e.g., CA19-9, CEA) were also reviewed.

Simple hepatic cysts are characterized by anechoic, thin-walled, fluid-filled lesions with strong posterior acoustic enhancement on US and hypoattenuation on CT without contrast enhancement. On MRI, they exhibit high T2 and low T1 signals. Pathogenesis is linked to ductal plate malformation. Distinction from other entities such as MCNs and PLD requires careful evaluation of septations, mural nodules, and communication with the biliary tree. Caroli disease shows saccular or fusiform intrahepatic bile duct dilatation, while biliary hamartomas present as multiple tiny cysts within the liver parenchyma.

Understanding the radiologic features, and clinical context of hepatic cystic lesions allows for more precise diagnosis and management in CLD. Radiologic criteria remain the cornerstone for differentiation, while selected cases may require histological confirmation or intervention depending on size, symptoms, or malignant potential.

Curriculum Vitae

Ji Won Han *(The Catholic Univ. of Korea)*

Brief Introduction of Yourself

Prof. Ji Won Han is an Assistant Professor in the Department of Gastroenterology and Hepatology at Seoul St. Mary's Hospital, The Catholic University of Korea.

He graduated from the College of Medicine at The Catholic University of Korea with a medical degree in 2011 and completed his residency in Internal Medicine at Seoul St. Mary's Hospital in 2016. He received his Master's degree from the Graduate School of Medicine at The Catholic University of Korea (2016) and his Ph.D. from the Graduate School of Medical Science and Engineering (GSMSE) at Korea Advanced Institute of Science and Technology (KAIST) in 2020.

He is currently involved in multiple academic societies, including the Korean Association for the Study of the Liver (Research Committee / Publication Committee), Korean Liver Cancer Association (Committee for Primary Liver Cancer Registry), Korean Society of Gastroenterology (Editorial Committee /Committee for External Cooperation), and Korean Society of Clinical Ultrasound (Scientific Committee / Public Relations Committee).

Research Interests

Liver Immunology and HCC Immunotherapy, Machine Learning Applications in Liver Diseases

Representative Publications

1. "Dynamic peripheral T-cell analysis identifies on-treatment prognostic biomarkers of atezolizumab plus bevacizumab in hepatocellular carcinoma" Liver Cancer 2024, accepted.
2. "Diagnostic accuracy of the Fibrosis-4 index for advanced liver fibrosis in nonalcoholic fatty liver disease with type 2 diabetes: A systematic review and meta-analysis" Clin Mol Hepatol. 2024.
3. "A Machine Learning Algorithm Facilitates Prognosis Prediction and Treatment Selection for Barcelona Clinic Liver Cancer Stage C Hepatocellular Carcinoma" Clin Cancer Res. 2024.
4. "IFNL3-adjuvanted HCV DNA vaccine reduces regulatory T-cell frequency and increases virus-specific T-cell responses" Journal of Hepatology. 2020.
5. "Functions of human liver CD69+CD103-CD8+ T cells depend on HIF-2α activity in healthy and pathologic livers" Journal of Hepatology. 2020.

A Step-by-Step Guide to Elastography and Ultrasound Interpretation in Chronic Liver Disease

Ji Won Han

The Catholic Univ. of Korea

Chronic liver disease (CLD) comprises a continuum of hepatic pathologies including chronic viral hepatitis (HBV, HCV), alcohol-associated liver disease, and metabolic dysfunction-associated steatotic liver disease (MASLD). Accurate, noninvasive assessment of liver structural and functional changes is crucial for staging disease severity, guiding therapy, and monitoring complications such as hepatocellular carcinoma and portal hypertension. Traditionally, liver biopsy was used for staging fibrosis, but its invasiveness and limitations have driven the widespread adoption of imaging-based evaluations.

This lecture provides a systematic guide to interpreting chronic liver disease using two complementary imaging approaches: conventional B-mode ultrasound and ultrasound-based elastography, including vibration-controlled transient elastography (VCTE) and shear wave elastography (SWE). While B-mode ultrasound remains a first-line tool for identifying gross hepatic morphological changes, it lacks sensitivity for detecting early or moderate fibrosis. Elastography compensates for this by quantifying liver stiffness, providing real-time functional insight into fibrotic burden.

The lecture also explores the technical principles, strengths, and limitations of VCTE and SWE, and highlights how they can be used in conjunction with standard ultrasonographic findings. Particularly, the lecture emphasizes how stiffness values and sonographic features such as parenchymal echotexture, surface nodularity, and lobe remodeling should be interpreted together, especially given that in certain etiologies like MASLD or alcohol-related liver disease, even cirrhotic livers may not exhibit classic gross changes. These subtleties make the integration of morphologic and quantitative imaging essential.

A stepwise diagnostic strategy will also be presented, starting with serum-based fibrosis scores (e.g., FIB-4) for risk stratification, followed by targeted elastography and ultrasound evaluation for intermediate-risk patients. Disease-specific sonographic patterns in HBV, HCV, MASLD, and alcohol-related liver disease will be reviewed in detail.

Finally, the lecture introduces emerging techniques such as AI-based sonographic pattern analysis, radiomic texture analysis, and contrast-enhanced ultrasound as potential future adjuncts in CLD imaging. Through this integrated approach, clinicians can more accurately diagnose, stage, and monitor chronic liver diseases using noninvasive, widely accessible tools.

Curriculum Vitae

Sung Bin Park *(Univ. of Ulsan)*

Brief Introduction of Yourself

Prof. Park is Professor in Department of Radiology, Asan Medical Center, Seoul, Korea.

He graduated Chung-Ang University and earned MD, Master of Medicine, PhD degree.

He trained internship and radiology residency at Asan Medical Center. He has finished GU imaging fellowship at Asan Medical Center in 2005.

He is an active member of Korean Society of Urogenital Radiology (KSUR).

Prof. Park has published many peer-reviewed articles in many prestigious journals.

He is being served as GU section editor of Korean Journal of Radiology (KJR).

Research Interests

Genitourinary Imaging

Representative Publications

1. Diagnostic performance of biparametric MRI according to prostate imaging quality (PI-QUAL) version Analysis of Multi-Institutional Data. Eur J Radiol. 2025 May 28.
2. MR Imaging for Ectopic Pregnancy. J Korean Soc Radiol. 2024 Nov; 85(6):1126-1140.
3. Dose Optimization Using a Deep Learning Tool in Various CT Protocols for Urolithiasis: A Physical Human Phantom Study. Medicina (Kaunas). 2023 Sep 17; 59(9):1677.
4. Prediction of renal recovery following sepsis-associated acute kidney injury requiring renal replacement therapy using contrast-enhanced ultrasonography. Kidney Res Clin Pract. 2023; 42(4):473-486.
5. Comparison between Conventional Breath-hold and Respiratory-triggered Magnetic Resonance Cholangiopancreatography with and without Compressed Sensing: Cross-sectional Study. Curr Med Imaging. 2023 Mar 28.

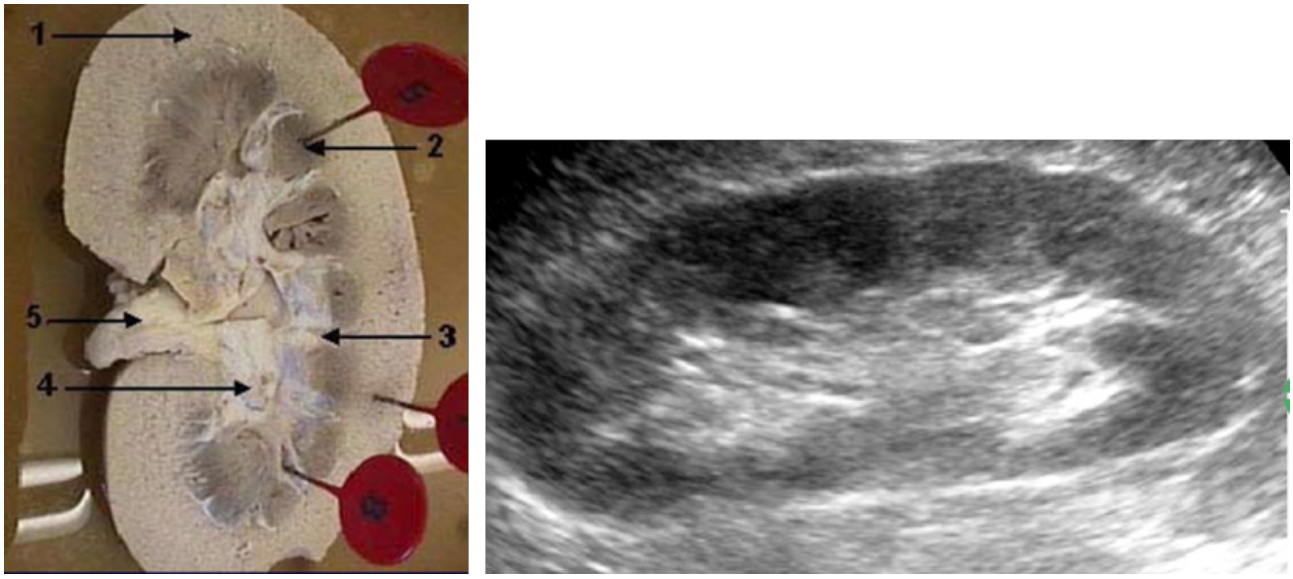
Essentials of Kidney and Urinary Tract Ultrasound

Sung Bin Park

Univ. of Ulsan

Introduction

Ultrasonography of the kidneys is essential in the diagnosis and management of kidney-related diseases. The kidneys are easily examined, and most pathological changes in the kidneys are distinguishable with ultrasound.



1-Cortex, 2-Medulla (renal pyramid), 3-Column of Bertin, 4-Calyx, 5-Renal pelvis

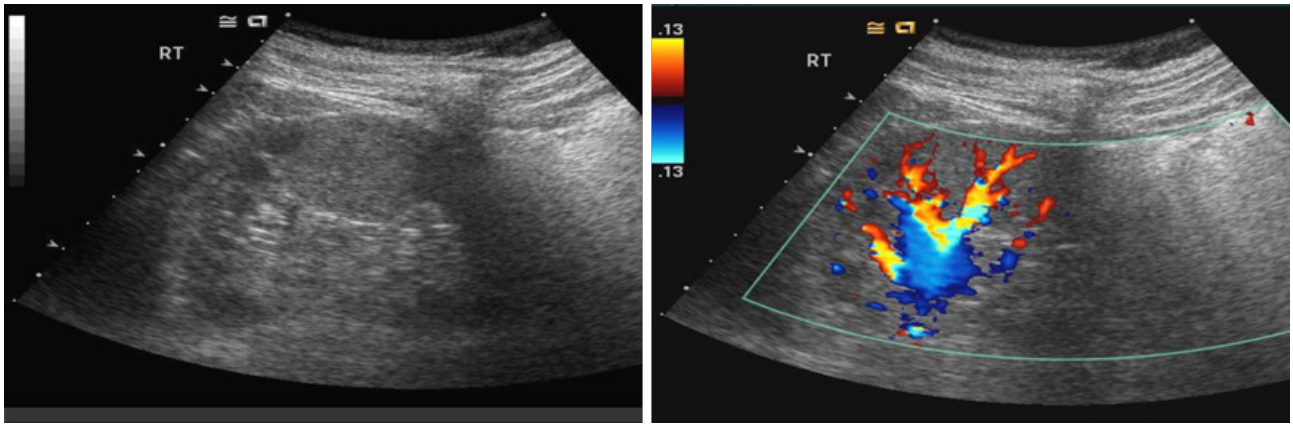
Normal Kidney Anatomy

The parenchyma is more hypoechoic and homogenous and is divided into the outermost cortex and the innermost and slightly less echogenic medullary pyramids. Between the pyramids are the cortical infoldings, called columns of Bertin (Figure).

Prominent column of Bertin

A prominent column of Bertin, also known as a hypertrophied column of Bertin, is a normal anatomical

variation where a portion of the renal cortex extends into the renal medulla, resembling a mass on ultrasound. It's not a tumor, but rather a normal extension of the kidney's outer layer (cortex) between the pyramids. These extensions can sometimes appear as a mass on imaging, leading to misdiagnosis as a renal tumor.



Hydronephrosis

One of the primary indications for referral to US evaluation of the kidneys is evaluation of the urinary collecting system. Enlargement of the urinary collecting system is usually related to urinary obstruction and can include the pelvis, the calyces and the ureter. Hydronephrosis is seen as an anechoic fluid-filled interconnected space with enhancement within the renal sinus, and normally, the dilated pelvis can be differentiated from the dilated calyces.

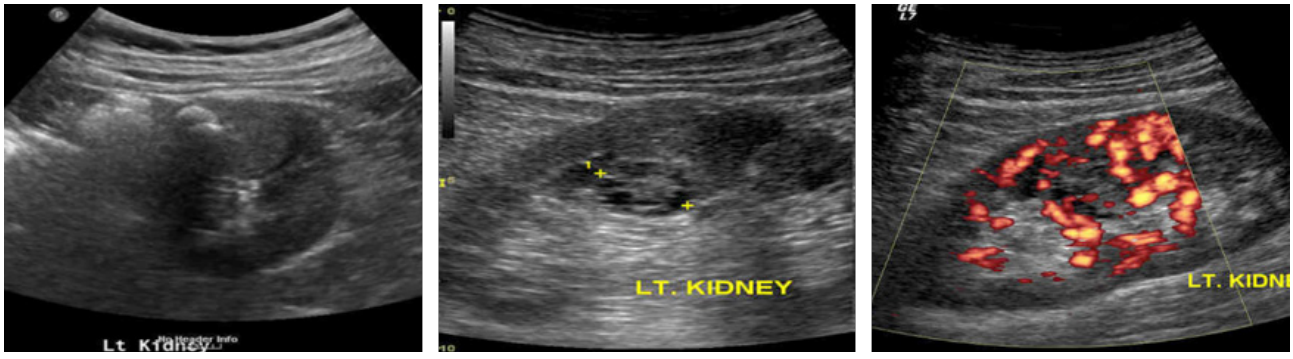
Under normal conditions, the ureter is not seen with US. However, in, e.g., urinary obstruction and vesicoureteral reflux with dilation of the ureter, the proximal part in continuation with the renal pelvis, as well as the distal part near the ostium can be evaluated.

The hydronephrosis is typically graded visually and can be divided into five categories going from a slight expansion of the renal pelvis to end-stage hydronephrosis with cortical thinning.

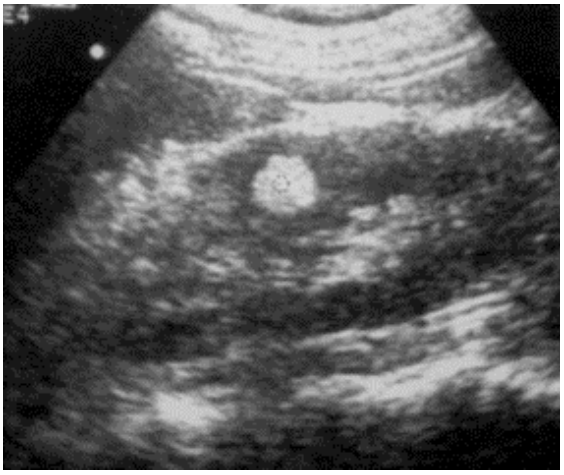
Solid Renal Masses

A solid renal mass appears in the US exam with internal echoes, without the well-defined, smooth walls seen in cysts, often with Doppler signal, and is frequently malignant or has a high malignant potential. The most common malignant renal parenchymal tumor is renal cell carcinoma (RCC), which accounts for 86% of the malignancies in the kidney. RCCs are typically isoechoic and peripherally located in the parenchyma, but can be both hypo- and hyper-echoic and are found centrally in medulla or sinus. The lesions can be multifocal and have cystic elements due to necrosis, calcifications and be multifocal.

The typical US features of RCC include 'intratumoral cysts', 'peritumoral hypoechoic halo' and 'vascular flow on Doppler image'.



Angiomyolipoma are often found in patients with tuberous sclerosis. They are composed of fat, smooth muscle tissue and vascular elements. The echogenicity is governed by the composition of these elements, but the lesion is often hyperechoic.



Cystic Renal Masses

Cystic renal masses are commonly encountered in daily clinical practice. Improvements in the resolution of imaging modalities have led to an improved ability to detect cystic renal masses. It is important for radiologists to recognize and appropriately characterize cystic renal masses. Since 1986, the Bosniak classification system has been widely accepted for the evaluation of cystic renal masses, portions of which have been revised in 2019. Although the Bosniak classification system cannot fully differentiate aggressive lesions from indolent lesions, the system may help improve the specificity of detection for higher-risk classes for malignancy, increase the proportion of masses that are surveilled or ignored rather than resected, and select optimal management strategies.

Table 1. Bosniak Classes and Management for Cystic Renal Masses

Class	Description	Management
I	Benign simple cyst with a hairline thin wall without septa, calcification, or solid component Homogeneous water attenuation density (0–20 Hounsfield unit) without enhancement	No follow-up
II	Benign minimally complicated cyst that may contain a few hairline thin septa ("perceived" but not measurable enhancement). Fine calcification or a segment of slightly thickened calcification may be present in the wall or septa; well-marginated nonenhancing homogeneous, hyperdense mass < 3 cm	No follow-up
IIF	Usually benign cystic mass with multiple hairline thin septa or minimal smooth thickening of the wall or septa. Wall or septa may contain thick and nodular calcification and may have "perceived" but not measurable enhancement or a well-marginated intrarenal nonenhancing cystic mass ≥ 3 cm with density above simple fluid	Follow-up*
III	Indeterminate complicated cystic renal mass with thickened irregular walls or septa that have measurable enhancement	Consider surgery†
IV	Malignant cystic renal mass with enhancing soft tissue components	Consider surgery†

*The recommended interval for follow-up examinations is to obtain a CT scan or MRI at 6 and 12 months, followed by yearly examinations for a minimum of 5 years.
†Although Bosniak III or IV cystic masses generally require surgical intervention, the most recent American Urological Association guidelines propose active surveillance as an initial management option for Bosniak III and IV masses 2 cm or less in patients with limited life expectancy.

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ISCU 2025

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Bridging Clinical Ultrasound Research and Practice for a Healthier Future

ROOM 2

Musculoskeletal Ultrasound

Chairs: ***Changhun Lee*** *(Wonkwang Univ.),* ***Yune Jung Park*** *(The Catholic Univ. of Korea)*

1. **Ultrasound Findings of the Knee**
   Youngjae Park (The Catholic Univ. of Korea)
2. **Ultrasound Findings of the Shoulder**
   In Ah Choi (Chungbuk National Univ.)
3. **Ultrasound-Guided Intra-Articular Injection**
   Jiyeol Yoon (Yonsei Univ.)

Curriculum Vitae

Youngjae Park *(The Catholic Univ. of Korea)*

Brief Introduction of Yourself

Prof. Park received his M.D. in 2011 and Ph.D. in 2023 from the College of Medicine at the Catholic University of Korea.

After completing his internship and internal medicine residency at the Catholic Medical Center, he pursued a fellowship in rheumatology at Seoul St. Mary's Hospital from 2019 to 2021. He then worked as a clinical assistant professor from 2021 to 2024 and currently serve as an assistant professor in the Division of Rheumatology at Seoul St. Mary's Hospital.

Research Interests

Investigation of Pathogenetic Mechanisms and Identification of Therapeutic Targets in SLE,
Sjögren's Syndrome, and Systemic Sclerosis

Representative Publications

1. Salivary ultrasonography and histopathologic evaluation of secondary Sjögren's syndrome in rheumatoid arthritis patients. Sci Rep. 2023 Jul 13;13(1):11339.
2. Kynurenine pathway can be a potential biomarker of fatigue in primary Sjögren's syndrome. Clin Exp Rheumatol. 2023 Dec;41(12):2363-2370.
3. Establishment of a humanized animal model of systemic sclerosis in which T helper-17 cells from patients with systemic sclerosis infiltrate and cause fibrosis in the lungs and skin. Exp Mol Med. 2022 Sep;54(9):1577-1585.
4. Lactobacillus acidophilus Supplementation Exerts a Synergistic Effect on Tacrolimus Efficacy by Modulating Th17/Treg Balance in Lupus-Prone Mice via the SIGNR3 Pathway. Front Immunol. 2021 Dec 10;12:696074.
5. Baricitinib Attenuates Autoimmune Phenotype and Podocyte Injury in a Murine Model of Systemic Lupus Erythematosus. Front Immunol. 2021 Aug 23;12:704526.

Ultrasound Findings of the Knee

Youngjae Park

The Catholic Univ. of Korea

Musculoskeletal ultrasound has become an integral part of clinical practice for rheumatologists, allowing for detailed, dynamic, and non-invasive assessment of joint and periarticular structures. Among the various joints, the knee is one of the most frequently examined sites due to its large size, superficial structures, and frequent involvement in both degenerative and inflammatory disorders. A thorough understanding of knee sonoanatomy, familiarity with standard scanning protocols, and the ability to recognize key pathological findings are essential for clinicians aiming to use ultrasound effectively in daily practice.

This presentation provides a comprehensive overview of knee joint ultrasound, starting with the selection of appropriate transducers. Depending on the patient's body habitus and the depth of the target structure, linear probes (typically 12–5 MHz) are most commonly used, while curved linear or compact linear probes may be preferred in certain cases for deeper visualization or better maneuverability.

The sonoanatomy of the knee is explored in detail through the anterior, medial, lateral, and posterior aspects. On the anterior side, key structures such as the quadriceps tendon, suprapatellar recess, patella, prepatellar bursa, patellar ligament, Hoffa's fat pad, and infrapatellar bursa are sequentially examined. On the medial aspect, attention is given to the medial collateral ligament, medial meniscus, and the pes anserinus complex, including the anserine bursa. Laterally, the iliotibial band, lateral collateral ligament, lateral meniscus, and biceps femoris tendon are visualized. Posteriorly, the popliteal fossa is assessed with a focus on identifying Baker's cysts and other cystic lesions. The femoral cartilage can be evaluated using both longitudinal and transverse suprapatellar views, which is particularly useful in detecting early degenerative changes.

To ensure comprehensive and consistent evaluation, a systematic scanning protocol is followed. Starting from the suprapatellar area in longitudinal and transverse planes, the examination proceeds to the prepatellar and infrapatellar regions, followed by the medial and lateral joint lines, cartilage surfaces, and posterior fossa. This structured approach helps ensure that no critical structure is overlooked, and allows clinicians to compare findings between views and sides efficiently.

In addition to normal anatomy, the lecture highlights characteristic sonographic findings associated with common knee pathologies. Joint effusions appear as anechoic or hypoechoic fluid collections in the suprapatellar recess, often seen in inflammatory arthritis or traumatic synovitis. Prepatellar and infrapatellar bursitis can be identified by localized fluid collections anterior or inferior to the patella, sometimes accompanied by bursal wall thickening. Anserine bursitis, which is a frequent cause of medial knee pain, manifests as hypoechoic distension of the anserine bursa near the pes anserinus insertion. Iliotibial band syndrome is characterized by thickening and hypoechogenicity of the distal iliotibial band, and may be accompanied by localized bursal fluid. Baker's cysts are visualized in the popliteal fossa between the semimembranosus tendon and medial head of the gastrocnemius, occasionally containing internal debris or septations. Additionally, features of degenerative joint disease such as osteophytes and meniscal protrusions can be readily detected by ultrasound, aiding in the assessment of osteoarthritis severity.

In summary, musculoskeletal ultrasound of the knee is a powerful extension of the physical examination that enables the detection of subtle structural changes with high sensitivity. Mastery of knee sonoanatomy and proficiency in standardized imaging techniques are crucial for accurate diagnosis and monitoring of knee joint diseases. Through this presentation, I aim to share practical strategies for scanning, interpreting, and integrating ultrasound findings into clinical decision-making for a variety of knee conditions commonly encountered in daily practice.

Curriculum Vitae

In Ah Choi *(Chungbuk National Univ.)*

Brief Introduction of Yourself

Prof. Choi is an Associate Professor in the Department of Internal Medicine at Chungbuk National University College of Medicine, with clinical and academic specialization in rheumatology. She earned my M.D. and M.S. degrees from Kyung Hee University and completed her Ph.D. in Medicine at Seoul National University. Her postgraduate training includes an internal medicine residency at Kyung Hee Medical Center and a fellowship in rheumatology at Seoul National University Hospital.

Since 2013, she has held various academic and clinical roles at Chungbuk National University Hospital, and she currently serves as the Chief of the Division of Rheumatology. From August 2022 to January 2024, she serves as a visiting research scholar at the David Z. Rosensweig Genomics Research Center, located at the Hospital for Special Surgery in New York.

She has a particular interest in musculoskeletal ultrasound (MSUS) as both a diagnostic and research tool in inflammatory and autoimmune diseases. She completed the Level 2 Train-the-Trainer program of the EULAR Competency Assessment in MSUS in June 2024. My research interests include translational rheumatology, advanced imaging techniques, and immunopathogenesis of chronic arthritis.

She remains committed to integrating precision diagnostics with clinical practice and contributing to medical education, research, and international collaboration in rheumatology.

Research Interests

Systemic Lupus Erythematosus, Rheumatoid Arthritis, Osteoimmunology

Representative Publications

1. Kim H*, Choi IA*, Umemoto A, Bae S, Kaneko K, Mizuno M, Giannopoulou E, Pannellini T, Deng L, Park-Min KH. SREBP2 restricts osteoclast differentiation and activity by regulating IRF7 and limits inflammatory bone erosion. Bone Res. 2024 Aug 27;12(1):48.
2. Kim SY, Koh JY, Lee DH, Kim HD, Choi SJ, Ko YY, Lee HS, Lee JS, Choi IA, Lee EY, Jeong HW, Jung MK, Park SH, Park JY, Kim W, Shin EC. Epigenetic scars in regulatory T cells are retained after successful treatment of chronic hepatitis C with direct-acting antivirals. J Hepatol. 2024 Jun 13:S0168-8278(24)02317-1
3. Kim W, Yeon H, Kim J, K J-H, Kim JH, Kim H-A, Jung J-Y, Kim J, Choi IA*, Lee K*. Association between SYVN1 and SEL1 genetic polymorphisms and remission in rheumatoid arthritis patients treated with TNF-α inhibitors: a machine learning approach. Immunol Res. 2023 Oct;71(5):709-716
4. Kim HJ, Swan H, Kazmi SZ, Hong G, Kim YS, Choi S, Kang T, Cha J, Eom J, Hann HJ, Choi IA*, Ahn HS. Familial risk of seropositive rheumatoid arthritis and interaction with smoking: a population-based cohort study. Rheumatology (Oxford). 2023 Sep 1;62(9):3006-3013

Ultrasound Findings of the Shoulder

In Ah Choi

Chungbuk National Univ.

1. Biceps Long Head Tendon

Patient Position: Seated, with the hand resting on the knee, palm upward. This induces slight external rotation, causing the bicipital groove to shift anteriorly.

Short Axis View: The biceps tendon appears within the groove as a bright, speckled oval structure.

Long Axis View: The tendon typically dives deeper distally, which can cause anisotropy: **heel-toe maneuver**

2. Subscapularis

Patient Position: Ask the patient to move the elbow posteriorly. While keeping it against their side, externally rotate the shoulder by asking them to move the hand laterally.

Long Axis View: The tendon should appear as a bright, continuous structure from the musculotendinous junction to its insertion. Dynamic internal and external rotation can help distinguish the tendon from the surrounding bursa and assess for **coracoid impingement.**

Short Axis View: Moving medially reveals a **multifascicular pattern**, which persists even over the joint capsule.

3. Supraspinatus

Patient Position:

- **Crass position:** Shoulder abducted and internally rotated, with the hand on the lower back.
- **Middleton position:** Less internal rotation, with the hand in the back pocket. Middleton position may better visualize the anterior portion adjacent to the biceps.

Short Axis View: A **slightly tilted axial plane.** Once the biceps tendon is identified, the leading edge of the supraspinatus appears lateral to it. The tendon is oval, with a smooth, rounded anterior border.

Long Axis: Confirm angle using the biceps as a reference. The **supraspinatus tendon** has a convex upper margin, with a bright bursal border (subacromial-subdeltoid bursa).

Dynamic Evaluation: Impingement syndromes are better appreciated during movement.

4. Infraspinatus and Teres Minor

Patient Position: Hand on the opposite shoulder, inducing internal rotation and lengthening of the infraspinatus tendon.

Scan: Place the probe in the axial plane, slightly lower medially to align with the tendon. The infraspinatus appears similar to the supraspinatus but is smaller. The posterior recess is also visible, which helps in detecting joint effusion.

Teres Minor: Continue moving inferiorly. It resembles the infraspinatus and can be hard to distinguish.

Tip: The deep structure under the teres minor is bone, while under the infraspinatus, it is articular cartilage

Summary of Patient Positions

1. Biceps long head – Neutral seated position with supinated hand on knee

2. Subscapularis – Elbow back, shoulder externally rotated

3. Supraspinatus –

- o Crass: Hand behind back
- o Middleton: Hand in back pocket

4. AC Joint / SASD Bursa – Probe superiorly over the shoulder

5. Infraspinatus – Hand on opposite shoulder

6. Posterior GH Recess – Continue scanning medially

Curriculum Vitae

Jiyeol Yoon *(Yonsei Univ.)*

Brief Introduction of Yourself

As a specialist in the field of rheumatology, Dr. Yoon Jiyeol's role involves the evaluation and treatment of a wide range of rheumatic diseases.

He is a certified musculoskeletal sonographer by the Korean College of Rheumatology and also certified echocardiographer by the Korean Society of Echocardiography.

Research Interests

Pulmonary and Cardiovascular Diseases Related to Rheumatic Diseases
Sonographic Intervention and Evaluation of Newly Emerging Technique

Representative Publications

1. Park PG, Yoon J, Park YB, Lee SW. A New Formula Consisting of the Initial Independent Predictors of All-Cause Mortality Derived from a Single-Centre Cohort of Antineutrophil Cytoplasmic Antibody-Associated Vasculitis. J Clin Med 2025;14.
2. Yoon T, Yoon J, Ko E, Park YB, Lee SW. Clinical perspective on serum periostin in antineutrophil-cytoplasmic antibody-associated vasculitis. Korean J Intern Med 2025;40:512–523.
3. Incidence of interstitial lung disease in seropositive rheumatoid arthritis patients receiving biologics, Janus kinase inhibitors, or methotrexate (In review)

Ultrasound-Guided Intra-Articular Injection

Jiyeol Yoon

Yonsei Univ.

Ultrasound-guided intraarticular injection has emerged as a critical skill for clinicians, particularly rheumatologists, who manage patients with autoimmune inflammatory diseases and non-inflammatory pain conditions. The precision and real-time visualization offered by ultrasound make it an indispensable tool for ensuring safe and effective interventions in musculoskeletal areas.

To achieve optimal therapeutic outcomes and minimize complications, practitioners must adhere to several procedural guidelines. First and foremost, the procedure should be conducted in a sterile environment that complies with universal infection-control protocols specific to each clinical setting. Furthermore, a thorough understanding of the anatomical structures at the injection site is essential; this knowledge ensures accurate needle placement, minimizes damage to vulnerable tissues, and reduces patient discomfort.

Practitioners should be proficient in handling and maneuvering the ultrasound probe to avoid misalignment with the needle during the procedure, which could compromise accuracy. It is also crucial to optimize the settings of the ultrasound device for the specific intervention, ensuring that the needle is clearly visible on the monitor while accounting for potential artifacts inherent to ultrasound imaging. Additionally, practitioners must familiarize themselves with the specific probe types and frequency settings appropriate for the needle's diameter and depth of penetration. Prior to commencing the procedure, the target area should be scanned, and the approximate needle path and injection point should be marked to streamline the intervention.

Proper alignment of the monitor, the injection site, and the clinician is critical for maintaining ergonomic positioning and reducing procedural errors. Ideally, the monitor should be located directly opposite the clinician, with the needle's entry trajectory aligned centrally toward the monitor. This arrangement ensures efficiency and comfort for both the clinician and the patient during the procedure.

Intraarticular injections primarily target the synovial cavity, which is located within the joints but also extends to adjacent structures such as tendon sheaths and bursae. These injections typically involve a combination of corticosteroids and local anesthetics to alleviate inflammation and pain. Synovial tissue

comprises two distinct components: the synovial lining and the sublining. The sublining is interconnected with intra-articular fat and connective tissue, making it challenging to delineate its boundaries unequivocally. Pathological changes, such as thickening and abnormal growth of the synovial lining, are frequently observed in inflammatory conditions and can significantly impact joint function.

The dorsum of the hand presents unique anatomical complexities that require precise knowledge for effective ultrasound-guided injections. Six distinct compartments on the dorsum, as well as the three joints radiocarpal, intercarpal, and distal radioulnar must be carefully examined for accurate diagnosis and treatment. A detailed understanding of these compartments is pivotal:

The first Compartment includes the abductor pollicis longus and the extensor pollicis brevis tendons. Injections in this region necessitate careful navigation to avoid injury to the superficial branch of the radial nerve, which courses near the cephalic vein.

The second compartment itself rarely develops inflammation; however, intersection syndromes may occur where this compartment crosses with the first or third compartments. Proximal intersection syndrome and distal intersection syndrome often result in localized pain, necessitating precise intervention guided by an understanding of their anatomical relationships.

The third compartment comprises the extensor pollicis longus tendon. This region frequently exhibits pathological changes associated with intersection syndromes, requiring expert handling during injection procedures.

The fourth compartment contains the extensor digitorum tendons encased in a naturally thick synovial sheath. This anatomical feature may sometimes be mistaken for inflammatory changes, emphasizing the need for accurate interpretation of ultrasound images.

The fifth compartment houses the extensor digiti minimi tendon and is often implicated in distal radioulnar joint inflammation. Rheumatoid arthritis patients with inflammation in this compartment may experience tendon rupture, leading to impaired extension of the fifth digit. Early intervention to address inflammation in this area is essential to prevent complications.

The sixth compartment encloses the extensor carpi ulnaris tendon and is commonly associated with distal radioulnar joint inflammation. Practitioners must exercise caution during injections to prevent inadvertent damage to this tendon.

Ultrasound guidance is indispensable for achieving therapeutic precision in injections targeting wrist and hand pain. Misplaced injections, particularly in anatomically distinct joints such as the distal radioulnar, radiocarpal, and intercarpal joints, often result in diminished efficacy. By accurately localizing pathological changes using ultrasound, clinicians can significantly improve treatment outcomes.

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Bridging Clinical Ultrasound Research and Practice for a Healthier Future

ROOM 2

State-of-the-Art Lecture 4

Chair: Soon Koo Baik *(Yonsei Univ. Wonju)*

Ultrasound of Focal Liver Masses: Towards Precision Imaging
Stephanie Wilson (Univ. of Calgary, Canada)

Curriculum Vitae

Stephanie Wilson *(Univ. of Calgary, Canada)*

Brief Introduction of Yourself

Educational Background and Professional Experience

Medical School Graduate, University of Alberta Canada
Radiology Residency, University of Toronto, Canada
Self taught PIONEER in Ultrasound and Contrast enhanced ultrasound (CEUS)

Current co-president of ICUS – the International Contrast Ultrasound Society (ICUS)
First female president of the Canadian Association of Radiologists
Recipient of their Gold Medal for Lifetime Contributin to Radiology in Canada

1984–2007	Department Head: Division of Ultrasound, Toronto General Hospital Professor of Radiology University of Toronto
2007-Present	Head Division of CEUS, Foothills Medical Centre Calgary CANADA Clinical Professor of Radiology and Medicine, University of Calgary
2000	Performed the first patient liver studies done I North America with CEUS in Toronto with the esteemed physicist Dr Peter Burns

Representative Publications

1. Nodules Identified on Surveillance Ultrasound for HCC. CEUS or MRI as the Initial test? Jinghui Hu, Stephanie R Wilson, et al J Ultrasound Med 2023; 9999:1–10 | 0278-4297 | www.aium.or
2. Clinical validation of contrast-enhanced ultrasound liver imaging reporting and data system in a prospective multinational study in North America and Europe. Lyshchik A, LI-RADS working group, Wilson SR et al. Hepatology August 8, 2023.
3. Portal Venous Phase Imaging Discordance: A clue to the diagnosis of Cholangiocarcinoma. Wilson SR, Burrowes DP, Merrill CD, et al. Abdominal Radiol. 2024 Jan(49) 1;11 – 20. doi: 10.1007/s00261-023-04031-8. Epub 2023 Oct 7.
4. Ancillary Ultrasound of the Bowel: Endovaginal sonography, CEUS, and Elastography. Wajahat N, Merrill C, Medellin A, Wilson SR. Radiographics April 2025.
5. Ultrasound of the bowel with a focus on IBD: the new best practice Merrill C, Wilson SR. Abdom Radiol (NY) doi: 10.1007/s00261-024-04496-1. PMID: 39141152.

Ultrasound of Focal Liver Masses: Towards Precision Imaging

Stephanie Wilson

Univ. of Calgary, Canada

The liver is the largest body organ and the presence of a mass within has variable significance, from totally inconsequential to life threatening. Noninvasive diagnosis of a focal liver mass (FLM) has, therefore, been a long time pursuit of radiologists and for many years, contrast enhanced CT and MR scan have been considered the gold standard modalities. Conventional Greyscale US has excellent spatial resolution and, with Doppler, provides valuable information about all abdominal organs. However, its inability to image blood flow at the perfusion level limited the role of US for the characterization of a focal liver mass prior to the approval of microbubble contrast agents (MBCA) for US around the year 2000. Injection of these tiny bubbles of a low solubility perfluoropropane gas allowed US, for the first time, to image blood flow at the capillary level. This introduction of **contrast enhanced ultrasound (CEUS)** has proven to be of monumental significance and since their introduction there has been a progressive expansion of their role, with the greatest international benefit experienced in the realm of characterization of FLM.

However, today there are two broad categories of masses recognized related to whether the patient does or does not have a increased risk for the development of HCC. This high-risk population includes patients with cirrhosis, of any cause, and chronic HV infection.

FLM CEUS study began with evaluation of all liver masses. Initial efforts included adoption of an **Algorithmic Approach** to FLM diagnosis based on the enhancement of the mass relative to the adjacent uninvolved liver in the Arterial phase (AP), the portal venous phase (PVP), and the late phase (LP). This showed us that arterial phase hyperenhancement (APHE)comprises a critical component of the diagnosis of most masses, both benign and malignant, and that benign tumors generally have a specific pattern of enhancement confirming their diagnosis, beautifully depicted with bubble tracking techniques called MIP **Maximum Intensity projection**. This included peripheral nodular enhancement for hemangiomas and stellate vascularity with centrifugal filling for FNH. We learned also that Washout (WO), whereby the enhancement declines to less than the adjacent enhanced liver, is the most reliable predictor of malignancy. Within this general pursuit we identified typical patterns for hepatocellular and

nonhepatocellular malignancy.

A game-altering clinical change occurred with the progressive study of FLM within the population at high risk for the development of HCC, notably those with cirrhosis of any cause and those with chronic HBV infection. Within this high-risk category we recognise two tumors: HCC, the most common primary tumor arising from the hepatocytes and the much less common intrahepatic cholangiocarcinoma (ICC) a malignant tumor of the biliary epithelium. Recognition and differentiation is essential as their prognosis and management differ.

The recent obesity epidemic with its associated risk for fatty liver and the acknowledgement that liver cancer is rising at an alarming rate, especially within western societies, has provoked a realignment of many towards a multi-disciplinary approach to all aspects of liver mass diagnosis, management and followup of patients with HCC. **Liver Imaging Reporting & Data System (LI-RADS)**, a product of the American College of Radiology (ACR) has transformed the practise of radiology and the interpretation and management of these patients, providing a diagnostic table based on imaging features which provides a score with a probability ranking for the presence of HCC within the category. Most important categories include **LR-5**, a confident diagnosis of HCC with high specificity, allowing for treatment without biopsy. Specificity exceeds 95% for LR-5 although not all HCC will be in this category. **L R-M**, possibly or probably malignant, includes virtually all ICC and metastases as well as a smaller number of HCC, not meeting the stringent criteria for LR_5

More recent progression in the technology of US and imaging of FLM are **microvascular flow** techniques, showing exquisite color coding relating to the relative **time of arrival** of the microbubbles at different locations within an image, with excellent diagnostic information.

Elastography, generally used to measure stiffness of an entire organ such as the liver can be directed at the center of a tumor thought to possibly have a scar, showing increased stiffness in association. And even fat quantification techniques can now be applied to a focal mass thought to have fatty content with altered measurements relative to background.

Yes, we realize that regular greyscale US, although wonderful, does not compete with CT and MR scan for characterization of a focal liver mass. However, CEUS surely does!!!

Our References

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2. Wilson SR, Burrowes DP, Merrill CD, et al. UNIQUE PORTAL VENOUS PHASE IMAGING DISCORDANCE BETWEEN CEUS AND MRI: A VALUABLE PREDICTOR OF INTRAHEPATIC CHOLANGIOCARCINOMA? Abdominal Radiology 07 October 2023.

3. Lyshchik A, Working group LI=RADS CEUS CONTRAST-ENHANCED ULTRASOUND LIVER IMAGING REPORTING AND DATA SYSTEM: CLINICAL VALIDATION IN A PROSPECTIVE MULTINATIONAL STUDY IN NORTH AMERICA AND EUROPE- Hepatology. 2024; 79:380–391.
4. Burrowes DP, Medellin A, Harris AC, Milot A, Wilson SR. CONTRAST-ENHANCED US APPROACH TO THE DIAGNOSIS OF FOCAL LIVER MASSES. Radiographics 2017; 37:1388–1400.
5. Burrowes DP, Merrill CD, Wison SR. ULTRASOUND INNOVATIONS IN ABDOMINAL RADIOLOGY: EVALUATION OF FOCAL LIVER LESIONS Abdom Radiol. DOI: 10.1007/s00261-025-04970-4.

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ROOM 2

Advances in Breast Ultrasound

Chairs: ***Ku Sang Kim*** *(Kosin Univ.),* ***Hyun Yul Kim*** *(Pusan National Univ.)*

1. **Screening of Implanted Breast with Ultrasound**
   Angela Lee (The W Breast Center)
2. **Ultrasonographic Assessment of Non-Mass Enhancement in Breast MRI**
   Jinhyuk Choi (Kosin Univ.)
3. **Imaging Surveillance of Breast Cancer Survivors with Ultrasound**
   Junwon Min (Dankook Univ.)

Curriculum Vitae

Angela Lee *(The W Breast Center)*

Brief Introduction of Yourself

Educational Background

2009 Chungnam University School of Medicine, Daejeon, Korea
2015 Board Certified, General Surgery, Korean Surgical Society
2016 Fellowship in Department of General Surgery (Breast), Seoul National University Bundang Hospital, Seoul, Korea
2017 Certified Breast Surgery Specialist, General Surgery (Breast) Instructor, Seoul National University Hospital

Professional Experience

worked with plastic surgeons for last 8 years as breast specialist focusing on breast implant screening & implant complication management as well as breast cancer screening, minimal invasive biopsy & excision of breast disease.

Hands-on instructor of Vaccum-assissted breast biopsy, stereotactic biopsy.

Research Interests

Breast Implants and Breast Disease, Pre-Post Screening of Breast Implant,
AI Screening of Breast Implants

Representative Publications

1. 2024 Exploration of Point-of-Care Ultrasonography for Silicone Breast Implant Rupture Detection and Classification, Medicina 2024-02-10 | Journal article DOI: 10.3390/medicina60020306
2. 2024 A Deep Learning Model to Predict Breast Implant Texture Types Using Ultrasonography Images: Feasibility Development Study JMIR Form Res 2024;8:e58776, DOI: 10.2196/58776
3. 2025 Importance of Breast Implant Screening With Ultrasound & Checklist To Find Implant Rupture in Asymptomatic Patients, poster presentation in Las Vegas , ASBrS American Society of Breast Surgeons
4. 2025 Expediency of Ultrasound and Checklist for Breast Implant Screening, Oral Presentation of Poster (6/28) ISCU

Screening of Implanted Breast with Ultrasound

Angela Lee

The W Breast Center

Problem Statement: As more information about the potential risks and complications related to breast implants has become available, the United States Food and Drug Administration (FDA) has responded by implementing changes to improve patient education. The addition of ultrasound (US) as an alternative to MRI for initial imaging surveillance for implant ruptures was a major change. Information about the style of the breast implants, such as provided on patient device cards, is critical for clinical observers during the interpretation of imaging surveillance tests. Since 2022 FDA guidelines now recommend the first screening imaging test at 5 years after implantation instead of 2 years after implantation.

Breast implants have been used since 1962 as medical devices.[1] One-million-eight-hundred-ninety-thousand individuals annually undergo the procedure for cosmetic or reconstructive purposes.[2] In addition to well-known complications such as capsular contracture and rupture, breast implants have also been associated with various other issues, including Breast Implant-Associated Anaplastic Large Cell Lymphoma (BIA-ALCL), which was first reported by Dr. Keech in 1997, Breast Implant Illness (BII) and, more recently, BIA-SCC.[3-6] Furthermore, in Korea, there have been medical fraud issues related to implant manufacturing by HansBiomed Corporation.[7] Due to these domestic and international issues concerning breast implants, increased surveillance of implant safety is necessary for many women who have undergone implant surgery.

Among the various complications associated with implants, rupture and capsular contracture are conditions that require reoperation. Ruptures increase over time and occur after 3 years post-surgery.[8-10] They are typically diagnosed using MRI or ultrasound.[11-13] Recently, high-resolution ultrasonography has shown reliable accuracy in diagnosing breast implant failure.[14,15] However, most ruptures of silicone implants are asymptomatic.[14,16] As a result, delayed diagnosis of ruptures may lead to extracapsular ruptures, where free silicone migrates to surrounding tissues, lymph nodes, and other sites.[17-21] In cases where free silicone invades the peri-prosthetic capsule, capsule removal becomes necessary. If it migrates to lymph nodes or other organs, complete or successful removal may be challenging or impossible. To prevent incomplete silicone removal caused by silicone migration, it is crucial to detect

implant ruptures as early as possible. Korean Ministry of Food and Drug Safety (MFDS) and US Food and Drug Administration (FDA) guidelines recommend regular ultrasound or MRI check-ups after implant surgery.[22,23] Capsular contracture often presents symptoms such as hardness and pain, which need revisional surgery.[24-26]

Recent studies have shown that ultrasound is practical for diagnosing ruptures and helpful in identifying and differentiating other implant-related complications, such as seroma, thickened capsules related to capsular contracture, upside-down rotation (USD), shell folding, and capsular calcification.[27]

Conclusion:

Ultrasonography is a valuable test for diagnosing various breast implant complications, such as implant failure, thickened capsules related to capsular contracture, capsular calcifications, upside-down rotations, and immediate or delayed seroma. Most silicone implant ruptures were asymptomatic even though silicone migrated to capsules. Implant failure was increased with post-operative duration time. In light of these facts, it can be inferred that regular check-ups are necessary after breast implant surgery, even if there are no symptoms related to the implants.

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Curriculum Vitae

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Brief Introduction of Yourself

Educational Background and Carrer

2018.3-Present	Assistant Professor of Breast Surgery, Kosin University Medical Center, Korea
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2017.3-2018.2	Fellowship of Breast Surgery, Kosin University Medical Center, Korea
2016.5-2017.2	Fellowship of Endocrine & Breast Surgery, National Cancer Center, Korea
2013.4-2016.4	Military Service
2009.3-2013.2	Residency of General Surgery, Kosin University Medical Center, Pusan, Korea
2002.3-2008.2	School of Medicine, Kosin University, Pusan, Korea

Professional Experience

Executive Director, Busan-Ulsan-Kyoungnam Society of Breast Cancer
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Research Interests

Breast Cancer, Breast Surgery (Robot), Oncology

Representative Publications

1. Ling X, Alexander GS, Molitoris J, Choi J, Schumaker L, Tran P, Mehra R, Gaykalova D, Ren L. Radiomic biomarkers of locoregional recurrence: prognostic insights from oral cavity squamous cell carcinoma preoperative CT scans. Front Oncol. 2024 Apr 23;14:1380599.
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Ultrasonographic Assessment of Non-Mass Enhancement in Breast MRI

Jinhyuk Choi

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Background

Magnetic resonance imaging (MRI) has emerged as a pivotal modality in breast imaging, particularly for high-risk screening, and preoperative staging. Among the various types of lesions identified on breast MRI, non-mass enhancement (NME) presents a unique diagnostic challenge. Unlike discrete masses, NMEs are characterized by areas of enhancement that lack a space-occupying lesion and are visible only on MRI.[1] These lesions encompass a wide spectrum of benign and malignant pathologies, necessitating further imaging correlation and often histopathological confirmation.[2]

Understanding NME in Breast MRI

NME is defined by the American College of Radiology's BI-RADS MRI lexicon as enhancement without a corresponding mass or focus.[3] It is categorized based on:

- Distribution: focal, linear, segmental, regional, multiple regions, or diffuse
- Internal enhancement patterns: homogeneous, heterogeneous, clumped, or clustered ring

These imaging characteristics provide important clues to the underlying histology. For example, segmental or clustered ring enhancement patterns are more often associated with ductal carcinoma in situ (DCIS) or invasive cancer,[4] while diffuse or homogeneous patterns may reflect benign processes such as hormonal stimulation or fibrocystic change.

Why Use Ultrasound?

While MRI is highly sensitive, it often lacks specificity and may detect lesions not seen on mammography or ultrasound. MRI-guided biopsy, though effective, is resource-intensive and not widely available.[5] Ultrasonography, on the other hand, is cost-effective, readily accessible, and allows for real-time, image-guided intervention.

Recent studies show that approximately 50–70% of MRI-detected NMEs can be correlated with

subtle findings on ultrasound, such as hypoechoic areas, ductal changes, or architectural distortion.[6] Identifying a sonographic correlate enables ultrasound-guided core needle biopsy, thus avoiding the need for MRI-guided intervention in many cases.

Ultrasound Techniques and Challenges

High-resolution breast ultrasound with meticulous scanning of the corresponding quadrant guided by MRI localization (clock-face, depth, and distance from nipple) is essential.[7] Advanced techniques such as elastography and Doppler imaging may improve detection rates.

However, ultrasonographic evaluation of NME is inherently limited by the lesion's non-mass nature. The absence of a discrete mass on ultrasound, combined with overlapping features of benignity and malignancy, increases the risk of both under- and over-diagnosis.[8] Awareness of potential pitfalls such as misinterpreting normal glandular tissue or post-biopsy changes as pathological is crucial.

Clinical Implications

The integration of MRI and ultrasound findings is critical for optimal patient management. For suspicious NME patterns (e.g., segmental distribution with clumped or clustered ring enhancement), an ultrasound search should be conducted with intent to locate a correlate amenable to biopsy. If no correlate is found, MRI-guided biopsy or short-term MRI follow-up may be warranted depending on the clinical context and patient preference.[9]

Conclusion

Ultrasonography plays a vital complementary role in the evaluation of non-mass enhancement on breast MRI. With careful technique and interpretation, it provides a practical pathway for biopsy and risk stratification of lesions that would otherwise require more complex interventions. Radiologists must be proficient in recognizing NME patterns and in applying targeted ultrasound techniques to improve diagnostic confidence and patient care.

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Educational Background

1995-2000	M.D., Dankook University College of Medicine, Korea
2003-2004	M.S., Dankook University College of Medicine, Korea
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Career

2001-2005	Internship and Residency, Department of Surgery, Dankook University Hospital, Korea
2009	Clinical and Research Fellow, Dept. of Surgery, Seoul National University Hospital, Seoul, Korea
2010-2011	Clinical Professor, Breast and Endocrine division, Department of Surgery, Dankook University Hospital
2012-2017	Assistant Professor, Breast and Endocrine division, Department of Surgery, Dankook University Hospital
2017-2018	Research Professor, Beckman Laser Institue & Medical Clinic, UC Irvine
2019-Present	Associate Professor, Breast and Endocrine division, Department of Surgery, Dankook University Hospital

Research Interests

Breast Cancer, Quality of Lifer for Cancer Survivor

Representative Publications

1. Shim EJ, Lee JW, Cho J, Jung HK, Kim NH, Lee JE, Min J, Noh WC, Park SH, Kim YS. Association of Depression and Anxiety Disorder With the Risk of Mortality in Breast Cancer: A National Health Insurance Service Study in Korea. Breast Cancer Res Treat 2020;179:491-98.
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5. Yang HM, Shin KJ, Min J, Woo SH. Anatomical Study of Gasless Transoral Thyroidectomy and Clinical Application. Surg Endosc 2020;34:3414-23.

Imaging Surveillance of Breast Cancer Survivors with Ultrasound

Junwon Min

Dankook Univ.

As the population of breast cancer survivors increases, optimal post-treatment imaging surveillance strategies have become a critical concern. While mammography remains the cornerstone of follow-up, its limitations in patients with a personal history of breast cancer (PHBC) and dense breast tissue prompt the need to evaluate supplemental imaging modalities, particularly ultrasound and MRI.

To review current guidelines, real-world practices, and the effectiveness of imaging surveillance in detecting recurrences or second primary breast cancers, with an emphasis on the role of ultrasound.

This presentation reviews international guidelines (NCCN, ASCO), Korean national health insurance policies, and multiple retrospective studies including Korean multicenter data. Case examples of locoregional and axillary recurrence were included to demonstrate clinical relevance. Particular focus was placed on postoperative ultrasonographic findings, surveillance intervals, and the utility of axillary ultrasound in high-risk subgroups.Routine imaging with mammography remains standard, but its sensitivity is lower in PHBC patients. Supplemental ultrasound or MRI can aid in early detection, especially in high-risk groups. However, routine use of axillary ultrasound for all survivors is not cost-effective. Importantly, patients undergoing mastectomy still require surveillance, as recurrence can occur in the chest wall or axilla.

A personalized, risk-adapted approach to imaging surveillance is essential for breast cancer survivors. While mammography should remain the backbone of follow-up, supplemental imaging including ultrasound and MRI should be selectively applied. Clinicians must counsel patients on the realistic need for continued imaging, even after mastectomy.

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ROOM 3

Liver Fibrosis Assessment Certification

Chair: Young Seok Kim *(Soonchunhyang Univ.)*

1. **Introducing the Certification of Liver Fibrosis Assessment**
   Seung Up Kim (Yonsei Univ.)
2. **Vibration-Controlled Transient Elastography: Conceptual Knowledge and Clinical Application**
   Ho Soo Chun (Ewha Womans Univ.)
3. **Shear Wave Elastography: Conceptual Knowledge and Clinical Application**
   Jae Seung Lee (Yonsei Univ.)

Curriculum Vitae

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Brief Introduction of Yourself

Education

1993-1999 Yonsei University College of Medicine, Seoul, Korea
2005-2007 M.D., Graduate School, Yonsei University, Seoul, Korea
2008-2014 Ph.D, Graduate School, Yonsei University College of Medicine

Brief Chronology of Training & Employment

2002-2003 Internship, Severance Hospital, Yonsei University College of Medicine, Seoul, Korea
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2009.10.5-13 Visiting Clinical Fellow, Division of Gastroenterology, Department of Internal Medicine, Kurume University College of Medicine, Kurume, Japan
2011- Clinical Assistant Professor, Severance Hospital, Department of Internal Medicine, Yonsei University College of Medicine, Seoul, Korea
2013- Assistant Professor, Severance Hospital, Department of Internal Medicine, Yonsei University College of Medicine, Seoul, Korea
2016- Associate Professor, Severance Hospital, Department of Internal Medicine, Yonsei University College of Medicine, Seoul, Korea
2015-2017 Postdoc Researcher, Department of Medicine, Columbia University, New York, US
2020- Professor, Severance Hospital, Department of Internal Medicine, Yonsei University College of Medicine, Seoul, Korea

Representative Publications

1. Vibration-Controlled Transient Elastography Scores to Predict Liver-Related Events in Steatotic Liver Disease. Lin H, Lee HW, Yip TC, Tsochatzis E, Petta S, Bugianesi E, Yoneda M, Zheng MH, Hagström H, Boursier J, Calleja JL, Goh GB, Chan WK, Gallego-Durán R, Sanyal AJ, de Lédinghen V, Newsome PN, Fan JG, Castéra L, Lai M, Harrison SA, Fournier-Poizat C, Wong GL, Pennisi G, Armandi A, Nakajima A, Liu WY, Shang Y, de Saint-Loup M, Llop E, Teh KK, Lara-Romero C, Asgharpour A, Mahgoub S, Chan MS, Canivet CM, Romero-Gomez M, Kim SU (Co-corresponding), Wong VW; VCTE-Prognosis Study Group. JAMA. 2024 Apr 16;331(15):1287-1297.
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Introducing the Certification of Liver Fibrosis Assessment

Seung Up Kim

Yonsei Univ.

The accurate assessment of liver fibrosis is critical in the management of chronic liver diseases, including metabolic dysfunction-associated steatotic liver disease (MASLD), chronic hepatitis B and C, autoimmune hepatitis, and alcoholic liver disease. Traditionally, liver biopsy has been considered the reference standard for staging fibrosis; however, it is invasive, costly, and associated with potential complications, limiting its widespread and repeated use in clinical practice. Over the past two decades, noninvasive tests (NITs), such as vibration-controlled transient elastography (VCTE), magnetic resonance elastography (MRE), and serum biomarker panels, have emerged as reliable alternatives for the evaluation of liver fibrosis. These modalities offer several advantages, including safety, reproducibility, patient acceptance, and suitability for longitudinal monitoring.

As noninvasive liver fibrosis assessment becomes integrated into routine clinical care and clinical research, the need for standardized operation, interpretation, and reporting has grown. Variability in operator expertise, device handling, and result interpretation can significantly influence diagnostic accuracy and patient management decisions. To address these challenges, a structured certification program for noninvasive liver fibrosis assessment has been introduced. The certification aims to ensure that healthcare professionals performing and interpreting NITs meet predefined standards of competence, thereby enhancing diagnostic reliability, patient safety, and comparability of results across centers.

The certification program encompasses several key components. First, it provides comprehensive theoretical education covering the principles of liver fibrosis pathophysiology, the technical aspects of each NIT modality, the strengths and limitations of different technologies, and the interpretation of test results in the context of specific liver diseases. Second, practical training is emphasized, where candidates gain hands-on experience under supervision, focusing on the correct application of devices such as VCTE probes, optimization of imaging parameters in MRE, and quality control measures. Third, competency is assessed through standardized examinations and performance evaluations that include interpretation of real-world cases and recognition of potential sources of error or variability.

The introduction of certification is expected to yield multiple benefits. It will improve the consistency and accuracy of fibrosis staging, which is essential for clinical decision-making, risk stratification, and treatment allocation. In addition, certified operators and centers will contribute to the quality of multicenter studies and registries, facilitating the generation of robust data on disease burden and treatment outcomes. The certification framework can also promote continuing professional development and encourage the dissemination of best practices in noninvasive liver disease assessment.

In conclusion, the certification of noninvasive liver fibrosis assessment represents a crucial step toward standardizing the use of NITs in clinical hepatology. By ensuring operator proficiency and harmonizing test performance, this initiative will support the optimal utilization of noninvasive tools in improving patient care and advancing liver disease research.

Key words: Noninvasive, Liver Fibrosis, Vibration-Controlled Transient Elastography, Shear Wave Elastography, Chronic Liver Disease

Curriculum Vitae

Ho Soo Chun *(Ewha Womans Univ.)*

Brief Introduction of Yourself

Prof. Ho Soo Chun graduated from Kosin university college of medicine, received residency and fellowship training at Severance Hospital, and has been working as a clinical assistant professor in Hepatology at Ewha Womans University Seoul Hospital since 2021.

Research Interests

Metabolic Dysfunction-Associated Fatty Liver Disease, Chronic Hepatitis B

Representative Publications

1. PAGE-B incorporating moderate HBV DNA levels predicts risk of HCC among patients entering into HBeAg-positive chronic hepatitis B. J Hepatol. 2024 Jan;80(1):20-30.
2. Risk Stratification for Sarcopenic Obesity in Subjects With Nonalcoholic Fatty Liver Disease. Clin Gastroenterol Hepatol. 2023 Aug;21(9):2298-2307.
3. Association of Physical Activity With Risk of Liver Fibrosis, Sarcopenia, and Cardiovascular Disease in Nonalcoholic Fatty Liver Disease. Clin Gastroenterol Hepatol. 2023 Feb;21(2):358-369.

Vibration-Controlled Transient Elastography: Conceptual Knowledge and Clinical Application

Ho Soo Chun

Ewha Womans Univ.

Chronic liver disease (CLD) affects more than 800 million individuals and its associated complications, such as cirrhosis and hepatocellular carcinoma (HCC), cause significant mortality, morbidity, and economic burden.[1] Clinically, the important goal of CLD treatment is to prevent the progression to cirrhosis and the subsequent development of liver-related events including hepatocellular carcinoma (HCC) and death. To this end, evaluating liver fibrosis and early diagnosis of cirrhosis play an important role in determining prognosis and treatment strategy in CLD.[2,3] Liver biopsy has been the gold standard for assessing fibrosis, but many non-invasive methods have been developed to predict liver fibrosis due to limitations such as invasiveness, variability in results, and cost. In this topic, especially, we explore the conceptual knowledge and clinical application of vibration-controlled transient elastography (VCTE) in CLD, evaluating its accuracy in assessing the fibrotic burden.

Conceptual Knowledge of VCTE in CLD

Elastography techniques assess liver stiffness by measuring the speed of an induced shear wave as an indicator of liver fibrosis.[4] A low-frequency shear wave generated by the transducer passes through the skin surface between the ribs, propagates to the liver, emits it through a transducer, and measures the speed of movement of the returned shear wave. A faster propagation speed of shear waves suggests a stiffer liver, indicating a relatively advanced stage of liver fibrosis.[5] The advantages of VCTE are that it is non-invasive, the results are highly reproducible, and it represents more than 100 times more liver parenchyma than liver biopsy. The measurement method is not difficult, so it does not take long to become proficient, and it is excellent for diagnosing liver fibrosis in CLD.[6,7] The accuracy of liver fibrosis measurement using VCTE is low or impossible in cases where there is ascites or the intercostal space is narrow. In the case of ascites, shear waves cannot reach the liver parenchyma, and it is difficult to position the probe in the case of narrow intercostal space. In addition, the possibility of test failure increases in cases where the body mass index is high (>28 kg/m^2).[8]

Clinical Implication of VCTE in CLD

The effectiveness of VCTE in evaluating liver fibrosis in chronic hepatitis B (CHB) patients has been extensively validated through liver histology. Recent meta-analysis including 211 studies with 61,665 CHB patients reported that a liver stiffness measurement (LSM) value greater than 7.0 kPa identifies significant fibrosis (≥F2) and a those greater than 12.5 kPa identifies cirrhosis (F4) in most patients.[9] The effectiveness of VCTE for assessing liver fibrosis in patients with chronic hepatitis C (CHC) also has been supported by many studies. A meta-analysis including 17 studies with 5,812 CHC patients reported a VCTE cutoff of 12.5 kPa for cirrhosis, with a sensitivity of 86% and specificity of 90%.[10] Many studies showed high sensitivity and specificity for evaluating the diagnostic utility of VCTE in patients with metabolic dysfunction-associated steatotic liver disease (MASLD).[11,12] Recent multinational study proposed the AGILE score, which leverages VCTE and outperformed fibrosis-4 index and VCTE alone for diagnosing advanced fibrosis and cirrhosis in patients with MASLD.[13]

Conclusion

The utility of VCTE continues to increase, as it can help predict significant fibrosis, thereby determining whether antiviral medications should be initiated, and predict cirrhosis, thereby helping to recognize the risk of developing hepatocellular carcinoma and initiate necessary surveillance. Broader clinical application of VCTE and related biomarkers necessitates further validation, particularly in diverse care settings, to ensure their optimal utility in routine clinical practice.

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Curriculum Vitae

Jae Seung Lee *(Yonsei Univ.)*

Brief Introduction of Yourself

Prof. Jae Seung Lee is a hepatologist from South Korea. He earned his medical degree and PhD from Yonsei University College of Medicine. He completed his residency in Internal Medicine at Severance Hospital, and after completing a two-year fellowship, he has been serving as a clinical assistant professor since 2020.

His research encompasses a wide range of topics in hepatology, with a particular focus on developing predictive models for hepatocellular carcinoma (HCC) in patients with chronic hepatitis B and metabolic dysfunction-associated steatotic liver disease (MASLD), as well as evaluating the diagnostic accuracy of non-invasive fibrosis measures.

His numerous publications focus on the treatment and prognosis of patients with liver-related diseases. Additionally, he explores experimental topics such as the mechanisms of drug resistance in HCC using HCC organoids. He is an active member of the Korean Association for the Study of the Liver and the Korean Liver Cancer Association.

Research Interests

Hepatitis B, Hepatitis C, Steatotic Liver Disease, Cirrhosis, Hepatocellular Carcinoma

Representative Publications

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Shear Wave Elastography: Conceptual Knowledge and Clinical Application

Jae Seung Lee

Yonsei Univ.

Shear-wave elastography (SWE) is a non-invasive ultrasound (US)-based technique that quantitatively measures tissue stiffness. Unlike traditional strain elastography, which provides only relative elasticity estimates, SWE generates real-time, quantitative elasticity maps overlaid on B-mode US images. SWE operates by using acoustic radiation force (ARF) to create localized tissue displacement, which induces shear waves that propagate transversely to the US beam. The US transducer detects the speed of these shear waves and calculates stiffness metrics such as the shear modulus and Young's modulus, based on wave propagation velocity and tissue density. Faster wave propagation indicates stiffer tissue. These quantitative measurements allow clinicians to assess liver stiffness and estimate the degree of fibrosis concurrently during a US examination.

Several modes of SWE have been developed, each with its strengths. Transient elastography (TE), commonly known by the FibroScan® device, uses an external mechanical vibrator to generate shear waves and has been widely validated for detecting advanced fibrosis and cirrhosis. Point SWE (p-SWE) utilizes ARF impulse at a single focal point and measures shear wave velocity at that site. Two-dimensional SWE (2D-SWE) acquires real-time elasticity maps over a wider region of interest (ROI), offering superior diagnostic accuracy, particularly for moderate fibrosis stages.

In clinical hepatology, SWE has become a pivotal non-invasive tool for staging liver fibrosis. Compared to serum biomarkers, SWE provides immediate, reproducible, and objective measurements. It is beneficial in patients with heterogeneous hepatic parenchyma or obesity, where B-mode guidance facilitates accurate ROI placement. SWE is also increasingly utilized in monitoring treatment response, screening for portal hypertension, and evaluating hepatic complications in metabolic dysfunction-associated steatotic liver disease.

According to recent data from the Korean Association for the Study of the Liver (KASL) clinical practice guidelines, the diagnostic performance of SWE differs by fibrosis stage and modality. For instance, p-SWE demonstrates an area under the receiver operating characteristic curve (AUC) of

approximately 0.85 for significant fibrosis (≥F2), 0.90 for advanced fibrosis (≥F3), and 0.94 for cirrhosis (F4). In comparison, 2D-SWE shows slightly higher AUCs of 0.89 for ≥F2, 0.93 for ≥F3, and 0.95 for F4. These findings highlight the strong performance of SWE modalities, particularly 2D-SWE, in staging liver fibrosis with high accuracy.

When performing p-SWE or 2D-SWE for liver fibrosis evaluation, specific technical precautions must be followed, as emphasized by guidelines from the World Federation for Ultrasound in Medicine and Biology (WFUMB) and the European Federation of Societies for Ultrasound in Medicine and Biology (EFSUMB). Patients should fast for at least 3 to 6 hours before the examination to reduce variability caused by bowel gas or gallbladder distention. The scan should be performed with the patient in a supine position with the right arm raised to open the intercostal spaces. During image acquisition, a brief breath-hold at the end of expiration is recommended to minimize respiratory artifacts. Measurements should target the right liver lobe, typically segment 8, via an intercostal approach, avoiding large vessels, biliary structures, and the liver capsule. The ROI should be positioned approximately 1.5 to 2.5 cm below the liver surface and at least 1–2 cm away from visible vascular structures. Excessive transducer pressure must be avoided, as it may falsely elevate stiffness readings. To ensure reliability, a minimum of 5 to 10 valid measurements should be acquired. The interquartile range (IQR)-to-median ratio is used to assess variability, with values ≤30% considered acceptable in 2D-SWE. For p-SWE, a standard deviation of less than 30% or minimal intra-measurement variability is recommended. Stiffness values may be reported in meters per second (m/s) or kilopascals (kPa), and conversion between units should follow standard physical formulas based on tissue density.

Specific physiological and pathological conditions, including acute inflammation, hepatic congestion, cholestasis, or steatohepatitis, can affect liver stiffness independently of fibrosis. Technical limitations may also arise in patients with obesity, ascites, or narrow intercostal windows. Consistent use of the same equipment and standardized protocols, combined with trained and experienced operators, is crucial for reducing inter-observer variability and enhancing measurement reliability.

In conclusion, shear-wave elastography is a robust and non-invasive modality that has revolutionized the assessment of liver fibrosis. With its ability to provide real-time, quantitative stiffness measurements, SWE facilitates accurate diagnosis, disease monitoring, and risk stratification in chronic liver disease. With further refinement and validation, SWE is expected to become a core component of liver imaging and may extend to broader clinical applications beyond hepatology.

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ISCU 2025

International Symposium of Clinical Ultrasound

in Conjunction with
2025 KACU Spring Annual Symposium

Bridging Clinical Ultrasound Research and Practice for a Healthier Future

Oral Poster Presentation

[Breast]

Chair: Ku Sang Kim (Kosin Univ.), Junwon Min (Dankook Univ.)

OP-1

Expediency of Ultrasound and Checklist for Breast Implant Screening

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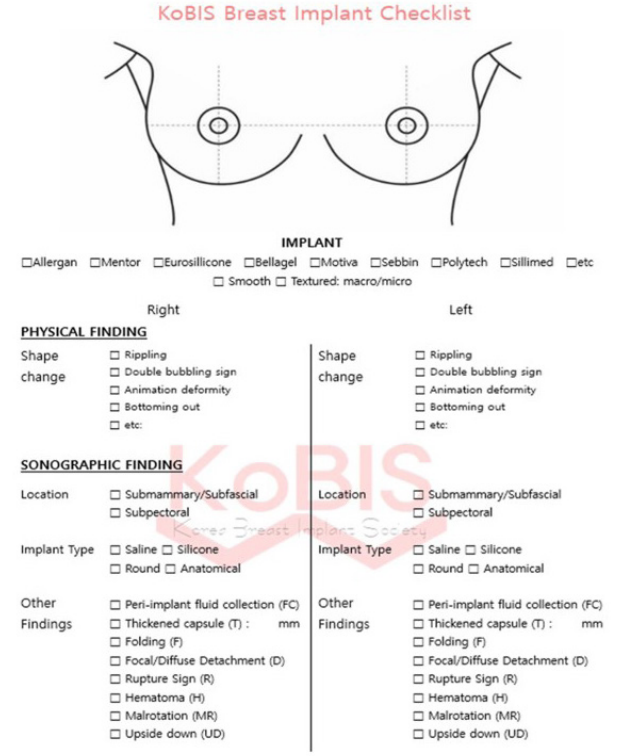
Aims: As the usage of breast implants increased gradually during the recent decade, various breast implant related complications and clinical conditions are made known including rarely reported Breast Implant-associated Anaplastic Large-Cell Lymphoma (BIA-ALCL).

Methods: Ultrasonographic evaluation was done on total of 540 women with breast implants who visited for a breast check-up during January, 2, 2023 to February, 29, 2024. Women were evaluated with high-resolution ultrasound (HRUS) plus the Breast implant related Checklist which was first introduced by the Korea Breast Implant Society (KoBIS).

Results: Women ranged from 20 to 55 years old (median 38) and 513(95%) had breast augmentation for cosmetic purpose than reconstruction. Median follow-up duration from surgery was 14 months (range 1 months to 204months). Breast implant inserted for cosmetic purpose were placed in submammary/subfascial (318, 61.9%) or subpectoral level (195, 37.1%). Implant types were saline (42, 7.8%) or silicone (498, 92.2%), implant shape was round (362, 67%) or anatomical (178, 32.9%). One-hundred seventy-two (31.8%) were found with single or multiple breast implant associated complications. Breast implant associated complication in ultrasonographic finding included peri-implant fluid collection (107, 19.8%), capsular thickening (49, 9.1%), folding (55, 10.1%), focal or diffuse detachment (83, 15.3%), rupture sign (76, 14%), hematoma 21(3.8%), malrotation (59, 10.9%), and upside down of implant (31, 5.7%). Late seroma was found in 43(7.9%) patients who had surgery 1 year ago or more, but none of the patients were diagnosed with BIA-ALCL so far.

Conclusions: Breast augmentation and reconstructions using breast implant are increasing but a useful sonographic evaluation guideline is not suggested for breast implants. Therefore, we suggest a breast implant associated complication check list that can be used for breast ultrasonography for women with breast implants. More studies are in need including the checklist which could help step towards thorough evaluation method for less miss of breast implant complication.

Keywords: Breast Implant, Implant Rupture, Breast Implant Checklist



Result

- Age: 20 to 55 years old (median 38)
- 513(95%) breast augmentation for cosmetic purpose > 27(5%) reconstruction.
- Median follow-up since breast augmentation: 14 months (range 1 month to 204months)

Table.1 Symptom at the time of follow up

Symptom	N	%
Breast symptom negative	**231**	**42.7%**
Breast symptom positive	**306**	**56.6%**
Breast pain(unilateral, bilateral)	245	45.3%
Other(implant related, skin irritation, nipple discharge)	47	8.7%
Mass		
Palpable only	3	0.56%
Palpable mass + pain	8	1.48%
Palpable mass + pain + other	3	0.56%
Unknown	3	0.56

Table.2 Result of Ultrasonographic Checklist

Ultrasonographic Breast Checklist	Number of Patients (N)	%
Breast implant position		
Submammary/subfascial	318	58.8%
Subpectoral	195	36.1%
Unknown	26	4.8%
different level*	1	0.2%
Implant type		
Saline	42	7.8%
silicone	498	92.2%
Implant Shape		
Round (smooth, textured, micro-textured)	362	67.0%
Anatomical	178	32.9%
Implant-related complication		
Peri-implant fluid collection**	107	19.8%
Focal/diffuse detachment	83	15.3%
Rupture sign	76	14%
Malrotation	59	10.9%
Folding	55	10.1%
Capsular thickening	49	9.1%
Upside down of implant	31	5.7%
Hematoma	21	3.8%
Total	**172**	**31.8%**
* Right subpectoral, Lt submammary	1	0.2%
** includes late seroma (postop 1yr or over)	43	7.9%

Result

Table 3. Number of Patients according to symptom & Checklist US finding

	Complication negative N	%	Complication positive N	%
Symptom(-)	169	31.5%	62	11.5%
Symptom(+)	196	36.5%	110	20.5%

- 8(1.48%) patients were recommended MRI before surgery.
- Checklist Rupture sign(+) : 59(10.9%) had surgical confirmation(+) within 1 month.
- 43 late seroma(7.9%): aspiration was done for cytology . 8(18.6%) were found with neutrophil (+) CD30 (-). None were diagnosed with BI-ALCL with the peri-implant fluid so far.

Table.4 Number of breast-associated unilateral or bilateral US finding

Number of complication	Right N	%	Left N	%	Both N	%
Single complication	11	6.3%	30	17.44%	69	40.1%
Two complications	21	12.2%	12	6.98%	5	2.9%
Three or more complications	12	6.98%	10	5.8%	2	1.16%

- Relationships between breast symptom, breast implant related complications, treatment, re-operative rate according to unilateral or bilateral US findings are in study.
- Limitations: follow up loss, short term, observer-dependent findings

OP-2

Evaluating Diagnostic Accuracy of Ultrasound and MRI in Breast Cancer: A Retrospective Study in Delhi, India

Monirujjaman Biswas

Special Centre for Molecular Medicine, Jawaharlal Nehru University

Aims: Breast cancer remains the most prevalent malignancy among women globally. Timely diagnosis is crucial to improving the likelihood of successful treatment. Among the commonly utilized imaging techniques for breast cancer detection are ultrasonography (USG) and magnetic resonance imaging (MRI). This study aims to evaluate and compare the diagnostic accuracy of ultrasound and MRI in identifying breast cancer among women in Delhi, India.

Methods: This retrospective study included 243 female patients who underwent both ultrasound and MRI scans at the National Institute of Tuberculosis and Respiratory Diseases, New Delhi, between July 2022 and Sepetember 2023. Patient data were extracted from electronic medical records and analyzed to assess and compare the diagnostic performance of the two imaging modalities.

Results: The results revealed that MRI outperforms ultrasound in terms of diagnostic accuracy for breast cancer. The sensitivity of MRI was 96.6%, compared to 79.8% for ultrasound. Specificity was also higher for MRI (98.9%) than for ultrasound (95.2%). Additionally, the positive predictive value (PPV) for MRI was 97.2%, while that for ultrasound was 89.1%. The negative predictive value (NPV) was 98.7% for MRI and 93.4% for ultrasound.

Conclusions: The findings suggested that MRI demonstrates superior accuracy in breast cancer detection and is recommended as the preferred imaging tool for female patients. The study further highlighted that ultrasound may still serve as a useful adjunct to MRI in clinical practice.

Keywords: Breast Cancer, Ultrasonography, MRI, Timely Diagnosis

OP-3

Integrating Microneedles and Ultrasound for Enhanced Drug Delivery in Breast Cancer Therapy: A Comprehensive Review

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Aims: Breast cancer treatments like chemotherapy and radiation often cause significant side effects and limited targeting. Nanomedicine offers improved drug delivery but faces challenges like toxicity and biodistribution issues. Recent advances in microneedles and ultrasound technology offer promising, non-invasive alternatives. Microneedles enable minimally invasive drug delivery by bypassing the skin barrier, while ultrasound enhances tissue penetration. This study explores the integration of microneedles and ultrasound for improved drug delivery in breast cancer therapy, aiming to enhance targeting and reduce systemic side effects.

Methods: A comprehensive literature review was conducted using PubMed and Scopus, focusing on recent developments (2014-2024) in microneedle-based drug delivery, ultrasound therapies, and their combined application in breast cancer treatment.

Results: Microneedles show potential for transdermal drug delivery, bypassing the skin barrier. Techniques such as tape-stripping, iontophoresis, and ultrasound are being explored to access skin biomarkers and analyze molecular composition. The ZnO nanowire-based microbubble generator probe (ZnONW-MGP) combines microneedles with ultrasound. This system uses microfabricated silicon needles covered with zinc-oxide nanowires and an electrochemical stimulator to generate microbubbles in the tumor environment. When activated by ultrasound, it induces microcavitation in tumor cells, enhancing drug delivery. In mouse models, the ZnONW-MGP system resulted in an 82% reduction in tumor size within 10 days, using only 25% of the conventional paclitaxel dose, compared to a 15% reduction without the system. Additionally, a Bi-based soluble microneedle enabled CT imaging and combination therapies, including tumor starvation, gas therapy, and enhanced phototherapy/sonodynamic therapy. Zinc-oxide nanostructures on

microneedles improved microbubble generation, further enhancing drug delivery.

Conclusions: The integration of microneedles and ultrasound offers enhanced drug delivery, reduced side effects, and improved treatment efficacy. This approach holds promise for personalized, effective breast cancer treatments and could revolutionize cancer therapy. Future research should focus on optimizing microneedle designs and investigating long-term safety and efficacy.

Keywords: Microneedles, Ultrasound-Assisted Therapy, Breast Cancer, Non-Invasive Therapy

OP-4

Artificial Intelligence-Enhanced Ultrasonography for Early Detection of Breast Cancer: A Systematic Review and Clinical Implications for Personalized Pharmacotherapy

Andi Nursanti[1], Agrin Febrian Pradana[2]

[1]Department of Pharmacy, University of Wallacea, [2]Department of Computational Engineering, University of Indonesia

Aims: Breast cancer is one of the leading causes of cancer death in women worldwide. Early detection is of key importance in improving patient survival rates and therapeutic effectiveness. Ultrasound (US) is recognized as a safe, non-invasive, and effective diagnostic method, especially for women with dense breast tissue. However, the limited subjectivity in the manual interpretation of ultrasound images may lead to variability in diagnosis. Integrating artificial intelligence (AI) technology in ultrasound is expected to improve the accuracy of early detection and support the development of imaging biomarker-based pharmacological therapy. This study aims to systematically review the development of AI technology in ultrasonography for the early detection of breast cancer and evaluate its implications for the personalization and development of pharmacological therapy for breast cancer.

Methods: The study used secondary data from PubMed, ScienceDirect, and Google Scholar for studies published between 2012 and 2024 using the keywords "artificial intelligence", "breast cancer", "ultrasonography", "early detection", and "pharmacological therapy". Articles were selected based on the inclusion criteria of original studies, systematic reviews, and relevant meta-analyses. The collected data were analyzed narratively to evaluate the performance of AI models, the potential integration of AI in therapy monitoring, and its impact on pharmacotherapy development.

Results: A total of 22 articles met the inclusion criteria, with the 10 most relevant being primary studies. CNN-based AI increased detection accuracy to 98% and decreased false negatives by 37%. Radiomic AI was able to predict pathologic complete response (pCR) to neoadjuvant chemotherapy with 91% accuracy. Another detection sensitivity showed 96% and a specificity of 93%. AI increased the sensitivity of ultrasound to 97%. AI can predict HER2 expression with an AUC of 0.88, opening up opportunities for biomarker prediction of target therapy. AI also shows significant potential in monitoring pharmacotherapy response, especially for Trastuzumab and neoadjuvant chemotherapy. AI is also effective in detecting cancer in dense breast tissue, which was previously a challenge with conventional ultrasound. Several studies reported the potential of AI as a non-invasive imaging surrogate biomarker to predict biomolecular expression, thus enabling optimization and personalization of pharmacotherapy regimens.

Conclusions: AI-integrated breast ultrasonography represents a significant advancement in the early detection of breast cancer, with substantial improvements in diagnostic performance and lesion stratification. Beyond diagnosis, AI shows considerable potential in guiding pharmacological decision-making by enabling imaging-based biomarker prediction and monitoring therapeutic response.

Keywords: Breast Cancer, Ultrasonography, Artificial Intelligence, Pharmacotherapy

[Cardiac]

Chair: Kee Sik Kim (Daegu Medical Center), Junwon Min (Yeungnam Univ.)

OP-5

Research on Left Ventricular Global Longitudinal Strain by Speckle Tracking Echocardiography in Patients with Chronic Heart Failure

Do Thi Hai Linh

Friendship Hospital

Aims: To evaluate left ventricular global longitudinal strain by 2D speckle tracking echocardiography in patients with chronic heart failure (HF).

Methods: A prospective, descriptive and cross-sectional study on 70 patients with HF treated at the Department of Cardiology, Military Hospital 103 and Friendship Hospital from January, 2022 to July, 2022. The patients were clinically and paraclinically evaluated for heart failure, patients were clasified according to NYHA. GLS was calculated using 2-dimensional speckle tracking and left ventricular ejection fraction was measured using Simpson's method.

Results: The mean age was 78.61 ± 8.24 years old, men were 70%. GLS in study group decreased more than normal (-11.92 ± 400 to – 19.65±1.78;-20.40±2.2; p<0.05). GLS of patients with heart failure in group NYHA II, NYHA III and NYHA IV, Were- 13.85 ± 3.24;- 10.39 ± 3.72 and -8.67 ± 4.42 respectively, the difference was statistically significant in the NYHA II group compared with NYHA III and NYHA IV. Patients with hypertension, coronary artery disease had a significant decrease in GLS compared with the others (p<0.05).

Conclusions: GLS of patients with HF was reduced. GLS decreased gradually according to the severity of heart failure according to NYHA. In the group of patients with heart failure with hypertension, coronary artery disease, the GLS value decreased significantly compared with the group of patients without hypertension, coronary artery disease (p<0.05).

Keywords: Heart Failure, Speckle Tracking, 2-Dimentional Echo, Global Longitudinal Strain

OP-6

Management of Lymphoma with Heart Disease

Harshita Dubey, Sathy V Merla, Amar Ranjan

All India Institute of Medical Sciences, New Delhi

Aims: Plasmablastic lymphoma (PL) predominantly inflicts immunocompromised individuals. Here we present a case of PL with heart disease.

Methods: A case study

Results: A 38-year-old female presented with swelling at the angle of the mandible (right) with tonsilar enlargement for 1 month. Echocardiography exhibited Grade II left ventricular diastolic dysfunction with an LVEF of 60%. The routine hemogram was within the normal range. Serum protein electrophoresis showed no M-band. Serum LDH level was 352 IU/ml.

HRCT showed a soft tissue mass with cervical lymphadenopathy. FNAC suggested an inflammatory lesion. The mass biopsy revealed atypical lymphoid cells admixed with plasmacytoid cells, positive for CD138, EMA, kappa, and lambda, while negative for CD20, CD79a, CD3, CD5, CD30, Bcl2, Bcl6, CD23, and CD10. Cells were also weakly positive for CD43, CD45RO, and PAX5. Non-Hodgkin lymphoma (NHL) was suggested. Radiologically, Lugano stage II E was suggested.

A review of the biopsy slide showed atypical cells positive for CD38 and negative for CD138, CD20, CD3, CD7a, and pan-cytokeratin with a Ki67 index of 30% & an MIB-1 index of 70-80%. Viral markers were negative. Plasmablastic lymphoma was considered. The bone marrow aspirate or biopsy showed no lymphoma filtration. DA-EPOCH was started. After 4 cycles of CT, PET CT showed a complete response. Post-5# CT, grade III thrombocytopenia, febrile neutropenia, & Oncovin-induced paralytic ileus were observed. After 6 CTs, CECT divulged cervical lymphadenopathy, indicating progressive disease. She was given methotrexate followed by radiotherapy (36 Gy) in 20 cycles to keep the patient asymptomatic for more than 30 months, although radiation-induced dermatitis and oral ulcers were seen, and hypothyroidism was seen. Presently, the patient is on follow-up.

Conclusions: PL with heart disease is a rare condition.

In this case, therapy-induced complications may result from compromised blood circulation. A care decision should be taken while choosing a therapeutic regimen in such cases.

Keywords: Lymphoma, Heart Disease, Complications

OP-7

The Impact of Cardiac Ultrasound-Guided Resuscitation in Shock and Cardiac Arrest: A Systematic Review

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Aims: Cardiac ultrasound (CUS), particularly point-of-care echocardiography (POCUS), is increasingly utilized during shock and cardiac arrest to guide resuscitation decisions. However, its true clinical impact on outcomes remains uncertain. This systematic review aimed to evaluate the role of CUS-guided resuscitation in improving diagnostic accuracy, therapeutic decision-making, and survival outcomes in adults with shock or cardiac arrest.

Methods: Following PRISMA guidelines, we searched PubMed, Embase, Web of Science, and Scopus through January 2024. Eligible studies included randomized controlled trials (RCTs), observational studies, and cohort analyses assessing outcomes of CUS-guided resuscitation in adult patients with undifferentiated shock or during cardiac arrest. Primary outcomes included survival to hospital admission/discharge, time to intervention, diagnostic accuracy, and ROSC (return of spontaneous circulation). Risk of bias was assessed using the ROBINS-I and Cochrane RoB 2 tools.

Results: From 3,118 initial records, 38 studies (n = 7,526 patients) met inclusion criteria. In cardiac arrest scenarios, CUS use was associated with increased ROSC rates (OR 1.42, 95% CI: 1.11–1.82) and improved identification of reversible causes such as tamponade or massive pulmonary embolism. In undifferentiated shock, CUS reduced diagnostic uncertainty (pooled diagnostic accuracy: 91%), expedited vasopressor initiation (mean difference: –14 minutes), and was associated with a non-significant trend toward lower mortality (RR 0.89, 95% CI: 0.76–1.03). No significant delays in CPR were noted when ultrasound was used during pulse checks.

Conclusions: Cardiac ultrasound-guided resuscitation significantly enhances early diagnostic clarity and clinical decision-making in both shock and cardiac arrest, and may improve critical outcomes such as ROSC. These findings support the integration of POCUS into standard resuscitation protocols. Further large-scale RCTs are needed to confirm survival benefits and define optimal training standards for emergency teams.

Keywords: Cardiac Ultrasound, Shock, Cardiac Arrest, Point-of-Care Ultrasound (POCUS)

OP-8

Real-Time Prediction of Hemodynamic Crash in ICU Patients Using Temporal Ultrasound of Inferior Vena Cava and Cardiac Chambers with Cross-Signal Transformer

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Aims: Hemodynamic instability in ICU patients often occurs without early warning, limiting time for intervention. Point-of-care ultrasound (POCUS), particularly cardiac and inferior vena cava (IVC) views, is widely available but rarely used for predictive modeling. This study presents a pilot deep learning approach that integrates temporal cardiac and IVC ultrasound clips to forecast hemodynamic crash within 3–6 hours, supporting early clinical decision-making.

Methods: Cardiac apical 4-chamber ultrasound videos (n=250) were obtained from the EchoNet-Dynamic dataset. Subcostal IVC clips were curated from accessible instructional ultrasound materials, including reputable medical education channels, selected for clear visualization of respiratory-phase variation. Motion interpolation was applied to simulate longitudinal sequences at 3-hour intervals. Ground-truth crash labels were assigned based on standard

clinical thresholds: cardiac output <2.2 L/min, IVC collapsibility index >50%, and systolic blood pressure drop >20 mmHg. A dual-branch temporal cross-signal Transformer was constructed, with one branch modeling spatial-temporal cardiac dynamics and the other capturing respiratory-driven IVC patterns. Cross-attention layers fused features across modalities. Model evaluation used 5-fold cross-validation on a limited set of simulated ICU patient trajectories (n=50), synthesized from curated video inputs to assess feasibility.

Results: The model achieved an AUROC of 0.81 (95% CI [0.74–0.87]), AUPRC of 0.73, sensitivity of 76.4%, specificity of 74.2%, and F1-score of 0.75. Performance exceeded CNN-LSTM baselines by +7.1%. Grad-CAM overlays showed physiologic consistency in 78.6% of IVC clips. In simulation testing (n=20), early warnings preceded MAP decline (<65 mmHg) by an average of 2.2 hours. Removing cross-signal attention reduced AUROC by 10.5%. Notably, IVC attention maps concentrated near respiratory cycle inflection points, supporting the model's sensitivity to dynamic venous return patterns.

Conclusions: This feasibility study provides evidence for the potential of temporal ultrasound integration in predicting hemodynamic crash and supports further development of non-invasive early-warning systems in critical care practice.

Keywords: Hemodynamic Crash Prediction, Temporal Ultrasound Integration, Transformer-Based Deep Learning, Point-of-Care Ultrasound (POCUS)

OP-9

Investigating the Long-Term Effects of Cardiovascular Pharmacotherapy on Gender: Implications for Precision Medicine

Muhammad Irzaq

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Aims: Cardiovascular disease (CVD) can also lead to damage to arteries in vital organs such as the brain, heart, and kidneys. Various types of CVD include heart failure, stroke, and heart attack. One effective treatment for CVD is cardiovascular disease (CVD) drugs. A cardiovascular drug is any agent that modulates the function of the heart and blood vessels (Rang and Janet, 2023). However, the long-term benefits and risks of cardiovascular drugs remain largely unknown (Rossello et al., 2015). Therefore, this study aims to elucidate the benefits and risks of long-term cardiovascular medications in men and women.

Methods: This research employs a systematic review methodology. Articles published between 2015 and 2025 were retrieved from the electronic database lens.org. Keywords utilized were "cardiovascular drug" and "effect." Subsequently, up to three selected papers were reviewed to address the objectives of this study.

Results: A study conducted by Lee et al. (2015) on the long-term use of CVD drugs revealed that evidence from randomized clinical trials (RCTs) typically extends beyond a few years of follow-up. Despite this, patients are often prescribed continuous treatment with multiple drugs well into old age, and recommendations for optimizing long-term drug use are provided. Based on Tronelli and Straus (2022), each of these CVD drugs demonstrates clinically relevant benefits when combined with existing therapies, and their indications for use are expanding rapidly. However, the complexity and cost of existing drug regimens pose a significant challenge in ensuring that society derives the maximum benefit from these novel agents. The final study, conducted by Tamargo et al. (2017), investigated the acceptance of CVD drugs among women and men. The study found that women and men exhibit distinct physiological characteristics, including hormonal influences during the menstrual cycle, menopause, and pregnancy. These differences translate into variations in drug pharmacokinetics (absorption, distribution, metabolism, and excretion) and pharmacodynamics, leading to the possibility of differential responses to cardiovascular drugs.

Table. Findings

Author(s)	Year	Key Findings
Lee et al.	2015	RCTs typically extend beyond a few years of follow-up, but patients are often prescribed continuous treatment with multiple drugs well into old age.
Tronelli and Straus	2022	Each of the CVD drugs demonstrates clinically relevant benefits when combined with existing therapies, and their indications for use are expanding rapidly.
Tamargo et al.	2017	Women and men exhibit distinct physiological characteristics that translate into variations in drug pharmacokinetics and pharmacodynamics, leading to the possibility of differential responses to cardiovascular drugs.

Conclusions: In conclusion, studies on cardiovascular disease (CVD) drugs demonstrate long-term benefits and expanding indications. However, complex regimens present challenges. Gender differences in physiology influence drug responses, necessitating personalized approaches.

Keywords: Cardiovascular, Long-Term Effects, Gender, Precision Medicine

[Liver - Upper & Lower]

Chair: Seung Up Kim (Yonsei Univ.), Sung-Eun Kim (Hallym Univ.)

OP-10

A Novel Contrast-Based Imaging-Enhanced Investigation Will Quantify Hepatic Diseases in Rodents

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Aims: Dynamic contrast-enhanced imaging uses oxyhemoglobin and deoxyhemoglobin optical absorption differences to provide a unique noninvasive imaging method. Dynamic imaging of liver indocyanine green (ICG) pharmacokinetics is possible. Photoacoustic imaging exploits these disparities. The DCE PAI parameters (maximum peak time [Tmax] and half-life [T1/2]) from the PA liver function curve are compared to histopathologic fibrosis in this work.

Methods: A liver fibrosis model was created by injecting mice with carbon tetrachloride solution intraperitoneally every two days. A PA technique was used to dynamically assess liver structure changes modelling process. Calculations were done to determine ICG Tmax and T1/2 at various pathologic stages and in a control group. Blood biochemistry and liver histopathology might be matched. Spearman rank correlation was used to determine the relationship between DCE PAI outcomes and histologic scores.

Results: Analysis of the PA liver function curve showed that Tmax and T1/2 values varied between groups. The mean Tmax for the control group was 12 seconds with a standard deviation of 1.4, whereas T1/2 values for 1 week were 43 seconds with 3.9, 4 weeks with 68 seconds with 4.2, and 8 weeks with 86 seconds with 5.9. All values were statistically significant (p<.001). (Histopathologic scores were positively correlated with dynamic characteristics (Tmax and T1/2). Positive regions for Sirius red and α-smooth muscle actin (αSMA) had Spearman ρ ratios of 0.89 and 0.91 (p<.001) for Tmax, and 0.84 and 0.86 (p<.001) for T1/2.

Conclusions: Dynamic contrast-enhanced photoacoustic imaging demonstrated that induced fibrosis mice had a longer maximum peak time and half-life than controls. These findings also matched histologic fibrosis measurements.

Keywords: Contrast, Liver Fibrosis, Rodents

OP-11

Development and Optimization of Ganoderic Acid Chitosan Lipid Nanoparticles Attenuate Diethylnitrosamine Induced Hepatocellular Carcinoma in Rats Via Modulating of Keap1/Nrf2/HO 1 and SIRT1/Notch1 Signaling Pathway

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Aims: Hepatocellular carcinoma (HCC) is the predominant form of primary liver cancer, whereas cholangiocarcinoma constitutes the remainder. Nanoparticle-based drug delivery systems have many advantages over traditional methods in cancer treatment such as targeted delivery to tumor cells, favorable pharmacokinetics, minimization of toxicity, and side effects. The aim of the current study was to develop the Ganoderic acid loaded chitosan lipid nanoparticles (GA-CLNPs) against Diethylnitrosamine (DEN) induced HCC in rats.

Methods: Oil-in-water homogenization method was used for the fabrication of GA-CLNP and the nanoparticles were characterized via determination of entrapment efficiency (EE), polydispersity index (PDI), zeta potential (ZP), particle size (PS), invitro release study. DEN was used for the induction of HCC in rats and oral administration of GA-CLNP

was given to the rats for 12 weeks. The body weight, organ weight, hematological, hepatic, non-hepatic, antioxidant, apoptosis and inflammatory parameters. The different mRNA expression were estimated in the hepatic tissue.

Results: GA-CLNP exhibited the high EE (95.32±0.55%), PS (85.34±7.47 nm), zeta potential (m –22.4±3.57) and after 24h exhibited the (29.34±9.34%) release study. GA-CLNP exhibited the improved body weight and suppressed the liver weight. GA-CLNP treatment significantly (p<0.001) suppressed the hepatic cancer parameters (AFP, CEA, CA19.9); hepatic parameters (AST, ALT, ALP); non hepatic parameters (total albumin, creatinine, bilirubin). GA-CLNP treatment altered the level of antioxidant parameters (MDA, SOD, CAT, GSH, GPx); inflammatory cytokines (TNF-α, IL-1β, IL-6, IL-17); inflammatory parameters (COX-2, NF-κB, iNOS, TGF-β) and apoptosis parameters (Bax, Bcl-2 and caspase-3). GA-CLNP treatment altered the mRNA expression of Bax, caspase-3, Bcl-2, Notch1, Keap-2, Hes-1, Nrf2, SIRT1 and HO-1 in the hepatic tissue.

Conclusions: GA-CLNP exhibited the anticancer effect against DEN induced HCC in rats via alteration of Keap1/Nrf2/HO-1 and SIRT1/Notch1 signaling pathway.

Keywords: Hepatocellular Carcinoma, Hepatic Cancer, Nanoformulation, Keap1/Nrf2/HO-1 Signaling Pathway

OP-12

Development of Creative Fluorescent Probes to Find and Visualise Reactive Nitrogen Species (RNS) and Reactive Oxygen Species (ROS) in Hepatotoxicity Brought on by Paracetamol

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Aims: Commonly known as DILI, the drug-induced liver damage is a major component in the development of liver disease capable of being rather catastrophic. This work aims to present details on the evolution of a molecular probe known as LW-OTf.

Methods: Two biomarkers linked to DILI were sought for by this probe, which also aims for imaging. First, a near-infrared fluorescence (NIRF) output is selectively activated by fluorophore LW-OH generation in the presence of main reactive oxygen species (ROS) superoxide ($O2^{\cdot}-$).

Results: Reactive nitrogen species (RNS) peroxynitrite (ONOO–) causes the subsequent oxidation of the carbon-carbon linkage of this hemicyanine fluorophore to produce a cleavage that finally results in the synthesis of the xanthene derivative LW-XTD. Two-photon excitation fluorescence (TCEF) allows one to identify this derivative. For instance, the cleavage of LW-OTf by ONOO– can produce LW-XTD-OTf, devoid of any luminous qualities. This non-fluorescent LW-XTD-OTf can undergo an extra reaction with the second analyte $O2^{\cdot}-$ which will finally produce the same LW-XTD fluorescent species employed in the first reaction. Differential and simultaneous detection of ROS and RNS in DILI is one of the powers of the LW-OTf method. Two optically orthogonal channels help to make this feasible. This is made feasible by NIRF and TPEF taken together. Either $O2^{\cdot}-$ or $O2^{\cdot}-$ and ONOO– can be detected by the probe LW-OTf when lysosomes are triggered by 2-methoxyestradiol (2-ME) or 2-ME and SIN-1 respectively. Moreover, we were able to show in living HL-7702 cells without any negative consequences the chemoprotective properties of tert-butylhydroxyanisole (BHA) against the toxicity of acetaminophen (APAP). This was achieved without any unfavourable effects. Mouse livers undergoing APAP-induced DILI showed higher levels of both $O2^{\cdot}-$ and ONOO– according the TPEF and NIRF imaging studies and histopathological studies too.

Conclusions: We can conclude that the developed system will be useful in detecting liver diseases and further scale up at large sector.

Keywords: Liver Toxicity, Fluroscent Probe

OP-13

Clinical Implications of Fatty Pancreas Detected by Ultrasonography

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Aims: Fatty pancreas, or pancreatic steatosis, is commonly observed in abdominal ultrasonography but its clinical implications remain less defined compared to other ectopic fat accumulations, such as fatty liver. This

review aims to summarize current evidence on the ultrasonographic characteristics of fatty pancreas and explore its associations with metabolic diseases.

Methods: A comprehensive literature review was conducted focusing on studies that examined the detection, grading, and clinical relevance of fatty pancreas using ultrasonography. Emphasis was placed on studies evaluating its correlation with metabolic conditions such as type 2 diabetes mellitus (T2DM), obesity, and metabolic syndrome.

Results: Fatty pancreas is typically identified on ultrasound as increased echogenicity of the pancreatic parenchyma relative to the renal cortex. Grading ranges from mild (grade 1) to severe (grade 3) based on echogenicity intensity. Accumulation of fat in the pancreas has been significantly associated with metabolic abnormalities including T2DM, obesity, and dyslipidemia. Proposed mechanisms include adipocyte-driven inflammation and altered cytokine secretion, which may promote insulin resistance and systemic metabolic dysfunction. Furthermore, pancreatic steatosis has been implicated in the development of pancreatic fibrosis and may increase the risk for pancreatic cancer.

Conclusions: Ultrasonography provides a practical, non-invasive tool for the detection and monitoring of fatty pancreas. Recognizing its potential role in the pathogenesis of metabolic diseases could inform early interventions and therapeutic strategies. Further research is required to establish standardized ultrasonographic criteria and evaluate treatment approaches to reduce its metabolic impact.

Keywords: Fatty Pancreas, Ultrasonography, Meatbolic Disease

OP-14

Sarcomatoid Transformation of Hepatocellular Carcinoma after Transarterial Chemoembolization: A Case Report

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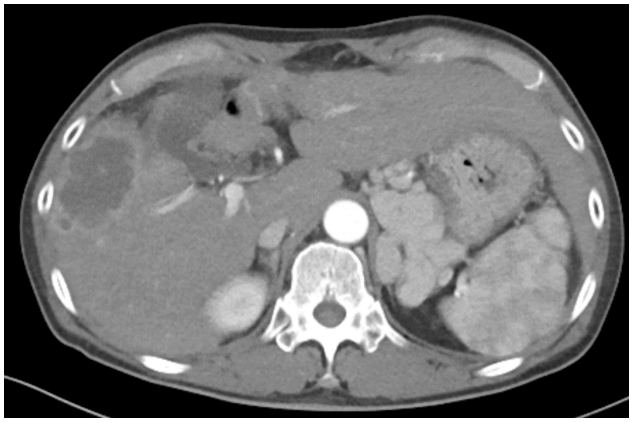
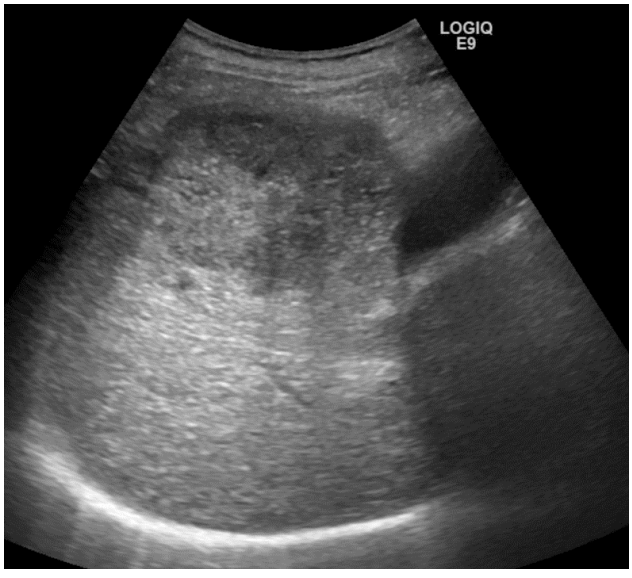
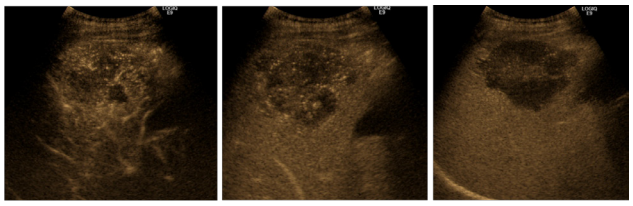
Aims: A 61-year-old male patient with underlying chronic hepatitis B and liver cirrhosis was diagnosed with multiple hepatocellular carcinomas (HCC) based on liver MRI and histopathological examination. He underwent three sessions of transarterial chemoembolization (TACE). However, follow-up three-phase CT revealed an increase in the size of a peripheral enhancing low-density lesion around the Lipiodol uptake area in segment 5 (Figure1).

Methods: As the imaging findings of the lesion were not consistent with typical HCC, contrast-enhanced ultrasound (CEUS) and biopsy were performed. Sonovue contrast agent was administered, and an 18G biopsy needle (ACECUT) was used for tissue sampling via an intercostal approach.







Results: On ultrasound, the lesion in segment 5 appeared as a 6.5 cm × 5.3 cm mixed echoic mass (Figure 2). After contrast agent injection, peripheral enhancement was observed in the arterial phase, followed by washout of the enhanced areas in the venous phase (Figure 3). Histopathological examination revealed a malignant neoplasm composed of pleomorphic polygonal and rhabdoid cells, suggestive of sarcomatoid carcinoma. Immunohistochemistry findings showed positivity for Pan-CK, CK7, and Vimentin, while CEA (monoclonal), Hepatocyte, and AFP were negative.

Conclusions: HCC with sarcomatoid transformation is a rare liver neoplasm that has been associated with treatments such as TACE and radiofrequency ablation (RFA). Since it is reported to have a poorer prognosis compared to typical HCC, the possibility of sarcomatoid HCC should be considered in patients with a history of TACE or other anticancer treatments who present with atypical HCC features.

Keywords: Hepatocellular Carcinoma, Sarcomatoid Change, Contrast-Enhanced Ultrasound

[Liver-Upper & Lower]

Chair: Moon Young Kim (Yonsei Univ. Wonju), Eun Ju Cho (Seoul National Univ.)

OP-15

The Effectiveness of Abdominal Doppler Ultrasound, Measurement of Abdominal Fat, and the Value of SWM/ATT in the Assessment of Liver Disease

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Aims: Abdominal doppler ultrasound (US), measurement of abdominal fat, and Shear Wave Measurement (SWM)/Attenuation measurement (ATT) cab be readily applied to the liver disease using abdominal US. The aim of this study is to identify the effectiveness of these tools in various liver disease.

Methods: During August 2024 - March 2025, total 234 patients with liver diseases were prospectively enrolled in Soonchunhyang University Seoul Hospital. Among these, the results of 209 cases were finally analyzed. Portal vein velocity (PPV), portal venous pulsatility index (VPI), hepatic vein wave form (HVWF), and hepatic artery resistive index (HARI) were measured in doppler US. The abdominal fat was measured with subcutaneous fat (SF) and visceral fat (VF) ranging from the skin to the anterior wall of the abdominal aorta. Liver stiffness was measured using SWM, and fatty liver estimations was made with the ATT on the ARIETTA 850 (FUJIFILM ultrasound). The value of SWM and ATT was compared with that of liver stiffness and controlled attenuation parameter (CAP) of the FibroScan. Spearman's rank correlation analysis, independent samples t-test, and Chi-Squared test were used for statistical analysis.

Results: The number of included diseases were as follows; metabolic dysfunction-associated steatotic liver disease (MASLD) 65, hepatitis B virus infection 63, MASLD combined with other liver disease 36, normal US findings with transient liver enzyme elevation 16, alcoholic liver disease 14, hepatitis C virus infection 7, primary biliary cholangitis 2, cryptogenic liver cirrhosis 2, autoimmune hepatitis 1, others 3. In PPSV, SF, and PF, there was significant difference between patients with MASLD and without MASLD [PPSV; 16.34±3.11 vs 17.96±3.86, (p=0.001), SF; 2.39±0.91 vs 1.83±0.74, (p<0.001), PF; 5.67±1.93 vs 3.40±1.85 (p<0.001)]. HVWF shows statistical tendency between patients with cirrhosis and without cirrhosis (monophasic or biphasic HVWF; 28% in cirrhosis vs 13.5% without cirrhosis, p=0.061). The correlation coefficient between ATT and CAP values was 0.423, and that of SWM and liverstiffness was 0.633, repectively (p<0.001).

Conclusions: The values of PSV, SF, and PF was significant

to identify MASLD in US and SWM/ATT showed good correlation with liver stiffness and CAP of FibroScan.

Keywords: Ultrasound, Doppler, Fibroscan, Visceral Fat

OP-16

Association between Hepatic Steatosis and Fibrosis Severity Assessed by Fibroscan and Age Matched Skeletal Muscle Index in Patients with MASLD

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Aims: Weight loss through diet and exercise plays a crucial role in reducing complications in metabolic dysfunction-associated steatotic liver disease (MASLD). Additionally, sarcopenia is a well-established risk factor for the development of MASLD. However, objective markers for monitoring and evaluating changes in body fat and muscle mass based on the severity of MASLD remain insufficiently studied.

Methods: : A cross-sectional study of 174 Male MASLD patients assessed hepatic steatosis and fibrosis using FibroScan. Body composition was measured using bioelectrical impedance analysis(BIA). We aimed to analyze differences in body composition and identify significant factors associated with to the severity of steatosis and fibrosis using appropriate statistical methods.

Results: The average age of the patients was 40.0 years, and the median body mass index (BMI) was 28.8 kg/m^2. Among the 140 patients with severe steatosis (CAP ≥ 290), compared to those with mild to moderate steatosis, the severe steatosis group had a higher BMI (29.6 kg/m^2 vs. 25.8 kg/m^2) and waist circumference (102.9 cm vs. 92.5 cm). In the body composition analysis, the severe steatosis group demonstrated significantly higher values in visceral fat area, muscle mass, fat mass, and skeletal muscle index (SMI). Mutiple regression analysis revealed a positive association between the severity of steatosis and higher age adjusted SMI along with the modest alcohol consumption and elevated triglyceride levels For advanced fibrosis (≥10 kPa), both higher SMI Z-score and elevated AST levels were positively correlated with the outcome.

Conclusions: In obese male patients with MASLD, age-adjusted SMI (Z score) was associated with both the severity of steatosis and advanced fibrosis. The use of body composition parameters, may be considered as a reliable objective tool for monitoring the progression and improvement of MASLD through individualized intervention strategies

Keywords: Metabolic Dysfunction-Associated Steatotic Liver Disease, Transient Elastography, Body Composition Analysis

OP-17

Enhancing Liver Cirrhosis Varices and CSPH Risk Prediction with Spleen Stiffness Measurement Using 100-Hz Probe

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Soonchunhyang Bucheon Hospital

Aims: Managing complications of liver cirrhosis such as varices needing treatment (VNT) and clinically significant portal hypertension (CSPH) demands precise and non-invasive diagnostic methods. This study assesses the efficacy of spleen stiffness measurement (SSM) using a 100-Hz probe for predicting VNT and CSPH, aiming to refine diagnostic thresholds.

Methods: A retrospective analysis was conducted on 257 cirrhotic patients, comparing the diagnostic performance of SSM against traditional criteria, including Baveno VII, for predicting VNT and CSPH. The DeLong test was used for statistical comparisons among predictive models.

Results: The success rate of SSM@100Hz was 94.60%, and factors related to SSM failure were high body mass index and small spleen volume or length. In our cohort, the identified SSM cut-off of 38.9 kPa, which achieved a sensitivity of 92% and a negative predictive value (NPV) of 98% for detecting VNT, is clinically nearly identical to the established Baveno threshold of 40 kPa. The predictive capability of the SSM-based model for VNT was superior to the LSM±PLT model (p=0.017). For CSPH prediction, the SSM model notably outperformed existing non-invasive tests (NITs), with an AUC improvement and significant correlations with HVPG measurements

(obtained from 49 patients), highlighting a correlation coefficient of 0.486 (p<0.001) between SSM and HVPG.

Conclusions: Incorporating SSM into clinical practice significantly enhances the prediction accuracy for both VNT and CSPH in cirrhosis patients, mainly due to the high correlation between SSM and HVPG. SSM@100Hz can offer valuable clinical assistance in avoiding unnecessary endoscopy in these patients.

Keywords: Spleen Stiffness; Varices, Liver Cirrhosis, Fibroscan 630, Portal Hypertension; HVPG

OP-18

Liver Stiffness by VCTE Predicts Hepatic Decompensation and Differential Efficacy of Atezolizumab-Bevacizumab versus TKIs in Advanced Hepatocellular Carcinoma

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Aims: Hepatic decompensation following systemic treatment, including atezolizumab plus bevacizumab (Ate/Bev), is a critical prognostic event in advanced hepatocellular carcinoma (HCC). This study evaluates the predictive utility of liver stiffness measurement (LSM) by vibration-controlled transient elastography (VCTE) for decompensation incidence post-treatment.

Methods: We analyzed 396 HCC patients treated with systemic therapy (Ate/Bev, lenvatinib, or sorafenib) who underwent VCTE prior to treatment. Hepatic decompensation, overall survival (OS), and progression-free survival (PFS) were assessed. Decompensation was defined as new or worsening ascites, variceal bleeding, or hepatic encephalopathy. A 25 kPa LSM threshold, based on Baveno criteria for significant portal hypertension, stratified patients into high and low LSM groups.

Results: Of the 396 patients, 176 received Ate/Bev, while 45 and 175 received lenvatinib and sorafenib, respectively. Ate/Bev improved OS (HR 0.72, p<0.05) and PFS (HR 0.75, p<0.05) but was associated with higher risks of decompensation (HR 1.81, p<0.05) and variceal bleeding (HR 4.6, p<0.05) compared to TKIs. Treatment distribution was similar between high and low LSM groups (p=0.546). High LSM was associated with increased decompensation risk (HR 1.99, p<0.001) and a trend toward worse OS (HR 1.27, p=0.065) and PFS (HR 1.10, p=0.417). In the low LSM group, Ate/Bev outperformed TKIs in OS and PFS (p<0.05) without increasing decompensation risk. In contrast, in the high LSM group, Ate/Bev and TKIs showed no OS or PFS differences, but Ate/Bev significantly increased decompensation and variceal bleeding risk (p<0.05). Patients with both high LSM and high-grade portal vein thrombosis (HGPVT) had the highest decompensation and mortality risk (HR 3.96, p<0.05).

Conclusions: LSM by VCTE predicts hepatic decompensation following systemic therapy in advanced HCC. In patients with high LSM, Ate/Bev increases decompensation and mortality risk, warranting careful treatment selection.

Keywords: HCC, VCTE, Hepatic Decompensation, Outcome

OP-19

Effectiveness of Point-of-Care Ultrasound in Acute Abdomen Diagnosis and Management

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Aims: Acute abdominal pain is a common and urgent clinical presentation in emergency settings, often requiring rapid and accurate diagnosis for timely management. Point-of-care ultrasound (POCUS) has become a crucial tool in the emergency department, allowing for real-time imaging and aiding in the diagnosis of various acute abdominal conditions. This systematic review aims to evaluate the diagnostic accuracy, clinical effectiveness, and impact of POCUS in diagnosing and managing acute abdomen, focusing on conditions such as acute appendicitis, cholecystitis, and free fluid detection.

Methods: A comprehensive search was performed in PubMed, Scopus, NLM, and the Cochrane Library for studies published up to 2023, assessing the use of POCUS in adult patients presenting with acute abdominal

pain. Studies were included if they reported diagnostic accuracy, sensitivity, specificity, clinical outcomes, or management improvements associated with POCUS use. Quality assessment was performed using the QUADAS-2 tool to evaluate the risk of bias.

Results: POCUS demonstrated high diagnostic accuracy for conditions such as acute appendicitis, with sensitivity ranging from 80% to 95%. In detecting free fluid, indicative of conditions like ruptured ectopic pregnancy or perforated viscus, POCUS showed sensitivity of 92%. For acute cholecystitis, the pooled sensitivity was 70.9%, and specificity was 94.4%. POCUS also facilitated faster diagnosis, reducing time to treatment and minimizing the need for more expensive and time-consuming advanced imaging methods. The impact on patient outcomes, particularly in resource-limited settings, was significant, with faster interventions and improved clinical decision-making.

Conclusions: POCUS is an effective diagnostic and management tool for acute abdomen, especially for conditions such as appendicitis and free fluid detection. Its bedside availability enhances the diagnostic accuracy and expedites clinical decisions, leading to improved patient management. Standardized training programs are essential to maximize its utility and ensure consistent diagnostic performance across various clinical settings.

Keywords: Acute Abdomen, Diagnosis, Effectiveness, Point-of-Care Ultrasound

OP-20

A New Era of Ultrasound Education Pioneered by Workstations: Synergistic Effects with Virtual US and Colorized Fusion Imaging

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Aims: Recent advancements in workstation technology have led to new approaches in ultrasound (US) education. This study emphasizes the importance of workstation-based instruction, particularly the utility of combining SYNAPSE 3D's virtual sonography with colorized fusion imaging in US training.

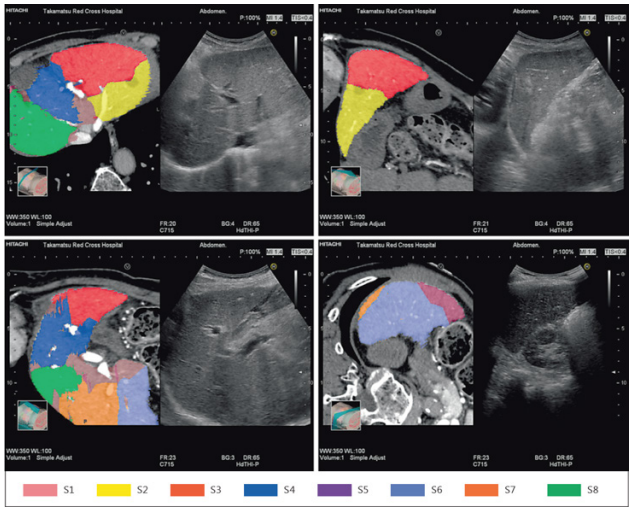
Methods: The evaluation integrates two studies.

The first study involved 7 patients with 9 hepatocellular carcinoma lesions. SYNAPSE 3D volume analyzer was used to extract DICOM data and create colorized fusion images for US display. The aim was to enhance comprehension of anatomical spatial relationships. The maximum tumor diameter ranged from 6.4 to 15 mm (mean ± SD, 11.0 ± 2.8 mm).

The second study was a prospective blinded pilot study involving 32 patients with liver lesions to evaluate the usefulness of SYNAPSE 3D in training novice sonographers. Lesions included liver cysts (n=24), hemangiomas (n=8), hepatocellular carcinomas (n=6), and liver metastases (n=4), with a maximum diameter ranging from 0.3 to 1.5 cm (mean ± SD, 0.8 ± 0.4 cm). US examinations were performed by sonographers and physicians with less than 5 years of experience, comparing lesion detection time and rates with and without SYNAPSE 3D guidance.

Results: Colorized fusion imaging enhanced the visualization of anatomical structures and facilitated the understanding of spatial relationships compared to conventional grayscale imaging.

SYNAPSE 3D-assisted training reduced lesion detection time for novice sonographers (mean 47.8 seconds with SYNAPSE 3D vs. 112.9 seconds without, p=0.0002) and improved detection rates. (100% with SYNAPSE 3D vs. 76.2% without).



Conclusions: Advances in workstation technology offer innovative approaches to ultrasound education. The combination of SYNAPSE 3D virtual sonography and colorized fusion imaging shows promise for enhancing anatomical comprehension and streamlining skill acquisition for novice sonographers.

Keywords: Ultrasound Education, Virtual US, Colorized Fusion Imaging, Liver

[Musculoskeletal]

Chair: Hong Ki Min (Konkuk Univ.)

OP-21

Muscle Architecture Assessment by Ultrasound in Sarcopenia: A Systematic Review

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Aims: Sarcopenia, characterized by progressive loss of skeletal muscle mass and function, is a major public health concern in aging and chronic disease populations. Ultrasound (US) imaging has emerged as a non-invasive, bedside tool for evaluating muscle architecture, yet its diagnostic consistency and clinical utility remain under investigation. This systematic review aimed to evaluate the accuracy, standardization, and prognostic value of ultrasound-based assessment of muscle architecture in diagnosing and monitoring sarcopenia.

Methods: A systematic search was performed across PubMed, Scopus, Web of Science, and Embase databases up to January 2024. Eligible studies included those assessing skeletal muscle parameters such as muscle thickness, cross-sectional area (CSA), pennation angle, and echo intensity via ultrasound in adults diagnosed with sarcopenia based on EWGSOP, AWGS, or FNIH criteria. Study quality was evaluated using the QUADAS-2 tool. Extracted data were analyzed qualitatively and, where feasible, meta-analyzed using a random-effects model.

Results: Out of 2,631 screened records, 46 studies (n = 6,248 participants) met inclusion criteria. Quadriceps (especially rectus femoris and vastus lateralis) was the most commonly assessed muscle group. Pooled sensitivity and specificity of ultrasound-derived muscle thickness for identifying sarcopenia were 85.1% (95% CI: 81.0–88.5) and 82.7% (95% CI: 78.2–86.1), respectively. Echo intensity and pennation angle provided additional prognostic value for muscle function. Studies varied in probe frequency, scanning site, and patient positioning, contributing to heterogeneity. However, US showed strong correlations with CT/MRI-based muscle measurements and handgrip strength.

Conclusions: Ultrasound offers a reliable, accessible method for assessing muscle architecture in sarcopenia. Muscle thickness and echo intensity correlate well with functional and radiological parameters. Standardized acquisition protocols and cut-off values are essential to enhance its diagnostic utility across clinical and community settings. Incorporation of ultrasound into routine sarcopenia assessment holds promise for early detection and targeted intervention.

Keywords: Sarcopenia, Muscle Ultrasound, Muscle Architecture, Muscle Thickness

OP-22

Innovative Digital Health Solutions for Musculoskeletal Rehabilitation: Preventing Low Back Pain in Individuals with Lower Limb Amputations

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Aims: Individuals with lower limb amputations are at high risk of musculoskeletal pain, especially low back pain (LBP), due to biomechanical changes and muscle imbalances. Currently, there are no technology-based solutions designed specifically for this population. This study aims to evaluate the effectiveness of an innovative digital application developed specifically for lower limb amputees, in improving core muscle strength and physical function to prevent LBP. In addition, this study also highlights the potential future use of musculoskeletal ultrasonography (MSK-US) to validate and improve the effectiveness of this intervention.

Methods: A total of 22 lower limb amputees experiencing

musculoskeletal pain, specifically LBP, were recruited from the Indonesian disability community through strict inclusion criteria. The study was conducted over six months, from September 2024 to February 2025. The intervention consisted of a structured digital exercise program, monitored and guided through a mobile application. Pre- and post-intervention assessments were conducted to measure changes in core muscle strength, functional mobility, and LBP intensity using validated scales and performance tests.

Results: The findings revealed a significant improvement in core muscle strength and physical function following the intervention (p<0.05). These results indicate that the digital health application is effective and has the potential to serve as a novel solution for LBP prevention in lower limb amputees. Given these promising outcomes, further research incorporating MSK-US is highly recommended to objectively assess muscle structural changes and validate the intervention's impact.

Conclusions: This study is the first to develop and evaluate a digital LBP prevention application for lower limb amputees. The results demonstrate that technology-based intervention can improve core strength and functional capacity, helping prevent LBP in this population. Future research using MSK-US could provide objective biomechanical analysis, enhance clinical applications, and further validate the efficacy of digital rehabilitation programs for individuals with physical disabilities.

DATA RESULTS

1. Core muscle enhancement

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
Core Muscle Improvement Post-Test Score - Core Muscle Improvement Pre-Test Score	Negative Ranks	3[a]	2.67	8.00
	Positive Ranks	13[b]	9.85	128.00
	Ties	6[c]		
	Total	22		

a. Core Muscle Improvement Post-Test Score < Core Muscle Improvement Pre-Test Score
b. Core Muscle Improvement Post-Test Score > Core Muscle Improvement Pre-Test Score
c. Core Muscle Improvement Post-Test Score = Core Muscle Improvement Pre-Test Score

Test Statistics[a]

	Skor Post-Test Peningkatan Otot Core - Skor Pre-Test Peningkatan Otot Core
Z	-3.135[b]
Asymp. Sig. (2-tailed)	.002

a. Wilcoxon Signed Ranks Test
b. Based on negative ranks.

Based on the data above, the p value of 0.002 means that there is an increase in core muscles before and after treatment.

2. Improved Physical Function

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
Category Post-Test Physical Function Improvement - Pre-Test Score Physical Function Improvement	Negative Ranks	22[a]	11.50	253.00
	Positive Ranks	0[b]	.00	.00
	Ties	0[c]		
	Total	22		

a. Post-Test Score of Physical Function Improvement < Pre-Test Score of Physical Function Improvement
b. Physical Function Improvement Post-Test Category > Physical Function Improvement Pre-Test Score
c. Physical Function Improvement Post-Test Category = Physical Function Improvement Pre-Test Score

Test Statistics[a]

	Category Post-Test Physical Function Improvement - Pre-Test Score Physical Function Improvement
Z	-4.166[b]
Asymp. Sig. (2-tailed)	.000

a. Wilcoxon Signed Ranks Test
b. Based on positive ranks.

Based on the data above, the p value of 0.0001 means that there is an increase in physical function before and after intervention.

"DOCUMENTATION OF RESEARCH MEMORIES WITH THE DISABILITY COMMUNITY"

Keywords: Low Back Pain Prevention, Musculoskeletal

Rehabilitation, Digital Health Intervention, Musculoskeletal Ultrasound (MSK-US)

OP-23

Zero-Shot Deep Learning Approach for Predicting Peripheral Nerve Entrapment Risk Using Dynamic Musculoskeletal Ultrasound of Repetitive Sports Motion

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Aims: Peripheral nerve entrapment syndromes, such as carpal tunnel and cubital tunnel, are common in athletes and manual workers due to repetitive joint motion. Diagnosis is often delayed until symptom onset, relying on invasive electromyography or static imaging. This study investigates a zero-shot deep learning approach to proactively estimate entrapment risk using dynamic musculoskeletal (MSK) ultrasound. The goal is to support the development of a non-invasive, real-time screening tool for asymptomatic individuals by leveraging biomechanical changes during repetitive motion.

Methods: A Transformer-based deep learning model is under development using both real and synthetic MSK ultrasound data. Real-world datasets include the CIUS Carpal Tunnel Challenge (median nerve segmentation in transverse ultrasound images) and additional sciatic nerve ultrasound datasets from OpenI and GitHub. To model dynamic motion, 4,500 synthetic video sequences were generated using a biomechanical simulation engine replicating wrist, elbow, and hip movements. The architecture integrates a kinematic encoder for joint-to-nerve strain tracking and a tissue dynamics encoder for fascial compression and nerve boundary motion, both analyzed frame-wise with differential attention. Zero-shot risk prediction relies on biomechanical surrogate thresholds derived from literature: nerve cross-sectional area variation >30%, fascial compression index >0.5, and loss of gliding motion >70%.

Results: Evaluation on 800 combined test sequences yielded AUROC = 0.84 (95% CI [0.80–0.88]), AUPRC = 0.81, sensitivity = 79.2%, specificity = 82.6%, and F1-score = 0.80. Saliency maps corresponded with labeled entrapment zones in 43 annotated cases (Dice = 0.81). On zero-shot generalization to cubital tunnel sequences, AUC remained 0.79. Removing the tissue encoder reduced AUC to 0.71. Real-time inference ran at 27 fps on a standard GPU setup. The model consistently identified early fascial compression patterns and nerve boundary instability prior to observable structural narrowing.

Conclusions: This approach shows early potential for real-time, zero-shot prediction of peripheral nerve entrapment using dynamic MSK ultrasound, supporting future applications in preventive neuromuscular screening.

Keywords: Musculoskeletal Ultrasound, Peripheral Nerve Entrapment, Zero-Shot Learning, Biomechanical Feature Extraction

OP-24

Ultrasound Evaluation of Clinical Mimics of Deep Vein Thrombosis: Essential Insights for Radiologists in Interpretation

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Aims: Deep vein thrombosis (DVT) is a potentially life-threatening condition that requires prompt diagnosis and management. However, a wide range of non-thrombotic conditions can clinically mimic DVT, often presenting with similar signs such as limb swelling, pain, and erythema. Misdiagnosis can lead to unnecessary anticoagulation or delayed treatment of the actual underlying pathology. This review aims to point out the important ultrasound signs of common conditions that can look like DVT and to give radiologists helpful tips to tell them apart from real blood clots.

Methods: A comprehensive overview of key mimickers—including Baker's cysts, cellulitis, lymphedema, hematomas, muscular tears, and venous insufficiency—is presented, with a focus on their sonographic characteristics. Diagnos-

tic pitfalls and strategies for optimizing vascular ultrasound protocols are also discussed.

Results: High-resolution compression ultrasonography continues to be the preferred method for assessing suspected DVT. However, awareness of alternative diagnoses and their distinct ultrasound findings significantly enhances diagnostic accuracy. For example, Baker's cysts appear as anechoic or hypoechoic fluid collections in the popliteal fossa, while cellulitis typically shows subcutaneous edema with a cobblestone appearance. Accurate identification of these mimics prevents misdiagnosis and ensures appropriate clinical management.

Conclusions: Ultrasound is a powerful tool not only for confirming DVT but also for identifying its mimics. Radiologists must be familiar with the spectrum of non-thrombotic conditions that simulate DVT clinically and sonographically. Enhanced interpretive skills in recognizing these mimics can greatly improve patient outcomes and reduce diagnostic errors in vascular imaging.

Keywords: Ultrasound, Deep Vein Thrombosis, Ultrasonography

[Thyroid]

Chair: Dong Yeob Shin (Yonsei Univ.)

OP-25

Balancing Guidelines and Patient Autonomy: A Thyroid Nodule Case with Limited Family History

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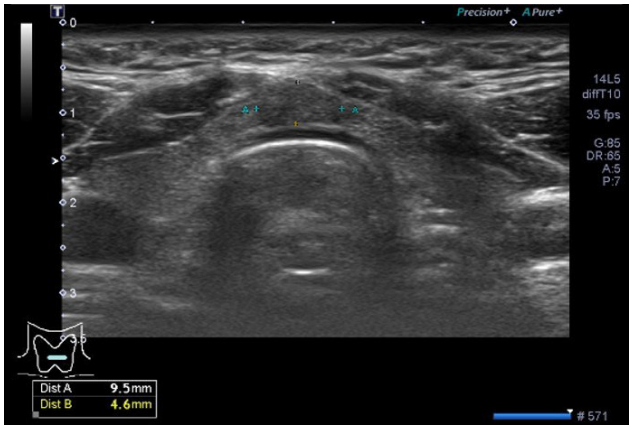
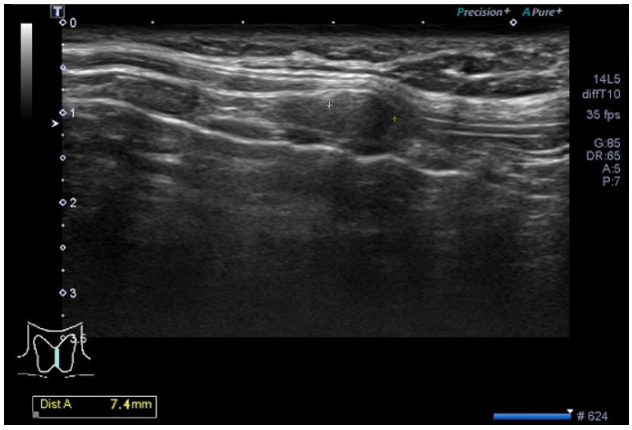
Aims: Ultrasound-based guidelines, such as the 2021 K-TIRADS and the 2024 Korean Thyroid Association recommendations, aid in determining indications for fine-needle aspiration (FNA) of thyroid nodules. However, guideline thresholds may sometimes conflict with patient-driven concerns, especially in familial contexts.

Methods: A 32-year-old male with no previous medical history presented for thyroid ultrasound at his strong request, motivated by anxiety about a family history of papillary thyroid carcinoma in his older brother. The ultrasound showed a 0.95 × 0.46 × 0.74 cm isoechoic isthmic nodule without any of the three suspicious features (punctate echogenic foci, nonparallel orientation, irregular margins), classifying it as K-TIRADS 3. Despite not meeting criteria for FNA, the patient insisted on biopsy.

Results: Thyroid function tests were normal. FNA unexpectedly revealed papillary thyroid carcinoma. The patient subsequently underwent a robotic thyroid isthmusectomy and bilateral central neck dissection without complications. Final pathology confirmed the malignancy was confined to the isthmus with no lymph node metastasis.





Conclusions: This case highlights the limitations of strict guideline adherence in certain patient contexts. Despite the absence of high-risk ultrasound or CT findings, malignancy was detected through patient-prompted biopsy. While guidelines are essential for evidence-based care, flexibility should be maintained to respect informed patient preferences, particularly in familial cancer settings.

Keywords: Thyroid Nodule, Fine-Needle Aspiration, Patient Autonomy, Family History

OP-26

Machine Learning and Ultrasound for Precision Diagnosis in Thyroid Cancer - A Bibliometric Odyssey

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Aims: Thyroid cancer is a common malignancy, and its timely and precise diagnosis is crucial for optimal patient management. Recently, there has been increasing interest in leveraging machine learning alongside ultrasound imaging to enhance diagnostic accuracy. This bibliometric analysis systematically explores existing research on the application of machine learning techniques in ultrasound-based thyroid cancer detection.

Methods: By employing advanced bibliometric methods, this study synthesizes key developments in the field. Articles published between 2017 and 2024 were retrieved from the Scopus database, and co-authorship networks as well as keyword co-occurrence trends were examined using VOSviewer (version 1.6.19).

Results: A total of 50 relevant studies were identified, indicating a growing research focus on the integration of machine learning in thyroid cancer diagnostics. Co-occurrence analysis highlighted the utilization of various machine learning algorithms—such as convolutional neural networks, support vector machines, and K-nearest neighbors—to improve the accuracy of ultrasound-based diagnosis. Major research themes include feature extraction, classification models, and assessment of performance metrics. Notably, support vector machines achieved an impressive accuracy of 96%, making them a promising approach for thyroid cancer detection.

Conclusions: In conclusion, this bibliometric study provides valuable insights into current research trends and potential future advancements, underscoring the increasing role of machine learning in refining diagnostic strategies for thyroid cancer.

Keywords: Machine Learning, Thyroid Cancer Diagnosis, Ultrasound Imaging, Bibliometric Analysis

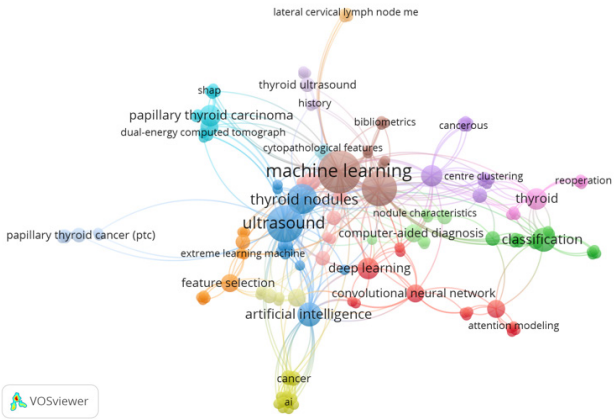

Figure 1. Network visualization.

OP-27

Artificial Intelligence in the Evaluation of Indeterminate Thyroid Nodules Using Ultrasound

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Aims: Thyroid nodules with indeterminate cytology, especially those classified under Bethesda categories III and IV, pose significant diagnostic challenges in clinical practice. Ultrasound remains a primary imaging modality for their evaluation, but interpretation is often subjective and operator-dependent. The integration of artificial intelligence (AI), particularly deep learning-based algorithms, into ultrasound image analysis offers promising potential to enhance diagnostic accuracy and support clinical decision-making. This review aims to summarize recent advancements in AI-based ultrasound analysis for indeterminate thyroid nodules, focusing on diagnostic performance, clinical applicability, and implementation challenges.

Methods: A systematic review was conducted using databases such as PubMed and Scopus. The inclusion criteria were studies involving machine learning or deep learning approaches applied to ultrasound imaging for thyroid nodules, particularly those addressing indeterminate categories. Parameters including model architecture, dataset size, diagnostic metrics, and external validation were evaluated.

Results: Several studies demonstrated that convolutional neural networks (CNNs) can achieve diagnostic

performance comparable to expert radiologists, with reported AUC values ranging from 0.85 to 0.92. Some models incorporated clinical and radiomic features to improve stratification of indeterminate nodules. Despite the promise, widespread clinical adoption faces limitations including small and heterogeneous datasets, lack of prospective validation, and the need for standardized imaging protocols.

Conclusions: AI-assisted ultrasound analysis represents a viable adjunct tool in managing indeterminate thyroid nodules. Literature to date supports its feasibility, but further development of large, diverse, and well-annotated datasets, along with clinical trials, is essential to facilitate safe and effective integration into routine practice.

Keywords: Artificial Intelligence, Thyroid Nodules, Ultrasound

OP-28

A Comprehensive Review of Legal and Ethical Considerations in the Development and Implementation of AI-Driven Thyroid Disease Diagnosis Systems

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Aims: The integration of AI in medical diagnostics, especially for thyroid disorders, has improved accuracy and efficiency. However, ethical and legal concerns arise, including accountability, transparency, bias, and patient data protection. This systematic literature review analyzes international research on AI applications' ethical and legal implications in thyroid disease diagnosis.

Methods: A comprehensive systematic search was conducted across multiple databases, including PubMed, Scopus, and Web of Science. The search encompassed articles published between January 2015 and March 2025. The keywords employed were: "artificial intelligence," "thyroid disease," "ethics," "legal implications," and "AI in healthcare." A systematic literature review guided the selection process.

Results: Seven articles were successfully evaluated and conformed to all the stipulated requirements. Several significant ethical concerns about using AI on thyroid disease diagnosis were identified, including ensuring the transparency of algorithms (London, 2019), obtaining informed consent before their utilization (Price & Cohen, 2019), collaborating with medical professionals and AI systems (Tonekaboni et al., 2019), and preventing AI from exacerbating healthcare outcomes due to biased training data (Wiens et al., 2019). Legally, the studies revealed a lack of consistent regulations regarding AI usage across different jurisdictions (Gerke et al., 2020). Furthermore, there is uncertainty regarding liability when AI encounters errors (Goodman & Flaxman, 2017), and stricter regulations are necessary to safeguard individuals' data during AI training and deployment (Morley et al., 2020).

Conclusions: In conclusion, this comprehensive review highlights the pressing ethical and legal challenges associated with AI-driven thyroid disease diagnosis. This review emphasises interdisciplinary frameworks integrating medical, legal, and technological expertise for safe, equitable, and accountable AI healthcare. By addressing these challenges, we can pave the way for responsible and beneficial use of AI in healthcare, ensuring patient safety and well-being.

Keywords: Artificial Intelligence, Thyroid Disease, Ethics, Legal Issues

Table 1. Summarized of Legal and Ethical in AI-Driven Thyroid Disease

Category	Concerns	References
Legal	Lack of consistent regulations on AI usage across jurisdictions	Gerke et al., 2020
Legal	Uncertainty regarding liability when AI encounters errors	Goodman & Flaxman, 2017
Legal	Need for stricter regulations to protect individuals' data during AI training and deployment	Morley et al., 2020
Ethical	Ensuring algorithm transparency	London, 2019
Ethical	Obtaining informed consent for AI use	Price & Cohen, 2019
Ethical	Collaboration between medical professionals and AI systems	Tonekaboni et al., 2019
Ethical	Preventing AI from exacerbating healthcare disparities due to biased training data	Wiens et al., 2019

[Vascular]

Chair: Hyangkyoung Kim (Ehwa Womans Univ.), Haeng Jin Ohe (The Catholic Univ. of Korea)

OP-29

Clinical Achievement in Developing Ultrasound-Guided Cannulation Skills among Dialysis Nurses in Tertiary Care Hospital

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Aims: Successful cannulation of arteriovenous fistula (AVF) is important to maintain patients for long term hemodialysis. Traditional blind needling technique rely on tactile sensation and estimation, making it less reliable especially for marginal size and deep AVFs. This increases the risk of infiltration and injury to the fistula.

Ultrasound (USG) guided cannulation enable real time visualization of vessel size, depth, and facilitate accurate needle placement. We aim to report the process of building USG guided cannulation skills among dialysis nurses in a tertiary care hospital and to assess its clinical benefit on challenging AVFs.

Methods: The training process included theory session, hands-on practice on stimulator, supervised USG guided cannulation on patients and a formal competency assessment. Patients with newly matured AVF diameter 5.0 - 6.5mm, or a depth >4mm, or usable region limited to cubital fossa are considered challenging where USG guided cannulation is recommended. Clinical outcomes, including cannulation success and complication rate were tracked for the post-training period and compared to historic statistics.

Results: 10 out of 40 dialysis nurses were selected to attend USG guided cannulation training. 8 successfully passed the competency assessment. The training program consists of a 4-hours theory session, 10-hours stimulator practice and average 10 supervised patient cannulation sessions (range 7-15).

Between December 2024 and March 2025, USG guided cannulation was performed for 47 patients with 190 hemodialysis sessions by the 8 trained nurses. Number of failed cannulations dropped from an average of 20 incidences before training to 9 per month in the post-training (study) period. There were no patient requiring temporary dialysis catheter insertion due to failed cannulation during the study period.

Conclusions: With proper training, nurses are able to acquire USG guided cannulation skill within short period of time. USG guided cannulation facilitate successful cannulation of challenging AVFs.

Keywords: Ultrasoud Guided Needling, Vascular

OP-30

Clinical Experience of Patients with Lower Extremity Edema

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Aims: Edema of the lower extremities can occur in various situations. We aim to identify the causes of edema commonly encountered in clinical practice and determine the role of vascular specialists in lower extremity edema

Methods: From January 1, 2019, to September 30, 2019, 112 medical records were reviewed retrospectively. We referred to the algorithm for leg edema. We proposed a final diagnosis based on the medical history, physical examination, laboratory tests, imaging studies, and consultation with other specialists.

Results: Among the 112 patients, 42 (37.5%) patients were diagnosed with chronic vascular disease. Overall, 28 (25%) patients had no clearly identified causes and were considered idiopathic. Another 28 (25%) patients had musculoskeletal disorders and 10 (2.9%) patients had medical disease. There were 4 isolated cases of dermatitis, insect bites, pregnancy, and morbid obesity. 24 cases (21.4%) of the 112 patients were diagnosed with lower-extremity varicose veins, with 17 (15.2%) patients showing reflux in the saphenous vein on Doppler ultrasound.

Conclusions: In this study, various leg edema indicated the need for interdisciplinary consultations and differential diagnoses. It is necessary to identify the various causes of lower extremity edema in patients and provide appropriate treatment.

Keywords: Edema, Varicose Veins, Chronic Venous Insufficiency

OP-31

Molecular Insights into the Radioprotective Potential of Kaempferol and Diosgenin in Repeated Vascular Ultrasound Exposure

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Aims: Vascular ultrasound (US) procedures are one of the non-invasive diagnostic methods increasingly used in clinical practice. However, repeated radiation exposure from these procedures has potential biological effects on tissues, particularly through the induction of oxidative stress and inflammation. This article aims to systematically review the molecular potential of kaempferol and diosgenin as protective agents against the biological effects of repeated radiation exposure from vascular ultrasound procedures.

Methods: This literature review was conducted through searching and analyzing scientific studies from various reliable databases such as PubMed, Scopus, and ScienceDirect (2015-2025). The literature reviewed included in vitro, in vivo, and relevant literature studies, with a focus on antioxidant, anti-inflammatory, and antiapoptotic activities.

Results: Kaempferol showed protective activity through activation of the Nrf2/ARE pathway that increases the expression of antioxidant enzymes such as SOD, CAT, and HO-1, and inhibition of the NF-κB pathway that decreases the expression of proinflammatory cytokines. Meanwhile, Diosgenin works through modulating the PI3K/Akt and MAPK pathways, suppressing vascular adhesion molecules (VCAM-1, ICAM-1), and regulating the balance of Bcl-2 and Bax proteins to prevent apoptosis.

Conclusions: Kaempferol and diosgenin have potential as cellular protective agents through antioxidant, anti-inflammatory, and cell damage protection activities.

Keywords: Kaempferol, Diosgenin, Vascular USG, Radioprotective

OP-32

AI-Driven Prediction of Placental Genomic Mosaicism Through Multi-Channel Doppler Ultrasound Dynamics in High-Risk Pregnancies: A Zero-Invasive Prenatal Genomics Framework

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Aims: Placental genomic mosaicism is a hidden contributor to complications such as preeclampsia, fetal growth restriction, and stillbirth. Current detection relies on invasive procedures, limiting safety and accessibility. No studies have yet decoded mosaicism from non-invasive Doppler ultrasound. We propose an AI framework to predict segmental placental genomic mosaicism, targeting CNVs and LOH, using multi-channel Doppler waveforms. This computational model integrates hemodynamic dynamics with genomic inference, offering a zero-lab prenatal screening paradigm.

Methods: We integrated data from the NICHD Fetal Growth Studies Biobank (n ≈ 1,500 pregnancies with serial Doppler waveforms and clinical outcomes), CNV data from DECIPHER and ClinVar, and transcriptomic profiles from the Gene Expression Omnibus (GEO). We extracted spatiotemporal features from uterine, umbilical, and middle cerebral artery Doppler flows using resistive index trajectories, spectral energy variance, and frequency modulation dynamics. A multi-input convolutional-recurrent transformer (CR-Transformer) was trained to associate these features with simulated mosaic CNV patterns at ~1 Mb resolution. Cross-modal fusion was achieved using gated attention between genomic expression embeddings and Doppler-derived signals. Model evaluation utilized 10-fold stratified cross-validation with gestational age-matched bootstrapping.

Results: The model achieved a mean AUC of 0.86 (95% CI: 0.83–0.88) for predicting clinically significant mosaic CNVs, and an F1-score of 0.79 (95% CI: 0.75–0.82) for detecting trisomic mosaic patterns. Prediction sensitivity for mosaic duplications in chromosome 15q11-q13 was 84.2%, with specificity of 88.1%. Segmental deletions in 1p36.3 were predicted with a mean absolute error (MAE) of 1.3 Mb. Umbilical artery Doppler complexity during the second trimester showed the strongest association with genomic alterations (SHAP score = 0.61). Model inference time averaged 2.7 seconds per case. Analysis of attention weights revealed consistent prioritization of late-diastolic waveform inflections

and high-frequency spectral shifts across mosaic-positive cases.

Conclusions: We present a zero-invasive framework for predicting placental genomic mosaicism based on AI-driven analysis of Doppler ultrasound waveforms. The findings suggest that vascular flow dynamics can encode underlying genomic alterations in utero, supporting a novel direction in non-invasive prenatal diagnostics.

Keywords: Placental Genomic Mosaicism, Doppler Ultrasound, Artificial Intelligence (AI), Copy Number Variation (CNV)

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Poster Exhibition

[Breast]

PE-1

AI in Breast Ultrasound Imaging: Diagnostic Accuracy, Workflow Efficiency, and Clinical Integration – A Systematic Review

Lok Ranjan Rajmohan

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Aims: Artificial intelligence (AI) is rapidly transforming breast ultrasound (US) imaging by improving lesion classification, streamlining workflow, and enhancing diagnostic consistency. This systematic review aimed to evaluate the diagnostic performance, workflow efficiency, and real-world clinical integration of AI-assisted breast US systems in detecting benign and malignant lesions.

Methods: A comprehensive literature search was conducted across PubMed, Scopus, Web of Science, and Embase up to January 2024, following PRISMA guidelines. Eligible studies included prospective, retrospective, or validation trials evaluating AI algorithms (e.g., deep learning or radiomics-based models) applied to breast US, with histopathological confirmation as the reference standard. Primary outcomes were sensitivity, specificity, AUROC, and impact on workflow efficiency (e.g., interpretation time, radiologist confidence). Study quality was assessed using the QUADAS-AI tool.

Results: Of 3,218 screened records, 42 studies (n = 38,456 breast lesions) met inclusion criteria. Deep learning convolutional neural networks (CNNs) achieved pooled sensitivity of 90.8% (95% CI: 87.2–93.4) and specificity of 85.6% (95% CI: 81.9–88.8), with an average AUROC of 0.93. AI-assisted readings improved radiologists' diagnostic confidence and reduced interpretation time by 18–25% in most studies. Clinical integration trials demonstrated consistent results across handheld US and automated breast ultrasound (ABUS) platforms. Key barriers included limited generalizability due to training dataset bias and lack of standardized thresholds for malignancy prediction.

Conclusions: AI-enhanced breast ultrasound significantly improves diagnostic accuracy, enhances workflow efficiency, and supports radiologist decision-making, particularly in high-volume or resource-limited settings. While results are promising, multicenter validation and standardized implementation protocols are essential for broader clinical adoption. AI has the potential to become a key component in breast cancer screening and triage, especially in dense breast populations.

Keywords: Artificial Intelligence, Breast Ultrasound, Deep Learning, Diagnostic Accuracy

PE-2

Elastography in Differentiating Benign and Malignant Breast Lesions: A Systematic Review

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Aims: Breast elastography is an evolving ultrasound technique that evaluates tissue stiffness, offering potential to enhance lesion characterization and reduce unnecessary biopsies. This systematic review aimed to assess the diagnostic performance of strain and shear wave elastography in differentiating benign from malignant breast lesions, compared to histopathology as the reference standard.

Methods: A comprehensive literature search was conducted across PubMed, Embase, Scopus, and Web of Science up to January 2024, following PRISMA guidelines. Included studies assessed adult patients undergoing breast elastography with subsequent histopathological confirmation. Data extracted included sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and area under the receiver operating characteristic curve (AUROC). Methodological quality was assessed using the QUADAS-2 tool, and pooled metrics were estimated using a bivariate random-effects model.

Results: From 2,907 records, 50 studies (n = 12,378 breast lesions) were included. Pooled sensitivity and specificity for elastography were 89.6% (95% CI: 86.1–92.4) and 88.1% (95% CI: 84.3–91.1), respectively. The AUROC for differentiating malignancy was 0.93, indicating excellent diagnostic performance. Shear wave elastography (SWE) slightly outperformed strain elastography (SE), especially in quantitative stiffness assessment. False positives were mainly attributed to fibrosis and benign lesions with increased stiffness (e.g.,

fat necrosis). Heterogeneity was moderate, driven by variability in ROI placement, elasticity scoring systems, and device vendors.

Conclusions: Elastography, particularly shear wave techniques, offers high sensitivity and specificity in distinguishing benign from malignant breast lesions, supporting its role as an adjunct to conventional ultrasound. Its integration into clinical protocols may reduce unnecessary biopsies, especially in BI-RADS 3–4a lesions. Standardization of imaging parameters and elasticity thresholds is essential for widespread clinical adoption.

Keywords: Breast Elastography, Shear Wave Elastography, Malignant Lesions, Ultrasound Diagnosis

PE-3

Comparative Effectiveness of Mammography vs. Ultrasound in Dense Breasts: A Systematic Review

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Aims: Women with dense breast tissue are at increased risk of breast cancer and reduced mammographic sensitivity. Adjunctive ultrasound (US) has been proposed as a supplemental screening tool in this population. This systematic review aimed to compare the diagnostic accuracy, cancer detection rates (CDR), and false-positive rates of mammography versus ultrasound in women with dense breasts.

Methods: A comprehensive search of PubMed, Scopus, Web of Science, and Embase was conducted up to January 2024, following PRISMA guidelines. Included studies assessed asymptomatic women with mammographically dense breasts who underwent both mammography and ultrasound, with histopathology or imaging follow-up as the reference standard. Key outcomes included pooled sensitivity, specificity, incremental cancer detection rate (iCDR), and recall rate. Quality was assessed using the QUADAS-2 tool, and data were meta-analyzed using a bivariate random-effects model.

Results: Of 3,294 screened articles, 41 studies (n = 362,471 women) met inclusion criteria. The pooled sensitivity of mammography alone in dense breasts was 65.1% (95% CI: 61.0–68.9), while combined mammography + US increased sensitivity to 92.3% (95% CI: 89.4–94.5). The incremental cancer detection rate (iCDR) with adjunctive US ranged from 1.9 to 4.4 per 1,000 women screened, particularly for invasive and node-negative tumors. However, false-positive recall rates increased significantly with US (6.8% vs. 2.3%). Subgroup analysis showed hand-held and automated breast ultrasound (ABUS) had comparable diagnostic performance.

Conclusions: In women with dense breasts, adjunctive ultrasound significantly improves cancer detection compared to mammography alone, particularly for small, node-negative tumors. While associated with higher recall rates, the improved sensitivity justifies its use in personalized breast cancer screening strategies. Future efforts should focus on optimizing US protocols to balance diagnostic yield with minimization of unnecessary biopsies.

Keywords: Dense Breast Tissue, Breast Ultrasound, Mammography, Cancer Detection Rate

PE-4

Galactocele or Malignancy? The Diagnostic Value of Breast Ultrasound

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Aims: To systematically evaluate the diagnostic role, imaging characteristics, and clinical utility of ultrasound (US) in the detection and differentiation of galactoceles from other breast pathologies in lactating women.

Methods: A systematic review was conducted by analyzing published studies, case series, and retrospective reviews reporting sonographic features of galactoceles over the past two decades. Databases searched included PubMed, Scopus, and Google Scholar using keywords: "galactocele", "breast ultrasound", "lactation", and "puerperal breast lesions." Studies were included if they evaluated lactating women with breast masses confirmed as galactoceles through aspiration, biopsy, or surgical excision. Sonographic features, diagnostic outcomes, and management approaches were extracted and synthesized.

Results: Several investigations have shown that galactoceles typically manifested as complicated cystic lesions with posterior acoustic enhancement that were well-circumscribed and hypoechoic. Echotexture was found to vary, ranging from uniform fluid content to heterogeneous echoes with fat-fluid levels or internal clefts. Galactoceles were classified as BI-RADS 4 in certain instances because they resembled solid masses with dubious sonographic characteristics such uneven edges, posterior shadowing, and non-parallel orientation. With excellent resolution rates, diagnostic needle aspiration was both therapeutic and, in the majority of instances, validated the diagnosis. In order to reduce the differential diagnosis, clinical association with lactation history was crucial

Conclusions: The safest, most efficient, and first-line imaging method for assessing galactoceles in nursing mothers is ultrasound. The existence of fat-fluid levels, posterior enhancement, well-defined margins, and recent breastfeeding are important diagnostic indicators despite a variety of sonographic presentations. In order to prevent misdiagnosis with malignancies, operator expertise and clinical history are essential. In addition to confirming the diagnosis, needle aspiration reduces symptoms and eliminates the need for intrusive treatments. To avoid needless biopsies and delayed identification of other illnesses, such as pregnancy-associated breast cancer, it is crucial to be aware of the varied sonographic spectrum of galactoceles.

Keywords: Breast Abscess, Ultrasound-Guided Needle Aspiration., Breastfeeding, Lactation

PE-5

The Impact Glucose and Insulin and Mediating of HOMA toward Breast Cancer Incidence: PLS-SEM Approach

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Aims: 670,000 people died from breast cancer worldwide in 2022, while 2.3 million women received a diagnosis (WHO, 2024). A number of factors raise the risk of breast cancer, such as elevated insulin and glucose levels and an indicator of insulin resistance based on fasting plasma insulin and glucose levels. About half of all breast cancers occur in women who have no other known risk factors for the disease beyond their age (over 0 years) and gender (female). Using a statistical PLS-SEM approach, the study aims to investigate the impact of glucose, insulin, and mediating HOMA from Breast Cancer Coimbra (BCC) on the incidence of breast cancer.

Methods: This research is a quantitative study using secondary data from patients suffering from breast cancer, glucose (mg/dL), insulin (μU/mL), and HOMA (Homeostasis Model Assessment) as an index of insulin resistance by incorporating fasting plasma glucose and insulin values. The data source is from UCI Machine Learning. The data was processed with partial least squares-structural equational modelling (PLS-SEM) to answer the research objectives.

Results: The structural model results show that Insulin's direct effect (SE=0.262, p-value 0.000) has a significant effect on breast cancer. The direct effect of glucose proxy (SE=0.126, p-value 0.000) also significantly affects breast cancer. Finally, the mediating HOMA significantly affects (SE=0.291, p-value 0.009) insulin and glucose toward breast cancer incidence. The association of insulin and glucose with HOMA was 93.6 % (R square= 0.93).

Conclusions: The study found that raising insulin and glucose levels significantly affects the incidence of breast cancer. According to studies by Biello et al. (2021) and Sun et al. (2019), elevated insulin and glucose aided in the proliferation of breast cancer cells. This suggested that HOMA played a part in moderating the relationship between insulin and glucose and the incidence of breast cancer.

Keywords: Breast Cancer, Glucose, Insulin, Homa

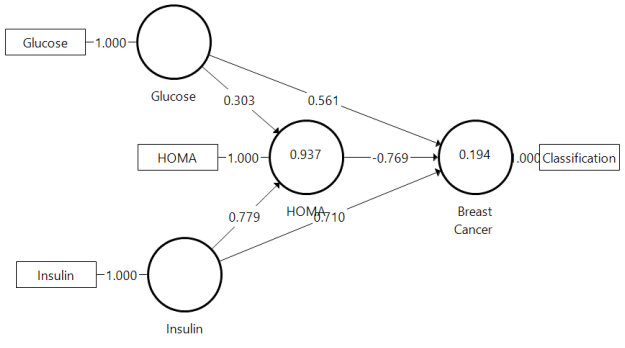

Figure 1. PLS Algoritme Model.

Mean, STDEV, T-Values, P-...	Confidence Intervals	Confidence Intervals Bias ...	Samples	Copy to Clipboa
	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistic...	P Values
Glucose -> Breast Cancer	0.561	0.580	0.126	4.458	0.000
Glucose -> HOMA	0.303	0.291	0.051	5.944	0.000
HOMA -> Breast Cancer	-0.769	-0.808	0.291	2.638	0.009
Insulin -> Breast Cancer	0.710	0.737	0.262	2.711	0.007
Insulin -> HOMA	0.779	0.791	0.061	12.763	0.000

Figure 2. Path Coefficients.

Matrix	R Square	R Square Adjusted
	R Square	R Square Adjusted
Breast Cancer	0.194	0.172
HOMA	0.937	0.936

Figure 3. R Square.

PE-6

Dual Receptor Targeting, Treatment, and Imaging with a Chitosan Nanoplatform That Simultaneous Administration of Gallic Acid and Ultra-Small Magneses Nanoaggregates

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Aims: The use of theranostic nanoparticles in cancer detection and treatment has recently attracted a lot of interest. This research aimed to create theranostic chitosan nanoparticles for imaging and treatment of breast cancer that were functionalized gallic acid and ultra-small magneses nano aggregates with and folic acid (GC-MNNPs-FA).

Methods: The nanoparticles (NPs) were studied and evaluated for their potential anti-cancer effects.

Results: The developed nontargeted theranostic NPs, and GC-MNNPs-FAand dual targeted theranostic NPs have small particle sizes and good surface charge, respectively. Research on the cytotoxicity of folate receptor (FR) expressing breast cancer cells found that GC-MNNPs-FA, a dual-targeted theranostic NP, inhibited cell proliferation in MCF-7 and T-47D cells by 54.17 and 42.23 times, respectively, compared to free PB. Also, unlike free PB, the created NPs could effectively block MCF-7 cells' ability to advance from the G1 to the S phase of the cell cycle. Compared to free PB, GC-MNNPs-FA and dual-targeted theranostic NPs were able to dramatically decrease tumour vascularity and reduce hypoxic tumour volume, according to ultrasound and photoacoustic (USG/PA) imaging. In addition, optical imaging in vivo showed that the dual-targeted theranostic NPs accumulated specifically in tumours. The biocompatibility of the created nanoformulations was further validated by histopathological and in vitro hemocompatibility investigations.

Conclusions: Based on our findings, theranostic chitosan nanoparticles functionalised with GC-MNNPs-FA were not effective in imaging or treating breast cancer.

Keywords: Breast Cancer, Theranostic, Imaging

PE-7

In Vitro and in Vivo Study of Solid Lipid Nanoparticle of Radiolabeled Docetaxel for the Management of Breast Cancer with Technetium-99 M: A Novel Approach

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Aims: The most prevalent form of cancer, breast cancer, is second only to heart disease in terms of fatalities among women. The current study aims to evaluate the biochemical and pharmacokinetic profiles of radiolabeled (Technetium-99 m) Docetaxel-loaded SLN breast cancer therapy in vitro and in vivo.

Methods: High shear homogenization and sonication procedures were used to create radiolabeled DCT-loaded SLN formulations. Breast cancer MCF-7 and MDA-MB-231 were used to display the cytotoxicity profiles of formulations and the impact of formulations on apoptosis. Additionally, a direct radiolabeling technique determined them with 99mTc after stannous chloride, the ideal reducing agent concentration. Pro-inflammatory cytokines, serum profile, and other biochemical parameters like the antioxidant profile were also measured.

Results: All formulations had particle sizes less than 100 nm with zeta potential values between 24 and 28 mV. The maximum cellular binding was found in cells that had been exposed to DCT-SLN-1 for 2 hours in the MCF-7 cell line. Higher cellular binding values were observed in the cells that had been incubated with SLNs compared to those that

had been incubated with Na99mTcO4. All formulations had a cell viability of more than 90%. Results of radiolabeling tests showed that radiolabeling was highly efficient and had good stability in saline and a cell culture medium. The results point to an improvement in the levels of the serum profile (ALT, AST, Creatinine), proinflammatory cytokines, and antioxidants (MDH, GPx, GST, SOD, and catalase). The key pharmacokinetic parameters, C?, were determined for the DCT solution, DCT-SLN-1, and DCT-SLN-2 to be 1.102, 1.32, and 1.48 g mL?[1]. AUC0-24 was found for DCT-SLN-1 (6.43 g/mL h), DCT-SLN-2 (6.01 g/mL h), and DCT solution (3.12 g/mL h).

Conclusions: The findings suggest that DCT-loaded SLN formulations could be attractive theranostic drugs based on in vitro cellular uptake and apoptotic induction.

Keywords: Breast Cancer, Radiolabelled

PE-8

Impact Evaluation of Mammographic Screening under BPJS Kesehatan on Early Detection and Breast Cancer Reduction in Indonesia

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Aims: Breast cancer accounts for 16.6% of all cancer cases in Indonesia, with late-stage diagnosis contributing to high mortality rates linked to late-stage diagnosis (Globocan, 2020). BPJS Kesehatan offers mammograms as preventive services. However, the effectiveness and challenges have not been evaluated yet, including equal access between islands. This study evaluates the policy's impact, focusing on social capital as a moderating variable and age-specific differences.

Methods: Data from the Indonesia Family Life Survey (IFLS) were analyzed. Dependent variables included breast cancer prevalence and early detection rates. Independent variables were mammographic screening uptake and social capital (community participation and trust). The sample was categorized into three age groups: 20-39, 40-59, and 60+ years. Control variables included demographics, health status, and healthcare access. Statistical methods included logistic regression, moderation analysis, multilevel modeling to address regional disparities, and propensity score matching to mitigate selection bias.

Results: Breast cancer prevalence of 4.2% was observed with their moderate level of social capital (7.8/10), and early-stage diagnoses accounted for 58% of cases among those screened. Mammographic screening uptake increased to 35%, improving early detection rates by 25%. Women who participated in mammographic screenings were 45% more likely to have breast cancer detected at an early stage compared to non-screened individuals. Social capital amplified screening outcomes, increasing early detection rates by 10% among those with higher social capital. Multilevel modeling revealed significant regional disparities, with urban areas outperforming rural regions. Propensity score matching confirmed the causal impact of screening, showing a 15% reduction in prevalence among screened populations.

Conclusions: The BPJS Kesehatan mammographic policy significantly improves early detection and reduces breast cancer prevalence, particularly among women aged 40-59 years. Social capital enhances the policy's effectiveness, emphasizing the role of community trust and resources. Addressing rural disparities and targeting younger and older populations can further enhance outcomes.

Keywords: Mammographic Screening, Early Detection, Rural Disparities, Breast Cancer Reduction

1. Descriptive Statistics

Variable	Mean/Proportion	Standard Deviation
Mammographic Uptake (%)	35%	-
Social Capital Score	7.8	2.2
Breast Cancer Prevalence (%)	4.2%	-
Early Detection Cases (%)	58%	-

2. Regression Results

Variable	Odds Ratio (OR)	95% Confidence Interval	p-value
Mammographic Screening	1.45	1.22-1.73	<0.001
Social Capital	1.30	1.10-1.53	0.01
Screening x Social Capital	1.25	1.11-1.41	<0.01

3. Subgroup Analysis (Impact by Age Group)

Age Group	Mammographic Uptake (%)	Early Detection (%)	Prevalence Reduction (%)
20-39	25%	50%	15%
40-59	45%	65%	25%
60+	30%	55%	20%

4. Multilevel Modeling Results

Level	Variance Explained (%)	p-value
Regional Variability	12%	<0.05
Facility Variability	8%	<0.05

5. Propensity Score Matching Results

Outcome	Treated (Screened)	Control (Not Screened)	Average Treatment Effect (ATE)	p-value
Early Detection (%)	65%	40%	25%	<0.001
Prevalence Reduction (%)	20%	10%	10%	<0.01

PE-9

Breast Cancer Detection in Mammography Using Computer-Aided Machine Learning

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Aims: Breast cancer remains one of the most prevalent and life-threatening cancers worldwide. Early detection significantly improves survival rates. This study aims to explore the application of machine learning in computer-aided detection of breast cancer through mammographic imaging.

Methods: A descriptive literature review was conducted by analyzing previously published studies related to breast cancer, machine learning, and mammography. Relevant articles were identified using specific keywords.

Results: Several studies have demonstrated high accuracy in breast cancer detection using machine learning models. For instance, Shen, Rangayyan, and Desautels (1994) reported 100% accuracy using k-NN classification, while Chen et al. (2015) found 95% accuracy with the same method. George (2019) achieved 90% accuracy. Similarly, SVM-based methods by Papadopoulos et al. (2005) and Jian, Sun, and Luo (2012) also reached 100% accuracy. Additional models such as EM-LR, Extreme Learning Machine, Scalable LDA, Stack Generalization, and LSNLR (as noted in studies from 2016 to 2019) also achieved accuracy rates exceeding 90%. The findings suggest that machine learning algorithms are effective tools for early breast cancer detection via mammography, although access to open datasets is crucial for enhancing the reliability of these models.

Conclusions: Machine learning-based classification methods are highly effective for early detection of breast cancer in mammographic images. Future research would benefit from greater access to open datasets to improve diagnostic accuracy.

Keywords: Breast Cancer, Mammography, Machine Learning

PE-10

Protective Effects of Nanostructured Lipid Carriers Loaded Caffeic Acid Topical Cream on Radiation Dermatitis in Breast Cancer: A Single Arm Double-Blind Randomized Clinical Trial Methods

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Aims: Radiation dermatitis is a common adverse effect in breast cancer patients undergoing radiotherapy, often leading to discomfort, inflammation, and compromised skin integrity. The objective of the study to formulate and evaluate caffeic acid loaded nanostructured lipid carriers (CA-NLCs) on radiation dermatitis in breast cancer.

Methods: A double-blind randomized clinical trial was performed from 2018-2019, with a total 52 patients who had undergone breast converving surgery and received post-operative radiation therapy. The radiotherapy was applied 5 days per week for 5 weeks. The adverse dermatoglogical effects were scrutinized via physician at the beginning of the fifth week of radiotherapy and the patients were then randomly assigned (1:1 ratio) to receive CA-NLCs or placebo cream for 7 days.

Results: The CA-NLCs exhibited the uniform particle size, zeta potential, PDI and encapsulation. Moreover, skin irritation study did not produce any signs of edema, irritation and erythema during skin irritation test. At baseline, the dermatitis grade did not exhibit any substantial differences between the CA-NLCs and placebo groups. The risk of acute dermatitis (grade 2 or higher) was significantly reduced when CA-NLCs were used in comparison to placebo ($P \leq .0001$, $Z\alpha = 1.96$ at 95% confidence interval).

Conclusions: Caffeic acid loaded nanostructured lipid carriers prevents dermatitis grade 2 or higher during post-operative breast irradiation.

Keywords: Radiation, Breast Cancer, Nanoparticle Cream

PE-11

Evaluating the Diagnostic Performance of Ultrasound, Mammography, and MRI in Identifying Breast Cancer Lesions among Patients with Breast Implants: A Comprehensive Systematic Review

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Aims: Breast cancer detection in patients with breast implants poses diagnostic challenges due to implant-related artifacts and compromised visualization of breast tissue. While ultrasound (US), mammography (MG), and magnetic resonance imaging (MRI) are routinely used, their diagnostic performance in this specific population remains unclear. This systematic review aims to compare the diagnostic accuracy of US, MG, and MRI in identifying breast cancer lesions in patients with implants.

Methods: A comprehensive literature search was conducted across PubMed, Embase, EBSCO, and the Cochrane Library for studies published through December 2024 that evaluated the diagnostic efficacy of US, MG, and MRI in patients with suspected breast cancer and implants. Key performance metrics included sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV).

Results: Eight studies met the inclusion criteria. Among the imaging modalities, MRI demonstrated the highest sensitivity at 91.3% (95% CI: 87.0–94.1%), followed by US at 80.6% (95% CI: 74.4–87.8%) and MG at 73.2% (95% CI: 66.1–79.3%). MG showed the highest specificity at 88.4% (95% CI: 82.3–92.6%), compared to MRI (85.1%) and US (77.8%). MRI also yielded the highest PPV (87.2%) and NPV (90.5%). US presented a lower PPV (78.3%) but maintained a solid NPV (84.1%).

Conclusions: MRI emerges as the most sensitive and reliable imaging tool for detecting breast cancer lesions in patients with implants, with superior PPV and NPV. Meanwhile, MG demonstrates the highest specificity. These findings underscore MRI's valuable role, particularly in high-risk or diagnostically ambiguous cases, to enhance early detection and diagnostic confidence in this unique patient population.

Keywords: Ultrasound, Mammography, Magnetic Resonance Imaging, Breast Implants And Breast Cancer

PE-12

Biofabrication of Magnetic Nanoparticles as Potential MRI Contrast Agents for Breast Cancer Diagnostics

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Aims: The intrinsic magnetic properties of magnetic nanoparticles (MNPs) have made them one of the most promising magnetic resonance imaging (MRI) candidates in recent years. This research aims to examine the effects on the magnetic properties of MNPs of coating agents (with and without targeting agents).

Methods: The polyol method was used to prepare iron oxide nanoparticles (IONPs) in detail. The nanoparticles were subsequently divided into two classes, one of which was silica (SiO_2) and hyperbranched polyglycerol (HPG) (SPION@SiO_2@HPG) coated; the other was HPG alone (SPION@HPG) coated. Folic acid (FA) was added to the surface of nanoparticles as a targeting agent in the following chapter. Using Fourier transform infrared spectroscopy (FT-IR), transmission electron microscopy (TEM), and a vibrating sample magnetometer, the physicochemical properties of nanostructures were characterized (VSM).

Results: TEM findings showed that SPION@HPG with an average size of about 20 nm was monodispersed, while SPION@SiO_2@HPG had a size of about 25 nm. In addition, the nanoparticles coated with HPG had much lower magnetic saturation than those coated with silica. The nanostructures' MR signal strength showed a relationship between increasing nanoparticle concentrations within the MCF-7 cells and decreasing the T2 relaxation time-related signal. The coating comparison showed that, compared to Fe3O4@HPG, SPION@SiO2@HPG (with/without the targeting agent) had a significantly higher r2 value.

Conclusions: The Fe3O4@SiO2@HPG-FA nanoparticles

have shown the best magnetic properties based on the results of this analysis, and can be considered promising contrast agents for magnetic resonance imaging applications.

Keywords: Breast Cancer, Magnetic Nanoparticles, Magnetic Resonance Imaging, MCF-7 Cells

PE-13

Beyond the Image: Emerging Ultrasound Technologies in Breast Cancer Diagnosis

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Aims: This systematic review aims to evaluate the diagnostic performance, clinical utility, and technological advancements in breast ultrasound imaging for cancer detection and diagnosis. It specifically reviews ultrasound-based techniques such as elastography, contrast-enhanced ultrasound (CEUS), 3D ultrasound, automated breast ultrasound (ABUS), and computer-aided detection (CAD), along with their fusion with other imaging modalities like MRI and CT. A comparative evaluation with mammography (MMG) and other imaging standards is also included.

Methods: A comprehensive literature search was performed across PubMed, Scopus, Embase, and clinical trial registries, targeting studies from 2008 to 2021. Studies included randomized controlled trials, cohort studies, and diagnostic performance analyses involving human subjects, particularly women aged 40–75. QUADAS-2 and GRADE criteria were used to assess bias and evidence strength. Meta-analyses were conducted where applicable, and pooled sensitivity, specificity, and AUC were calculated for US and MMG.

Results: Ultrasound imaging techniques, particularly elastography and CEUS, have shown promise in characterizing lesion stiffness and vascularity. ABUS demonstrated high diagnostic value, especially in women with dense breasts. Pooled sensitivity and specificity for US per-patient were 0.83 and 0.84, comparable to MMG (0.82 and 0.84). Per-lesion sensitivity was higher with US (94%) than MMG (76%). Supplemental US to MMG increased cancer detection in dense breasts but also led to higher false-positive rates and biopsy numbers. Non-mass lesions on ultrasound, though underrepresented in Western guidelines, are recognized in Asian literature as relevant indicators.

Conclusions: Advanced breast ultrasound techniques significantly improve diagnostic accuracy, especially in dense breasts and lesion characterization. When combined with MMG or MRI, US enhances sensitivity but may increase false positives. Standardized protocols and integration into multimodal workflows are needed to fully leverage these tools in clinical practice.

Keywords: Breast Tumour Segmentation And Classification, Breast Ultrasound (BUS), Segmentation Performance Analysis, Meta-Analysis Ultrasound

PE-14

Clinical Experience and Optimization of Automated Breast Ultrasound

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Aims: Automated Breast Ultrasound (ABUS) has emerged as a valuable adjunct imaging modality to mammography, particularly in women with dense breast tissue. Its operator-independent nature and standardized image acquisition make it suitable for large-scale screening and reproducible diagnostic evaluations. This study aims to share clinical insights, challenges, and optimization strategies gained from the routine use of ABUS in a clinical setting, focusing on its diagnostic performance, workflow integration, and interpretative nuances.

Methods: Clinical data and imaging outcomes from patients undergoing ABUS were retrospectively analyzed. Parameters assessed included lesion detection rates, recall rates, image quality, acquisition times, and diagnostic concordance with hand-held ultrasound and mammography. Optimization approaches in patient positioning, scan protocols, and image interpretation were systematically implemented and evaluated.

Results: ABUS demonstrated high sensitivity in detecting breast lesions, especially in dense breast tissue, and significantly reduced operator dependency. Key optimization strategies—such as appropriate transducer pressure, patient comfort positioning, and standardized training for technologists—enhanced image quality and minimized ar-

tifacts. Integration into the diagnostic workflow was feasible and improved overall screening efficiency.

Conclusions: ABUS offers a consistent and efficient method for breast imaging, particularly in dense breasts. Clinical experience highlights its strengths and identifies opportunities for optimization in both image acquisition and interpretation. Continued refinement of ABUS protocols and reader training is essential for maximizing its diagnostic potential and improving breast cancer detection in diverse patient populations.

Keywords: Automated Breast Ultrasound, Breast Cancer, Mammography, Tissue

[Cardiac]

PE-1

Strain Imaging in Speckle Tracking Echocardiography for Early Cardiotoxicity Detection: A Systematic Review

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Aims: Cardiotoxicity is a major limitation in the use of chemotherapeutic agents, particularly anthracyclines and HER2 inhibitors. Traditional measures such as left ventricular ejection fraction (LVEF) often fail to detect early subclinical myocardial dysfunction. This systematic review aimed to evaluate the diagnostic performance and prognostic value of strain imaging using speckle tracking echocardiography (STE) in detecting early cardiotoxicity before the onset of LVEF decline.

Methods: In accordance with PRISMA guidelines, we conducted a comprehensive search across PubMed, Scopus, Web of Science, and Embase through January 2024. We included prospective studies evaluating strain imaging (primarily global longitudinal strain, GLS) via STE in adult cancer patients receiving potentially cardiotoxic chemotherapy. Studies were required to report outcomes related to early myocardial dysfunction or prediction of future LVEF reduction. Data were pooled using a random-effects meta-analysis model. Study quality was assessed using the QUADAS-2 tool.

Results: From 2,987 initial records, 36 studies (n = 5,472 patients) were eligible for analysis. A relative reduction in GLS of ≥15% from baseline was the most consistent predictor of subclinical cardiotoxicity. Pooled sensitivity and specificity of GLS for predicting subsequent LVEF decline were 89.6% (95% CI: 85.3–92.8) and 83.2% (95% CI: 77.1–88.0) respectively. GLS changes were evident as early as 2–4 weeks into therapy, preceding LVEF changes by several months. Heterogeneity was minimal, with consistent findings across different chemotherapy regimens and imaging vendors.

Conclusions: Speckle tracking-derived strain imaging, particularly GLS, is a highly sensitive and early marker of chemotherapy-induced cardiotoxicity. Its routine implementation in cardio-oncology protocols may facilitate timely cardioprotective strategies, reduce heart failure risk, and improve long-term oncologic and cardiac outcomes. Future studies should aim to establish standardized GLS thresholds and timing of surveillance.

Keywords: Cardiotoxicity, Speckle Tracking Echocardiography, Global Longitudinal Strain, Chemotherapy-Induced Cardiac Dysfunction

PE-2

Enhancing the Beat: Ultrasound Contrast Agents in Myocardial Perfusion Imaging

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Aims: This review evaluates the clinical utility, diagnostic accuracy, and emerging roles of contrast-enhanced ultrasound (CEUS) and MCE in detecting myocardial perfusion abnormalities, particularly in coronary artery disease (CAD) and microvascular dysfunction.: Myocardial perfusion imaging (MPI) using microbubble-based ultrasound contrast agents (UCAs) is an evolving technique that augments conventional echocardiography by enabling visualization of myocardial microvascular blood flow. Myocardial Contrast Echocardiography (MCE) offers a bedside, radiation-free, and dynamic method for assessing coronary perfusion and ischemia.

Methods: A systematic search was conducted in PubMed, Scopus, and Web of Science databases for studies published

between 2005–2024. Inclusion criteria focused on clinical trials, observational studies, and reviews utilizing UCAs for assessing myocardial perfusion via transthoracic or stress echocardiography. Studies on other imaging modalities (e.g., CT, MRI) were excluded unless directly comparing with MCE.

Results: Across 54 included studies, MCE demonstrated high diagnostic accuracy for detecting ischemia, with sensitivity and specificity comparable to nuclear and MRI perfusion imaging. Quantitative MCE allowed real-time assessment of perfusion defects, particularly in patients with suspected CAD or post-infarction recovery. Stress MCE (pharmacologic or exercise-induced) significantly improved detection of subendocardial ischemia and microvascular angina. UCAs also showed promise in therapeutic monitoring (e.g., sonothrombolysis), and risk stratification post-MI. Operator-independent software and AI-assisted quantification tools are further enhancing clinical implementation.

Conclusions: Contrast-enhanced echocardiography using microbubble UCAs is a valuable, noninvasive tool for myocardial perfusion assessment. It holds unique advantages in accessibility, safety, and bedside utility, especially in acute or resource-limited settings. Ongoing advances in software, AI integration, and therapeutic ultrasound will further expand its diagnostic and prognostic potential in cardiovascular care.

Keywords: Myocardial Contrast Echocardiography, Perfusion Imaging, Ultrasound Contrast Agents, Coronary Artery Disease

PE-3

3D Echocardiographic Mapping of Left Atrial Strain: A Novel Tool for the Early Detection and Prognosis of Atrial Fibrillation

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Aims: This systematic review aims to critically evaluate the diagnostic role of 3D echocardiography in the quantification of left atrial (LA) strain, with a focus on its implications for early detection and risk stratification of atrial fibrillation (AF). The review seeks to assess the sensitivity, prognostic value, and clinical utility of LA strain derived from 3D echocardiographic imaging, and to compare it with traditional 2D methods in the early identification of subclinical AF.

Methods: We systematically searched multiple databases (PubMed, Scopus, Embase) for studies published between 2010 and 2023 that assessed 3D echocardiography for measuring LA strain in populations at risk of AF. Included studies evaluated parameters such as LA reservoir strain, contractile strain, and conduit strain. Meta-analysis was performed to pool the data regarding the predictive accuracy of these measurements for incident AF and AF recurrence. Studies were selected based on inclusion criteria: (1) use of 3D echocardiography for LA strain quantification, (2) analysis of AF as a clinical outcome, and (3) use of standardized methods for strain measurements.

Results: The review identified 15 studies involving a total of 2,850 participants, including both healthy controls and AF patients. The pooled data showed that LA reservoir strain and LA contractile strain were significantly lower in individuals who developed AF ($p<0.001$). Furthermore, 3D-derived LA strain demonstrated strong predictive value for AF development, with hazard ratios ranging from 1.15 to 1.22 for each 1% decrease in LA strain ($p<0.01$). LA strain measurements also showed incremental prognostic value beyond traditional clinical risk scores (CHA2DS2-VASc), with an area under the curve (AUC) improvement from 0.70 to 0.80 ($p=0.03$). Studies comparing 3D echocardiography with 2D echocardiography consistently found superior sensitivity and accuracy in detecting subclinical AF with 3D imaging.

Conclusions: 3D echocardiography offers a promising, non-invasive method for quantifying LA strain and plays a critical role in the early detection and risk assessment of atrial fibrillation. The incremental prognostic value of 3D-derived LA strain measurements significantly enhances clinical decision-making compared to traditional methods, especially in patients with normal left ventricular function and mildly enlarged LA. These findings support the use of 3D echocardiography as a tool for early intervention and preventive management in at-risk populations. Further large-scale studies and longitudinal follow-up are necessary to validate these findings and establish 3D LA strain as a standard diagnostic tool in clinical practice.

Keywords: 3D Echocardiography, Left Atrial Strain (LA Strain), Atrial Fibrillation (AF), Contractile Strain

PE-4

Cardio-Toxicity Associated with Lynch Syndrome

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Aims: Lynch syndrome (LS) is the most common hereditary colorectal cancer (CRC) syndrome (1), caused by mutations in any MMR genes like MLH1, MSH2, MSH6, & PMS2.

Methods: Case study

Results: A 38-year-old male presented with fatigue and weight loss with no lymphadenopathy. The hemogram showed Hb 11.0 gm% and leukocytosis 12500/cmm. Liver and kidney function tests were normal. Ultrasound depicted hepatomegaly with grade I fatty change. The colonoscopy revealed a growth in the proximal transverse colon. US-guided biopsy confirmed adenocarcinoma. The patient underwent a right hemicolectomy with findings of a hard mass at the hepatic flexure, involving the omentum and serosa. It was excised.

Pathological analysis showed poorly differentiated adenocarcinoma (pT3 N0 M0). The patient was started on the CAPOX (capecitabine and oxaliplatin) regimen. After two cycles of chemotherapy, vomiting, chest pain, and T-wave inversion on ECG were noticed to compel the discontinuation of chemotherapy. Microsatellite instability (MSI) testing revealed focal weak positivity for MLH1, while MSH2 and MSH6 were positive, indicating the lynch syndrome (HNPCC). PMS2 showed focal weak positivity.

Subsequent follow-up visits revealed recurrent chest pain with T-wave inversion and elevated troponin levels, confirming chemo-induced cardiomyopathy. Chemotherapy was permanently stopped. Gradually, the patient remained asymptomatic, with occasional elevation in CEA levels. The patient is on regular follow-up and doing well.

Conclusions: This case was sent for genetic counseling, although no positive family history could be found in this case. It is clinically more significant, especially if any of his family members were diagnosed with CRC before age 50.

Keywords: Hereditary Colorectal Cancer Syndrome, Cardio-Toxicity, Genetic Counseling

PE-5

Dilated Cardiomyopathy and Toxic Hepatitis Induced by Creosote Oil Toxicity: A Rare Case Report

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Aims: Railway wooden sleepers are often treated with Creosote oil to enhance durability and prevent decay caused by pests and fungi. However, excessive exposure to creosote oil can lead to various toxicities.

Methods: A 28-year-old man was admitted to a local hospital on June 12, 2022, after prolonged exposure to creosote-treated wooden sleepers while building a house during hot summer days.

Results: The patient presented with severe symptoms and exhibited elevated liver enzyme levels (AST 7.116 IU/L, ALT 7.995 IU/L), gamma-glutamyl transpeptidase of 234 IU/L, LDH 3684 IU/L, and bilirubin levels (TB 2.41 mg/dL, DB 1.2 mg/dL). Abdominal computed tomography revealed acute hepatitis with mild hepatosplenomegaly. Echo CG performed on June 20, 2022, showed EF of 18.8%, LV of 8.4 cm, and LA of 5.8 cm. The four cardiac chambers are dilated. The overall contraction of the left ventricle was significantly reduced. There is diffuse hyperkinesia in contraction. In the inferior lateral wall, there is akinesia. The pulmonary artery is dilated. The patient was promptly transferred to the Department of Internal Medicine for further management. Further investigation ruled out other causes of liver toxicity, and the patient was diagnosed with acute hepatitis and toxic dilated cardiomyopathy attributed to creosote oil exposure. Despite intensive medical care over the following year, the patient's condition deteriorated, and he unfortunately passed away. In conclusion, this case highlights the severe health risks associated with prolonged exposure to creosote-treated wooden sleepers, explicitly leading to acute hepatitis and

toxic dilated cardiomyopathy.

Conclusions: The patient's adverse outcomes, including significant liver enzyme abnormalities and heart dysfunction, underscore the critical need for safety measures and protective guidelines for individuals working with such materials. Despite exhaustive medical efforts, the toxic effects of creosote were fatal, emphasizing the importance of early detection and intervention in similar cases.

Keywords: Dilated Cardiomyopathy, Creosote Oil Toxicity, Toxic Hepatitis

PE-6

Imaging the Invisible: Early Myocardial Changes in Diabetic Patients through Echo

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Aims: The objective of this systematic review was to investigate and summarize emerging strategies for the early diagnosis and management of diabetic cardiomyopathy (DCM), with a particular focus on the evolving role of imaging techniques. Emphasis was placed on echocardiographic modalities—especially speckle tracking echocardiography—as well as cardiac magnetic resonance (CMR), and their integration with novel biomarkers and sequencing technologies to identify subclinical myocardial dysfunction in patients with diabetes mellitus (DM), independent of coronary artery disease or hypertension.

Methods: A comprehensive literature search was conducted using PubMed, Embase, Web of Science, and Cochrane Library databases, reviewing studies involving human and animal models of DCM. The primary diagnostic methods assessed were conventional echocardiography, speckle tracking echocardiography, and CMR. Special attention was given to advanced imaging techniques such as T1 mapping for quantifying interstitial fibrosis. Biomarkers including long non-coding RNAs, soluble ST2, and galectin-3 were also evaluated for their correlation with imaging findings and potential to enhance diagnostic precision.

Results: Conventional echocardiography remains foundational, but speckle tracking imaging enables detection of early myocardial strain abnormalities before overt diastolic dysfunction develops. CMR, especially with T1 mapping, provides a detailed assessment of interstitial myocardial fibrosis—a potentially reversible early marker of DCM that correlates strongly with glycemic control. The integration of imaging with serum biomarkers like ST2 and galectin-3 enhances early risk stratification and guides targeted intervention.

Conclusions: Advanced echocardiographic techniques and CMR are transforming the diagnostic landscape of DCM by enabling earlier, non-invasive detection of cardiac abnormalities. Combining imaging modalities with biomarker analysis offers a powerful, multimodal strategy for screening and managing DCM, underscoring the need for routine imaging surveillance in at-risk diabetic populations. This approach holds promise for timely intervention and improved patient outcomes.

Keywords: Speckle Tracking Echocardiography, T1 Mapping, Left Ventricular Diastolic Dysfunction, Myocardial Interstitial Fibrosis

PE-7

Carotid Artery Intima-Media Thickness on Doppler Ultrasound: A Surrogate Marker for Early Cardiovascular Disease

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Aims: Cardiovascular disease (CVD) remains the leading cause of global mortality, with early detection being crucial for preventive interventions. Carotid Intima-Media Thickness (CIMT), measured via Doppler ultrasound, has emerged as a non-invasive, radiation-free biomarker for subclinical atherosclerosis and cardiovascular risk assessment. This study evaluates the predictive value of CIMT in detecting early vascular changes and its correlation with coronary artery disease (CAD) and metabolic syndrome.

Methods: A prospective cross-sectional study was conducted on 150 asymptomatic adults (ages 30–60) undergoing routine cardiovascular risk assessment. Participants were categorized based on metabolic profiles into:

Group A (n=75): No metabolic syndrome (control group).

Group B (n=75): Diagnosed metabolic syndrome (based on NCEP-ATP III criteria).

All participants underwent:

High-resolution Doppler ultrasound for bilateral CIMT measurement.

Lipid profiling, fasting glucose, and hs-CRP to assess metabolic risk factors.

Electrocardiogram (ECG) and echocardiography for subclinical cardiac dysfunction assessment.

Results: CIMT Values:

Group A: Mean CIMT = 0.58 ± 0.12 mm (within normal range).

Group B: Mean CIMT = 0.85 ± 0.18 mm (significantly higher, $p<0.001$).

Correlation with CVD Markers:

CIMT positively correlated with LDL-C (r = 0.78), HbA1c (r = 0.72), and hs-CRP (r = 0.69).

Patients with CIMT > 0.9 mm had a 3.5x higher risk of subclinical CAD on echocardiography.

Predictive Value: CIMT ≥0.8 mm was identified as a strong predictor of early-stage atherosclerosis, with 85% sensitivity and 92% specificity for CAD risk.

Conclusions: Doppler ultrasound-based CIMT measurement provides an accessible, cost-effective, and highly predictive tool for early cardiovascular risk assessment. This study establishes CIMT as an independent marker of subclinical atherosclerosis, emphasizing its integration into routine cardiovascular screening—especially for individuals with metabolic syndrome. Widespread adoption of CIMT screening could transform preventive cardiology by enabling early intervention before symptomatic disease onset.

Keywords: Carotid Artery Intima

PE-8

Echocardiographic Evaluation in Pediatric CHD: Current Practices and the Need for Standardization

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Aims: This review aims to evaluate the current practices, advancements, and gaps in the standardization of echocardiographic assessment protocols in pediatric patients with congenital heart disease (CHD). Emphasis is placed on the accuracy, reproducibility, and clinical utility of echocardiographic measurements, particularly in complex cardiac anatomies

Methods: A systematic search was conducted in PubMed, Scopus, and Web of Science for studies published between 2000 and 2024. Keywords included "pediatric echocardiography," "congenital heart disease," "standardization," and "quantitative assessment." Inclusion criteria encompassed original research, clinical guidelines, and review articles focusing on echocardiographic protocols in children with CHD. Data were extracted on imaging techniques, measurement parameters, use of Z-scores, reporting standards, and limitations in applying adult-based criteria to pediatric populations.

Results: Out of 86 screened articles, 42 met inclusion criteria. Findings indicate considerable variability in echocardiographic measurement techniques across institutions. Although advancements such as three-dimensional echocardiography and myocardial deformation imaging have enhanced anatomical and functional assessment, the lack of standardized protocols limits cross-center comparisons and outcome benchmarking. The use of Z-scores and lesion-specific guidelines improves diagnostic precision but remains inconsistently applied. Particularly in right ventricular assessment and complex lesions (e.g., tetralogy of Fallot, single-ventricle physiology), adult-derived parameters often lack pediatric validation.

Conclusions: While echocardiography remains indispensable in pediatric CHD evaluation, the absence of unified standards undermines diagnostic consistency and clinical decision-making. Developing comprehensive, age- and lesion-specific echocardiographic protocols and reporting formats is crucial. Future efforts should focus on multicenter validation of quantitative parameters, integration of AI-based measurements, and incorporation of standardized training to ensure reproducibility and improve patient outcomes.

Keywords: Pediatric Echocardiography, Congenital

Heart Disease, Right Ventricular Function, Right Ventricular Function

PE-9

Spotlight on the Heart: The Role of Contrast Agents in Echocardiographic Mass Detection

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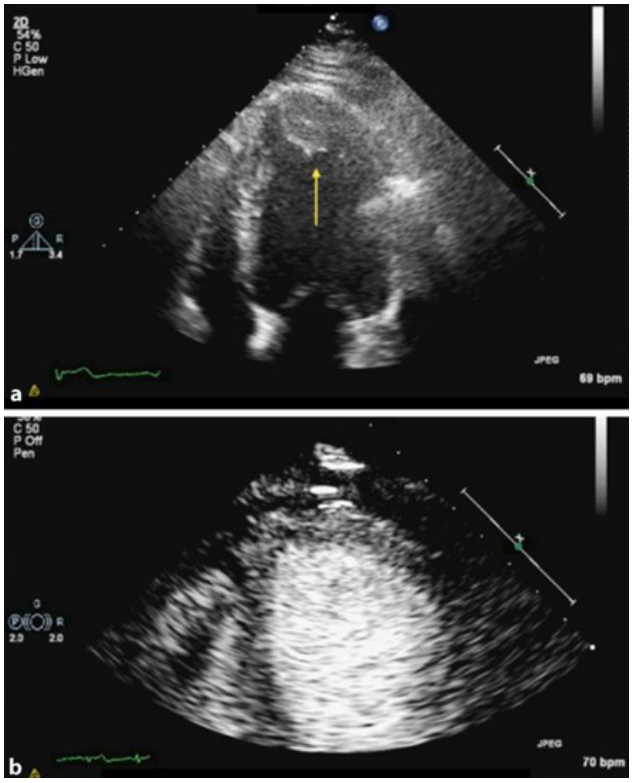
Aims: To assess the diagnostic utility and clinical applicability of contrast echocardiography, which uses contrast agents based on microbubbles to more accurately and clearly identify heart masses. In cardiovascular imaging, cardiac masses such as thrombi, malignancies, and vegetations pose serious diagnostic difficulties. One useful method for enhancing the identification and description of these masses is contrast-enhanced echocardiography.

Methods: A systematic review of literature from PubMed and MEDLINE (2000–2024) was performed, focusing on studies evaluating contrast-enhanced transthoracic (TTE) and transesophageal echocardiography (TEE) in detecting intracardiac and extracardiac masses. Studies were included if they assessed diagnostic accuracy, image quality improvement, or clinical utility of contrast use.

Results: Contrast echocardiography reduces acoustic dropout and enhances endocardial border delineation, which greatly improves the visibility of cardiac masses. It makes it easier to distinguish between tumors and thrombi, particularly at the ventricular apex and left atrial appendage. TEE combined with contrast agents works especially well for movable masses and posterior cardiac structures. Contrast-enhanced imaging guided clinical care and increased diagnostic confidence in patients with suspected cardioembolic stroke. Compared to non-contrast imaging, the use of contrast resulted in up to 30% of cases involving reclassification of mass type or existence.

Conclusions: Both TTE and TEE are more accurate diagnostic tools for evaluating heart mass when contrast echocardiography is used. It is essential for differentiating real clinical symptoms from anatomical mimics or artifacts, which helps determine the best course of treatment. When cardiac masses are suspected, contrast echocardiography should be the first-line procedure due to its safety, accessibility, and real-time imaging capabilities, particularly in instances that are complicated or unclear.

Keywords: Atrial Fibrillation, Cardioembolic Sources, Echocardiography, Endocarditis



[Liver-Upper & Lower]

PE-1

Association between US Based MASLD and Systemic Atherosclerosis: Insights from Carotid Ultrasound and Coronary CT Findings

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Aims: Metabolic dysfunction associated with steatotic liver disease (MASLD) is known to be associated with various cardiovascular risk factors. This study aimed to evaluate the differences in carotid atherosclerosis, and coronary artery disease severity based on general health screening data

Methods: A total of 2,979 subjects who underwent health screening including abdominal ultrasound, carotid ultrasound, and cardiac CT were analyzed. Subjects were stratified by the presence of MASLD, and by grades (0–3). Baseline clinical characteristics, carotid plaque presence (CCA, ICA, ECA, bulb), and coronary artery stenosis (LM, LAD, LCX, RCA) and coronary artery calcium score (CACS) were compared using appropriate statistical tests.

Results: Compared to individuals without MASLD, those with MASLD demonstrated a significantly higher prevalence of male sex (72.3% vs. 44.6%, $p<0.001$) and higher abdominal circumference was notably higher (92.4 cm vs. 83.5 cm, $p<0.001$).

With respect to carotid atherosclerosis, MASLD patients showed a higher frequency of plaques in the common carotid artery (CCA), internal carotid artery (ICA), and carotid bulb (all $p<0.001$). Moreover, the prevalence of carotid plaques increased progressively with the grade of fatty liver, indicating a dose-response relationship between hepatic steatosis and subclinical atherosclerosis.

Cardiac CT findings revealed that patients with MASLD had a significantly greater prevalence of coronary artery stenosis involving the left main (LM), left anterior descending (LAD), left circumflex (LCX), and right coronary artery (RCA) ($p<0.05$ for all vessels). Furthermore, the coronary artery calcium score (CACS) increased with severity (70.6 vs. 188.1 $p=0.003$), suggesting a strong association between MASLD and coronary atherosclerosis.

Conclusions: These findings support the role of MASLD as a marker of systemic atherosclerosis and cardiovascular risk.

Keywords: MASLD, Ultrasonography, Coronary Heart Disease

PE-2

Liver Protective Effect of Crocetin-Chitosan Nanobeads in Rats Using Ultrasound, Histology, and Biochemical Analysis

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Aims: Liver injury caused by oxidative stress and inflammation remains a major health concern. Ultrasound imaging proved to be a valuable non-invasive tool for monitoring gastric mucosal health. In this study, we fabricate the Crocetin-Chitosan loaded nanobeads (CT-NBs) and scrutinized against ethanol induced liver toxicity in rats using a comprehensive approach involving ultrasound imaging, histopathological examination, and biochemical analysis.

Methods: An improved ionic gelation technique was used to fabricate the CT-NBs and particle size, entrapment efficiency and drug loading capacity were estimated. Ethanol was used for the induction of liver toxicity in rats. The rats were received the oral administration of CT-NBs. The liver parameters, non-liver parameters, antioxidant, inflammatory cytokines, inflammatory parameters and apoptosis parameters were assessed in the ulcerated tissue. Additionally, we also scrutinized the liver using the ultrasound technique. Post-sacrifice, histological assessment of liver tissue was conducted using hematoxylin and eosin staining.

Results: CT-NBs exhibited the drag loading capacity (24.21±0.46%), encapsulation efficiency capacity (65.42±2.03%). Rats treated with CT-NBs showed significant improvements in liver texture and structure, with less liver swelling and fewer dark spots seen on ultrasound. CT-NBs alter the level of liver parameters such as ALP, ALT, AST non-hepatic parameters viz., total protein, creatinine, BUN; oxidative stress parameters (MDA,

GSH, GPx, SOD, CAT); inflammatory cytokine (TNF-α, IL-β, IL-4, IL-6, IL-10); inflammatory parameters (NF-κB, TGF-β, COX-2, PGE_2); apoptosis parameters (Bax, Bcl-2, Caspase-3), respectively. CT-NBs alter the mRNA expression of Nrf2, HO-1, PI3k, Akt and mTOR.

Conclusions: Crocetin-loaded chitosan nanobeads exhibit potent hepatoprotective effects against ethanol induced liver injury in rats. Their efficacy is attributed to enhanced bioavailability of crocetin, leading to superior antioxidant, anti-inflammatory, and hepatocyte-stabilizing actions. Ultrasound imaging, along with tissue and chemical tests, confirmed that CT-NBs help protect the liver, showing they could be a new treatment option for liver problems.

Keywords: Liver Injury, Ultrasound, Inflammation, Antixoidant

PE-3

Global Research Trends on Ultrasound-Based Noninvasive Assessment of Hepatic Fibrosis and Steatosis

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Aims: Hepatic fibrosis and steatosis are common manifestations of chronic liver diseases, including non-alcoholic fatty liver disease (NAFLD) and viral hepatitis. Traditionally, liver biopsy has been considered the gold standard for diagnosis, but it is invasive and associated with complications. In recent years, noninvasive imaging methods, particularly ultrasound-based techniques such as transient elastography (FibroScan), shear wave elastography (SWE), and controlled attenuation parameter (CAP), have gained prominence due to their safety, accessibility, and reproducibility. Bibliometric analysis provides insights into research trends, influential publications, and future directions in this evolving field.

Methods: A bibliometric analysis was conducted using the Scopus and Pubmed database. Articles published between 2014 and 2024 were included. Bibliometric indicators such as publication count, citation analysis, keyword co-occurrence, author productivity, and institutional collaboration were analyzed using VOSviewer and BiblioMetrix.

Results: The number of publications increased steadily over the decade, peaking in 2021. The leading countries contributing to research on ultrasound-based liver assessments were China, the United States, and Italy. The most productive journals in this field included Journal of Hepatology, Hepatology International, and Ultrasound in Medicine and Biology. The most highly cited article was a 2015 consensus statement on the noninvasive assessment of liver diseases. Popular keywords in the literature were "elastography," "NAFLD," "FibroScan," and "non-alcoholic steatohepatitis (NASH)." Visualization through VOSviewer revealed strong collaboration networks, particularly among European and Asian institutions. The results highlight the growing global interest in ultrasound-based noninvasive techniques for liver disease assessment. The increasing number of publications reflects the significant progress made in this field, particularly in refining ultrasound elastography methods. The dominance of keywords like "FibroScan" and "NAFLD" emphasizes the importance of these tools in assessing liver fibrosis and fatty liver diseases. The citation patterns and institutional collaborations underscore the collaborative nature of research in this area, with strong ties between European, Asian, and American institutions. Additionally, the rise of research in countries such as China and India points to the expanding recognition of liver disease as a public health issue in these regions.

Conclusions: Ultrasound-based noninvasive techniques for the assessment of hepatic fibrosis and steatosis have become critical tools in the diagnosis and management of liver diseases. The bibliometric analysis shows a significant increase in publications over the past decade, highlighting the growing importance of these techniques in clinical practice. The results suggest that the field is characterized by global collaboration and a continuous evolution of research. Further advancements are expected, particularly in improving the accuracy, accessibility, and affordability of these noninvasive diagnostic tools. Continued research and development will be essential to ensure these techniques can be more widely implemented in diverse healthcare settings.

Keywords: Hepatic Fibrosis, Research Trends, Steatosis, Ultrasound-Based Noninvasive Assessment

PE-4

Association of Biochemical Markers and CAP Score (Ultrasound) in Predicting Hepatic Steatosis and Fibrosis Progression in NAFLD

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Aims: The burden of non-alcoholic fatty liver disease (NAFLD) is increasing globally, and a major priority is to identify patients with non-alcoholic steatohepatitis (NASH). The present study aimed to evaluate the biochemical parameters and clinical parameters, as well as non-invasive features, including liquid biopsy & imaging techniques, to determine the early diagnosis of NAFLD for better treatments.

Methods: The present study was carried out in 100 NAFLD and healthy individuals as controls with serologically defined fatty liver. They underwent detailed history evaluation, clinical examination and anthropometric measurements, biochemical and serological tests (liver function test), in both the NAFLD and control groups. NAFLD was established by abdominal ultrasound and controlled attenuation parameter (CAP) measurement with transient elastography (TE). Liver fibrosis was estimated by liver stiffness measurement (LSM) with TE.

Results: Our findings indicate that with increasing age, the progression of liver disease advances from Grade 1 (non-alcoholic fatty liver disease, NAFLD) to Grade 3 (cirrhosis). Serum levels of aspartate aminotransferase (AST), alanine aminotransferase (ALT), and body mass index (BMI) were significantly elevated in cases compared to controls. Controlled attenuation parameter (CAP) values demonstrated a significant positive correlation with BMI ($\rho = 0.27$, $p<0.05$) and hemoglobin levels ($\rho = 0.324$). Additionally, CAP was positively correlated with liver enzymes, including AST ($\rho = 0.17$) and ALT ($\rho = 0.11$). The mean values of AST and ALT across the different disease grades were as follows: Grade 1 – AST: 90.83 IU/L, ALT: 59.55 IU/L; Grade 2 – AST: 77.23 IU/L, ALT: 54.0 IU/L; and Grade 3 – AST: 52.83 IU/L, ALT: 35.40 IU/L.

Conclusions: The findings from our study suggest that transient elastography (fibroscan), when used in combination with serum biomarker tests (AST & ALT), might be a better tool for identifying disease severity in NAFLD patients as well as grades of fibrosis.

Keywords: Transient Elastography, Controlled Attenuation Parameter, Nafld, Liver Function Test

PE-5

Diagnostic Accuracy of Contrast-Enhanced Ultrasound in Differentiating Focal Liver Lesions: A Systematic Review

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Aims: Differentiating benign from malignant focal liver lesions (FLLs) is a clinical challenge. Contrast-enhanced ultrasound (CEUS) has emerged as a promising real-time, radiation-free, and cost-effective modality. This systematic review aimed to evaluate the diagnostic accuracy of CEUS in differentiating FLLs, using histopathology or contrast-enhanced CT/MRI as reference standards.

Methods: This review followed PRISMA guidelines. Databases including PubMed, Embase, Scopus, and Web of Science were searched up to January 2024. Eligible studies were prospective or retrospective cohorts assessing CEUS in differentiating benign vs. malignant FLLs in adults. Sensitivity, specificity, and area under the receiver operating characteristic curve (AUROC) were pooled using a bivariate random-effects model. Study quality was assessed using the QUADAS-2 tool.

Results: Of 3,946 records screened, 42 studies (n = 9,183 patients; 11,546 FLLs) met the inclusion criteria. Pooled sensitivity and specificity of CEUS in differentiating malignant from benign FLLs were 92.8% (95% CI: 89.7–94.9) and 88.5% (95% CI: 84.6–91.5), respectively. CEUS showed highest accuracy in characterizing hepatocellular carcinoma (HCC) and hemangiomas, particularly in cirrhotic livers. The pooled AUROC was 0.94. CEUS exhibited comparable or superior diagnostic accuracy to contrast-enhanced CT and MRI in detecting arterial phase hyperenhancement and washout patterns. Heterogeneity was moderate and mainly due to lesion size and liver disease etiology.

Conclusions: CEUS demonstrates high diagnostic accuracy in distinguishing benign from malignant FLLs, with

performance comparable to CT/MRI, especially for HCC. Its dynamic real-time imaging, absence of nephrotoxicity, and cost-effectiveness make CEUS an invaluable tool in liver imaging. Wider adoption and standardization of CEUS protocols could enhance early lesion characterization, reduce unnecessary biopsies, and streamline liver cancer surveillance in high-risk populations.

Keywords: Contrast-Enhanced Ultrasound, Focal Liver Lesions, Hepatocellular Carcinoma, Diagnostic Imaging

PE-6

Elastography-Based Ultrasound Techniques in Staging Liver Fibrosis: A Systematic Review and Meta-Analysis

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Aims: Liver fibrosis staging is critical in the management of chronic liver disease (CLD). Non-invasive elastography-based ultrasound (US) techniques—such as Transient Elastography (TE), Point Shear Wave Elastography (pSWE), and 2D Shear Wave Elastography (2D-SWE)—are increasingly replacing liver biopsy. This systematic review and meta-analysis aimed to evaluate the diagnostic accuracy of elastography-based US techniques in staging liver fibrosis (≥F2, ≥F3, and F4), using histology as the reference standard.

Methods: Following PRISMA guidelines, we systematically searched PubMed, Embase, Web of Science, and Scopus for studies published up to January 2024. Inclusion criteria were prospective or retrospective studies that assessed TE, pSWE, or 2D-SWE in adult patients with biopsy-proven liver fibrosis. Pooled sensitivity, specificity, and AUROC values were calculated using a bivariate random-effects model. Study quality was appraised using the QUADAS-2 tool.

Results: Out of 3,472 records, 49 studies (n = 13,865 patients) met inclusion criteria. For ≥F2 fibrosis, pooled AUROCs were 0.87 (95% CI: 0.84–0.90) for TE, 0.89 (0.86–0.92) for pSWE, and 0.91 (0.87–0.94) for 2D-SWE. For cirrhosis (F4), AUROCs were 0.92, 0.93, and 0.95 respectively. 2D-SWE showed the highest sensitivity (89%) and specificity (87%) across all fibrosis stages. Heterogeneity was attributed to etiology (HBV, HCV, NAFLD) and BMI variations. No serious publication bias was detected.

Conclusions: Elastography-based US techniques, particularly 2D-SWE, demonstrate excellent diagnostic accuracy for staging liver fibrosis and cirrhosis. These modalities offer a safe, reproducible, and non-invasive alternative to biopsy, enabling broader clinical application in CLD screening and monitoring. Further standardization and large-scale validation studies are warranted to harmonize cut-off values and improve implementation.

Keywords: Liver Fibrosis, Ultrasound Elastography, Non-Invasive Diagnosis, Shear Wave Elastography

PE-7

Mapping the Role of Metal-Organic Frameworks in Sonodynamic Therapy for Liver Fibrosis and Metastasis: Bibliometric Trends in Clinical Ultrasound (2015-2025)

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Aims: Metal-organic frameworks (MOFs), renowned for their customizable porosity and high surface area, are increasingly integrated into clinical applications, especially Sonodynamic Therapy (SDT). SDT leverages ultrasound and sonosensitizers often MOFs to produce reactive oxygen species (ROS), enabling targeted, non-invasive treatment of tumors and fibrotic tissues. The clinical relevance of MOF-assisted SDT is rapidly expanding, showing potential not only in cancer but also in conditions such as liver fibrosis and metastasis prevention through ROS-mediated cellular modulation. Despite growing interest, a systematic evaluation of this interdisciplinary research domain remains limited. This study presents a decade-long bibliometric analysis to reveal key trends, thematic clusters, and global collaborations at the MOF-ultrasound interface.

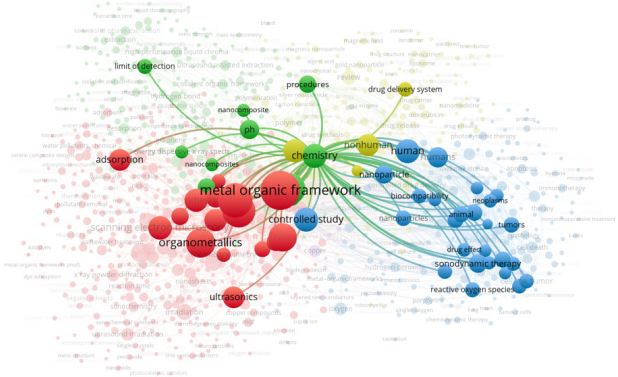
Methods: Scopus-indexed publications (2015–early 2025) were analyzed using the keywords “clinical,” “ultrasound,” "liver", and “metal-organic frameworks.” VOSviewer software was used to assess keyword co-occurrence, citation networks, bibliographic coupling, and density maps.

Results: A total of 328 publications were analyzed. Five major thematic clusters emerged: MOFs, chemistry, SDT, drug

delivery systems, and enzyme activity. A notable surge in publications after 2020 reflects intensifying research interest. The field is led by chemistry (21%), followed by materials science (14.8%) and chemical engineering (13.9%). China, Iran, and India dominated publication output, collectively contributing over 60% of the literature. Overlay and density maps revealed a shift from basic MOF synthesis to biomedical applications, particularly in ultrasound-triggered drug release and SDT. Emerging terms such as sonosensitizer, ROS, and theranostics indicate a growing focus on precision nanomedicine. Notably, SDT is gaining recognition for its potential in disrupting tumor metastasis and reducing liver fibrosis through oxidative and immunomodulatory mechanisms.

Conclusions: This analysis underscores SDT as a rising application of MOF-based ultrasound technologies, with promising implications in oncology and fibrotic disease. The convergence of nanotechnology and therapeutic ultrasound reflects a paradigm shift toward non-invasive, offering valuable insights for future research and clinical innovation.

Keywords: Sonodynamic Therapy, Metal-Organic Frameworks, Liver Fibrosis, Non-Invasive Therapy



PE-8

Spatial and Sectoral Analysis of Abdominal Ultrasound Tracking Equipment and Mobility in Healthcare, South Sulawesi Indonesia

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Aims: Increasing the availability and mobility of abdominal ultrasound devices in a healthcare setting (hospital) or region (clinics) can be crucial for early detection of liver cancer, monitoring chronic liver disease, and improving general abdominal health diagnostics. However, the scarcity of abdominal ultrasound devices in Indonesia has occurred and is expected to result in patient death. So, spatial mapping is required to cooperate with and make decisions on the distribution and sectoral potential of the existence and use of abdominal ultrasound more effectively and efficiently. This study focuses on spatial and sectoral analysis of geo-mapping on Abdominal Ultrasound Equipment and Its Mobility in Healthcare, such as hospital dan clinics in South Sulawesi.

Methods: This research integrates spatial analysis techniques such as proximity analysis of abdominal ultrasound device existence in hospitals and clinics and determines the potential fast-action of the machine mobility surrounding the primary sector of South Sulawesi. A comprehensive perspective on developing Geographic Information Systems and spatial-sectoral framework built in ArcGIS Pro analyst. Proximity analysis is a spatial analysis technique used to determine the relationship between geographic features based on location and distance in public health. Research analysis refers to creating zones around 500 m, 1 km, and 3 km around a hospital, measuring the distance to the closest hospital (NNA), and combining proximity with sectoral layers.

Results: Ultrasonography (USG) medical devices are important because they allow doctors to see inside the body without surgery. USG can help detect diseases early, improve service quality, and increase patient satisfaction. Results showed the abdominal USG was only available in seven hospitals or clinics with easy mobility of location information and price lists through digital information, Alodokter. The number of regional public hospitals in Sulawesi reached 59 hospitals in 21 districts, with abdominal USG facilities recorded in the manual sector. Based on information and data, seven hospitals or clinics were zoning areas within a range of 500m, 1 km, to 3m, and the results of the nearest location and distance identification of public health showed limited coverage to meet the necessity of abdominal USG devices. The development of

necessary based on regional sectors requires the coordination of savings and loans for devices to facilitate mobility based on the availability of abdominal USG devices.

Conclusions: The existence of abdominal ultrasound is still considered lacking, and the lack of health facilities in Indonesia can negatively impact public health. This deficiency causes high mortality and disease rates, poor quality of life, and delays in medical treatment. Based on the results, fragmentation of health information systems, incomplete data recording, and lack of standardization in managing health data can affect the mobility of the existence and use of abdominal ultrasound devices. Further research requires a comprehensive solution involving the government, health organizations, and the community to improve access to preventive health services.

Keywords: Spatial and Sectoral Analysis, Abdominal Ultrasound, Tracking Equipment and Mobility, South Sulawesi

PE-9

From Guidelines to Practice: A Systematic Review on Ultrasound-Guided Microwave Ablation in Hepatic Oncology

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Aims: This systematic review evaluates the safety, efficacy, and clinical performance of US-guided MWA in managing primary and metastatic liver tumors, and highlights current practice guidelines and key prognostic factors. Ultrasound-guided percutaneous microwave ablation (US-MWA) has emerged as a promising minimally invasive therapy for the treatment of liver tumors, particularly in patients who are poor surgical candidates. The method leverages real-time imaging for accurate needle placement and efficient tumor necrosis.

Methods: A comprehensive search of PubMed, Scopus, and Web of Science was conducted for studies published between 2005 and 2024. Inclusion criteria were clinical studies involving US-guided percutaneous MWA for liver malignancies reporting at least one of the following outcomes: complete ablation, local tumor progression (LTP), complication rates, or survival. Data on procedural technique, tumor characteristics, and clinical outcomes were synthesized.

Results: Across 52 studies, involving over 3,000 ablations, US-guided MWA achieved complete ablation in 95–100% of tumors, with LTP rates ranging from 5–15%. Factors associated with LTP included tumor size >3 cm, proximity to large vessels or the diaphragm, and lack of prior chemotherapy response. Complications were generally minor, with a major complication rate below 5% and no reported procedure-related mortality. Innovations such as real-time thermometry, cooled antennae, and image fusion have significantly improved treatment precision and outcomes.

Conclusions: US-guided MWA is a clinically effective and safe modality for liver tumor ablation, especially for small or non-resectable lesions. Ongoing advancements and consensus guidelines support its integration as a standard care option in hepatic oncology.

Keywords: Microwave Ablation, Ultrasound-Guided, Hepatocellular Carcinoma, Percutaneous Therapy

PE-10

Illuminating Liver Lesions: A Systematic Review of Contrast-Enhanced Ultrasound (CEUS) in Focal Liver Lesion Diagnosis

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Aims: In order to distinguish between benign and malignant lesions and compare it to other imaging modalities, the diagnostic performance and clinical utility of contrast-enhanced ultrasound (CEUS) in the identification and characterization of focal liver lesions (FLLs) will be thoroughly reviewed and evaluated.

Methods: A comprehensive search of PubMed, MEDLINE, Cochrane Library, and Embase was conducted for studies published between 2001 and 2023 using MeSH terms related to CEUS and focal liver lesions. Inclusion criteria were human studies reporting CEUS diagnostic metrics with histopathology or clinical follow-up as reference. Case reports and non-English articles were excluded. Quality was assessed using the QUADAS-2 tool, and data were extracted for meta-analysis where possible.

Results: Analysis was done on 45 studies that included more than 8000 FLLs. With sensitivity ranging from 77.5% to 93% and specificity from 90% to 94%, CEUS showed excellent diagnostic accuracy. Based on distinctive enhancement patterns, CEUS proved particularly successful in detecting hepatocellular cancer in cirrhotic livers. With the advantages of real-time vascular imaging, no ionizing radiation, and safety for patients with renal insufficiency, CEUS provided a comparable diagnostic yield to CT and MRI. It was very helpful in directing samples and assessing indeterminate lesions.

Conclusions: A safe, reliable, and easily accessible ultrasound-based method for describing localized liver lesions is CEUS. In skilled hands, it provides similar precision to CT and MRI and allows for real-time microvascular assessment. Its importance in clinical processes is shown by its function in rapid bedside evaluation and diagnostic confidence. To increase its uptake, procedure standardization and additional multicenter validation research are necessary.

Keywords: Contrast-Enhanced Ultrasoundliver Cirrhosis, Focal Liver Lesions, Hepatocellular Carcinoma, Ultrasonography

PE-11

How Did the Analysis of Asian Children's Autoimmune Liver Disease (AILD) Unfold?

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Aims: When the body's immune system targets the liver, it can result in inflammation and autoimmune liver disorders. Autoimmune liver disease (AILD) in Asian children is poorly understood. Numerous research studies have yielded diverse conclusions regarding AILD in Asian children. Therefore, the primary objective of this study is to provide a comprehensive overview of AILD in the Asian population.

Methods: Bibliometric analysis is employed in this study. Articles from the electronic database lens.org, which was retrieved from 2015 to 2024, were selected based on the keywords "Asian children" and "autimmune liver disease." Up to eight articles were subsequently connected to facilitate visualization.

Results: A study by Lee et al. (2015) on the clinical characteristics and outcome factors of pediatric Autoimmune Liver Disease (AILD) in an Asian population demonstrated that emission was achieved. Furthermore, a bibliometric investigation revealed that AILD is prevalent in female children and adolescents. Network visualization indicated that Malaysia ranks among the Asian nations with the highest prevalence of AILD in children. Mann et al. (2018) also suggested that seeking a diagnosis and therapy negatively impacts the outcome of childhood AILD in Malaysia. Notably, Malaysia, the United Kingdom, and the United States have made significant contributions to AILD research.

Conclusions: Research on AILD in Asian children is gaining momentum, encompassing studies on the clinical characteristics and outcome predictors of aggressive course, liver disease, and AILD in Asian children. Furthermore, as previously explained, bibliometric analysis can provide a concise summary of the literature review conducted in AILD studies.

Keywords: Autoimmume Liver Disease, Asian Children, Sistematic Review

Table. Summary of Analysis

Author(s)	Year	Key Findings	Contribution
Lee et al.	2015	Emission achieved in pediatric AILD patients.	Clinical characteristics and outcome factors in Asian population.
		AILD prevalent in female children and adolescents.	Bibliometric investigation on AILD prevalence.
		Malaysia has high prevalence of AILD in children.	Network visualization on AILD research in Asia.
Mann et al.	2018	Seeking diagnosis and therapy negatively impacts childhood AILD outcome in Malaysia.	Insights into AILD outcome factors in Malaysia.
		Significant contributions from Malaysia, UK, and US to AILD research.	

PE-12

Effect of Alkaline Phosphatase (ALP) and Bilirubin (BIL) Levels on Gamma-Glutamyl Transferase (GGT) in Liver Cirrhosis Patients

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Aims: Liver cirrhosis is a significant contributor to morbidity and mortality among individuals with chronic liver disease globally. In 2019, cirrhosis accounted for 2.4% of global fatalities (Huang et al., 2023). Previous studies have demonstrated the elevation of gamma-glutamyl transferase (GGT) levels in patients with metabolic syndrome (Dan et al., 2014). Furthermore, alkaline phosphatase (ALP) and bilirubin (BIL) levels serve as valuable predictors of liver transplantation outcomes. This study seeks to elucidate the impact of ALP and bilirubin on GGT levels in liver cirrhosis patients

Methods: This quantitative research employs secondary data from patients diagnosed with liver cirrhosis. The primary variables utilized in this study are ALP, BIL, and GGT. The data source is UCI Machine Learning, and the data was processed through multiple regression analysis to address the research objectives.

Results: The normality test was conducted, and the p-p plot indicated that the data used is normal. Referring to the tolerance and VIF values, the two independent variables (ALP and BIL) exhibit no multicollinearity (0.919 and 1.089). The Pearson correlation test revealed that ALT is correlated with GGT, while BIL is not correlated with GGT. The regression test (F Test) results demonstrated that ALP and BIL have a significant impact on GGT (p-value < 0.05). F=9.836)

Conclusions: The study's findings demonstrate that ALP and BIL significantly influence γ-Glutamyl Transferase (γ-GT) levels in individuals with liver cirrhosis. Notably, ALP exhibits a substantial impact on γ-GT.

Keywords: Liver Cirrhosis, Gamma-Glutamyl Transferase, Alkaline Phosphatase, Bilirubin

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	95.0% Confidence Interval for B Lower Bound	95.0% Confidence Interval for B Upper Bound	Correlations Zero-order	Correlations Partial	Correlations Part	Collinearity Statistics Tolerance	Collinearity Statistics VIF
1	(Constant)	49.533	36.064		1.373	.189	-26.919	125.985					
	ALT	10.026	2.393	.732	4.190	.001	4.953	15.098	.742	.723	.702	.919	1.089
	BIL	-.058	.292	-.035	-.198	.845	-.677	.561	-.243	-.050	-.033	.919	1.089

a. Dependent Variable: GGT

PE-13

AI-Augmented Contrast-Enhanced Ultrasound (CEUS) for Real-Time Characterization of Liver Lesions: A Multicenter Study

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Aims: This review abstract evaluates the diagnostic utility and clinical feasibility of integrating artificial intelligence (AI) into real-time contrast-enhanced ultrasound (CEUS) for accurate classification of focal liver lesions (FLLs). The goal is to highlight its potential in improving early detection of malignancies, standardizing interpretation across centers, and minimizing unnecessary invasive procedures.

Methods: This review synthesizes findings from seven recent peer-reviewed studies and multicenter evaluations focused on AI-assisted CEUS for liver lesion characterization. Deep learning models—primarily convolutional neural networks (CNNs)—were trained using large CEUS video datasets and validated against histopathological or MRI-confirmed diagnoses.AI-augmented CEUS demonstrated an average diagnostic accuracy of 91–95%, with sensitivity and specificity surpassing unaided radiologists by 10–15%. In a referenced cohort of over 500 patients across three centers, the AI model significantly improved lesion stratification—especially in small (<2 cm) nodules within cirrhotic livers. Moreover, diagnostic confidence rose in less-experienced operators, and variability between readers fell sharply (κ = 0.87 vs. 0.59). The false-positive biopsy rate decreased by over 30% in preliminary trials

Results: AI-augmented CEUS demonstrated an average diagnostic accuracy of 91–95%, with sensitivity and specificity surpassing unaided radiologists by 10–15%. In a referenced cohort of over 500 patients across three centers, the AI model significantly improved lesion stratification—especially in small (<2 cm) nodules within cirrhotic livers. Moreover, diagnostic confidence rose in less-experienced operators, and variability between readers fell sharply (κ = 0.87 vs. 0.59). The false-positive biopsy rate decreased by over 30% in preliminary trials.

Conclusions: AI-enhanced CEUS represents a frontier in hepatobiliary imaging, combining the safety and immediacy of ultrasound with the precision of machine learning. Multicenter evaluations confirm its potential to standardize lesion characterization, optimize care workflows, and democratize high-level diagnostic accuracy irrespective of operator experience. This paradigm shift sets the stage for AI-integrated, non-invasive diagnostic ecosystems in liver oncology and surveillance.

Keywords: Artificial Intelligence (AI), Contrast-Enhanced Ultrasound (CEUS), Focal Liver Lesions (FLLS), Real-Time Diagnosis

PE-14

Socioeconomic Status Effect on Patient Liver Transplantation: A Review

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Aims: Socioeconomic status has been shown as a significant predictor of noncompliance with medical treatment. The patients' socioeconomic backgrounds have been linked to noncompliance with medical treatment, delayed transplant application, and challenges managing patients after transplantation. This study determine whether education level and socioeconomic status in a cohort of liver transplant recipients potential predictors of patient survival.

Methods: This study uses a literature review that follows the PRISMA method and a literature search on PubMed and Google Scholar using the keywords "Liver Transplantation", and "SocioEconomic". Several articles that fit the criteria were found in the search results for the years 2014-2024

Results: The patients chosen for liver transplantation must be carefully chosen, in addition to the challenges associated with acquiring the liver. In solid organ transplantation, patient compliance is crucial and encompasses medication use, dietary modifications, and lifestyle adjustments. Liver transplant recipients reside in neighborhoods that correspond with their financial situation, but it's also critical that they live in locations that allow them to access resources for meeting their needs mostly medical ones. The socioeconomic status of the recipient is one of the factors that affect patient after transplantation, and it may need to be taken into account when selecting patients prior to transplantation. The current study intends to examine the variables influencing patient and graft survival, with a focus on socioeconomic and educational status.

Conclusions: It can be concluded that socioeconomic status can affect quality of life of liver transplantation

Keywords: Socioeconomic, Liver Transplantation, Indonesia

PE-15

A Case of Malignant Hepatic Perivascular Epithelioid Cell Tumor (PEComa) Misdiagnosed as Hepatocellular Carcinoma (HCC)

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Aims: Perivascular epithelioid cell tumor (PEComa) is an uncommon mesenchymal tumor that can be found in any organ but rarely in the liver. Hepatic PEComa is rarely malignant, and difficult to differentiate from other hepatic neoplasms such as hepatocellular carcinoma (HCC), focal nodular hyperplasia (FNH), hemangioma.

Methods: Not applicable

Results: This case is on a 57-year-old female patient with perivascular epithelioid cell tumor (PEComa), misdiagnosed as hepatocellular carcinoma (HCC). She was initially referred to our department for a 8.1x7.3 cm hepatic nodule, incidentally discovered in an abdominal ultrasound performed due to elevated liver function test.

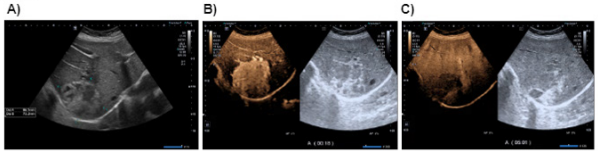
Her viral and tumor markers were negative, and the liver function test was soon normalized. Contrast enhanced ultrasound (CEUS) performed at a 9.4x8.3 cm heterogeneously echogenic mass visible in abdominal ultrasound showed early hyperenhancement in arterial phase with delayed washout in portal phase, suggestive of HCC (Figure 1). Both hepatic computed tomography (CT) and magnetic resonance imaging (MRI) showed a 10 cm sized mass in the right hepatic lobe with hypertrophic artery and large draining vein, suggestive of differential diagnosis between hypervascular tumors like HCC and AML. The patient underwent laparoscopic right hemihepatectomy for definitive diagnosis and treatment. The resected segment's pathology revealed mitotic rate of 2/50 high power, necrosis, moderately increased cellularity, epithelioid and spindle cellular morphology with

positive HMB45 immunohistochemical staining, consistent with pathological diagnosis of malignant PEComa. The surgical resection was curative with no evidence of recurrence during follow-up.

Conclusions: Hepatic PEComas are not only rare but also extremely challenging to diagnose due to lack of clinical symptoms and characteristic radiological features. Therefore, it is usually diagnosed postoperatively through histopathological and immunohistochemical studies. In this case, PEComa was initially misdiagnosed as HCC. Consequently, PEComa should be considered as a differential diagnosis of liver nodules despite its rarity.

Keywords: PEComa, Perivascular Epithelioid Cell Tumor, HCC, Ceus

Figure 1:



CEUS examination :
A) A 86.5x72.2 mm sized fat containing heterogeneous mass in right hepatic lobe B) rapid filling of contrast and hyperenhancement in arterial phase C) delayed washout in portal phase

PE-16

Comparison of Modified CEUS LI-RADS with Sonazoid and CT/MRI LI-RADS for Diagnosis of Hepatocellular Carcinoma

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Aims: To compare the diagnostic performance based on the modified CEUS Liver Imaging Reporting and Data System (LI-RADS), which includes Kupffer-phase findings as a major imaging feature, with that of CT and MRI (CT/MRI) LI-RADS for liver nodules in patients at high risk of HCC.

Methods: A total of 120 patients with 120 nodules were included in this retrospective study. The median size of the lesions was 20.0 mm (interquartile range, 14.0-30.8 mm). Of these lesions, 90.0% (108 of 120) were confirmed as HCCs, 6.7% (8 of 120) were intrahepatic cholangiocarcinomas, 1.7% (2 of 120) were metastases, and 1.7% (2 of 120) were dysplastic nodules. All nodules were diagnosed histopathologically. Each nodule was categorized according to the modified CEUS LI-RADS and CT/MRI LI-RADS version 2018. The diagnostic performance and inter-modality agreement of each criterion was compared.

Results: The inter-modality agreement for the modified CEUS LI-RADS and CT/MRI LI-RADS was slight agreement (kappa = 0.139, p=0.015). The diagnostic accuracies of HCCs for the modified CEUS LR-5 and CT/MRI LR-5 were 70.0% (95% confidence interval [CI]: 61.0%, 78.0%) versus 70.8% (95% CI: 61.8%, 78.8%) (p=0.876), respectively. The diagnostic accuracies of non-HCC malignancies for the modified CEUS LR-M and CT/MRI LR-M were 84.2% (95% CI: 76.4%, 90.2%) versus 96.7% (95% CI: 91.7%, 99.1%) (p=0.002), respectively.

Conclusions: The diagnostic performance for HCCs on the modified CEUS LR-5 and CT/MRI LR-5 are comparable. In contrast, CT/MRI LR-M has better diagnostic performance for non-HCC malignancy than that of the modified CEUS LR-M.

Keywords: CEUS LI-RADS with Sonazoid, CT/MRI LI-RADS, Hepatocellular Carcinoma

PE-17

Metabolic Fatty Liver Disease in Pregnant Women

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Aims: Metabolic fatty liver disease (MAFLD) has been considered the most common liver disease in the last year. The most common risk factor associated with MAFLD is the presence of metabolic syndrome and type 2 diabetes. We aimed to investigate pregnancy outcomes in MAFLD.

Methods: Pregnant volunteers (n=31) were referred to the obstetric medicine clinic of Dornod Medical Center, Dornod, Mongolia. All pregnant had tests for blood chemistries ALT (0-45 u/l), AST (0-35 u/l), cholesterol (349 mg/dl), triglyceride (<453 mg/dl), HBsAg, Anti-HCV, BMI (calculator.net), gestational age and abdominal ultrasound scans using accepted criteria.

Results: The BMI before pregnancy is 1 (3.2%); women are underweight, 16 (51.6%) are normal weight, 7 (22.5%) are overweight, and 8 (25.8%) are obese. During the pregnancy, BMI was 13 (41.9%) as overweight and 14 (45.1%) as obese, compared to before pregnancy increased percent overweight and obese. The average BMI before pregnancy was 26.2 ± 5.4 and during pregnancy, the BMI average was 30,39 ± 5.1 (P value 3.5 * 10-5), this was shown to increase obesity during pregnancy. Nineteen pregnant had fatty liver on ultrasound, in 16 (84.2%) increased the weight should be, during pregnancy. Among the five patients who developed abnormal liver function tests. One patient with hypercholesterolemia, and another one with hyperglycemia.

Conclusions: Ultrasound is a noninvasive and useful diagnostic tool in the detection of MAFLD. Most pregnant women with MAFLD have normal AST and ALT. This study has shown that having overweight and obesity increased in pregnant women is associated with increased risks for diagnosis of NAFLD.

Keywords: Metabolic Fatty Liver Disease, Pregnancy

PE-18

Characteristics of Gastroesophageal Varices and Associated Factors in Cirrhotic Patients: A Cross-Sectional Study

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Background: Gastroesophageal varices are common and potentially life-threatening complications of portal hypertension in cirrhotic patients. They are strongly associated with gastrointestinal bleeding, which contributes significantly to morbidity and mortality. Early identification and evaluation of related factors are crucial for improving clinical outcomes.

Aims: To explore the characteristics of gastroesophageal varices and investigate several associated factors in patients with liver cirrhosis.

Methods: A descriptive, cross-sectional study with randomized design was conducted on 129 patients diagnosed with liver cirrhosis, from August 2023 to June 2024. All patients underwent upper gastrointestinal endoscopy using the Olympus CV-170 endoscopic system to evaluate the presence and severity of gastroesophageal varices and other related lesions.

Results: The age group with the highest prevalence of cirrhosis was 50–59 years, accounting for 41.1% of cases. The mean age of the patients was 54.24 ± 9.415 years, with the youngest being 34 and the oldest 87 years old. Esophageal varices were detected in 89.1% of cirrhotic patients, while gastric varices were found in 34.9%. A statistically significant association was observed between gastric varices and gastrointestinal bleeding (p<0.05). Among 53 patients with portal hypertensive gastropathy, 98.1% also had esophageal varices, while only 1.9% did not, indicating a significant correlation (p<0.05). Gastric erosions were more prevalent in patients with esophageal varices (83.4%) compared to those without (17.6%), with the difference being statistically significant (p<0.05). Furthermore, portal hypertensive gastropathy was more commonly observed in patients with grade II and III esophageal varices (43.4% and 47.2%, respectively) than in those with grade I varices (1.9%) (p<0.05). The use of the polypectomy technique with Endoloop-assisted hemostasis demonstrated high efficacy and safety for polyps ≥2 cm, especially for pedunculated polyps.

Conclusions: Esophageal and gastric varices are highly prevalent among patients with liver cirrhosis. Factors significantly associated with the presence of varices include gastrointestinal bleeding, portal hypertensive gastropathy, and gastric erosions. Early endoscopic assessment and timely management are essential in cirrhotic patients to prevent life-threatening complications.

Keywords: Gastric Varices, Gastrointestinal Bleeding, Esophageal Varices, Cirrhosis, Portal Hypertensive Gastropathy

PE-19

Comparison of Liver Fibrosis Severity between Alcohol-Related and Viral Hepatitis Patients Using Transient Elastography: A Cross-Sectional Study at Clinic 103 CK

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Aims: Background: Liver fibrosis is a common consequence

of chronic liver injury and a major predictor of progression to cirrhosis and liver failure. Among the most prevalent etiologies are chronic viral hepatitis and long-term alcohol abuse, both of which trigger ongoing hepatic inflammation and fibrogenesis.

Aims: This study aimed to compare the degree of liver fibrosis between patients with alcohol-related liver disease (ALD) and those with chronic viral hepatitis (HBV or HCV), utilizing ultrasound elastography. The fibrosis stage was evaluated using the METAVIR scoring system to determine which etiology was associated with more advanced fibrotic changes.

Methods: A cross-sectional study was conducted from February 2023 to February 2025 at Clinic 103 Cam Khe (Phòng khám 103 Cẩm Khê). A total of 64 patients were enrolled, including 32 with alcohol-related liver disease and 32 with chronic viral hepatitis. All patients underwent liver stiffness measurement using transient elastography (FibroScan®). Fibrosis stages were classified according to the METAVIR system (F0–F4). Statistical analyses were performed using SPSS software, with significance set at $p<0.05$.

Results: Patients with alcohol-related liver disease exhibited a significantly higher prevalence of advanced fibrosis. In the ALD group, 43.7% of patients were classified as METAVIR stage F4, compared to 18.7% in the viral hepatitis group. The mean fibrosis score in the ALD group was F3.16, significantly higher than the F2.44 observed in the viral group ($p<0.05$). Conversely, early-stage fibrosis (F0–F2) was more frequently observed among patients with viral hepatitis.

Conclusions: The findings indicate that alcohol-related liver disease is associated with more severe liver fibrosis compared to viral hepatitis. Transient elastography is a reliable, non-invasive modality for quantifying liver fibrosis and should be routinely employed in the clinical assessment of chronic liver diseases.

Keywords: Liver Fibrosis, Fibroscan, Alcohol-Related Liver Disease, Viral Hepatitis

PE-20

Clinical Evaluation of Liver Metastasis in Ovarian Cancer

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Aims: Metastatic lesions in the liver follow a unique pattern in peritoneal malignancies,A 37-year-old female presented with loss of appetite, abdominal distension & supraumbilical swelling. CA 125 was 1888.5 IU/L. MRI showed bulky ovaries, ascites, retroperitoneal lymphadenopathy, omental & supraumbilical nodules with herniation, nodules on the liver surface, and moderate pleural effusion in the right chest. Ascitic fluid Cytology showed malignant cells. US-guided FNAC from omental nodule confirmed Adenocarcinoma. Considering Ovarian Carcinoma stage 3C, 3# TP regimen was given as neoadjuvant chemotherapy (CT). After 1# CT, alopecia was seen. Then suboptimal cytoreductive surgery was done, which was followed by 3 cycles of TP regimen. Treatment-free interval was seen for 4 months. On follow-up; Clinical, radiological & serological investigations showed progressive disease.

Oral metronomic therapy with oral CE (cyclophosphamide and etoposide for 1-5 days, every 21 days) was given. After 2 cycles the response was poor with PS-2 & CA 125 3830 IU/L. CECT showed progressive disease. Gemcita + cisplatin (GC) regimen was started with D1, D15 plans. This was being tolerated well. Post CT#2; GR 2 thrombocytopenia was seen. POST 3# GC regimen no response was seen. Now weekly Paclitaxel was given. As a last option, in case of no response after 2, the BSC regimen (Paclitaxel + Carboplatin +Bevacizumab) remains an option.

Including ovarian cancer (OC). In (OC), if the tumor spreads to the liver from the peritoneum, it is categorized as FIGO stage III, but if there is hematogenous spread to the liver, it is categorized as stage IV of ovarian cancer. Here we discuss a unique case of OC with liver nodules.

Methods: A case study

Results: A 37-year-old female presented with loss of appetite, abdominal distension & supraumbilical swelling. CA 125 was 1888. 5 IU/L. MRI showed bulky ovaries, ascites, retroperitoneal lymphadenopathy, omental & supraumbilical nodules with herniation, nodules on the liver surface, and moderate pleural effusion in the right chest. Ascitic fluid cytology showed malignant cells. US-guided FNAC from the omental nodule confirmed adenocarcinoma. Considering ovarian carcinoma stage

3C, the 3# TP regimen was given as neoadjuvant chemotherapy (CT). After 1 CT, alopecia was seen. Then suboptimal cytoreductive surgery was done, which was followed by 3 cycles of TP regimen. A treatment-free interval was seen for 4 months. On follow-up, clinical, radiological, & serological investigations showed progressive disease.

Oral metronomic therapy with oral CE (cyclophosphamide and etoposide for 1-5 days, every 21 days) was given. After 2 cycles the response was poor with PS-2 & CA 125 at 3830 IU/L. CECT showed progressive disease. The gemcitabine + cisplatin (GC) regimen was started with D1 and D15 plans that were tolerated well. Post CT#2, GR 2 thrombocytopenia was seen. POST 3# GC regimen: no response was seen. Now weekly Paclitaxel was given. As a last option, in case of no response after 2, the BSC regimen (Paclitaxel + Carboplatin + Bevacizumab) remains an option.

Conclusions: This case was categorized as FIGO stage IV A. Liver surface involvement was considered as peritoneal spread. Pre- and post-debulking surgery chemotherapy with the TP regimen is the standard protocol for management.

Keywords: Liver Metastasis, Ovarian Cancer, Staging

PE-21

Diagnostic Limitations of DNA-Based PCR in Screening for Chronic Hepatitis B: Implications for False-Negative Results

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Central Diagnostic Laboratory and Research Center, Nepal

Aims: According to the WHO, an estimated 296 million individuals worldwide were living with chronic hepatitis B virus (HBV) infection in 2019, making it a significant public health challenge. Hepatocellular carcinoma, hepatic decompensation, and liver cirrhosis are all more likely to occur in people with chronic hepatitis B (CHB). For BHV diagnosis, people think PCR is a more sophisticated, accurate, and sensitive test. PCR is often preferred over rapid tests for its accuracy; however, its limitations in detecting low viral loads may result in false-negative results. This study aims to demonstrate the limitations of PCR in HBV screening and diagnosis, emphasizing the need for complementary rapid testing or more advanced diagnostic techniques to minimize false-negative results.

Methods: Samples were taken from various clients at the central diagnostic laboratory and research center between January 2022 and January 2025. This was a cross-sectional observational study conducted at CDL. Samples were included if they tested positive for HBsAg using the HEPACARD Kit. After centrifugation[U1] of whole blood, plasma was used for HBsAg testing via a rapid diagnostic kit. Viral DNA was extracted from EDTA blood samples using the TRUPCR HBV viral load extraction kit. PCR was performed with 15 µL of master mix and 10 µL of template, including three standard controls for quantification.

[U1]

Results: Out of 450 samples that were positive in the rapid test, the sensitivity of the rapid kit was 0.5 ng/ml; among them, 45 percent were male, and the remaining were female. Mean age was 41 with minimum 17 to maximum 77 years old. Despite testing positive on the rapid test, only 13% of samples had a detectable viral load (>20 IU/mL) by PCR, indicating a low sensitivity of 13.11% for viral load detection in these cases. Here, the cut-off value is 33.5, which was the ct value, and FAM is the dye of the HBV gene. We dispatched the report, which included IU/ml, copies/ml, and log10, along with appropriate counseling. The mean values of results, copies/ml, and log 10 were 589.5 IU/ml, 3301.2, and 2.71, respectively.

Conclusions: PCR alone is insufficient for HBV screening and diagnosis. A combination of rapid tests and advanced molecular techniques is essential to prevent false-negative results and reduce transmission risk.

Keywords: HBV, PCR, CT Value

PE-22

The Values of Acoustic Radiation Force Impulse Elastography of Liver in Evaluating the Degree of Liver Fibrosis in Alcoholic Liver Disease

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Background: Alcoholic liver disease (ALD) is increasingly prevalent worldwide, with liver fibrosis (LF) being a crucial factor influencing treatment and prognosis. Acoustic radiation force impulse (ARFI) elastography is a novel, non-invasive method for assessing LF.

Aims: To evaluate the diagnostic accuracy of ARFI elastography in determining the degree of LF in ALD patients.

Methods: This prospective study included 40 male patients diagnosed with ALD at 103 Cam Khe Clinic from May 2021 to September 2024, following AASLD 2010 guidelines. Laboratory tests were conducted, liver stiffness was measured using ARFI elastography, and liver biopsy was graded according to the Metavir classification.

Results: 63% of patients were aged 45-60 years.

The mean shear wave velocity (SWV) measured by ARFI elastography was 2.8 ± 0.56 m/s (range: 0.85-4.43 m/s).

SWV significantly correlated with fibrosis stage.

The area under the ROC curve (AUROC) for diagnosing ≥ F2 and ≥ F3 fibrosis stages was 0.88 (95% CI: 0.75-0.96) and 0.9 (95% CI: 0.80-0.96), respectively.

The SWV cut-off values for diagnosing ≥ F2 and ≥ F3 were 1.97 m/s (Se 79.25%, Sp 88.43%, PPV 85.5%, NPV 82.3%) and 2.32 m/s (Se 96.67%, Sp 86.57%, PPV 72.6%, NPV 97.6%), respectively.

The aspartate aminotransferase-to-platelet ratio index (APRI) also correlated with fibrosis stage, with AUROCs of 0.81 and 0.79 for ≥ F2 and ≥ F3, respectively.

The APRI cut-off values for diagnosing ≥ F2 and ≥ F3 were 0.62 (Se 51.2%, Sp 86.13%, PPV 71.5%, NPV 69.1%) and 1.161 (Se 42%, Sp 96.53%, PPV 81%, NPV 83.2%), respectively.

Conclusions: Increasing SWV correlates with higher degrees of liver fibrosis. ARFI elastography is a non-invasive, reliable, and reproducible diagnostic tool for assessing LF in ALD patients.

Keywords: Acoustic Radiation Force Impulse Elastography, Liver Fibrosis, Alcoholic Liver Disease

PE-23

Biliary Stents: Ultrasound Monitoring of Biodegradable Stents in the Treatment of Benign Strictures

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Aims: Postoperative and post-transplant benign biliary strictures represent a significant clinical challenge. Percutaneous methods are effective, however, the need for prolonged drainage (over 7 months) negatively impacts the quality of life. Biodegradable stents offer an alternative, but the important fact is they are not radiopaque, which complicates visual monitoring. The purpose of this study is to evaluate the effectiveness of ultrasound monitoring for biodegradable stents.

Methods: A retrospective analysis was conducted on 4 patients with benign biliary strictures who received ELLA biodegradable biliary stents following previous balloon dilation of benign strictures of biliary anastomoses under fluoroscopic control. After placement, ultrasound monitoring was performed to assess the stent's location, degree of expansion, presence of migration, patency of the bile ducts, resolution of the stricture, and signs of complications (inflammation, occlusion). Radiographic studies were utilized to visualize the radiopaque markers at the ends of the stent.

Results: Ultrasound examination accurately determined the location of biodegradable stents, assessed their degree of expansion, and monitored the dynamics of stricture resolution. Ultrasound effectively detected signs of stent migration, biliary duct obstruction, and complications development. Patients with biodegradable stents reported significant improvement in quality of life compared to those with prolonged drainage.

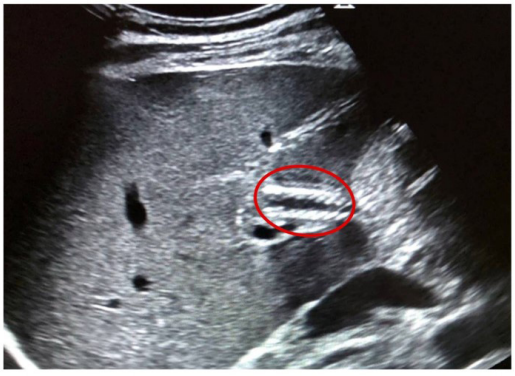
Conclusions: Ultrasound has proven to be a reliable method for visual monitoring of biodegradable biliary stents after placement. It allows for timely detection of complications and evaluation of treatment efficacy, thereby enhancing the quality of life for patients with benign biliary strictures. The use of biodegradable stents

followed by ultrasound monitoring represents a promising approach to managing this pathology.

Keywords: Biliary Stents, Ultrasound Monitoring, Biodegradable Stents, Benign Strictures, Quality of Life

Placement of a biodegradable stent in a benign stricture of the bile duct

The stent is not radiopaque, so only two radiopaque markers (circled in red) are visible on the X-ray, indicating the start and end of the stent.



Good visualization of the stent on ultrasound. Monitoring the position of the stent (circled in red), degree of its expansion, etc., using ultrasound

PE-24

The Role of Radiogenomics in Early-Stage Liver Cancer Screening

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Aims: Liver cancer often presents at advanced stages, reducing survival rates. Early detection is critical, and radiogenomics offers a promising approach by integrating imaging and genomic data to improve diagnostic accuracy and enable personalized screening. This study evaluates the diagnostic performance, cost-effectiveness, and key variables influencing the success of radiogenomic models in early-stage liver cancer screening.

Methods: A cross-sectional study utilized systematic review data from peer-reviewed journals published between 2015 and 2024. Key metrics included sensitivity, specificity, and area under the receiver operating characteristic (ROC) curve (AUC). Independent variables were radiogenomic features (e.g., tumor heterogeneity, vascular patterns) and genomic alterations (e.g., TP53 mutations). Control variables included age, gender, hepatitis B/C status, and tracer pricing. Multivariate regression and cost-effectiveness analyses assessed diagnostic accuracy and economic viability.

Results: Radiogenomic models achieved an AUC of 0.92, outperforming traditional methods (0.78). Sensitivity and specificity were 85% and 80%, respectively. Tumor heterogeneity had the highest predictive value (AUC +0.12, $p<0.01$), followed by vascular patterns (+0.08, $p<0.05$). Hepatitis B/C status significantly enhanced accuracy (+0.15, $p<0.01$). Cost-effectiveness analysis showed radiogenomics was highly cost-effective in high-income countries (ICER: $15,000/QALY) but marginally cost-effective in LMICs (ICER: $20,000/QALY), where tracer costs posed barriers.

Conclusions: Radiogenomics is a highly accurate and cost-effective tool for early-stage liver cancer screening, particularly in high-income settings. Tumor heterogeneity and vascular patterns are key contributors to its

success, while reducing tracer costs could enhance its feasibility in LMICs. Radiogenomics represents a transformative approach to improving early detection and patient outcomes.

Keywords: Radiogenomics, Cost-Effectiveness, Diagnostic Accuracy, Genomic Biomarkers

Metric	Radiogenomic Models	Traditional Screening	
Sensitivity (%)	85	70	
Specificity (%)	80	65	
AUC	0.92	0.78	
Region	**ICER ($/QALY)**	**Threshold ($/QALY)**	**Cost-Effectiveness**
High-Income Countries	15000	50000	Highly Cost-Effective
Low- and Middle-Income Countries (LMICs)	20000	20000	Marginally Cost-Effective
Variable	**Impact on Early Detection (AUC)**	**P-Value**	
Tumor Heterogeneity	0.12	<0.01	
Vascular Patterns	0.08	<0.05	
Hepatitis B/C Status	0.15	<0.01	
Tracer Pricing	-0.05	<0.05	

PE-25

Optimizing Preoperative Evaluation in Cholelithiasis: The Role of Ultrasonography and UGI Scopy in Reducing Post-Cholecystectomy Syndrome

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Aims: Ultrasonography (USG) is the gold standard for diagnosing cholelithiasis, providing a non-invasive, real-time assessment of gallstones, biliary sludge, and anatomical variations. However, USG alone may not detect coexisting upper gastrointestinal (UGI) disorders, which can contribute to post-cholecystectomy syndrome (PCS)—a persistent challenge in gallbladder surgery. This study explores the role of preoperative USG combined with UGI endoscopy (UGI scopy) in optimizing surgical outcomes and minimizing PCS incidence.

Methods: A prospective study was conducted on 40 patients with symptomatic cholelithiasis, all confirmed via high-resolution USG. Patients were divided into:

Group A (Test Group, n=20): Underwent both USG and preoperative UGI scopy.

Group B (Control Group, n=20): Evaluated with USG alone, followed by direct cholecystectomy.

Key parameters analyzed included USG findings, endoscopic abnormalities, and postoperative PCS symptoms, assessed via a Likert Scale over three weeks.

Results: USG Findings: All patients had gallstones, while no direct indicators of upper GI disorders were visible on USG.

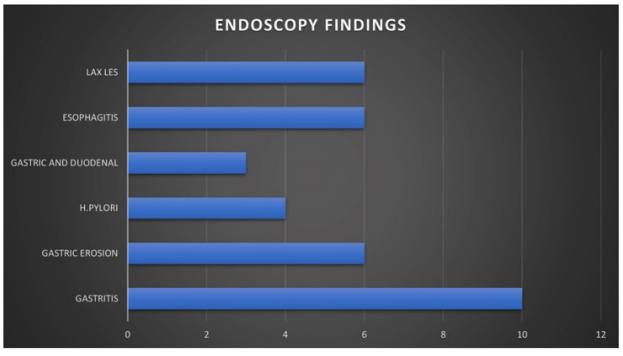
Endoscopic Findings (Group A): Gastritis (50%), gastric erosions (40%), lax LES & esophagitis (30%), and H. pylori (20%)—all undetectable via USG.

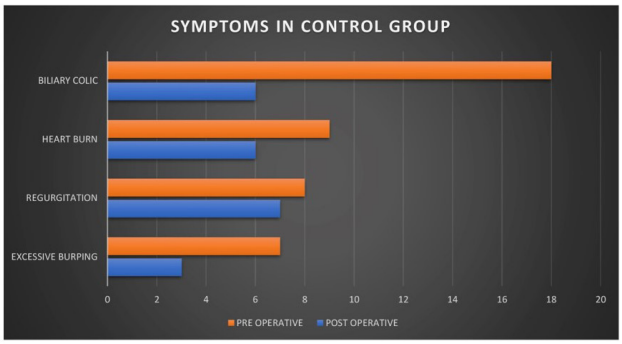
PCS Incidence:
Group A (USG + UGI Scopy): Significantly lower PCS symptoms, with only 10% experiencing severe pain (Likert ≥3).

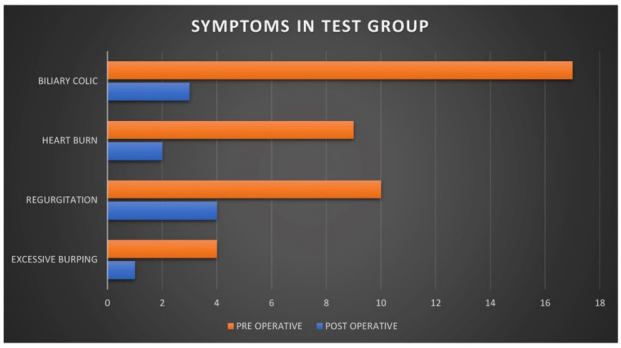
Group B (USG Alone): Higher PCS burden, with 55% reporting severe pain (Likert ≥3), alongside increased regurgitation and biliary colic.

Conclusions: While USG remains the cornerstone of cholelithiasis diagnosis, it does not identify occult UGI pathologies that may exacerbate PCS. Integrating preoperative UGI scopy with USG enhances risk stratification, reduces postoperative complications, and improves patient outcomes. This study advocates for a paradigm shift in cholelithiasis management—moving from a USG-only approach to a comprehensive USG + UGI scopy strategy for superior surgical planning and recovery.

Keywords: Ultrasonography in Post-Cholecystectomy Syndrome







PE-26

A Systematic Review and Meta-Analysis on Diagnosing Presumed Malignant Biliary Obstruction: Comparing ERCP and EUS-FNA

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Aims: Obstructive jaundice is commonly caused by biliary stones or neoplasms. While endoscopic retrograde cholangiopancreatography (ERCP) is traditionally considered the gold standard for diagnosing malignant biliary obstruction, endoscopic ultrasound-guided fine needle aspiration (EUS-FNA) has emerged as an alternative. This study aims to compare the diagnostic sensitivity of ERCP and EUS-FNA in patients with suspected malignant biliary obstruction.

Methods: A comprehensive literature search was conducted across databases including PUBMED, EMBASE, EBSCO, PROQUEST, snowballing, Global Index Medicus, GARUDA, SINTA, and various Indonesian university repositories, covering publications up to January 31, 2024.

Results: Five studies met the inclusion criteria for analysis. Using Review Manager 5.4.1, the pooled sensitivity of ERCP in diagnosing malignant biliary obstruction was found to be 62.2% [95% CI: 57.7–74.7%], while EUS-FNA demonstrated a higher sensitivity of 86.7% [95% CI: 72.5–89.4%].

Conclusions: EUS-FNA demonstrates superior sensitivity compared to ERCP in detecting malignancies responsible for obstructive jaundice

Keywords: EUS-FNA, Malignant Biliary Obstruction

PE-27

Mapping the Future of Liver Cancer Detection: How Machine Learning Is Transforming Ultrasound Diagnostics

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Aims: Hepatocellular carcinoma (HCC), a predominant form of liver cancer, continues to be a major global cause of cancer-related deaths. Recent progress in machine learning (ML) and artificial intelligence (AI) has significantly enhanced ultrasound imaging, a key diagnostic tool for liver cancer. This study presents a bibliometric review of publications from 2020 to 2025, analyzing research trends, focal areas, and emerging developments in ML-driven ultrasound for liver cancer detection.

Methods: Using Scopus, 134 relevant articles were extracted and analyzed with VOSviewer 1.6.19 to visualize research networks, keyword co-occurrence, and collaboration patterns.

Results: Key research clusters included "deep learning," "machine learning," and "AI applications in ultrasound diagnostics," with notable subfields like "contrast-enhanced ultrasound" and "convolutional neural networks" (CNNs). ML integration has improved feature extraction, tumor classification, and computer-aided diagnosis, while recurrence prediction and prognostic evaluation have gained traction. CNNs and ensemble learning models have shown particular promise in boosting diagnostic accuracy.

Conclusions: The findings highlight increasing interest in AI-enhanced ultrasound for liver cancer, with a focus on automated detection, classification, and outcome prediction. Future research should prioritize standardization, clinical validation, and practical implementation

of ML-based ultrasound tools for HCC. This study maps the current advancements and identifies critical areas for further investigation in AI-powered liver cancer diagnostics.

Keywords: Liver Cancer Diagnosis, Artificial Intelligence (AI), Ultrasound Imaging, Bibliometric Analysis

PE-28

Chronic Hepatitis B Virus Cannot Be Adequately Treated with a DNA-Directed PCR Result

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Aims: Hepatitis B virus (HBV) infection is a global public health problem that concerns 350 million people worldwide. Individuals with chronic hepatitis B (CHB) are at increased risk of developing liver cirrhosis, hepatic decompensation, and hepatocellular carcinoma. To maintain an undetectable viral load reduces chronic infection complications. There is no treatment that eradicates HBV infection. In DNA-guided hepatitis B treatment, viral load is insufficient, and requires other viral markers for treatment of hepatitis B patients. Current guidelines try to standardize the clinical practice. Nevertheless, controversy remains about the management of asymptomatic patients with CHB. We discuss in detail why DNA level alone is not sufficient to begin treatment of CHB.

Methods: The sample was collected at the central diagnostic laboratory from different clients from January 2022 to January 2025. Initially, a rapid test was done by using a rapid kit (HBsAg); after that, an EDTA sample was extracted by using an HBV viral load extraction kit (TRUPCR). Then it was run in the BIORAD CFX96 Real-Time PCR machine using 15 microliters of master mix and 10 microliters of template with at least 3 standards. We had run using TRUPCR, DIAGSURE, SENSURE reagent

Results: Out of 450 samples, 45 percent were male and the remaining were female. Even though rapid tests were positive, out of them, 13% showed a viral load greater than 20 IU/ml. Here, the cut-off value is 33.5, and FAM is the dye of the HBV gene. The report was dispatched with IU/ml, copies/ml, and log10, as well as proper counseling. The mean values of results, copies/ml, and log 10 were 589.5 IU/ml, 3301.2, and 2.71, respectively.

Conclusions: We had found that even those who were positive in the rapid test could give <20 IU/ml, and using different reagents gives slightly different results. Only rapid tests as well as PCR methods were not sufficient for proper screening, diagnosis, and prognosis; we require more advanced diagnostic tools for that purpose, or we have to use both tests hand in hand.

Keywords: Hepatitis B Virus, Biorad CFX96 Real-Time PCR, TRUPCR

PE-29

Spontaneous Rupture of Hepatocellular Carcinoma Presenting with Hemoperitoneum: A Case Highlighting the Diagnostic Role of Point-of-Care Ultrasound

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Aims: Spontaneous rupture of hepatocellular carcinoma (HCC) is a rare but life-threatening condition. Early diagnosis is essential for appropriate management. This case underscores the diagnostic utility of point-of-care ultrasound (POCUS) in the emergency setting.

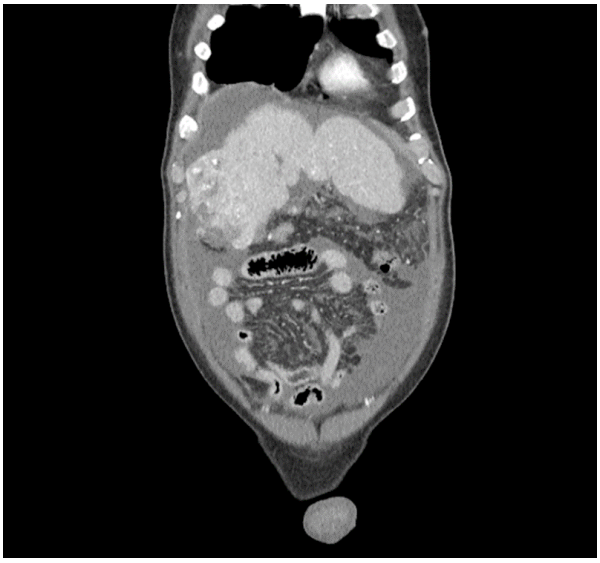
Methods: A 54-year-old male with no known history of liver disease presented to the emergency department with sudden-onset abdominal pain beginning the night before, accompanied by abdominal distension and absence of flatus. Initial evaluation at a local clinic raised suspicion for an intra-abdominal pathology, and he was referred to a tertiary care center. On arrival, the patient was hemodynamically stable. POCUS revealed a heterogeneous hepatic mass in the right lobe measuring approximately 4.5 cm, with surrounding anechoic free fluid suggestive of hemoperitoneum. A contrast-enhanced abdominal CT scan confirmed active intra-abdominal bleeding and a ruptured hepatic mass consistent with HCC. The patient was promptly admitted to the intensive

care unit for further management and interventional planning.

Results: Ruptured HCC can present as acute abdomen and is associated with high mortality. While CT remains the diagnostic gold standard, POCUS enables rapid bedside identification of intraperitoneal fluid and hepatic lesions, which is crucial for timely triage and intervention. Notably, the absence of prior liver disease or cirrhosis in this patient highlights the importance of considering HCC rupture even in non-cirrhotic individuals.

Conclusions: This case emphasizes the critical role of POCUS in the early detection of hemoperitoneum and hepatic lesions suggestive of ruptured HCC. Early suspicion and immediate imaging can facilitate life-saving interventions.

Keywords: Hepatocellular Carcinoma, Spontaneous Rupture, Hemoperitoneum, Point-of-Care Ultrasound



PE-30

Prediction of Insulin Resistance Using Abdominal Ultrasound-Based Fat Parameters and Machine Learning Models

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Aims: Insulin resistance (IR) plays a central role in the pathogenesis of metabolic disorders. While abdominal fat distribution is closely associated with IR, the clinical utility of ultrasound-based fat parameters for predicting IR remains underexplored. To develop and evaluate prediction models for insulin resistance using abdominal ultrasound-derived fat measurements and machine learning algorithms.

Methods: We retrospectively analyzed clinical and ultrasound data from adult patients. Predictor variables included subcutaneous anterior fat, aortomesenteric fat (or anterior paraspinal fat), subperitoneal fat, perirenal fat, liver-to-kidney echogenicity ratio, subcutaneous lateral fat, lateral spine fat, age, and sex. IR was defined based on clinical criteria. We trained both logistic regression (with class-weight balancing) and XGBoost models. Perfor-

mance was evaluated on a stratified test set (20%) using accuracy and area under the ROC curve (AUC). Feature importance and directionality were assessed using model coefficients and SHAP values.

Results: The XGBoost model achieved an AUC of 0.83 and an accuracy of 0.86. The logistic regression model yielded comparable performance (AUC 0.83, accuracy 0.82) and allowed for coefficient-based interpretation. Subperitoneal fat, abdominal subcutaneous fat, and aortomesenteric fat were the top contributors to IR risk across both models. SHAP analysis confirmed these variables had strong positive impact on prediction. Variables such as age and subcutaneous lateral fat showed a modest inverse association with IR. The model was robust across different class imbalance handling techniques.

Conclusions: Abdominal ultrasound-based fat measurements can effectively predict insulin resistance, with subperitoneal and subcutaneous anterior fat being key contributors.

Keywords: Ultrasonography; Metabolic Syndrome; Insulin Resistance

PE-31

A Diagnostic Challenge: Eosinophilic Liver Abscess Mimicking Malignancy on Imaging

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Aims: Eosinophilic liver abscess (ELA) is a rare hepatic lesion associated with eosinophilia, parasitic infections, or allergic responses. Its imaging characteristics often resemble those of malignant liver tumors, making accurate diagnosis difficult. This case report aims to describe the multimodal imaging findings and diagnostic approach used to identify ELA.

Methods: A single patient presenting with epigastric pain underwent a series of diagnostic evaluations, including grayscale ultrasonography, contrast-enhanced ultrasound (CEUS) using Sonazoid, contrast-enhanced computed tomography (CT), magnetic resonance imaging (MRI), and positron emission tomography-computed tomography (PET-CT). Laboratory tests and parasitic serologies were also performed. Final diagnosis was established by histopathological examination following surgical

Results: Initial ultrasound revealed a 2.5 cm hypoechoic lesion with well-defined borders in hepatic segment 5. CEUS showed rim enhancement in the arterial and portal phases and hypo-enhancement in delayed and Kupffer phases, suggestive of malignancy. CT presented a hypodense lesion with peripheral enhancement and a target-like appearance. MRI revealed peripheral enhancement and restricted diffusion. PET-CT indicated a hypermetabolic lesion (SUVmax 3.7; delayed SUVmax 5.8) and a metabolically active portocaval lymph node. However, blood tests showed significant eosinophilia (14.8%, 1,000/μL), and Clonorchis sinensis serology was positive. Surgical resection was performed due to diagnostic uncertainty, and histopathology confirmed ELA.

Conclusions: This case highlights the diagnostic complexity of ELA, which can mimic hepatic malignancy on imaging. Despite advanced imaging modalities, histological confirmation remains the gold standard. Clinicians should consider ELA in the differential diagnosis of hepatic lesions, particularly in the presence of eosinophilia and parasitic exposure, to guide appropriate management.

Keywords: Eosinophilic Liver Abscess, Malignancy, Imaging

PE-32

Head-to-Head Comparison of EUS and MRCP in Uncovering the Diagnostic of Malignant Obstructive Jaundice: A Comprehensive Meta-Analysis

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Aims: Malignant biliary obstruction is a common cause of obstructive jaundice and presents notable diagnostic challenges. Non-invasive imaging modalities such as endoscopic ultrasonography (EUS) and magnetic resonance

cholangiopancreatography (MRCP) are frequently utilized for evaluation. However, the comparative diagnostic effectiveness of EUS versus MRCP in identifying malignancy remains uncertain. This systematic review and meta-analysis aimed to compare the diagnostic performance of these two modalities.

Methods: A systematic search of PubMed, Embase, Scopus, and the Cochrane Library was conducted for relevant studies published up to December 2024. Studies comparing the diagnostic accuracy of EUS and MRCP in patients with suspected malignant biliary obstruction were included. Data were synthesized to calculate pooled sensitivity, specificity, positive likelihood ratio (PLR), and negative likelihood ratio (NLR). Heterogeneity was evaluated using the I^2 statistic, and data analysis was performed with Review Manager 5.4.1.

Results: Eight studies met the inclusion criteria. EUS demonstrated a pooled sensitivity of 93.1% (95% CI: 89.6%–95.3%) and specificity of 88.4% (95% CI: 85.5%–93.2%), while MRCP showed lower sensitivity (83.5%, 95% CI: 80.3%–89.7%) and specificity (83.4%, 95% CI: 78.8%–87.0%). The PLR for EUS was 8.87, compared to 5.06 for MRCP. EUS also yielded a lower NLR (0.07) than MRCP (0.16), indicating better rule-out capability. Moderate heterogeneity was noted across studies (I^2 = 42.8%).

Conclusions: EUS outperforms MRCP in diagnostic accuracy for detecting malignant causes of obstructive jaundice, offering higher sensitivity and specificity. EUS may serve as the preferred diagnostic approach, particularly in cases with inconclusive MRCP results. Nonetheless, selection should be individualized based on clinical context, available resources, and operator expertise. Further prospective studies are warranted to strengthen these findings.

Keywords: Endoscopic Ultrasonography, Magnetic Resonance Cholangiopancreatography, Obstructive Jaundice

PE-33

Enhancing Predictive Accuracy of Biliary Drainage Outcomes Using Machine Learning-Augmented Endoscopic Ultrasound in Malignant Biliary Obstruction: A Retrospective Insight

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Aims: Malignant biliary obstruction (MBO), commonly caused by hepatopancreatobiliary malignancies, often requires timely biliary drainage to alleviate symptoms and prevent complications. Endoscopic ultrasound (EUS) has become essential for both diagnosis and therapeutic intervention. This study explores the added value of integrating machine learning (ML) with EUS to predict the likelihood of successful biliary drainage, aiming to improve clinical decision-making in MBO management.

Methods: A retrospective analysis was conducted on 90 patients with MBO who underwent EUS-guided biliary drainage between 2021 and 2023. Clinical, imaging, and procedural variables were collected. Three ML models—logistic regression, random forest, and neural networks—were developed using 70% of the dataset for training and 30% for validation. Successful drainage was defined as a bilirubin reduction exceeding 50% within seven days. Model performance was evaluated using the area under the curve (AUC), and key predictors were identified through statistical analysis.

Results: Of the 90 patients, 72 (80%) achieved successful biliary drainage. The random forest model demonstrated the highest predictive performance (AUC = 0.89; 95% CI: 0.82–0.95), outperforming logistic regression (AUC = 0.79) and neural networks (AUC = 0.84). Significant predictors of success included tumor size (OR: 1.45), stent placement (OR: 2.12), and baseline bilirubin levels (OR: 1.28). Patients with successful drainage experienced fewer complications (15% vs. 32%, p=0.03). Notably, the random forest model was associated with a 20% reduction in procedural complications compared to traditional approaches.

Conclusions: Machine learning-enhanced EUS, particularly utilizing the random forest algorithm, offers robust predictive capability for biliary drainage success in MBO patients. These findings support the integration of ML tools into routine practice to optimize therapeutic outcomes and minimize procedure-related risks.

Keywords: Endoscopic Ultrasound, Machine Learning, Malignant Biliary Obstruction, Biliary Drainage

PE-34

Predictors of Mortality in Liver Cirrhosis Patients with Spontaneous Bacterial Peritonitis

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Aims: This study aimed to investigate the initial treatment response and mortality of spontaneous bacterial peritonitis (SBP) in cirrhotic patients.

Methods: Data were retrospectively reviewed for patients with liver cirrhosis who were admitted for treatment of SBP at Jeonbuk National University Hospital from January 2004 to December 2020. SBP was defined as a case where the PMN count was ≥250/mm^3 in fluid obtained via ultrasound-guided paracentesis. Sarcopenia was measured using the skeletal muscle index at the third lumbar vertebra and defined as the lowest quintile.

Results: A total of 137 patients were enrolled in the study, with sarcopenia cut-off values set at 35.82 for men and 30.49 for women. In the demographic and baseline characteristics, there were no statistically significant differences related to the presence of sarcopenia, except for hemoglobin levels. Clinical outcomes were compared based on the presence of sarcopenia, revealing no difference in treatment response according to sarcopenia status. While there were no significant differences in short-term mortality rates at 7 and 30 days, the sarcopenia group exhibited statistically significant higher mortality rates at 3 months, 6 months, 12 months, and in-hospital. Additionally, we conducted a Cox regression analysis on 6-month survival, identifying four significant predictors of mortality in the multivariate analysis: acquisition type (nosocomial vs. community-acquired), CTP grade C versus B, treatment failure, and sarcopenia, with sarcopenia showing an odds ratio of 7.647 (95% CI 1.231-47.501, p=0.029). In the Kaplan-Meier survival curve, we observed that survival was significantly differentiated by the four major predictors of mortality, as evidenced by p-values from the log-rank test.

Conclusions: Sarcopenia, nosocomial infection, CTP grade C, and treatment failure were statistically significant factors influencing prognosis after SBP treatment.

Keywords: Sarcopenia, Peritonitis, Prognosis

PE-35

Impact of Sono-Guided Percutaneous Catheter Drainage on Hospital Stay and Mortality in Pyogenic Liver Abscess Patients

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Aims: We aimed to investigate the factors associated with prolonged hospital stay and mortality among patients with pyogenic liver abscess (PLA) who underwent sono-guided percutaneous drainage (PCD).

Methods: We retrospectively reviewed data from PLA patients admitted from 2005 to 2018 at three tertiary hospitals in Jeonbuk province. We selected patients who underwent sono-guided PCD during the admission period and early PCD was defined whether the procedure was done within 3 days of admission.

Results: Among 655 patients diagnosed with PLA, 366 patients who underwent PCD were enrolled for the study. The patients had a mean age of 65.5 ± 14.7 years, and mean maximal diameter of the hepatic abscess was 6.1 ± 2.6 cm and 71.9% of the lesion was single. Next, two groups were divided depending on the time period of PCD and 269 patients (73.5%) underwent PCD within 3 days of hospitalization. In baseline characteristics, early PCD group was significantly higher in the number of abscess as well as the maximal abscess diameter. However, hospitalization period was significantly lower in the early PCD group though in-hospital mortality was not different. We checked laboratory results at 1 week after the admission and CRP levels were significantly lower in the early PCD group. We further analyzed the factors related to the long-term hospitalization more than 14 days. In multivariate analysis, underlying diabetes, lower

albumin levels, and PCD inserted after 3 days of admission were independent factors associated with prolonged hospital stay.

Conclusions: Early sono-guided PCD facilitated improvement of inflammatory laboratory markers and shortened the hospital stay. Early PCD may be beneficial in patients with PLA.

Keywords: Liver Abscess, Pyogenic, Drainage, Prognosis

PE-36

Risk Factors for Hepatic Decompensation after Surgical Resection in Patients with Hepatocellular Carcinoma

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Aims: Indocyanine green (ICG) clearance test is commonly used for assessment of preoperative risk, and the degree of liver fibrosis might be associated with preoperative liver function. The aim of study was to evaluate the risk factors for postoperative hepatic decompensation in patients with HCC.

Methods: A total of 62 patients with HCC who performed ICG retention rate at 15 minutes (R15) and fibroscan before surgery, and underwent surgical resection between April 2007 and August 2021 were retrospectively enrolled. The clinical characteristics, laboratory data, the result of ICG R15 test, and non-invasive fibrosis markers [aspartate aminotransferase to platelet ratio index (APRI), FIB-4 index, and liver stiffness measurement (LSM) on fibroscan] were analyzed for the risk factors of postoperative or persistent hepatic decompensation after surgery.

Results: There was a significant correlation between the results of ICG R15 test and LSM at baseline (r=0.498, p<0.001). Postoperative hepatic decompensation was present in 25.8% (16/62) and persistent decompensation at 3 months after surgery was present in 4.8% (3/62) of patients. In the univariate analysis, LSM [odds ratio (OR): 1.05 (1.01-1.09), p=0.025], AST [OR: 1.03 (1.00-1.05), p=0.047], albumin [OR: 0.05 (0.01-0.37), p=0.004], platelet count [OR: 0.99 (0.98-0.99), p=0.031], FIB-4 index [OR: 1.80 (1.15-2.83), p=0.010], and APRI [OR: 9.18 (1.98-42.59), p=0.005] were risk factors for postoperative decompensation. In the multivariate analysis, albumin [OR:0.06 (0.004-0.846), p=0.037] was an independent risk factor for postoperative decompensation. In the univariate analysis, LSM [OR: 1.06 (1.01-1.12), p=0.011], AST [OR: 1.04 (1.00-1.09), p=0.048], and APRI [OR: 5.57 (1.09-28.31), p=0.039] were risk factors for persistent decompensation. In the multivariate analysis, LSM [OR:1.06 (1.00-1.13), p=0.035] was an independent risk factor for persistent decompensation.

Conclusions: Although the results of preoperative ICG R15 are suitable for surgery, careful decision about whether or not to perform surgery may be needed in patients with high preoperative LSM.

Keywords: Hepatocellular Carcinoma, Hepatic Decompensation, Liver Stiffness Measurement

PE-37

The Role of Point-of-Care Ultrasound (POCUS) in Detecting Early-Stage Liver Disease: A Systematic Review

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Aims: Point-of-Care Ultrasound (POCUS) is increasingly used for early detection of liver diseases, including fibrosis, steatosis, and cirrhosis. Compared to conventional imaging, POCUS offers a rapid, non-invasive, and cost-effective diagnostic approach. This systematic review evaluates the accuracy, clinical applications, and effectiveness of POCUS in early liver disease detection.

Methods: A systematic search was conducted in PubMed, Scopus, and Web of Science, selecting articles published from 2015 to February 2025. Studies included randomized controlled trials (RCTs) and observational studies assessing POCUS for liver disease diagnosis. A total of 10 studies met the inclusion criteria, covering a diverse population of adults at risk for liver disease. Data extraction and quality assessment were performed inde-

pendently using the JBI Critical Appraisal Checklist.

Results: A total of 10 studies met the inclusion criteria, covering a diverse population of adults at risk for liver disease. The review found that POCUS has a sensitivity range of 78%-95% and a specificity of 80%-98% for detecting early-stage liver fibrosis and steatosis. Five studies highlighted its advantages over traditional ultrasound, particularly in bedside assessments. Four studies demonstrated that integrating POCUS into routine liver disease screening improved early detection rates and patient outcomes. However, challenges such as operator dependency and variability in interpretation remain.

Conclusions: POCUS is a promising tool for the early diagnosis of liver diseases, offering high accuracy and ease of use in clinical settings. Further research should focus on standardization, training protocols, and validation against advanced imaging techniques. Its widespread implementation, particularly in primary care and resource-limited settings, could significantly improve liver disease management.

Keywords: Point-Of-Care Ultrasound, Liver Disease, Early Detection, Systematic Review

Title of Systematic Review Table:
Summary of Studies on Point-of-Care Ultrasound (POCUS) for Early Liver Disease Detection

Author(s) & Year	Title	Population	Intervention	Outcomes	Review Summary
Smith et al., 2016	POCUS for Early Liver Fibrosis Detection	500 adults with liver disease risk	POCUS vs. biopsy	Sensitivity: 89%, Specificity: 92%	POCUS highly effective for early fibrosis detection
Lee et al., 2017	Comparing POCUS with MRI for Liver Steatosis	350 NAFLD patients	POCUS vs. MRI	Sensitivity: 85%, Specificity: 90%	POCUS comparable to MRI but more accessible
Kim et al., 2018	POCUS for Cirrhosis Screening	400 patients with chronic hepatitis	POCUS vs. elastography	Sensitivity: 78%, Specificity: 85%	Effective but operator-dependent
Johnson et al., 2019	POCUS in Primary Care Liver Screening	200 high-risk individuals	POCUS as a routine screening tool	Early detection improved	Recommended for primary care use
Wang et al., 2020	Diagnostic Accuracy of POCUS vs. Standard Ultrasound	250 liver disease patients	POCUS vs. standard US	Sensitivity: 91%, Specificity: 94%	POCUS superior in rapid diagnosis
Patel et al., 2021	Point-of-Care Liver Imaging in Emergency Settings	180 ER patients with abnormal LFTs	POCUS vs. CT scan	Early identification improved	Useful in emergency settings
Tanaka et al., 2022	POCUS for Fatty Liver Detection	300 diabetic patients	POCUS vs. biopsy	Sensitivity: 92%, Specificity: 95%	High accuracy for fatty liver screening
Rossi et al., 2023	Liver Fibrosis Monitoring Using POCUS	250 cirrhosis patients	Serial POCUS monitoring	Progression tracking improved	Valuable for follow-up assessments
Almeida et al., 2024	Training General Practitioners in POCUS	120 primary care physicians	POCUS training program	Increased diagnostic confidence	Training improves accuracy
Hassan et al., 2025	POCUS vs. Liver Elastography in Fibrosis Detection	270 hepatitis B patients	POCUS vs. elastography	Sensitivity: 88%, Specificity: 96%	POCUS effective but requires skill

PE-38

Primary Hepatic Amyloidosis with Kappa Light Chain Involvement: A Rare Case of Multisystemic Involvement with Poor Prognosis

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Aims: Amyloidosis is a systemic disorder characterized by extracellular deposition of misfolded proteins produced in excess, mainly in the bone marrow. While the heart and kidneys are the most commonly affected organs, hepatic involvement is reported in approximately 9% of cases. Primary amyloidosis is classified based on light chain (AL), serum amyloid A (AA), transthyretin (ATTR), and apolipoprotein A1 (ApoA1). Among these, AL amyloidosis with kappa light chain predominance is relatively rare. This case presents a patient diagnosed with kappa-type hepatic amyloidosis who progressed rapidly with multisystem involvement.

Methods: An 84-year-old man presented with abnormal liver function tests (AST 92 IU/L, ALT 98 IU/L, ALP 994 IU/L, GGT 1170 IU/L, total bilirubin 1.47 mg/dL). Viral and autoimmune hepatitis panels were negative. He had a history of diabetes mellitus and right nephrectomy for renal cell carcinoma 20 years ago. Imaging studies showed mild hepatomegaly with fatty liver, without splenomegaly or parenchymal surface nodularity. Fibroscan revealed severe hepatic stiffness (61.9 kPa), but contrast-enhanced CT and MRI were not performed due to impaired renal function (Cr 2.09 mg/dL, GFR 30.5 mL/min). Liver biopsy was performed for further evaluation.

Results: Congo red staining revealed apple-green birefringence under polarized light, consistent with amyloidosis. Immunohistochemistry showed predominance of kappa light chain. Additional workup demonstrated cardiac involvement on echocardiography and bone marrow infiltration on biopsy. Multiple nodular opacities were also noted in both lungs, although lung biopsy was not performed. The patient was treated with bortezomib and dexamethasone. Although transient improvement was observed in ALP/

GGT and kappa/lambda ratio, his condition deteriorated due to heart failure, pleural effusions, and poor oral intake. After 4 months, the patient and family declined further chemotherapy, and he was referred to hospice care.

Conclusions: Hepatic involvement in amyloidosis occurs in approximately 9% of cases and is often associated with poor prognosis, particularly in the presence of multisystemic infiltration. Primary hepatic amyloidosis with kappa light chain is uncommon, and few clinical cases have been reported. The average survival for untreated hepatic amyloidosis is 8–9 months, with 5-year survival rates as low as 13–17%. While treatments such as melphalan, dexamethasone, or autologous stem cell transplantation are available, their efficacy remains limited, especially in elderly patients or those with organ dysfunction. In this case, extensive systemic involvement including the heart and bone marrow contributed to a rapidly progressive clinical course. Clinicians should consider systemic amyloidosis in patients with unexplained liver dysfunction and promptly evaluate for multi-organ involvement.

Keywords: Amyloidosis, Immunoglobulin Light-Chain Amyloidosis, Plasma Cells

PE-39

A Case of Intrahepatic Cholangiocarcinoma Diagnosed at the Same Site after 5 Years Who Treated for Liver Abscess

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Aims: Cholangitis and liver abscesses are typically benign and self-limited conditions, but repeated episodes may obscure underlying malignancies. We report a case of intrahepatic cholangiocarcinoma (iCCA) that was initially misinterpreted as recurrent liver abscess, highlighting the importance of imaging surveillance in patients with a history of recurrent biliary infections.

Methods: A 69-year-old man with a history of hypertension, pulmonary tuberculosis, smoking, alcohol use, and cholecystectomy due to cholecystitis in 2018 was followed for recurrent liver abscesses. In 2018 and 2019, he presented with cholangitis complicated by hepatic abscesses, managed with antibiotics and biliary drainage. In January 2023, he revisited with epigastric pain and was treated with ERCP and endoscopic biliary stenting (ERBD). In August 2023, he presented with new-onset right upper quadrant pain.

Results: Abdominal CT at the emergency department revealed a suspected recurrent liver abscess at segment 6 (S6), the same site as the previous lesion. Ultrasonography demonstrated a 5 cm-sized hyperechoic lobulated mass with a peripheral hypoechoic rim in S6, accompanied by right intrahepatic duct dilatation. The sonographic features raised suspicion for malignancy rather than abscess. Ultrasound-guided liver biopsy was performed, and histopathology confirmed intrahepatic cholangiocarcinoma.

Conclusions: This case emphasizes the need for continued vigilance and repeat imaging in patients with recurrent cholangitis or liver abscess. While hepatic abscesses are often benign, atypical imaging findings should prompt consideration of malignancy. Ultrasonography, in particular, can provide crucial clues for early cancer detection, especially when CT findings are inconclusive.

Keywords: Cholangiocarcinoma, Liver Abscess, Cholangitis

PE-40

Magnetic Resonance Imaging Improves Stratification of Fibrosis and Steatosis in Patients with Chronic Liver Disease

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Aims: We aimed to compare the diagnostic accuracy of magnetic resonance imaging (MRI) and transient elastography (TE) in assessing liver fibrosis and steatosis in patients with chronic liver disease (CLD).

Methods: Patients who underwent liver biopsy or liver surgery at two academic hospitals between 2017 and 2021 were retrospectively recruited. The stages of liver fibrosis and steatosis were evaluated using histologic examination. Liver stiffness (LS) was assessed using MR elastography (LSMRE) and TE (LSTE). Liver steatosis was assessed using proton density fat fraction (PDFF) and controlled attenuation parameter (CAP).

Results: The mean age of the study population (n = 280) was 53.6 years and male sex predominated (n = 199, 71.1%). Nonalcoholic fatty liver disease was the most prevalent (n = 127, 45.5%), followed by hepatitis B virus (n = 112, 40.0%). Hepatocellular carcinoma was identified in 130 patients (46.4%). The proportions of F0, F1, F2, F3, and F4 fibrosis were 13.2%, 31.1%, 9.6%, 16.4%, and 29.7%, respectively. LSMRE had a significantly greater AUROC value than LSTE for detecting F2-F4 (0.846 vs. 0.781, p=0.046), whereas LSMRE and LSTE similarly predicted F1-4, F3-4, and F4 (all P > 0.05). The proportions of S0, S1, S2, and S3 steatosis were 34.7%, 49.6%, 12.5%, and 3.2%, respectively. PDFF had significantly greater AUROC values than CAP in predicting S1-3 (0.922 vs. 0.806, p<0.001) and S2-3 (0.924 vs. 0.795, p=0.005); however, PDFF and CAP similarly predicted S3 (p=0.086).

Conclusions: MRI exhibited significantly higher diagnostic accuracy than TE for detecting significant fibrosis and mild or moderate steatosis in patients with CLD.

Keywords: Vibration-Controlled Transient Elastography, Controlled Attenuation Parameter, Mr Elastography, Proton Density Fat Fraction

PE-41

Non-Invasive Prediction of Post-Sustained Virological Response Hepatocellular Carcinoma in Hepatitis C Virus: A Systematic Review and Meta-Analysis

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Aims: Despite advances in antiviral therapy for hepatitis C virus (HCV) infection, hepatocellular carcinoma (HCC) still develops even after sustained viral response (SVR) in patients with advanced liver fibrosis or cirrhosis. This meta-analysis investigated the predictive performance of vibration-controlled transient elastography (VCTE) and fibrosis 4-index (FIB-4) for the development of HCC after SVR.

Methods: We searched PubMed, MEDLINE, EMBASE, and the Cochrane Library for studies examining the predictive performance of these tests in adult patients with HCV. Two authors independently screened the studies' methodological quality and extracted data. Pooled estimates of sensitivity, specificity, and area under the curve (AUC) were calculated for HCC development using random-effects bivariate logit normal and linear-mixed effect models.

Results: We included 27 studies (169,911 patients). Meta-analysis of HCC after SVR was possible in nine VCTE and 15 FIB-4 studies. Regarding the prediction of HCC development after SVR, the pooled AUCs of pre-treatment VCTE >9.2–13 kPa and FIB-4 >3.25 were 0.79 and 0.73, respectively. VCTE >8.4–11 kPa and FIB-4 >3.25 measured after SVR maintained good predictive performance, albeit slightly reduced (pooled AUCs: 0.77 and 0.70, respectively). The identified optimal cut-off value for HCC development after

SVR was 12.6 kPa for pre-treatment VCTE. That of VCTE measured after the SVR was 11.2 kPa.

Conclusions: VCTE and FIB-4 showed acceptable predictive performance for HCC development in patients with HCV who achieved SVR, underscoring their utility in clinical practice for guiding surveillance strategies. Future studies are needed to validate these findings prospectively and validate their clinical impact.

Keywords: Vibration-Controlled Transient Elastography, Fibrosis 4-Index, Hepatitis C Virus, Hepatocellular Carcinoma

PE-42

Impact of Breast Cancer and Hormone Therapy on Liver Disease Progression in Patients with MASLD

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Aims: This prospective study aimed to assess the progression of metabolic dysfunction-associated steatotic liver disease (MASLD) among breast cancer (BC) patients compared to female patients without BC.

Methods: MASLD patients with BC who underwent surgery were prospectively enrolled at Ewha Womans University Mokdong Hospital between August 2018 and December 2022. Data from female patients without BC were retrospectively collected during the same period. The primary outcome was the relative change in hepatic steatosis, assessed using the controlled attenuation parameter (CAP) via vibration-controlled transient elastography (VCTE), from baseline to year 2.

Results: A total of 339 patients with BC and 2,200 patients without BC were included in the study. At baseline, the BC group had lower liver stiffness (LS) (4.7 kPa vs. 7.3 kPa) and CAP values (288 dB/m vs. 299 dB/m) compared to the non-BC group. At two years after the initial VCTE measurement, the CAP value increased in the BC group but decreased in the non-BC group (relative change: +7.6% vs. -4.1%; p<0.001). The relative change in LS value was similar between the two groups (+1.4% vs. -0.01%; p=0.119). In subgroup analysis, BC patients who received hormone therapy exhibited significant increases in both LS (+2.8% vs. -0.1%; p=0.039) and CAP (+7.3% vs. -4.1%; p<0.001) at year 2 compared to the non-BC group. Conversely, in BC patients who did not receive hormone therapy, the CAP value significantly increased (+9.9% vs. -4.1%; p<0.001), whereas the relative change in LS were not significantly different (-4.4% vs. -0.1%; p=0.064) compared to the non-BC group.

Conclusions: BC patients with MASLD experienced a significant increase in hepatic steatosis, whereas non-BC patients showed a reduction. Notably, those receiving hormone therapy exhibited a significant increase in both LS and CAP values, suggesting a potential impact of breast cancer and its treatments on MASLD progression.

Keywords: Breast Cancer, Metabolic Dysfunction-Associated Steatotic Liver Disease, Transient Elastography, Controlled Attenuation Parameter

PE-43

Eosinophilic Liver Infiltration Detected by Ultrasound

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Aims: Eosinophilic liver infiltration (ELI) is a condition in which focal liver infiltration of eosinophils is observed due to a number of different etiologies. Organ involvement of eosinophils is often secondary to other causes, including drug and parasitic infections, allergic diseases, and hyper-eosinophilic syndromes, and is often asymptomatic or discovered incidentally during screening for other conditions. ELI can be incidentally detected on ultrasound. Hereby, we report a case of ELI detected by ultrasound and treated with medication.

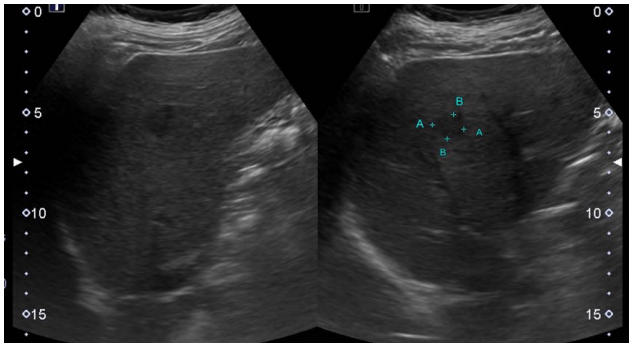
Methods: A 60-year-old male patient presented with a suspicious intrahepatic mass found incidentally on an abdominal ultrasound. (15.8*12.4mm sized hypoechoic nodule at segment 6) He was known to have a past history of hepatitis B infection, but was not being followed up. His usual diet included raw beef, raw liver, and cloth leaves.

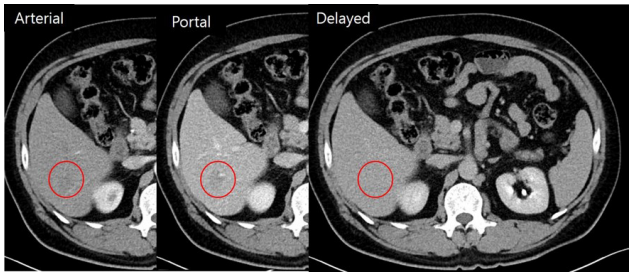
Results: Computed tomography showed equal attenu-

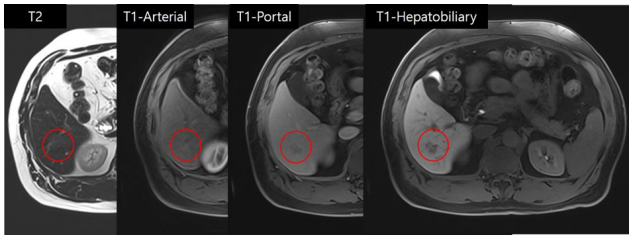
ation in the arterial phase, low attenuation in the portal vein, and equal attenuation in the delayed phase. Magnetic resonance imaging showed slightly higher signal intensity (SI) on T2-enhanced images, equal or slightly higher SI in the arterial phase on T1-enhanced images, slightly lower SI in the portal phase, and lower SI in the biliary phase. Based on the elevated eosinophils in the blood test and imaging studies, eosinophilic liver infiltration was diagnosed. Blood tests confirmed toxocara canis antibody IgG, leading to a diagnosis of toxocariasis. Intrahepatic lesion was successfully treated with albendazole medication.

Conclusions: ELI can be incidentally detected by ultrasound. Since ELI can be caused by a variety of underlying conditions, treatment should be based on the underlying disease. In some cases, eosinophilic liver infiltration caused by parasites may resolve spontaneously without treatment, but in other cases, as in this case, it may be treated with medications.

Keywords: Eosinophil, Liver, Infiltration, Ultrasound







PE-44

Use of Contrast-Enhanced Ultrasound with Sonazoid for Evaluating the Radiotherapy Efficacy for Hepatocellular Carcinoma

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Aims: Radiotherapy is one of the available curative therapies for hepatocellular carcinoma (HCC). We investigate the use of contrast-enhanced ultrasound using Sonazoid (SCEUS) in evaluating the efficacy of radiotherapy for HCC.

Methods: A retrospective analysis was conducted on 59 HCC patients with 59 tumors who underwent radiotherapy. Tumor size and tumor vascularity were assessed using SCEUS before and 1, 3, 7, 10, and 13 months after radiotherapy. The median follow-up period was 44.5 months (range: 16–82 months).

Results: Of the total number of HCCs, 95% (56/59) had no local recurrence. In contrast, 5% (3/59) had local recurrence. At 13 months after radiotherapy, in cases with no local recurrence, SCEUS showed a reduction in tumor vascularity in all cases, while tumor size reduction (>30% reduction, compared with pre-radiotherapy) was observed in 82.1% (46/56). In all three cases of local recurrence, vascularity and tumor size reduction were not observed during the follow-up period and residual HCCs were demonstrated pathologically. Compared with cases with local recurrence, tumor size reduction and reduction in tumor vascularity (p<0.001) were significantly greater in cases with no local recurrence at 13 months after radiotherapy.

Conclusions: This study suggests that SCEUS may be useful for assessing the effectiveness of radiotherapy in patients with HCC.

Keywords: Liver, Ultrasound, Radiotherapy, Hepatocellular Carcinoma

PE-45

Platelet Count Spleen Diameter Ratio to Predict Esophageal Varices in with Liver Cirrhosis Patients-Single Center Study

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Aims: Portal hypertension commonly accompanies the presence of liver cirrhosis, and the development of esophageal varices is one of the major complications of portal hypertension. To validate whether the platelet count/spleen size ratio can be used to predict the presence of esophageal varices in liver cirrhosis patients.

Methods: This was a cross-sectional study to validate the diagnostic test for hepatic cirrhosis and was performed between 2020 to 2023. Only stable patients were included in the study. Patients with active gastrointestinal bleeding at the time of admission were excluded. All patients underwent screening for upper gastrointestinal endoscopy. Biochemical parameters were evaluated, and ultrasound was used to measure the longest diameter of the spleen. The platelet count/spleen diameter ratio was calculated and analyzed to determine whether it can predict the presence of esophageal varices.

Results: A total of 31 patients were included. The mean age was 51.23 ± 14 years; 17 (55%) were men, and 14 (45.0%) women. Child-Pugh classification, 18 (58%) patients were classified as class A, 11(37%) as class B, and 2 (5%) as class C. The platelet count/spleen diameter ratio to detect esophageal varices independent of the grade showed using a cutoff value of ≤ 884.3, had 82% sensitivity, 71% specificity, and positive and negative predictive values of 93% and 41%, respectively.

Conclusions: The platelet count to spleen diameter ratio may be a useful tool for diagnosing EVs in liver cirrhosis noninvasively when endoscopy facilities are not available.

Keywords: Platelet Count, Spleen Diameter, Liver Cirrhosis, Esophageal Varices

PE-46

Assessment of Non-Alcoholic Fatty Pancreas via Abdominal Ultrasound among Adult Medical Check-Up Patients

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Aims: Pancreatic steatosis or fatty pancreas refers to the fat accumulation in the pancreas, which can lead to inflammation and fibrosis, β-cell dysfunction, fibrosis, and, possibly, pancreatic cancer. It is often an incidental finding on abdominal ultrasound, mainly associated with metabolic conditions and the risk of pancreatic malignancy. This study aims to evaluate the prevalence of NAFPD among adult medical check-up patients.

Methods: A cross-sectional study was done among adult medical check-up patients between 2022-2024 in Dornod Medical Center, Eastern Province Mongolia. All patients had gone through laboratory tests and abdominal ultrasonography. The fatty pancreas was defined as hyperechoic pancreas echotexture compared with spleen echotexture.

Results: A total of 723 cases were included in this study; the pancreas cannot be visualized in 53 cases and was excluded from the analysis. The fatty pancreas was present in 301 (45.0 %) patients. The presence of fatty pancreas was significantly associated with male gender, age >35 years, higher systolic and diastolic blood pressures, fasting blood glucose >100 mg/dL, triglycerides, total and LDL-cholesterol, and lower HDL cholesterol levels (all $p<0.05$).

Conclusions: Fatty pancreas is a common disorder. The prevalence of fatty pancreas in the examined population is approximately 45%. Increased age, central obesity, and fatty liver disease are independent risk factors for a fatty pancreas.

Keywords: Fatty Pancreas, Ultrasonography

PE-47

Characterization of Hepatobiliary Phase Hypointense Nodules without Arterial Phase Hyperenhancement on Gadoxetic Acid-Enhanced MRI via Contrast-Enhanced Ultrasound Using Perfluorobutane

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Aims: Hepatobiliary phase (HBP) hypointense nodules without arterial phase hyperenhancement (APHE) on gadoxetic acid-enhanced MRI (GA-MRI) may be nonmalignant cirrhosis-associated nodules or hepatocellular carcinomas (HCCs). We aimed to characterize HBP hypointense nodules without APHE on GA-MRI by performing contrast-enhanced ultrasound using perfluorobutane (PFB-CEUS).

Methods: In this prospective, single-center study, participants at high-risk of HCC having HBP hypointense nodules without APHE at GA-MRI were enrolled. All participants underwent PFB-CEUS; if APHE and late, mild washout or washout in the Kupffer phase were present, the diagnosis of HCC was established according to the v2022 Korean guidelines. The reference standard consisted of histopathology or imaging. The sensitivity, specificity, and positive/negative predictive values of PFB-CEUS for detecting HCC were calculated. Associations between clinical/imaging features and the diagnosis of HCC were evaluated with logistic regression analyses.

Results: In total, 67 participants (age, 67.0 years±8.4; 56 men) with 67 HBP hypointense nodules without APHE (median size, 1.5cm [range, 1.0–3.0cm]) were included. The prevalence of HCC was 11.9% (8/67). The sensitivity, specificity, and positive and negative predictive values of PFB-CEUS for detecting HCC were 12.5%(1/8), 96.6%(57/59), 33.3%(1/3) and 89.1%(57/64), respectively. Mild-moderate T2 hyperintensity on GA-MRI (odds ratio, 5.756; p=0.042) and washout in the Kupffer phase on PFB-CEUS (odds ratio, 5.828; p=0.048) were independently associated with HCC.

Conclusions: Among HBP hypointense nodules without APHE, PFB-CEUS was specific for detecting HCC, which had a low prevalence. Mild-moderate T2 hyperintensity on GA-MRI and washout in the Kupffer phase on PFB-CEUS may be useful to detect HCC in those nodules.

Keywords: Carcinoma, Hepatocellular, Perfluorobutane, Ultrasonography, Magnetic Resonance Imaging

PE-48

Predicting the Chemotherapeutic Response of Colorectal Cancer Liver Metastasis Using Shear-Wave Elastography

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Aims: To assess the prognostic role of shear-wave velocity (SWV) value for predicting chemotherapeutic response and progression-free survival (PFS) in patients with colorectal cancer liver metastases (CRLMs).

Methods: In this prospective, single-center study, participants with CRLM who were scheduled to undergo chemotherapy were enrolled between May 2018 and June 2021. SWV value measurements by using shear-wave elastography were performed at the CRLM before and after starting chemotherapy. Based on the Response Evaluation Criteria in Solid Tumors, the chemotherapeutic response of the participants was categorized into two categories: responders including complete remission and partial remission, and nonresponders including stable disease and progressive disease. Receiver operating characteristic (ROC) curve analysis was performed to evaluate the performance of changes in SWV values in predicting the chemotherapeutic response of CRLM. In addition, Cox proportional hazard model was used to identify variables associated with PFS.

Results: In total, 67 participants (40 men; mean age, 62.3 years ± 10.1) were enrolled, of which 34 were responders and 33 were nonresponders. The area under the ROC curve, sensitivity, and negative predictive value of SWV value in predicting nonresponders were 0.840, 97.0%, and 95.2%, respectively, with a cutoff value of 13% decrease. The change in SWV value was also independently associated with PFS (hazard ratio, 1.020) as well as being a nonresponder and number of CRLM≥5.

Conclusions: The change in SWV values measured after chemotherapy demonstrated a meaningful diagnostic performance to predict nonresponders in patients with CRLM. The change in SWV value was also independently

associated with PFS.

Keywords: Elasticity Imaging Techniques, Prognosis, Response Evaluation Criteria In Solid Tumors, Liver Neoplasms

PE-49

A Case of Inflammatory Perivascular Epithelioid Cell Tumor

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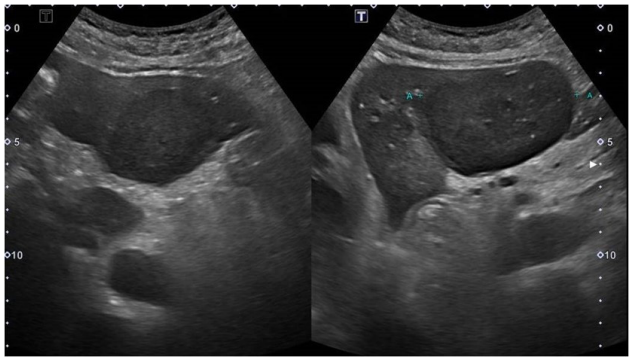
Aims: Hemangioepithelioma cases have been sporadically reported worldwide and generally do not show specific symptoms. They are often discovered incidentally, but as the tumor size increases, some patients may exhibit symptoms due to tumor compression.

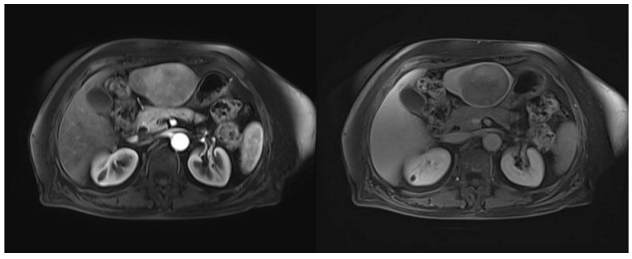
Methods: A 75-year-old male patient was referred from an external hospital due to external compression observed on an upper gastrointestinal endoscopy. The patient had a medical history of diabetes, hypertension, and hypothyroidism, but did not present any specific symptoms. Laboratory tests showed total bilirubin at 0.49 mg/dL, aspartate aminotransferase at 17 IU/L, alanine aminotransferase at 14 IU/L, alkaline phosphatase at 93 IU/L, gamma-glutamyl transferase at 27 IU/L, and albumin at 4.22 g/dL, all of which were within normal limits. Tumor markers such as alpha-fetoprotein at 0.49 ng/mL and Protein Induced by Vitamin K Absence or Antagonist-II at 20 mAU/mL were also within normal ranges. Abdominal ultrasound was performed, revealing a well-demarcated, homogeneous hypoechoic mass measuring 7 cm in the longest diameter located in segment 3 of the liver. An abdominal computed tomography scan showed slight arterial phase enhancement in segment 3, prompting further evaluation with magnetic resonance imaging. On T2-weighted images, the lesion appeared hyperintense, with arterial phase enhancement and washout during the portal venous and hepatobiliary phases, exhibiting lower signal intensity compared to the liver parenchyma.

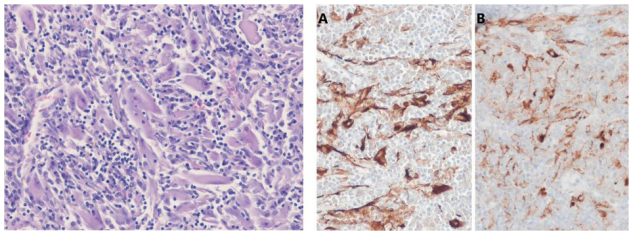
Results: Based on the magnetic resonance image findings alone, it was difficult to differentiate between benign and malignant tumors. A biopsy could result in inadequate diagnosis or, if the tumor were malignant, there was a concern about the potential for metastasis to the procedure site. Therefore, it was decided to proceed directly with surgery. A left lateral sectionectomy was successfully performed, achieving complete resection. Pathological examination diagnosed the lesion as an Inflammatory Perivascular Epithelioid Cell Tumor. The patient is currently under simple observation in the outpatient clinic for three months.

Conclusions: If a large mass detected on ultrasound cannot be definitively characterized as benign or malignant through additional imaging studies, a histological diagnosis is necessary. Even if the mass is deemed benign, if there are findings that cannot rule out the potential for future malignancy, as in this case, surgical resection can be performed to achieve both diagnosis and treatment simultaneously.

Keywords: Inflammatory Perivascular Epithelioid Cell Tumor







PE-50

Chronic Hepatitis B and the Risk of Bile Duct Malignancies: Emphasizing the Challenge of Differentiating IPNB from Cysts

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Aims: This case study explores the link between chronic hepatitis B (CHB) and the development of bile duct malignancies. Intraductal papillary neoplasms of the bile duct (IPNB) are recognized as precursors to cholangiocarcinoma.

Methods: The presence of CHB can elevate this risk due to its association with chronic inflammation and liver damage, both known risk factors for cholangiocarcinoma. The progression of IPNB into cholangiocarcinoma, especially in CHB patients, highlights the critical need for comprehensive evaluation and monitoring of liver lesions. Malignant transformations may initially mimic simple cysts, becoming apparent only through advanced diagnostic imaging and histopathological analysis.

Results: A 56-year-old male with chronic hepatitis B was monitored using Computed Tomography (CT) beginning in 2010, which identified a lesion resembling a simple cyst in segment 1 of the liver. No changes were noted in 2011. In 2012, abdominal ultrasonography (US) revealed a fatty liver and hepatic cyst. By 2013, US showed the cyst had grown from 3 cm to 3.5 cm and developed an internal solid portion. A subsequent CT scan a month later depicted a well-defined cystic lesion with an enhancing nodule inside. Following a caudate lobectomy, pathology confirmed the presence of cholangiocarcinoma with an intraductal papillary neoplasm. Eleven years later, the patient continues hepatitis treatment without cancer recurrence.

Conclusions: This case underscores the importance of vigilance in CHB patients, who may be at increased risk for malignant transformations. Regular imaging and chemical studies are essential for early detection and management of potential bile duct malignancies. Particularly, in cases where cysts are difficult to distinguish from IPNB, follow-up with ultrasonography should be considered even if cirrhosis is absent.

Keywords: Chronic Hepatitis B, Intraductal Papillary Neoplasms of the Bile Duct, Cholangiocarcinoma

PE-51

Liver Abscess Mimicking Malignant Tumor

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Aims: A liver abscess is a condition characterized by the accumulation of pus in the liver, usually caused by bacteria or parasites. It can be diagnosed through blood tests, imaging studies, and clinical symptoms such as fever and abdominal pain. However, in its early stages, a liver abscess may present with an immature, solid echogenic pattern, making it challenging to differentiate from a malignant tumor.

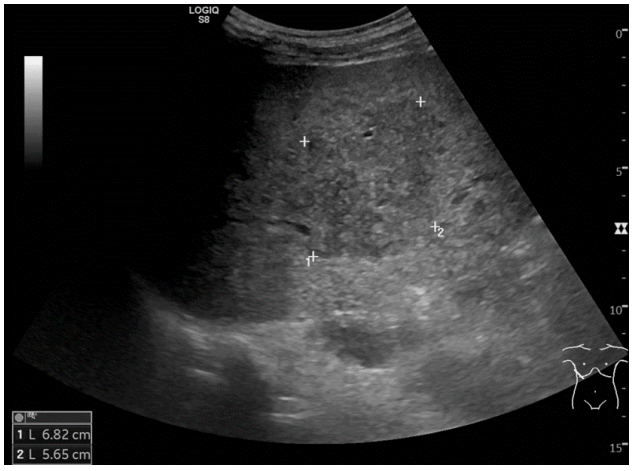
Methods: We would like to present a case of a malignant tumor that was initially misdiagnosed as a liver abscess.

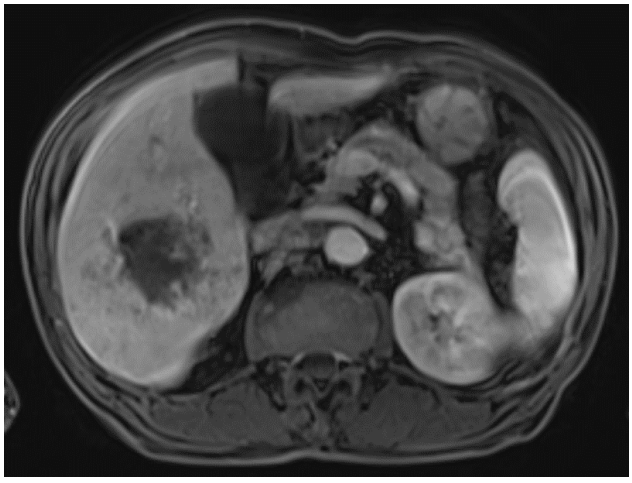
Results: A 65-year-old woman presented to our clinic with right upper quadrant pain and fever, which had started 3 days prior to admission. She had a history of right nephrectomy due to renal cell carcinoma. Blood tests revealed an elevated white blood cell count of 10,620/μL and an increased C-reactive protein (CRP) level of 12.37 mg/dL. Initial abdominal ultrasound revealed a 6.8 cm hypoechoic mass with ill-defined margins located in segment 6 (Figure 1). Magnetic resonance imaging (MRI) demonstrated slightly low signal intensity (SI) on T1-weighted imaging, slightly high SI on T2-weighted imaging, no definite high SI on diffusion-weighted imaging, and a non-enhancing lesion, which was consistent with a liver abscess (Figure 2). Clinically suspected as an immature liver abscess, empirical antibiotic treatment was initiated. However, as the fever persisted and CRP did not decrease, a follow-up ultrasound was performed one week later. The size of the lesion had increased to 8.6 cm, and no liquefied area was observed, prompting the decision to perform a liver biopsy (Figure 3). The biopsy results confirmed metastatic carcinoma, predominantly transitional cell carcinoma of the kidney.

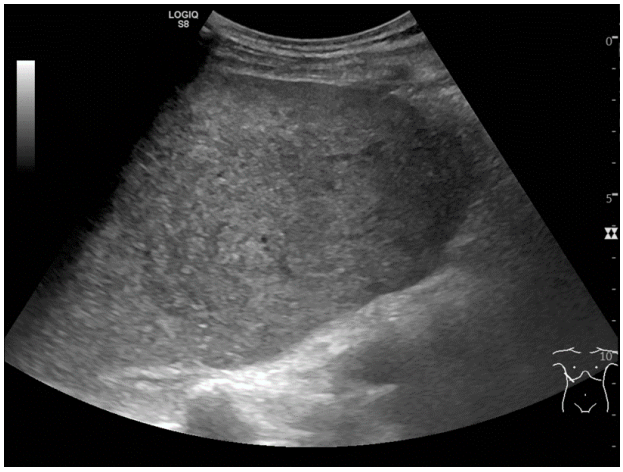
Conclusions: This case was initially suspected to be a liver abscess based on clinical symptoms, blood tests, and abdominal imaging studies. Although typical liver abscess

findings were observed on MRI, both the initial and follow-up ultrasound examinations did not reveal the characteristic features of a liver abscess. Liver abscesses can present with varying ultrasound findings depending on the stage. In the case of an immature liver abscess, before liquefaction and necrosis occur, a solid echogenic pattern may be observed, necessitating differentiation from malignant tumors. If the patient does not improve clinically with antibiotic treatment, and the lesion increases in size without the appearance of a hypoechoic area on follow-up exams, the possibility of a malignant tumor should be considered rather than a liver abscess.

Keywords: Liver Abscess, Malignancy







PE-52

Diagnostic Test Accuracy of Contrast-Enhanced Ultrasound with Sonazoid for Assessment of Focal Liver Lesions: A Systematic Review and Meta-Analysis

Yongqing Tang[1], Shun-ichi Sasaki[2], Joshua Hawley[3], Aurélie Peillon[4], Anders Sjöström[5], Adolfo Fuentes-Alburo[6], Francois Tranquart[4]

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Aims: This meta-analysis evaluated the diagnostic accuracy of Sonazoid-enhanced ultrasound (SZ-CEUS) in differentiating malignant from benign focal liver lesions (FLLs), and in distinguishing hepatocellular carcinoma (HCC) from non-HCC FLLs.

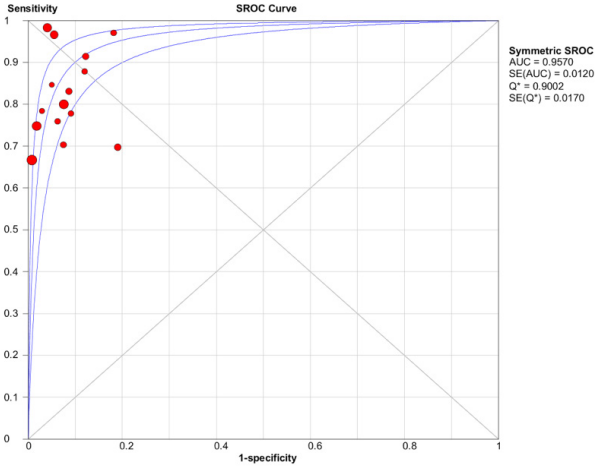
Methods: A systematic search of PubMed, EMBASE, and other relevant databases was conducted to find relevant studies. Study quality was assessed using the QUADAS-2 tool. The analysis included data pooling, subgroup analyses, meta-regression, and publication bias assessment

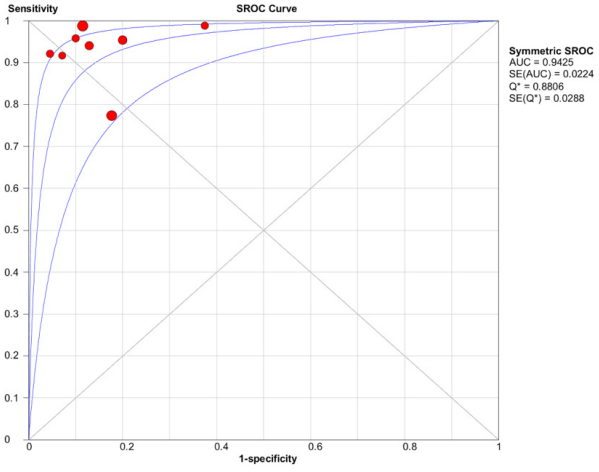
Results: This meta-analysis included 2995 patients with 3384 lesions. Eight studies focused on differentiating benign and malignant FLLs, while 15 studies addressed HCC versus non-HCC distinctions. The quality assessment indicated overall high quality. SZ-CEUS yielded a pooled sensitivity of 94% (95% CI: 0.91-0.95) and specificity of 84% (95% CI: 0.78-0.89)for characterizing malignant versus benign FLLs. For

HCC differentiation, sensitivity was 83% (95% CI: 0.80-0.85) and specificity 96%(95% CI: 0.95-0.97). Subgroup analysis showed that diagnostic accuracy was better for smaller lesions (<3 cm) and higher proportions of malignant lesions. No significant publication bias was found.

Conclusions: SZ-CEUS demonstrates high diagnostic accuracy in differentiating malignant from benign FLLs and distinguishing HCC from non-HCC lesions, particularly effective in identifying smaller HCC lesions. It offers significant potential for early and accurate liver cancer diagnosis.

Keywords: Sonazoid-Enhanced Ultrasound, Liver Lesions, Diagnostic Accuracy, Meta-Analysis





PE-53

2D-Shear Wave Elastography versus Transient Elastography: Which Is Superior in Detecting Liver Fibrosis?

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Aims: This systematic review was performed to evaluate and compare the diagnostic accuracy of Transient Elastography (TE) and Two-Dimensional Shear Wave Elastography (2D-SWE) for staging liver fibrosis. The literature was limited to adult patients with Chronic Viral Hepatitis (CVH) and children with chronic liver disease. The reference standard was liver biopsy, and the aim was to assess whether the non-invasive imaging technique better detects significant fibrosis (≥F2), advanced fibrosis (≥F3) and cirrhosis (F4).

Methods: A thorough literature search was performed across PubMed, Embase, Web of Science, and Cochrane Library databases up to August and November 2021. Studies comparing TE and 2D-SWE in cohorts with chronic liver disease (CVH in adults; all causes in children/adolescents) were included. Diagnostic metrics such as sensitivity, specificity, and Area Under the Receiver Operating Characteristic Curve (AUROC) were pooled using a bivariate random-effects model. Additionally, a prospective study assessed 108 adult patients using 2D-SWE (Canon Aplio i800) and TE against liver histology.

Results: The adult systematic review included 8 studies that had a total of 1301 patients, and the pediatric meta-analysis included 27 studies with a total of 1956 patients. In adults, 2D-SWE had greater AUROC than TE for significant fibrosis (0.93 vs. 0.85, p=0.04). Both modalities had similar performance for advanced fibrosis and cirrhosis. Both techniques had AUROC values >0.90 across fibrosis stages in children. The performance of TE and 2D-SWE was excellent in the prospective studies, with AUROCs between 85.2% and 96%.

Conclusions: TE and 2D-SWE exhibit high diagnostic accuracy for liver fibrosis staging in both adult and pediatric populations. While both are reliable for advanced stages, 2D-SWE shows slightly superior performance in

detecting significant fibrosis, suggesting its value in early intervention and its growing potential to replace liver biopsy in clinical practice.

Keywords: Transient Elastography, 2D-SWE, Auroc, Bivariate Random-Effects Model

PE-54

Intestinal Ultrasound for Precise Monitoring of Pediatric Inflammatory Bowel Disease in Korea

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[1]Department of Pediatrics, Kyung Hee University Hospital at Gangdong, Korea; [2]Department of Pediatrics, Kangwon National University School of Medicine, Korea; [3]Department of Pediatrics, Asan Medical Center Children's Hospital, University of Ulsan College of Medicine, Korea

Aims: Intestinal ultrasound (IUS) is rapidly becoming a critical tool in the management of inflammatory bowel disease (IBD), particularly in pediatric patients where traditional monitoring techniques like colonoscopy present practical challenges. This is consistent with a tight control model that aims for early and precise intervention to prevent irreversible intestinal damage and optimize long-term outcomes.

Methods: To establish the inaugural Korean guidelines on pediatric IUS for IBD, this thesis delineates a systematic methodology encompassing a comprehensive review of existing literature, formation of a multidisciplinary expert panel, meticulous data extraction and synthesis, and proactive stakeholder engagement. This methodological framework ensures that the development of the Korean pediatric IUS guidelines is both evidence-based and aligned with clinical needs, thereby enhancing the diagnostic and monitoring capabilities in pediatric IBD management.

Results: This imaging technology provides real-time, noninvasive assessment of disease activity, offering a safe, cost-effective, and bedside option for evaluating disease state and making immediate clinical decisions. IUS excels at accurately identifying and characterizing disease severity and extent, and detecting complications, facilitating a more personalized approach to IBD management. In pediatric settings, IUS has proven (is proving) indispensable not only for its diagnostic accuracy, but also because it does not involve radiation, making it the preferred choice (preferable option) for younger patients. Notably, especially in Korea, the incidence of pediatric IBD is increasing, further emphasizing the need for effective diagnostic strategies such as IUS.

Conclusions: We propose a standardized monitoring algorithm tailored to the management of pediatric IBD using IUS. By combining IUS with traditional biomarkers and integrating them into clinical and home settings, this approach hopes to improve patient care, shared decision-making, and treatment personalization.

Keywords: Intestinal Ultrasound, Children, Inflammatory Bowel Disease, Korea

[Musculoskeletal]

PE-1

Effectiveness of Ultrasound on Pain Reduction in Knee Osteoarthritis Patients in Indonesia: Literature Review

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Aims: Pain is a major problem in osteoarthritis patients. In Indonesia, the prevalence of osteoarthritis reaches 5% at the age of 61 years. For knee osteoarthritis, the prevalence is quite high at 15.5% in men and 12.7% in women. Knee osteoarthritis is a progressive degenerative disease, which causes morphological changes, especially in cartilage. Patients with osteoarthritis tend to have problems with hamstring muscle flexibility due to the length of osteoarthritis suffered, resulting in shortening of the hamstring muscles. The purpose of the study was to determine the effect of ultrasound administration on knee osteoarthritis patients

Methods: Review of the literature based on 30 national and international publications published in the last ten years of study, from 2015 to 2025.

Results: The results of the literature study conducted found that 70% stated that there was an effect of ultrasound administration on knee osteoarthritis patients. Knee osteoarthritis is characterized by pain, deformity, and movement restrictions. The mean value of pain before treatment was 66 mm and the average value of pain after treatment was 40 mm with a value of p=0.000 (p<0.05). The results of another study stated that the use of ultrasound can reduce pain levels by 49.48% before action 6.79 and after action 3.43 Ultrasound also has a sedative effect, which can provide an increase in muscle flexibility so that problems caused by limited movement can be reduced immediately. ultrasound can improve muscle relaxation and blood circulation. In particular, it can be used for muscle contractures caused by muscle spasm as it has the effect of increasing tissue flexibility.

Conclusions: The administration of ultrasound to knee osteoarthritis patients in Indonesia has a significant effect in reducing pain, but the number of studies is still very limited. Therefore, more and more in-depth research needs to be done.

Keywords: Ultrasound, Pain Reduction, Indonesia, Literature Review

PE-2

Global Research and Emerging Trends in the Use of Emergency Ultrasound for Trauma Care

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Aims: Emergency ultrasound (EUS) has become an essential diagnostic tool in trauma care, providing rapid, non-invasive imaging that significantly influences clinical decision-making. Trauma is a leading cause of morbidity and mortality worldwide, and early diagnosis is crucial for improving patient outcomes. Over the past two decades, the role of EUS in trauma management has expanded, with its use in detecting free fluid, assessing organ damage, and guiding life-saving interventions. This paper explores the global research and emerging trends in the use of EUS in trauma care, highlighting its impact on patient outcomes and its evolving role in emergency departments.

Methods: This study involved a comprehensive review of literature from databases including PubMed, Scopus, and Web of Science, focusing on articles published between 2000 and 2024. The analysis covered trends in EUS technology, its clinical applications in trauma care, and the geographical distribution of research. Studies were categorized based on the type of trauma (abdominal, chest, head) and the use of EUS in diagnosing and managing these injuries. Key metrics, including the number of publications, citation impact, and major contributors, were evaluated to identify the growth of this field and its clinical relevance were analyzed using VOSviewer and BiblioMetrix.

Results: Research in emergency ultrasound for trauma care has grown substantially, particularly in abdominal trauma, where EUS has proven effective in detecting hemoperitoneum. Studies have demonstrated the utility of EUS in trauma settings to quickly assess patients, reduce the need for invasive procedures, and improve diagnostic accuracy. The United States, Europe, and Japan have emerged as leading contributors to this field, with high-impact journals such as Annals of Emergency Medicine and Trauma Surgery & Acute Care Open publishing key findings. Emerging trends indicate a growing focus on the use of EUS for chest trauma, pericardiocentesis, and its role in resuscitation protocols. The increasing use of EUS in trauma care underscores its importance in modern emergency medicine. EUS offers a rapid, real-time diagnostic tool that allows healthcare providers to make critical decisions quickly, improving patient triage and management. It is particularly beneficial in resource-limited settings where access to advanced imaging technologies such as CT scans may be restricted. However, challenges remain, such as the need for standardized training and protocols, limited availability of ultrasound devices, and the variability in expertise among healthcare providers. Efforts to address these barriers, including standardized training programs and the development of portable ultrasound devices, are essential for further expanding the use of EUS globally.

Conclusions: Emergency ultrasound has become a cornerstone in the management of trauma, significantly improving the speed and accuracy of diagnosis, thereby en-

hancing patient outcomes. The global research landscape reflects a growing recognition of EUS's clinical value in trauma care, with innovations continuing to shape its role in emergency departments worldwide. As research progresses, ongoing efforts to overcome the challenges related to training, accessibility, and standardization will be crucial for optimizing the impact of EUS in trauma care. Ultimately, the widespread integration of EUS into trauma protocols has the potential to transform emergency medicine and improve outcomes for trauma patients globally.

Keywords: Emergency Ultrasound, Trauma Care

PE-3

Efficacy of Ultrasound-Guided Joint Injections in Rheumatoid and Osteoarthritis: A Systematic Review

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Aims: Joint injections are commonly used to manage pain and inflammation in rheumatoid arthritis (RA) and osteoarthritis (OA). Ultrasound guidance has been proposed to improve injection accuracy, therapeutic efficacy, and patient outcomes. This systematic review aimed to evaluate the clinical effectiveness, safety, and accuracy of ultrasound-guided joint injections compared to landmark-based techniques in RA and OA.

Methods: A systematic search was conducted across PubMed, Scopus, Web of Science, and Embase up to January 2024 in accordance with PRISMA guidelines. Eligible studies included randomized controlled trials (RCTs), cohort studies, or comparative trials assessing clinical outcomes of corticosteroid or hyaluronic acid injections under ultrasound guidance versus palpation-based methods in RA or OA patients. Primary outcomes included pain reduction (VAS scores), functional improvement (WOMAC or DAS28), accuracy rates, and complication profiles. Study quality was assessed using the Cochrane RoB2 and ROBINS-I tools.

Results: A total of 45 studies (n = 5,874 patients) were included. Ultrasound-guided injections demonstrated significantly higher accuracy (mean accuracy: 93.6%) compared to landmark-based methods (76.5%). Patients receiving ultrasound-guided injections reported greater pain relief at 2–6 weeks (mean VAS reduction: –2.3 vs. –1.5, $p<0.01$) and improved functional scores in both RA (DAS28) and OA (WOMAC) subgroups. Additionally, ultrasound guidance reduced procedure-related complications (e.g., soft tissue infiltration, vascular puncture) and improved patient satisfaction. No significant heterogeneity in effect sizes was noted across joint types (knee, shoulder, wrist).

Conclusions: Ultrasound-guided joint injections provide superior accuracy, enhanced pain relief, and improved functional outcomes in patients with RA and OA compared to conventional techniques. Their incorporation into routine rheumatology and musculoskeletal care can optimize therapeutic outcomes and procedural safety. Standardized training and cost-benefit analyses are warranted to support broader clinical adoption.

Keywords: Ultrasound-Guided Injection, Rheumatoid Arthritis, Osteoarthritis, Joint Pain Management

PE-4

Ultrasound Assessment of Rotator Cuff Tears: A Systematic Review of Accuracy Compared to MRI

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Aims: Rotator cuff tears are among the most common causes of shoulder pain and disability. While MRI is considered the gold standard for imaging, ultrasound (US) offers a cost-effective, accessible, and radiation-free alternative. This systematic review aimed to evaluate the diagnostic accuracy of US compared to MRI in detecting full-thickness and partial-thickness rotator cuff tears.

Methods: A systematic literature search was conducted in PubMed, Embase, Web of Science, and Scopus up to January 2024, following PRISMA guidelines. Studies directly comparing the diagnostic performance of US and MRI against arthroscopy or surgical findings were included. Pooled sensitivity, specificity, and area under the receiver operating characteristic curve (AUROC) were calculated using a bivariate random-effects model. Study quality was

assessed using the QUADAS-2 tool.

Results: Out of 3,722 screened articles, 39 studies (n = 4,982 shoulders) met inclusion criteria. For full-thickness tears, pooled sensitivity and specificity of US were 91.7% (95% CI: 88.0–94.2) and 89.5% (95% CI: 85.4–92.6), respectively. MRI showed slightly higher sensitivity (94.2%) but comparable specificity (90.1%). For partial-thickness tears, US had a lower sensitivity (72.3%) compared to MRI (83.9%), though specificity was similar. Operator experience significantly influenced US performance. No significant heterogeneity was noted in full-thickness tear analysis; moderate heterogeneity existed in partial-thickness evaluations.

Conclusions: Ultrasound demonstrates high diagnostic accuracy in detecting full-thickness rotator cuff tears, comparable to MRI, particularly when performed by experienced operators. While MRI remains superior for partial-thickness tears, US remains a valuable first-line imaging tool due to its accessibility, dynamic assessment capability, and cost-effectiveness. Standardized training and operator protocols may further enhance its diagnostic utility in musculoskeletal imaging.

Keywords: Rotator Cuff Tear, Ultrasound, MRI, Shoulder Imaging

PE-5

FAST Ultrasonography as an Initial Modality in Internal Organ and Spinal Injuries: A Bibliometric Analysis Using VOS Viewer

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Aims: Focused Assessment with Sonography for Trauma (FAST) ultrasonography is a rapid, non-invasive diagnostic tool increasingly utilized for detecting internal organ and spinal injuries. This study aims to analyze global scientific publication trends on this topic using bibliometric methods.

Methods: A comprehensive bibliometric analysis was conducted using VOSviewer software with Scopus as the data source. Keywords including "spinal injury," "FAST," and "ultrasound" were used to extract relevant publications. Network, overlay, and density visualizations were employed to assess publication trends, thematic clusters, and international contributions.

Results: A total of 24 documents were identified across various disciplines: Medicine (18), Biochemistry, Genetics and Molecular Biology (4), Chemical Engineering (2), Engineering (2), and Neuroscience (2). The countries contributing the most were Germany (5), China (4), the United States (4), Spain (2), and Canada (1). The keyword co-occurrence analysis revealed two major thematic clusters:

Cluster 1 focused on clinical and demographic aspects, including "adult," "aged," "computer-assisted tomography," "diagnostic imaging," "echography," "female," "injury," "major clinical study," "male," "priority journal," and "spine fracture."

Cluster 2 emphasized preclinical and animal-based research, with keywords such as "animal model," "animal tissues," "article," "nonhuman," "spinal cord injury," and "ultrasound."

A correlation between the two clusters is evident in their shared focus on spinal trauma. Cluster 2 provides foundational insights into the pathophysiology and mechanisms of injury using experimental models, which inform and support the clinical applications observed in Cluster 1. This interplay underlines the translational relevance of preclinical findings in guiding diagnostic imaging strategies such as FAST ultrasonography in human subjects.

Conclusions: This bibliometric analysis reveals a notable correlation between the use of FAST ultrasonography in internal organ injury and spinal injury. While traditionally utilized for rapid assessment of intra-abdominal bleeding, FAST is increasingly explored for its potential role in the early detection of spinal injuries, particularly in trauma settings. The co-occurrence of clinical and preclinical research clusters highlights a translational pathway where findings from animal models inform clinical imaging applications. Moving forward, further clinical studies are needed to validate the effectiveness of FAST in detecting spinal trauma, either as a primary or adjunct diagnostic tool. Integration of FAST with other imaging modalities, such as portable MRI or advanced point-of-care ultrasound (POCUS), may enhance diagnostic accuracy in musculoskeletal trauma. Additionally, global standardization of FAST protocols and expanded train-

ing programs for healthcare professionals can support its broader application in comprehensive trauma care.

Keywords: Fast Ultrasonography, Spinal Injury, Musculoskeletal Trauma, Bibliometric Analysis

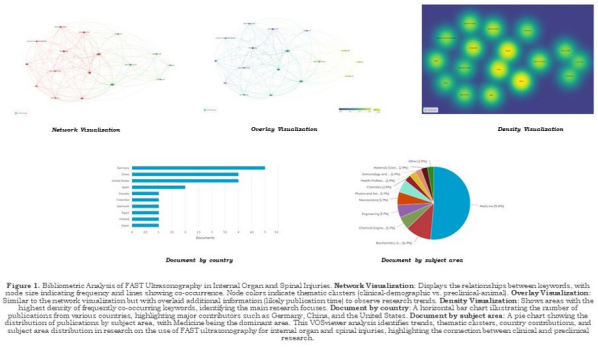

Figure 1. Bibliometric Analysis of FAST Ultrasonography in Internal Organ and Spinal Injuries. **Network Visualization**: Displays the relationships between keywords, with node size indicating frequency and lines showing co-occurrence. Node colors indicate thematic clusters (clinical-demographic vs. preclinical-animal). **Overlay Visualization**: Similar to the network visualization but with overlaid additional information (likely publication time) to observe research trends. **Density Visualization**: Shows areas with the highest density of frequently co-occurring keywords, identifying the main research focuses. **Document by country**: A horizontal bar chart illustrating the number of publications from various countries, highlighting major contributors such as Germany, China, and the United States. **Document by subject area**: A pie chart showing the distribution of publications by subject area, with Medicine being the dominant area. This VOSviewer analysis identifies trends, thematic clusters, country contributions, and subject area distribution in research on the use of FAST ultrasonography for internal organ and spinal injuries, highlighting the connection between clinical and preclinical research.

PE-6

Musculoskeletal Ultrasonography as a Tool for Monitoring the Progress of Rehabilitation of Spinal Injury Patients: A Comprehensive Bibliometric Analysis (2014–2024)

Willy Febri

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Aims: Musculoskeletal ultrasonography (MSUS) has emerged as a non-invasive, real-time imaging modality for assessing rehabilitation progress in spinal injury patients. Despite its growing use, there remains a need to understand the global research landscape and trends in this field.

Methods: This bibliometric study utilized the Scopus database to analyze publications from 2014 to 2024 using keywords: spinal injury, ultrasound, and rehabilitation. VOSviewer was employed to visualize and analyze bibliographic data including co-authorship, co-occurrence, citation, and keyword mapping.

Results: A total of 127 relevant documents were identified. These documents were primarily distributed across subject areas including Medicine (n=99), Health Professions (n=27), Neuroscience (n=20), Engineering (n=19), and Biochemistry, Genetics and Molecular Biology (n=16). The United States led in publication volume (n=47), followed by China (n=21), Canada (n=10), Turkey (n=8), and Italy (n=7). VOSviewer analysis revealed six major research clusters: Cluster 1 (Red) Complication encompasses research addressing post-injury complications observed in spinal injury patients during rehabilitation, with a focus on diagnostic support provided by musculoskeletal ultrasound. Cluster 2 (Green) Spinal Cord Injury centers on core studies exploring the pathophysiology, management, and clinical monitoring of spinal cord injury, highlighting the integration of ultrasonography in therapeutic evaluation. Cluster 3 (Blue) Spasticity includes investigations into the role of musculoskeletal ultrasound in detecting and assessing spasticity, a common motor disorder in spinal injury rehabilitation. Cluster 4 (Yellow) Echography focuses on the application of ultrasound (echography) techniques in musculoskeletal imaging, including methodology development and imaging protocols used for monitoring muscle and tissue recovery. Cluster 5 (Purple) Procedures captures studies on various clinical procedures enhanced or guided by musculoskeletal ultrasonography, including interventional techniques, physical therapy, and neuromuscular assessments. Cluster 6 (Turquoise) Major Clinical Study represents comprehensive clinical trials and multicenter studies evaluating the effectiveness and reliability of ultrasonography in rehabilitation monitoring across diverse patient populations. Visual outputs included network visualization, overlay visualization, and density visualization, offering insights into evolving keyword trends and collaborative networks.

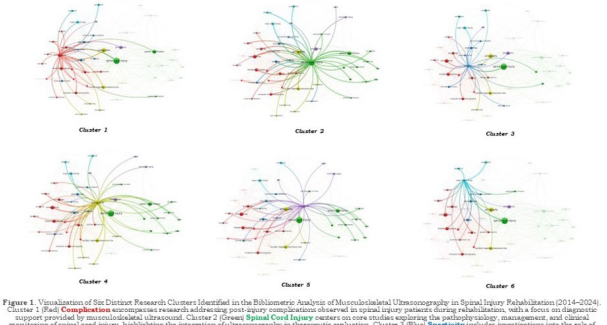

Figure 1. Visualization of Six Distinct Research Clusters Identified in the Bibliometric Analysis of Musculoskeletal Ultrasonography in Spinal Injury Rehabilitation (2014–2024). Cluster 1 (Red) **Complication** encompasses research addressing post-injury complications observed in spinal injury patients during rehabilitation, with a focus on diagnostic support provided by musculoskeletal ultrasound. Cluster 2 (Green) **Spinal Cord Injury** centers on core studies exploring the pathophysiology, management, and clinical monitoring of spinal cord injury, highlighting the integration of ultrasonography in therapeutic evaluation. Cluster 3 (Blue) **Spasticity** includes investigations into the role of musculoskeletal ultrasound in detecting and assessing spasticity, a common motor disorder in spinal injury rehabilitation. Cluster 4 (Yellow) **Echography** focuses on the application of ultrasound (echography) techniques in musculoskeletal imaging, including methodology development and imaging protocols used for monitoring muscle and tissue recovery. Cluster 5 (Purple) **Procedures** captures studies on various clinical procedures enhanced or guided by musculoskeletal ultrasonography, including interventional techniques, physical therapy, and neuromuscular assessments. Cluster 6 (Turquoise) **Major Clinical Study** represents comprehensive clinical trials and multicenter studies evaluating the effectiveness and reliability of ultrasonography in rehabilitation monitoring across diverse patient populations. The map visualizes keyword co-occurrences and thematic interconnections among these clusters. Overlay visualizations from 2014–2024 highlight the chronological evolution of research themes, with increasing attention toward procedural applications and clinical outcome assessment. This VOSviewer-based analysis offers a detailed framework for understanding the global research landscape and guiding future scientific inquiry in the use of musculoskeletal ultrasonography for spinal injury rehabilitation.

Conclusions: The bibliometric analysis reveals a growing and interdisciplinary research interest in MSUS for spinal injury rehabilitation. The findings highlight key research domains, prolific countries, and core subject areas contributing to this field. The study effectively addresses: (1) the evolution of international scientific publications from

2014–2024, (2) the identification of core journals and major contributors, and (3) the thematic mapping of research development based on keyword analysis. These insights may inform future research directions and clinical applications of musculoskeletal ultrasonography in spinal rehabilitation.

Keywords: Musculoskeletal Ultrasonography, Spinal Cord Injury, Rehabilitation Monitoring, Bibliometric Analysis

PE-7

Investment in Preventing Musculoskeletal Disorders: A Financial Perspective for a Healthy Future

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Aims: Musculoskeletal disorders (MSDs) represent a significant global health challenge with extensive economic implications. Recent studies have shown that MSDs contribute to high rates of disability-adjusted life years (DALYs) and impose substantial direct and indirect costs on healthcare systems and employers. Global prevalence and burden of MSDs for 195 countries, emphasizing the extensive impact on public health. Additionally, due to an aging population and prevailing occupational hazards, musculoskeletal conditions affect a substantial portion of the population, thereby straining economic resources. These findings underscore the urgent need for investments in preventive measures that can alleviate both health and economic burdens

Methods: Our approach consisted of a systematic literature review combined with an economic analysis framework. We surveyed peer-reviewed articles that assessed the epidemiological burden of musculoskeletal disorders, the cost-effectiveness of preventive interventions, and the impact of ergonomic and occupational health modifications on reducing the incidence of MSDs. We focused on studies that quantified productivity loss, direct medical expenditures, and the benefits derived from prevention strategies.

Results: The results of this integrated analysis suggest that preventive interventions in musculoskeletal health generate significant cost savings and productivity improvements. Multiple studies lend support to this conclusion. For example, ergonomic training and workplace modifications, have been shown to reduce the incidence of neck, shoulder, and arm complaints that are common precursors to more serious musculoskeletal conditions. Severe financial burden of MSDs—with annual costs in the United States ranging from $45 billion to $54 billion—could be mitigated through structured prevention and early intervention strategies. Further demonstrate that addressing high body mass index-related musculoskeletal conditions can lead to decreased healthcare spending and improved health-related quality of life. Overall, integrating occupational health measures with targeted educational programs prevents disease progression and offers a significant return on investment by lowering both direct healthcare costs and indirect economic losses associated with absenteeism and reduced work efficiency.

Conclusions: Investment in the prevention of musculoskeletal disorders reflects a sound financial strategy that can yield profound benefits for public health and economic stability. The synthesized evidence shows that early interventions, including ergonomic training, workplace redesign, and public health initiatives, result in decreased incidence of MSDs, reduction in healthcare expenditures, and improved productivity. This integrative approach not only enhances workforce health but also creates a healthier environment for future generations, supporting a sustainable and cost-effective model for managing and ultimately reducing the prevalence of musculoskeletal disorders.

Keywords: Musculoskeletal Disorders, Economic, Finance, Health

PE-8

Musculoskeletal Ultrasound in Pediatric Rheumatic Diseases: Diagnostic and Monitoring Applications

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Aims: To evaluate the diagnostic and clinical utility of musculoskeletal ultrasound (MSUS) in pediatric joint disorders, with a focus on juvenile idiopathic arthritis (JIA), and summarize recent advances in standardization and application.

Methods: A systematic literature search was conducted

using PubMed, Embase, and Cochrane Library (2010–2024). Studies were selected based on relevance to MSUS in pediatric populations (0–18 years), specifically involving joint disorders. Data were extracted on diagnostic accuracy, disease monitoring, and standardization efforts. Study quality was assessed using PRISMA and QUADAS-2 guidelines.

Results: A total of 67 studies met inclusion criteria. MSUS demonstrated high sensitivity in detecting synovitis, enthesitis, and tenosynovitis—often identifying subclinical disease in children considered clinically inactive. Recent developments include standardized definitions of normal pediatric joint anatomy and pathology, as well as semi-quantitative scoring systems. MSUS has been integrated into treat-to-target strategies, assisting in early diagnosis, therapy monitoring, and guiding interventions like intra-articular injections. Additional uses include evaluation of developmental dysplasia of the hip (DDH), joint effusions, trauma, and peripheral nerve injuries. Limitations include operator dependency and limited bone imaging.

Conclusions: MSUS is a safe, radiation-free, and highly informative imaging modality for pediatric joint disorders. It enhances early diagnosis, disease activity assessment, and treatment planning, especially in JIA. Ongoing standardization and validation efforts are essential to integrate MSUS into routine pediatric rheumatology practice. Further longitudinal studies are needed to solidify its role in achieving precision medicine in pediatric care.

Keywords: Normative Data, Pediatric Rheumatology, Ultrasound Imaging, Ultrasound Pathology

PE-9

AI-Based Prediction of Prenatal Autism Risk Using Simulated 3D Fetal Cranial Morphodynamics and Biometric Trajectories

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Aims: Altered fetal cranial development has been associated with neurodevelopmental conditions such as Autism Spectrum Disorder (ASD), yet no prenatal screening tools exist for early risk identification. Current ASD diagnoses rely on postnatal behavioral observations, often delaying early intervention. This study aims to explore the feasibility of using deep learning to predict ASD risk during gestation by modeling fetal cranial morphodynamics through simulated 3D reconstructions based on real biometric trajectories.

Methods: A dataset of 832 synthetic 3D fetal head volumes was generated by interpolating head circumference (HC), biparietal diameter (BPD), and occipitofrontal diameter (OFD) trajectories from the INTERGROWTH-21st dataset across 20–36 gestational weeks. Each case included 3–5 simulated longitudinal timepoints. ASD risk proxy labels were assigned using literature-based thresholds for extreme BPD/HC ratios, frontal overgrowth, and cranial asymmetry. A temporal-spatial Transformer model was developed to classify ASD-risk morphologies, incorporating self-attention mechanisms to capture dynamic shape evolution. SHAP-based saliency analysis identified the most influential cranial regions contributing to classification. Model performance was tested on a synthetic set of 500 samples, with robustness evaluated under biometric variability (±3 SD).

Results: The model achieved an AUROC of 0.85 (95% CI: 0.83–0.87), sensitivity of 76.2%, specificity of 81.5%, and F1 score of 0.78. Temporal modeling improved AUROC by 8.6% compared to single-timepoint CNNs (p<0.01). Frontal and occipital regions consistently showed high saliency, aligning with ASD-linked features reported in fetal MRI literature. Model performance remained stable under simulated perturbations (AUROC fluctuation < ±2.8%).

Conclusions: This early-stage investigation supports the potential of deep learning applied to simulated 3D fetal cranial morphology, derived from real biometric standards, as a non-invasive framework for prenatal ASD risk profiling.

Keywords: Autism Spectrum Disorder, Fetal Ultrasound Simulation, Temporal-Spatial Transformer, Cranial Morphodynamics

PE-10

Seeing Beneath the Surface: A Multimodal Approach to Subclinical Synovitis in RA

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Aims: The purpose of this review is to assess and contrast the diagnostic accuracy, inter-rater reliability, clinical relevance, and practical utility of physical examination, musculoskeletal ultrasound (MSUS), and thermography in identifying disease activity and subclinical synovitis in rheumatoid arthritis (RA).

Methods: Data from cross-sectional observational studies were sourced from PubMed, Scopus, and Web of Science including RA patients at different phases of disease activity are combined in this systematic review. Physical examinations evaluated edema and joint pain in 10 and 28 chosen joints. MSUS used OMERACT's 0–3 scale to grade synovial hypertrophy and power Doppler (PD) signals. Joint surface temperatures (Tavg, Tmax, and Tmin) were measured using thermography. The statistical analyses employed intraclass correlation coefficients (ICC) for reliability, Spearman's and Pearson's correlation, Cohen's and Fleiss' Kappa for agreement, and ROC-AUC for diagnostic performance.

Results: Compared to swelling (66%, k = 0.227), physical examination revealed greater interobserver agreement for tenderness (81.7%, k = 0.449). Particularly in subclinical patients, ultrasound found more swollen joints (43%) than manual examination (39%). Both clinically silent and symptomatic joints with US-confirmed synovitis had noticeably higher thermographic temperatures. Thermography and US showed strong relationships (r = 0.43–0.48 for PD; r = 0.33–0.37 for GS). Excellent reliability was confirmed by ICCs, which ranged from 0.994 to 0.998 for thermography and from 0.933 to 0.952 for ultrasonography. MCP 2–5 GLOESS exhibited a moderate connection with DAS28 (r = 0.62), and disease activity levels could be efficiently distinguished with a ≤3 threshold. 90% sensitivity was maintained when only three joints were scanned (dominant MCP2, both wrists). There was no clinical association or response to treatment for GSUS grade 1 results, which were prevalent in healthy participants.

Conclusions: Subclinical inflammation is best detected by ultrasound. There is great potential for thermography as a trustworthy, non-invasive supplement. The reliability of physical exams is increased by standardized training. Monitoring efficiency is improved by minimal joint scanning and GLOESS scoring. For the best RA assessment, a multimodal approach is supported by the limited relevance of GSUS grade 1 data.

Keywords: Subclinical Synovitis, Metacarpophalangeal Joints (MCP), Gray-Scale Ultrasound (GSUS), Power Doppler Ultrasound (PDUS)

PE-11

Dynamic Ultrasound for Rotator Cuff Tears: Accuracy in Motion

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Aims: This systematic review evaluates the diagnostic accuracy, clinical applications, and advantages of dynamic ultrasound (US) in identifying rotator cuff injuries, with a focus on its role compared to other imaging modalities such as MRI.

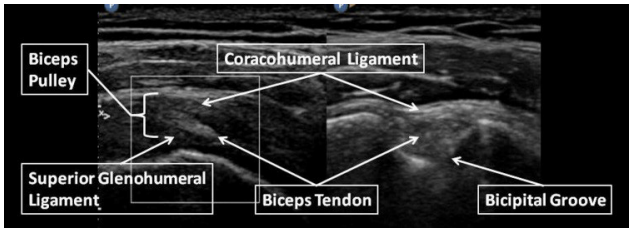
Methods: A comprehensive literature search was conducted across PubMed, Embase, Cochrane, and Web of Science databases for studies published between 2000 and 2024. Inclusion criteria encompassed clinical trials, cohort studies, and reviews evaluating the use of dynamic US for diagnosing rotator cuff tears. Data extraction focused on diagnostic sensitivity, specificity, clinical utility, and comparison with MRI. Quality assessment was performed using PRISMA guidelines and the QUADAS-2 tool.

Results: A total of 23 studies with 3,212 patients satisfied the requirements for inclusion. For the detection of full-thickness rips, dynamic ultrasonography showed a pooled sensitivity of 91% and specificity of 88%. With a sensitivity of 72%, it performed less accurately in partial-thickness tears. Dynamic US demonstrated notable benefits in evaluating bursal pathology, subacromial impingement, and tendon mobility in real time. US was quicker, less expensive, and easier to use than MRI, particularly for athletes and in outpatient settings. However,

there was a significant operator dependence on diagnostic accuracy.

Conclusions: Dynamic ultrasonography is a useful non-invasive diagnostic technique for rotator cuff injuries. It is especially good at identifying functional abnormalities and full-thickness rips. Even while MRI is still the gold standard, dynamic US provides cost-effectiveness and real-time assessment, particularly in situations where access to sophisticated imaging is restricted. Although more training and standardization are necessary to reduce operator variability, integrating US into routine musculoskeletal evaluation methods can improve early diagnosis and patient treatment.

Keywords: Rotator Cuff Tear, Dynamic Ultrasound, Musculoskeletal Sonography, Shoulder Injury



PE-12

Sonoelastography vs. Conventional Ultrasound in Diagnosing Rotator Cuff Tendinopathy: A Game-Changer in Musculoskeletal Imaging

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Aims: Rotator cuff tendinopathy is a leading cause of chronic shoulder pain, often progressing to partial or full-thickness tears if undiagnosed. Conventional B-mode ultrasound (USG) is widely used for tendon assessment but lacks sensitivity in detecting early-stage degeneration. Sonoelastography (SE), including Strain Elastography (SE) and Shear Wave Elastography (SWE), provides a functional assessment of tendon stiffness, offering a superior tool for early diagnosis. This study aims to compare the diagnostic accuracy of sonoelastography versus conventional ultrasound in identifying early tendinopathy and predicting the risk of progression to rotator cuff tears.

Methods: A prospective observational study was conducted on 120 patients (ages 25–60) presenting with chronic shoulder pain (>3 months) but without full-thickness tendon tears on MRI. Patients were classified based on clinical and imaging findings into:

- Group A (n=60): Early tendinopathy without structural damage.
- Group B (n=60): Advanced tendinopathy with partial-thickness tears.

All participants underwent:

Conventional B-mode ultrasound to evaluate echogenicity, tendon thickness, and presence of tears.

Sonoelastography (SE and SWE) to assess tendon stiffness, with SWE values expressed in kilopascals (kPa).

MRI confirmation as the gold standard for structural assessment.

Results: Diagnostic Accuracy:

B-mode USG detected tendinopathy in 72% of cases, whereas sonoelastography identified 94%, with a sensitivity of 93% and specificity of 96% (p<0.001).

Elasticity Patterns:

Group A: SWE values ranged from 18–26 kPa, correlating with early degeneration.

Group B: SWE values exceeded 32 kPa, indicating significant tendon stiffening and pre-tear changes.

Predictive Value:

SWE values >30 kPa were significantly associated with partial-thickness tears within 12 months of follow-up (HR = 3.8, p<0.001).

Conclusions: Sonoelastography outperforms conventional ultrasound in detecting early rotator cuff tendinopathy, providing quantitative stiffness assessment before structural damage occurs. This study establishes shear wave elastography as a superior diagnostic tool, allowing for early intervention and reducing the risk of rotator cuff tears. Incorporating sonoelastography into routine musculoskeletal imaging could revolutionize the early diagnosis and management of shoulder disorders.

Keywords: Sonoelastography, Rotator Cuff Tendinopathy, Shear Wave Elastography

PE-13

Exploring the Relationship between Lower Limb Doppler Ultrasound Findings and Severe PEDIS Scores in Patients with Diabetic Foot Ulcers: A Comprehensive Analysis

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Aims: Diabetic foot ulcers (DFUs) are a serious complication of diabetes, often resulting in infection, ischemia, and potential limb amputation. The PEDIS (Perfusion, Extent, Depth, Infection, and Sensation) classification system is commonly used to assess DFU severity, with perfusion status playing a crucial role in predicting healing and treatment outcomes. Doppler ultrasound is a widely available, non-invasive imaging tool for evaluating lower limb blood flow, yet its correlation with severe PEDIS perfusion scores remains uncertain.

Methods: This cross-sectional study included 80 patients with DFUs, categorized into mild-to-moderate (PEDIS grades 1–2) and severe (grades 3–4) groups. All participants underwent Doppler ultrasound to assess ankle-brachial index (ABI), peak systolic velocity (PSV), and resistive index (RI) of the lower limb arteries. The association between Doppler parameters and severe PEDIS scores was analyzed using logistic regression models, while the diagnostic performance of these parameters was evaluated through receiver operating characteristic (ROC) curve analysis. Statistical significance was set at $p<0.05$.

Results: Patients with severe PEDIS scores had significantly lower ABI (0.60 ± 0.15 vs. 0.90 ± 0.15, $p<0.001$) and PSV (38.8 ± 12.5 cm/s vs. 61.4 ± 15.9 cm/s, $p<0.001$), while RI was higher (0.80 ± 0.08 vs. 0.69 ± 0.06, $p<0.001$), suggesting increased arterial resistance. Logistic regression identified ABI < 0.7 (OR: 4.80, 95% CI: 2.70–8.76, $p<0.001$) and PSV < 45 cm/s (OR: 3.90, 95% CI: 2.10–7.30, $p<0.001$) as independent predictors of severe perfusion impairment. ROC analysis demonstrated strong predictive accuracy for severe DFUs (AUC: 0.86 for ABI, 0.83 for PSV).

Conclusions: Doppler ultrasound parameters, particularly ABI and PSV, are strongly associated with severe PEDIS scores in DFUs. Their integration into clinical assessment may improve early diagnosis and treatment planning.

Keywords: Doppler Ultrasound, Lower Limb, Pedis Score, Diabetic Foot Ulcers

[Thyroid]

PE-1

Point-of-Care Ultrasound for Thyroid Dysfunction Detection in Primary Care Settings: A Systematic Review

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Aims: Thyroid disorders are highly prevalent but often underdiagnosed in primary care. Point-of-care ultrasound (POCUS) has emerged as a rapid, low-cost tool that could support thyroid dysfunction detection by identifying structural abnormalities suggestive of nodular disease, goiter, or thyroiditis. This systematic review aimed to evaluate the diagnostic accuracy, feasibility, and clinical impact of POCUS in identifying thyroid dysfunction in primary care settings.

Methods: A comprehensive search of PubMed, Scopus, Web of Science, and Embase was conducted up to January 2024. Included studies assessed the use of thyroid POCUS by general practitioners or primary care physicians, with reference standards including serum thyroid function tests, radiologist-performed ultrasound, or fine-needle aspiration cytology (FNAC). Methodological quality was assessed using the QUADAS-2 tool. A random-effects meta-analysis was performed to pool sensitivity, specificity, and diagnostic concordance with standard assessments.

Results: Out of 2,415 screened records, 34 studies (n = 8,761 patients) met inclusion criteria. The pooled sensitivity and specificity of POCUS for detecting clinically relevant thyroid abnormalities were 88.3% (95% CI: 84.7–91.1) and 85.2% (95% CI: 80.1–89.3), respectively. When used to triage nodules ≥1 cm, POCUS showed high agreement with radiologist reports ($\kappa = 0.82$). Several studies demonstrated that early POCUS altered management in 29–45% of cases, prompting further investigation or endocrinology referral. Barriers included lack of standardized training and inter-operator variability.

Conclusions: POCUS is a valuable adjunct in the early detection of thyroid dysfunction in primary care. It enhances diagnostic efficiency, facilitates timely referrals, and may reduce unnecessary testing. Standardized training protocols and integration into clinical workflows are necessary for broader adoption. Future studies should evaluate long-term outcomes and cost-effectiveness.

Keywords: Point-Of-Care Ultrasound, Thyroid Dysfunction, Primary Care, Diagnostic Accuracy

PE-2

Artificial Intelligence in Thyroid Ultrasound: A Systematic Review of Diagnostic Algorithms and Accuracy

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Aims: Thyroid nodules are increasingly detected with ultrasound, but inter-observer variability in interpretation remains a challenge. Artificial intelligence (AI), particularly deep learning (DL) and machine learning (ML) algorithms, has emerged as a promising tool to standardize risk stratification and enhance diagnostic accuracy. This systematic review aimed to evaluate the performance of AI algorithms in differentiating benign from malignant thyroid nodules using ultrasound imaging.

Methods: Following PRISMA guidelines, a comprehensive search was conducted across PubMed, Embase, Web of Science, and Scopus databases up to January 2024. Included studies were those employing AI models (including convolutional neural networks, support vector machines, and random forest classifiers) to interpret thyroid ultrasound for malignancy prediction, with histopathology or cytology as reference standards. Study quality was assessed using the QUADAS-AI tool. Pooled sensitivity, specificity, and AUROC were calculated using a random-effects model.

Results: A total of 43 studies (n = 31,202 nodules) met inclusion criteria. Convolutional neural networks (CNNs) were the most frequently used architecture. Pooled sensitivity and specificity for AI-based diagnosis were 91.4% (95% CI: 87.3–94.2) and 87.2% (95% CI: 83.5–90.3) respectively. The pooled AUROC was 0.94, indicating excellent diagnostic performance. Several studies reported that AI models outperformed radiologists, particularly in low-to-intermediate suspicion nodules. Most algorithms demonstrated generalizability across different datasets, though performance declined with poor image quality or small training sets.

Conclusions: AI algorithms, especially deep learning-based models, show high diagnostic accuracy in thyroid nodule classification on ultrasound and may reduce operator dependency and unnecessary biopsies. Integration into clinical workflows, with continued validation across diverse populations and platforms, could revolutionize thyroid imaging and standardize malignancy risk assessment.

Keywords: Artificial Intelligence, Thyroid Nodule, Ultrasound, Deep Learning

PE-3

Ultrasound Risk Stratification Systems (TIRADS) for Thyroid Nodules: A Systematic Review and Diagnostic Accuracy Analysis

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Aims: Thyroid Imaging Reporting and Data System (TIRADS) frameworks have been developed to stratify the malignancy risk of thyroid nodules based on ultrasound features, guiding decisions on fine-needle aspiration (FNA). This systematic review aimed to evaluate and compare the diagnostic accuracy of different TIRADS versions, including ACR-TIRADS, EU-TIRADS, K-TIRADS, and ATA guidelines, in predicting thyroid malignancy.

Methods: A comprehensive search was conducted across PubMed, Embase, Scopus, and Web of Science up to January 2024. Prospective and retrospective studies evaluating at least one TIRADS classification system against histopathological or cytological gold standards were included. Data extraction and quality appraisal followed PRISMA and QUADAS-2 guidelines. Sensitivity, specificity, and area under the ROC curve (AUROC) were pooled using a bivariate random-effects model.

Results: From 4,161 screened records, 54 studies (n = 28,902 nodules) met the inclusion criteria. The pooled AUROC for malignancy detection was 0.89 (95% CI: 0.86–0.92) for

ACR-TIRADS, 0.87 (95% CI: 0.84–0.90) for K-TIRADS, 0.86 (95% CI: 0.83–0.89) for EU-TIRADS, and 0.85 (95% CI: 0.82–0.88) for ATA guidelines. ACR-TIRADS demonstrated the highest specificity (78.2%) while K-TIRADS had the highest sensitivity (90.1%). Stratification performance varied with nodule size and patient age. Heterogeneity was moderate, driven by inter-reader variability and institutional protocols.

Conclusions: Ultrasound-based TIRADS systems are effective tools for thyroid nodule risk stratification, with ACR-TIRADS offering superior overall diagnostic accuracy. While inter-system variability exists, TIRADS improves decision-making and reduces unnecessary biopsies. Standardization of reporting practices and further multicenter validation are recommended to optimize its clinical utility in thyroid cancer screening.

Keywords: Thyroid Nodule, Tirads, Ultrasound Risk Stratification, Diagnostic Accuracy

PE-4

Clinical Characteristics of Thyroid Nodules Detected by Ultrasonography at Large Health Screening Centers in Korea

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Aims: We investigated the prevalence and clinical characteristics of thyroid nodules detected by thyroid ultrasonography (US) at health screening centers in Korea and examined associated metabolic and laboratory parameters.

Methods: From January 2024 to December 2024, a total of 550,858 adults (287,399 men and 263,459 women) underwent thyroid US at KMI (Korea Medical Institute) health screening centers in Korea. Clinical data including anthropometric indices, blood pressure, laboratory values, and thyroid function tests were compared between subjects with and without thyroid nodules.

Results: Thyroid nodules including cysts were identified in 44.6% of men and 52.2% of women. Nodules were more frequently detected in older individuals and in those with metabolic syndrome. Subjects with thyroid nodules had higher body mass index, waist circumference, systolic and diastolic blood pressure, fasting glucose, HbA1c, and lower HDL-cholesterol levels compared with those without nodules. In both sexes, the prevalence of metabolic syndrome was significantly higher in subjects with thyroid nodules (men: 32.3% vs. 27.1%; women: 15.4% vs. 9.3%; $p<0.0001$). Additionally, the number of metabolic syndrome components increased proportionally with the presence of nodules.

Conclusions: The high prevalence of thyroid nodules in individuals undergoing thyroid US at health checkups suggests that increased detection has contributed to the rise in prevalence in Korea. Furthermore, metabolic disturbances, including obesity and insulin resistance, may be closely associated with the development of thyroid nodules.

Keywords: Ultrasonography, Thyroid Nodule, Metabolic Syndrome, Health Screening

PE-5

Comparative Diagnostic Accuracy of Ultrasound-Guided versus Palpation-Guided Fine-Needle Aspiration Biopsy in Detecting Malignancy in Thyroid Nodules: A Comprehensive Systematic Review and Meta-Analysis

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Aims: Fine-needle aspiration biopsy (FNAB) is the primary diagnostic method for evaluating thyroid nodules and distinguishing malignant from benign lesions. While palpation-guided FNAB (PG-FNAB) has been traditionally used, ultrasound-guided FNAB (US-FNAB) offers real-time visualization, potentially improving accuracy. Despite its growing adoption, the comparative effectiveness of US-FNAB versus PG-FNAB in detecting thyroid malignancies remains a topic of discussion. This systematic review and meta-analysis aim to assess and compare the diagnostic performance of these two approaches in identifying malignant thyroid nodules.

Methods: A systematic literature search was conducted across PubMed, Embase, EBSCO, and Cochrane Library databases up to December 2024. Eligible studies comparing

US-FNAB and PG-FNAB for detecting malignant thyroid nodules were included. Data were extracted on sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV). A random-effects model was used to pool the diagnostic performance estimates, and heterogeneity was assessed using the I^2 statistic.

Results: A total of eleven studies were included. US-FNAB demonstrated significantly higher sensitivity (86.4%, 95% CI: 81.2–90.1%) compared to PG-FNAB (73.7%, 95% CI: 67.4–79.1%, $p<0.001$). Specificity was also higher for US-FNAB (93.1%, 95% CI: 89.0–95.7%) than PG-FNAB (87.4%, 95% CI: 82.1–91.0%, $p=0.002$). Regarding predictive values, PPV for US-FNAB was 91.7% (95% CI: 87.3–94.6%), compared to 85.0% (95% CI: 79.2–89.4%) for PG-FNAB ($p=0.01$). Similarly, NPV was significantly higher in US-FNAB (88.5%, 95% CI: 83.1–92.1%) than in PG-FNAB (77.3%, 95% CI: 70.4–82.8%, $p<0.001$), indicating greater reliability in ruling out malignancy.

Conclusions: US-FNAB demonstrates superior sensitivity, specificity, PPV, and NPV compared to PG-FNAB, enhancing diagnostic accuracy in detecting malignant thyroid nodules. These findings support the routine use of ultrasound guidance to improve biopsy precision and patient management.

Keywords: Ultrasound, Palpation-Guided Fine-Needle Aspiration, Malignancy, Thyroid Nodules

PE-6

A Case of Cervical Lymph Node Metastasis from Papillary Thyroid Carcinoma without a Detectable Thyroid Nodule

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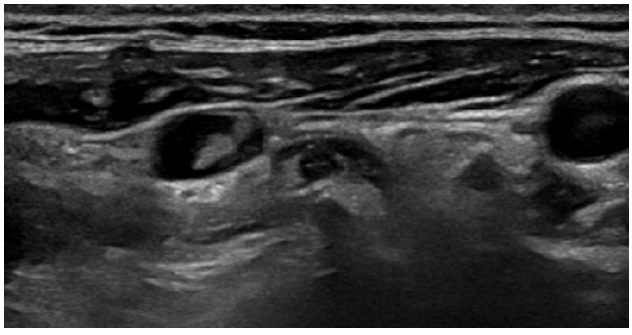
Aims: Cervical lymph node metastasis is common in papillary thyroid carcinoma (PTC), but in most cases, a primary thyroid lesion is detectable on ultrasound. Rarely, PTC may present with metastatic lymph nodes without an identifiable thyroid nodule, posing a diagnostic challenge.

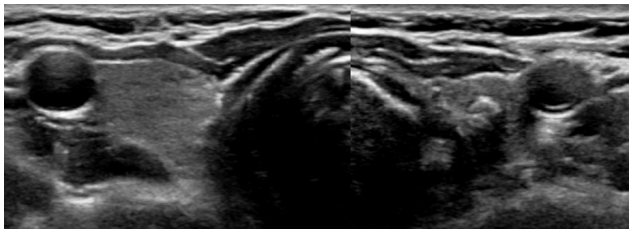
Methods: A 55-year-old woman underwent thyroid ultrasonography as part of a routine health check-up. Although no definite nodule was identified in the right thyroid lobe, a suspicious lymph node was noted in the right level IV cervical region. Ultrasonography revealed cystic changes within the lymph node, along with a round shape, and loss of the fatty hilum.

Results: Ultrasound-guided fine needle aspiration (FNA) of the lymph node was performed. Cytology was consistent with metastatic papillary thyroid carcinoma. Measurement of thyroglobulin (Tg) in the needle washout fluid (Tg-washout) revealed a markedly elevated level (>500 ng/mL), strongly supporting metastatic thyroid origin.

The patient was referred for surgical management under the clinical diagnosis of papillary thyroid carcinoma with occult primary.

Conclusions: This case illustrates an unusual presentation of PTC with cervical lymph node metastasis in the absence of an identifiable primary thyroid tumor. The diagnosis was supported by characteristic cytologic features and a highly elevated Tg level in lymph node aspirate. Such cases emphasize the importance of considering metastatic PTC in patients with suspicious cervical lymphadenopathy, even when thyroid imaging is negative. Measurement of Tg in FNA washout fluid is a valuable adjunct in confirming the thyroidal origin of metastatic disease. Surgical exploration and total thyroidectomy with lymph node dissection remain essential for diagnosis and treatment.





Keywords: Thyroid Carcinoma, Lymphnode Metastais, Thyroglobulin

PE-7

A Case of Diffuse Sclerosing Variant of Papillary Thyroid Carcinoma

Young Sik Choi

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Aims: Papillary thyroid carcinoma (PTC) comprises various histological subtypes, including the classical form and more than 15 subtypes that do not exhibit typical papillary nuclear features. Among them, the diffuse sclerosing variant of PTC (DSPTC) is rare, accounting for less than 6% of all thyroid carcinomas. DSPTC tends to occur in younger individuals, often presents with cervical lymph node metastasis at diagnosis, and is known for its aggressive behavior. Characteristic ultrasonographic findings such as diffuse microcalcifications and fibrosis enable early suspicion and diagnosis.

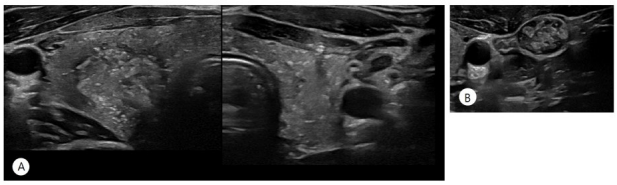
Methods: A 23-year-old man presented to our clinic following a routine health check-up that revealed a TSH level of 9 mIU/L. He was asymptomatic, but ultrasonography was performed to evaluate for Hashimoto's thyroiditis as a possible cause of subclinical hypothyroidism.

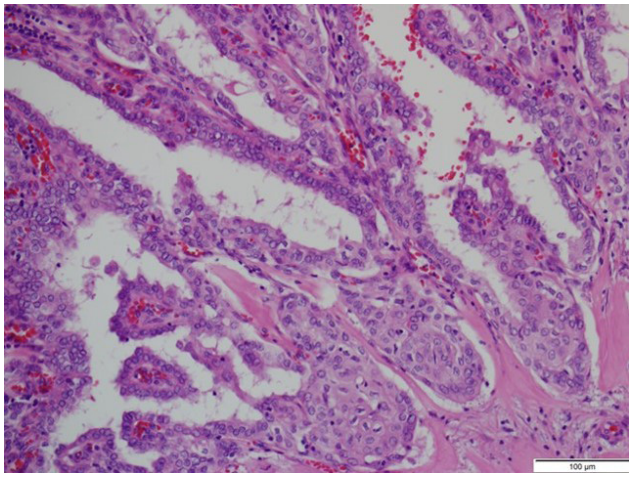
Results: A 23-year-old man presented to our clinic following a routine health check-up that revealed a TSH level of 9 mIU/L. He was asymptomatic, but ultrasonography was performed to evaluate for Hashimoto's thyroiditis as a possible cause of subclinical hypothyroidism. Ultrasound revealed diffuse microcalcifications and heterogeneous hypoechogenicity in both thyroid lobes, along with a suspicious nodule in the right lobe and lateral cervical lymphadenopathy. Fine needle aspiration (FNA) confirmed papillary thyroid carcinoma not only in the right nodule but also in the left lobe, where no distinct nodule was identified. Metastasis to the lateral lymph nodes was also confirmed.

Surgical pathology revealed a tumor measuring 3.3 × 2.4 × 1.8 cm with extrathyroidal extension. Of 45 dissected lymph nodes, 25 showed metastatic involvement

Conclusions: DSPTC is a rare but aggressive subtype of PTC that typically affects young patients and is frequently associated with cervical lymph node metastasis. Since DSPTC often lacks a distinct nodule, cytologic and histopathologic confirmation via FNA or core biopsy is essential. Early recognition of its sonographic patterns and appropriate treatment significantly improve clinical outcomes.

Keywords: Thyroid Carcinoma, Diffuse Sclerosing Subtype, Ultrasound





PE-8

Research Trends on Artificial Intelligence in the Ultrasound-Based Classification of Thyroid Nodules from 2000 to 2024

Hafizh Rizqi[1], Nadyatul Husna[2]

[1]Department of Engineering, Prince Sattam Bin Abdulaziz University, Al Kharj, Saudi Arabia, [2]Internship Dr.Reksodiwiryo Military Hospital Padang, Indonesia

Aims: Thyroid nodules are highly prevalent, and distinguishing betwe-en benign and malignant lesions remains a clinical challenge. Ultrasound is the primary imaging modality for initial evaluation, with classification systems such as TIRADS aiding risk stratification. In recent years, artificial intelligence (AI) has emerged as a promising tool to enhance diagnostic accuracy and reduce operator dependency. This study explores global research trends on the application of AI in the ultrasound-based classification of thyroid nodules.

Methods: A bibliometric analysis was conducted using the Scopus database for publications between 2000 and 2024. Search terms. Bibliometric indicators analyzed included

publication volume over time, top contributing countries and institutions, frequently cited journals, and keyword co-occurrence networks were analyzed using VOSviewer and BiblioMetrix.

Results: The number of publications increased significantly after 2016, with rapid acceleration in the past five years. China, the United States, and South Korea were leading contributors. Key research topics included automated TIRADS classification, convolutional neural networks for ultrasound image interpretation, and integration of elastography data. High-frequency keywords highlighted trends such as "deep learning", "computer-aided diagnosis", and "image segmentation". Collaborative networks showed increasing international partnerships, particularly among institutions with radiology and AI expertise.

Conclusions: This study demonstrates a growing global interest in integrating AI into thyroid ultrasound diagnostics. The trend reflects a shift toward more objective, consistent, and scalable approaches in nodule classification. Future research is likely to focus on clinical validation, real-world implementation, and explainable AI to enhance adoption in routine practice.

Keywords: Artificial Intelligence, Research Trends, Ultrasound, Thyroid Nodules

PE-9

Echoes of Precision: Ultrasound Innovations in Thyroid Nodule Risk Stratification

Arul Akash S, Madhumitha A

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Aims: To review how ultrasound (US) technologies—including cutting-edge modalities like radiomics and elastography—are developing in the evaluation, risk assessment, and treatment of thyroid nodules, with an emphasis on clinical utility and diagnostic precision.

Methods: A systematic review of peer-reviewed literature was conducted using PubMed, Embase, Web of Science, and Cochrane Library databases. Studies included conventional US, Doppler imaging, US-guided fine-needle aspiration (FNA), US elastography, radiomics, and computer-aided diagnostic (CAD) systems such as S-Detect. Both retrospective and prospective studies involving benign and malignant thyroid nodules were analyzed, with particular attention to nodules ≤5 mm.

Results: The primary imaging technique for evaluating thyroid nodules is ultrasound. While more sophisticated techniques like speckle tracking, color Doppler, and elastography increase specificity for malignancy, conventional B-mode US is still necessary for morphology-based risk assessment. High diagnostic value was shown by elastography, especially in solid nodules with unclear cytology. Through the quantification of image features and the reduction of operator dependency, radiomics and CAD systems further improve diagnosis accuracy. Notably, size changes rarely affected clinical outcomes in nodules ≤5 mm, indicating that routine US monitoring would be an adequate first line of treatment. In order to inform biopsy decisions, recent guidelines support the use of stratification systems such as TI-RADS.

Conclusions: When it comes to thyroid nodule management, ultrasound is essential for diagnosis, follow-up, and therapy planning. Particularly for nodules with unclear cytology, innovations like US elastography and radiomics provide promising, non-invasive improvements to traditional US. CAD system integration could enhance early detection and further optimize operations. To maximize results and minimize needless interventions, US-based techniques must be continuously improved.

Keywords: Fine-Needle Aspiration (FNA), Ultrasound Elastography, Thyroid Ultrasonography, B-Mode Ultrasound

PE-10

Minimally Invasive Management of Benign Thyroid Nodules: The Power of Ultrasound-Guided Ablation

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Aims: To investigate the potential of ultrasound-guided ablation techniques, such as ethanol ablation (EA), radiofrequency ablation (RFA), and laser ablation (LA), as alternatives to traditional surgical management for benign thyroid nodular disease, and to assess their clinical

applicability, safety, and effectiveness.

Methods: A systematic review conducted using databases including PubMed, Embase, Web of Science, and Cochrane Library. Inclusion criteria encompassed randomized controlled trials, cohort studies, and meta-analyses evaluating ultrasound-guided ablation techniques for benign thyroid nodules. Key outcome measures included volume reduction ratio (VRR), symptom and cosmetic improvement, complication rates, and need for repeat interventions or surgery. Data synthesis focused on comparative outcomes between EA, RFA, LA, and conventional treatments.

Results: Included were 36 trials with more than 4,000 patients. With a pooled VRR of about 84% and a low complication rate of about 0.5%, EA demonstrated significant efficacy in treating cystic nodules. When applied to solid nodules, RFA and LA consistently produced >50% VRR and long-lasting symptom alleviation. In big nodules, RFA had the best long-term efficacy with the fewest side effects and consistency. The majority of treatments were carried out in outpatient settings with intact thyroid function, and the rates of complications were substantially lower than those of surgery across all modalities.

Conclusions: Techniques for ultrasound-guided ablation provide certain patients with benign thyroid nodules with safe, efficient, and minimally invasive alternatives to surgery. In situations that are carefully chosen, these methods are an appealing first-line alternative since they decrease nodule volume, alleviate symptoms, and maintain thyroid function. To encourage broad use, however, long-term outcome data and standardized treatment regimens are still required.

Keywords: Ethanol Ablation, Radiofrequency Ablation, Laser Ablation, Minimally Invasive

[Vascular]

PE-1

Ultrasound-Guided Vascular Access in Critical Care: A Systematic Review of Success Rates and Complications

Lok Ranjan Rajmohan

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Aims: Vascular access is a critical procedure in the management of critically ill patients, with central and peripheral catheterization required for drug delivery, monitoring, and resuscitation. Ultrasound-guided (USG) vascular access is increasingly used to improve success rates and reduce complications. This systematic review aimed to evaluate the effectiveness and safety of USG vascular access in critically ill patients, compared to landmark-based techniques.

Methods: We conducted a comprehensive literature search of PubMed, Embase, Scopus, and Web of Science up to January 2024. Randomized controlled trials (RCTs), observational studies, and meta-analyses comparing ultrasound-guided to landmark-based vascular access in adult ICU patients were included. Outcomes analyzed included first-attempt success rate, total success rate, procedure time, and complications such as arterial puncture, hematoma, and pneumothorax. Study quality was assessed using the Cochrane RoB2 and ROBINS-I tools, and results were synthesized using a random-effects meta-analysis model.

Results: From 3,244 screened articles, 47 studies (n = 11,263 procedures) met inclusion criteria. USG significantly improved first-attempt success rate (82.4% vs. 65.8%, RR 1.26; 95% CI: 1.18–1.33) and overall success rate (95.1% vs. 86.6%). Complication rates were significantly lower with USG, including reduced arterial puncture (2.4% vs. 7.8%, $p<0.01$) and pneumothorax (0.4% vs. 1.7%). Procedure time was shorter with experienced operators, particularly for internal jugular vein cannulation. Heterogeneity was moderate, largely due to variability in operator expertise and site of access.

Conclusions: Ultrasound-guided vascular access in critically ill patients significantly improves first-pass and overall success rates while reducing procedural complications. It should be considered the standard of care in intensive care settings. Wider adoption requires structured training and protocol standardization to ensure consistent safety and efficacy across healthcare systems.

Keywords: Ultrasound-Guided Access, Central Venous Catheterization, Critical Care, Vascular Complications

PE-2

Role of Doppler Ultrasound in Diagnosing Deep Vein Thrombosis: A Systematic Review

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Aims: Deep vein thrombosis (DVT) is a potentially life-threatening condition with significant morbidity due to its association with pulmonary embolism. Doppler ultrasound (US), especially compression ultrasonography with color flow and spectral Doppler, is widely used as the first-line imaging modality for DVT diagnosis. This systematic review aimed to evaluate the diagnostic accuracy and clinical effectiveness of Doppler US in diagnosing lower extremity DVT compared to the gold standard of venography or clinical outcomes.

Methods: A systematic search of PubMed, Scopus, Embase, and Web of Science databases was conducted up to January 2024, adhering to PRISMA guidelines. Eligible studies included adult patients with suspected lower limb DVT assessed by Doppler US, with confirmation by contrast venography, CT/MR venography, or long-term clinical follow-up. Quality was assessed using the QUADAS-2 tool, and pooled sensitivity, specificity, and diagnostic odds ratios were computed using a bivariate random-effects model.

Results: From 3,758 initial records, 52 studies (n = 22,947 patients) were included. Pooled sensitivity and specificity of Doppler US for proximal DVT were 94.2% (95% CI: 91.8–96.0) and 93.8% (95% CI: 91.2–95.7), respectively. For isolated distal DVT, sensitivity was lower at 72.5%, though specificity remained high. Compression ultrasonography alone showed similar diagnostic performance compared to full Doppler protocol. Operator expertise and use of whole-leg vs. limited US protocols contributed to heterogeneity.

Conclusions: Doppler ultrasound is a highly accurate, non-invasive, and widely accessible diagnostic tool for proximal DVT, with performance comparable to invasive venography. While sensitivity for distal DVT is lower, its excellent specificity supports its role as a frontline modality. Standardized scanning protocols and operator training are essential to maximize diagnostic accuracy and reduce false negatives.

Keywords: Doppler Ultrasound, Deep Vein Thrombosis, Compression Ultrasonography, Vascular Imaging

PE-3

Global Trends in Vascular Ultrasonography Research over the Past Two Decades

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Aims: Vascular ultrasonography is a critical clinical application of ultrasound technology, widely used for the diagnosis and monitoring of vascular disorders, including both arterial and venous diseases. With continuous advancements in imaging techniques, understanding the research landscape in this field is essential for guiding future developments.

Methods: This study aimed to assess global research trends in vascular ultrasonography using a bibliometric approach. Data were collected from the Scopus database covering the period from 2000 to 2024. The search strategy employed combinations of keywords. The analysis included publication output per year, leading countries and institutions, top publishing journals, international collaboration networks, and frequently occurring keywords.

Results: The findings revealed a significant increase in the number of publications over the past two decades, with the United States, China, and the United Kingdom identified as the top contributing countries. Frequently studied topics included early detection of atherosclerosis, evaluation of deep vein thrombosis, and postoperative monitoring of vascular grafts. Collaboration network visualizations showed a growing pattern of international cooperation, particularly between developed and developing nations.

Conclusions: This bibliometric study provides a comprehensive overview of the dynamics and focus areas of research in vascular ultrasonography. The findings may serve as a reference for future research planning and technological development in vascular imaging and related clinical practices.

Keywords: Global Trends, Vascular Ultrasonography

PE-4

AI-Driven Inference of Cell-Free Fetal DNA Fragmentation from Raw Ultrasound RF Signals: A Novel Framework for Non-Invasive Placental Genomic Mapping

Elfiany Syafruddin[1], Sahnaz Vivinda Putri[2], Rini Winarti[3], Andi Nursanti[4], Prihantini[5], Rifaldy Fajar[5]

[1]Computational Science Research Laboratory, BLK Muhammadiyah University, Indonesia; [2]Health Management Laboratory, International University Semen Indonesia, Indonesia; [3]Department of Biology, Yogyakarta State University, Indonesia; [4]Department of Pharmacy, Wallacea University, Indonesia; [5]Mathematical and Computational BioMedicine Research Group, The Integrated Mathematical, Computational, and Data Science for BioMedicine Research Community Foundation, Indonesia

Aims: Cell-free fetal DNA (cffDNA) is central to non-invasive prenatal testing (NIPT), although current approaches depend on blood sampling and molecular laboratory infrastructure, limiting accessibility. Acoustic signatures from placental tissue, specifically within the intervillous space, may reflect underlying biological processes such as trophoblast turnover and DNA release. We hypothesized that spectral features of raw ultrasound radiofrequency (RF) signals could be leveraged to infer cffDNA fragmentation profiles, including fetal fraction and segmental CNVs. This study presents a novel AI-based framework to predict placental fragmentomic signatures directly from ultrasound data.

Methods: Raw B-mode ultrasound frames and signal data were sourced from the Ultrasound Nerve Segmentation Dataset (Kaggle) and repurposed to simulate placenta-relevant spectral harmonics. Echogenicity maps were derived from placental morphometric data in the NIH Human Placental Atlas Project and supported by structural profiles from placental imaging studies. For ground-truth genomic features, we used cffDNA datasets from GEO and dbGaP, including fragment size distributions, fetal fraction, GC content, and CNV annotations from shallow whole-genome sequencing. A Dual-Branch Spectral Transformer (DBST) model was trained: one branch processed simulated RF signals using spectral attention over STFTs, while the other used 3D CNNs on echogenicity maps. Outputs were fused to predict fragment density, fetal fraction (%), and CNV likelihoods. Limitations include the absence of direct placental RF datasets and unpaired imaging-genomic records.

Results: The model predicted cffDNA fragment lengths with RMSE of 9.3 bp (95% CI: 8.6–10.1) and fetal fraction with MAE of 1.9% (95% CI: 1.5–2.2%), outperforming existing ultrasound-only benchmarks. Detection of segmental CNVs larger than 5 Mb achieved an AUC of 0.83, precision 76.4%, recall 79.1%, and F1-score 0.776. Specific detection of clinically significant CNVs, such as 22q11.2 deletion, yielded a specificity of 90.8% and PPV of 84.2%. Model confidence improved with advancing gestational age, especially beyond 24 weeks, where spectral differentiation of tissue patterns became more distinct. Accuracy improved with gestational age, and mean inference time was 4.5 seconds per subject on a single A100 GPU.

Conclusions: This model infers cffDNA fragmentation from ultrasound alone, enabling blood-free, lab-independent genomic screening. It offers a practical step toward accessible, non-invasive prenatal care.

Keywords: Cell-Free Fetal DNA (CFFDNA), Ultrasound Radiofrequency (RF) Signals, Non-Invasive Prenatal Testing (NIPT), Deep Learning

PE-5

A Rare Case of Arteriovenous Fistula after Endovenous Laser Ablation for Saphenous Vein Reflux

Sangchul Yun

Department of Transplantation and Vascular Surgery, Soonchunhyang University Seoul Hospital, Seoul, Republic of Korea

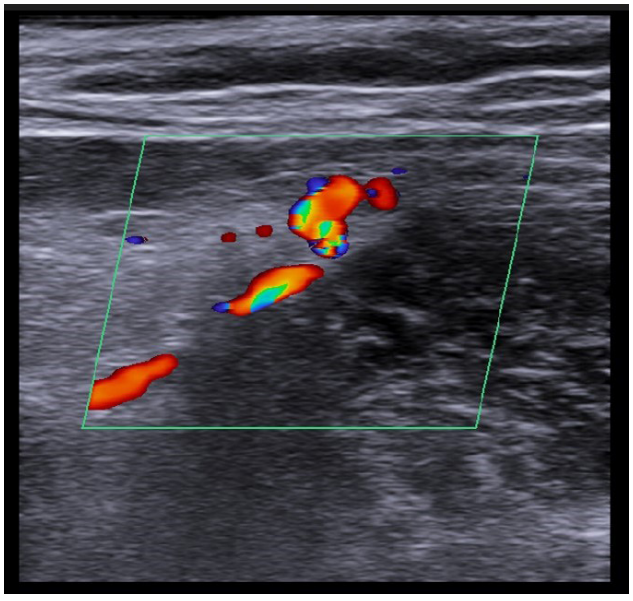
Aims: Main sequence of endovenous laser ablation for saphenous vein is thrombosis and thermal coagulation. Inflammation and high temperature could affect surrounding tissue such as nerve, artery and lymphatics. We present a rare case of arteriovenous fistula, which was developed at saphenous vein stump after endovenous laser ablation.

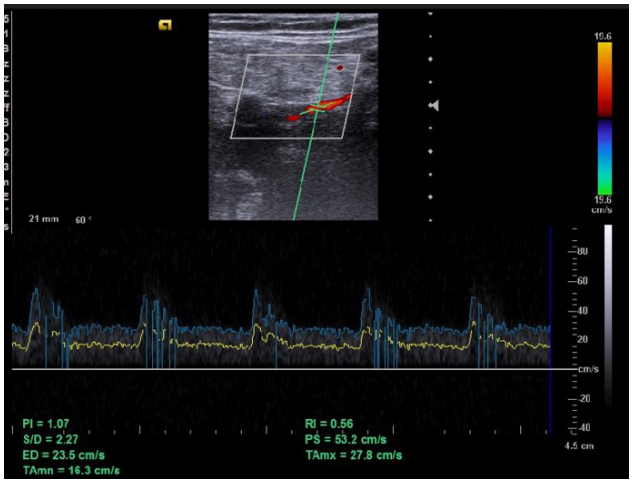
Methods: 71-year-old female patient suffered from both legs swelling for 3 years. The patient received EVLA for both GSV 1 year ago, using 1470 nm laser. Both GSV was successfully occluded without EHIT. However, the leg swelling was persistent. Leg swelling study was normal. Doppler ultrasound at both legs showed arteriovenous fistula formation at right saphenous vein stump. Selective

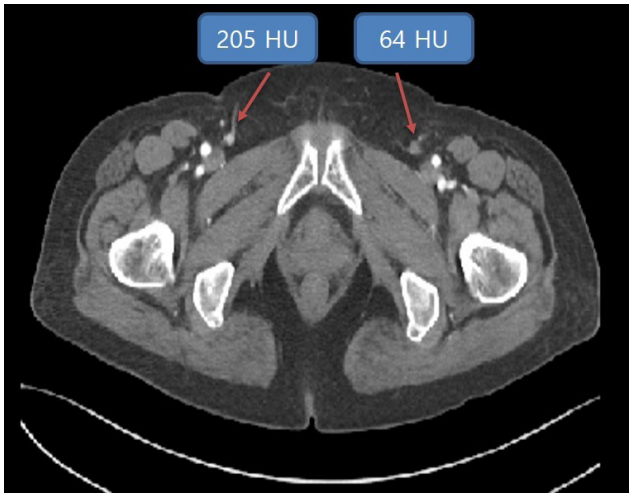
angiography showed multiple feeded AV fistula.

Results: After glue and coil embolization were performed, there was no more flow at the right saphenous vein stump. The leg swelling was improved temporarily but recurred after 2month. The patient got used to wearing compressive stocking. The leg swelling was somewhat controlled but not improved completely.

Conclusions: Leg swelling cannot be improved after varicose vein treatment. Treatment of AV fistula was also not effective for leg swelling. There was not any other cause of leg swelling in this patient, so the patient was treated under the diagnosis of chronic venous insufficiency. Tumescent solution may be needed in thermal laser ablation to protect adjacent structures.







Keywords: Arteriovenous Fistula, Endovenous Laser Ablation, Saphenous Vein, Varicose Vein

PE-6

Global Research Trends on Deep Vein Thrombosis: A Bibliometric Analysis with Clinical Implications for Vascular Ultrasound

Nadyatul Husna[1], Hafizh Rizqi[2]

[1]Internship Dr.Reksodiwiryo Military Hospital Padang, Indonesia; [2]Department of Engineering, Prince Sattam Bin Abdulaziz University, Al Kharj, Saudi Arabia

Aims: Deep vein thrombosis (DVT) is a serious vascular condition characterized by the formation of blood clots in deep veins, most commonly in the lower limbs. It poses significant risks, including pulmonary embolism, if not diagnosed promptly. Vascular ultrasound, particularly compression ultrasonography, plays a central role in the non-invasive diagnosis of DVT. Understanding the global research landscape surrounding DVT can provide valuable insights into scientific trends, clinical focus areas, and gaps in knowledge.

Methods: A bibliometric analysis was conducted using the Scopus database to retrieve relevant literature on DVT published between 2000 and 2024. Search terms included "deep vein thrombosis", "venous thromboembolism", and "ultrasound". The analysis included publication trends, prolific countries and institutions, influential journals, international collaborations, and keyword

co-occurrence. Visualization tools such as VOSviewer were used to map bibliographic networks.

Results: The volume of publications on DVT has shown steady growth over the past two decades, with a marked increase in the last ten years. The United States, the United Kingdom, and China emerged as the most productive countries. High-impact journals publishing DVT-related research included *Thrombosis Research*, *Journal of Thrombosis and Haemostasis*, and *Ultrasound in Medicine and Biology*. Major research themes identified through keyword analysis were early diagnosis using ultrasound, DVT prophylaxis in orthopedic surgery, and thrombotic complications in COVID-19 patients. The co-authorship analysis revealed increasing global collaboration, particularly among institutions in North America and Europe.

Conclusions: This bibliometric study highlights the evolving research focus on DVT, emphasizing the central role of vascular ultrasound in its clinical management. The findings reflect growing international interest and collaboration in thrombosis research and underline the importance of continued innovation in diagnostic imaging and risk stratification strategies.

Keywords: Clinical Implications, Deep Vein Thrombosis, Global Research Trends, Vascular Ultrasound

PE-7

Imaging the Invisible: Advanced Ultrasound and MRI Techniques in Stroke and Atherosclerosis Risk

Arul Akash S, Gayathri Saravanan

ACS Medical College and Hospital, India

Aims: This systematic review discusses recent developments in vascular imaging, in particular shear wave elastography (SWE), contrast-enhanced ultrasound (CEUS), three-dimensional ultrasound (3DUS), and phase-contrast MRI. They are then assessed for clinical applicability for arterial stiffness, vascular elasticity, and plaque vulnerability, paying particular attention to diagnostic performance, into routine cardiovascular risk stratification and cerebrovascular disease management.

Methods: A comprehensive literature search was conducted across PubMed, Scopus, Embase, and IEEE databases, covering human and non-human studies using ultrasound-based elastography and advanced vascular imaging techniques. The studies were assessed for diagnostic quality using the QUADAS-2 tool, and pilot study results were included when available. Modalities such as SWE, CEUS, 3DUS, and phase-contrast MRI were analyzed based on technical feasibility, diagnostic accuracy, measurement protocols, and reproducibility.

Results: Despite significant variation in elasticity values reported across research, many review papers have established that SWE may accurately quantify carotid stiffness, clinically correlate STS, identify plaque kinds, and correlate plaque features. While 3DUS offered better visualization of vessel shape and flow, CEUS showed promise for evaluating microvascular neovascularization. Phase-contrast MRI showed promise in MR elastography and enabled precise flow estimation in the heart, brain, and systemic arteries. data on brain elasticity and artery wall stiffness in real time utilizing cutting-edge technology like time-harmonic elastography and ultrafast echography. However, a significant obstacle to clinical adoption is the lack of a defined imaging protocol.

Conclusions: Both SWE and CEUS grow to become important in early discovery and risk stratification of vascular diseases, comprising atherosclerosis and stroke. These modality afford direct, quantitative assessment of arterial stiffness and plaque components. Phase-contrast MRI expands these insights by providing measures of flow dynamics and stiffness in tissues. Despite technical differences and absence of standardized protocols, these tools have the potential to transform cardiovascular diagnostics. In both clinical and research areas, a multimodal approach well-suited for vascular assessment should include ultrasound-based elastography, CEUS.

Keywords: Brain Stiffness, Hypercapnia, Intracranial Pressure, Time-Harmonic Elastograph

PE-8

Role of Contrast-Enhanced Ultrasound in the Detection of Hepatic Artery Thrombosis and Vascular Complications Post-Liver Transplantation

Nagaraj S, Arul Akash S

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Aims: To systematically evaluate the diagnostic performance and clinical value of CEUS in the surveillance of liver transplant grafts, particularly in detecting vascular complications such as HAT.Hepatic artery thrombosis (HAT) and other vascular complications are among the most serious threats to graft and patient survival after liver transplantation. While Doppler ultrasound is the initial surveillance tool, its limitations in specificity necessitate adjunctive imaging modalities. Contrast-enhanced ultrasound (CEUS) has emerged as a promising tool for evaluating graft perfusion and guiding clinical decisions.

Methods: A comprehensive review of published studies from 2005–2023 was conducted using PubMed and Scopus databases. Studies involving CEUS for post-liver transplant vascular assessment, including living donor and deceased donor transplants, were included. Diagnostic accuracy, sensitivity, specificity, positive and negative predictive values, and clinical outcomes were analyzed. Additional emphasis was placed on comparative performance with Doppler US and its role in altering clinical workflows.

Results: CEUS demonstrated high diagnostic accuracy for detecting HAT, with pooled sensitivity and specificity of 100% and 96.9%, respectively. It reduced unnecessary angiographic procedures in patients with suspected but ultimately excluded HAT. CEUS enabled real-time perfusion assessment and improved early diagnosis of complications like splenic artery steal syndrome and delayed perfusion. Its bedside availability and radiation-free nature added practical benefits over CT/MRI. Doppler ultrasonography remained useful for routine screening, while CEUS provided crucial confirmatory detail.

Conclusions: CEUS is a highly effective, safe, and non-invasive modality for graft surveillance in liver transplantation. It significantly enhances diagnostic confidence following inconclusive Doppler findings and helps avoid unnecessary invasive investigations. CEUS should be considered a first-line adjunct in post-transplant vascular complication assessment protocols.

Keywords: Contrast-Enhanced Ultrasound, Liver Transplant, Graft Surveillance, Hepatic Artery Thrombosis

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CV, cardiovascular; **SCIE**, Science Citation Index Expanded; **R&D**, research and development

Ref 1) UBIST D1 outpatient prescription sales data in 2024. **2)** Kim BK, et al. *Lancet*. 2022 Jul;400(10349):380-390.

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3. Treatment of Gastric Ulcer
4. Eradication of *H. pylori* concurrently given with appropriate antibiotic therapy treatment in patients with peptic ulcer and/or chronic atrophic gastritis
5. Maintenance of Healing of Erosive Gastroesophageal Reflux Disease – 25mg once daily

[References] **1.** Han S, et al. Aliment Pharmacol Ther. 2019;50(7):751-759 **2.** K-CAB® tablet prescribing information(2023.11.30) **3.** K-CAB® orally disintegrating tablet prescribing information(2023.4.17)

* Please scan the QR code for more detailed prescribing information.

K-CAB® tablet 25mg | K-CAB® tablet 50mg | K-CAB® orally disintegrating tablet 50mg

ínno.N HK inno.N Corporation | 239, Osongsaengmyeong 2-ro, Osong-eup, Heungdeok-gu, Cheongju-si, Chungcheongbuk-do, Republic of Korea
Seoul office: Pine Avenue Tower A, 100, Eulji-ro, Jung-gu, Seoul, Republic of Korea | 080-700-8801 | http://www.inno-n.com

BORYUNG | 136, Changgyeonggung-ro, Jongno-gu, Seoul, Republic of Korea | 080-708-8088

K-CAB 케이캡 50mg 25mg

240228 KCA-GRAD22-352-01

GODEX® cap.

Confidence for MASLD treatment

Evidenced by numerous clinical results

- ✓ Restoration of Hepatic Mitochondrial Dysfunction by Carnitine Complex[1]
- ✓ Rapid Normalization of ALT Level[2]
- ✓ Improving effect for MASLD as Evidenced by CT scans[2]

Product Information

Description | Reddish brown colored hard gelatin capsule containing yellowish brown colored powder | **Composition** | Each capsule contains Carnitine Orotate 150mg (73.8mg as orotic acid, 76.2mg as carnitine), Liver Extract Antitoxic fraction 12.5mg, Adenine HCl 2.5mg, Pyridoxine HCl 25mg, Riboflavin 0.5mg, Cyanocobalamin 0.125mg, Biphenyl dimethyl dicarboxylate 25mg | **Indication** | 1) General therapeutics for the following hepatic disease – Acute, Subacute and Chronic Hepatitis, Hepatic cirrhosis, Fatty liver, Drug or chemical induced hepatitis 2) Acute, chronic hepatitis involving high transaminase value | **Dosage & Administration** | Usually, each time 2 capsules, 2~3 times a day as adult dosage. Dosage unit can be changeable depending on symptom or age of patient. | **Special caution** | 1) Severe state of chronic hepatitis 2) Severe state of hapatic cirrhosis | **General caution** | 1) Rarely skin rash can be represented, in this case general antihistamin therapy will be required. 2) In severe case, sometimes intermittent jaundice can be occur in this case, discontinue administration for awhile and other adjuvant therapy for jaundice shall be required. 3) Rarely nausea, gastric discomfortness can be represented. 4) Rarely itching or reddness can be occur, in this case, discontinue administration and follow physician's instruction. | **Insurance Code** | 693900080 | **Packing Unit** | 100, 300 caps. (bottle)/ 100 caps. (PTP) | **Storage** | Tight closed container, room temperature (1~30°C) in dry place. Expiry – 60 months from Manufacturing date.

Diagnostic Codes

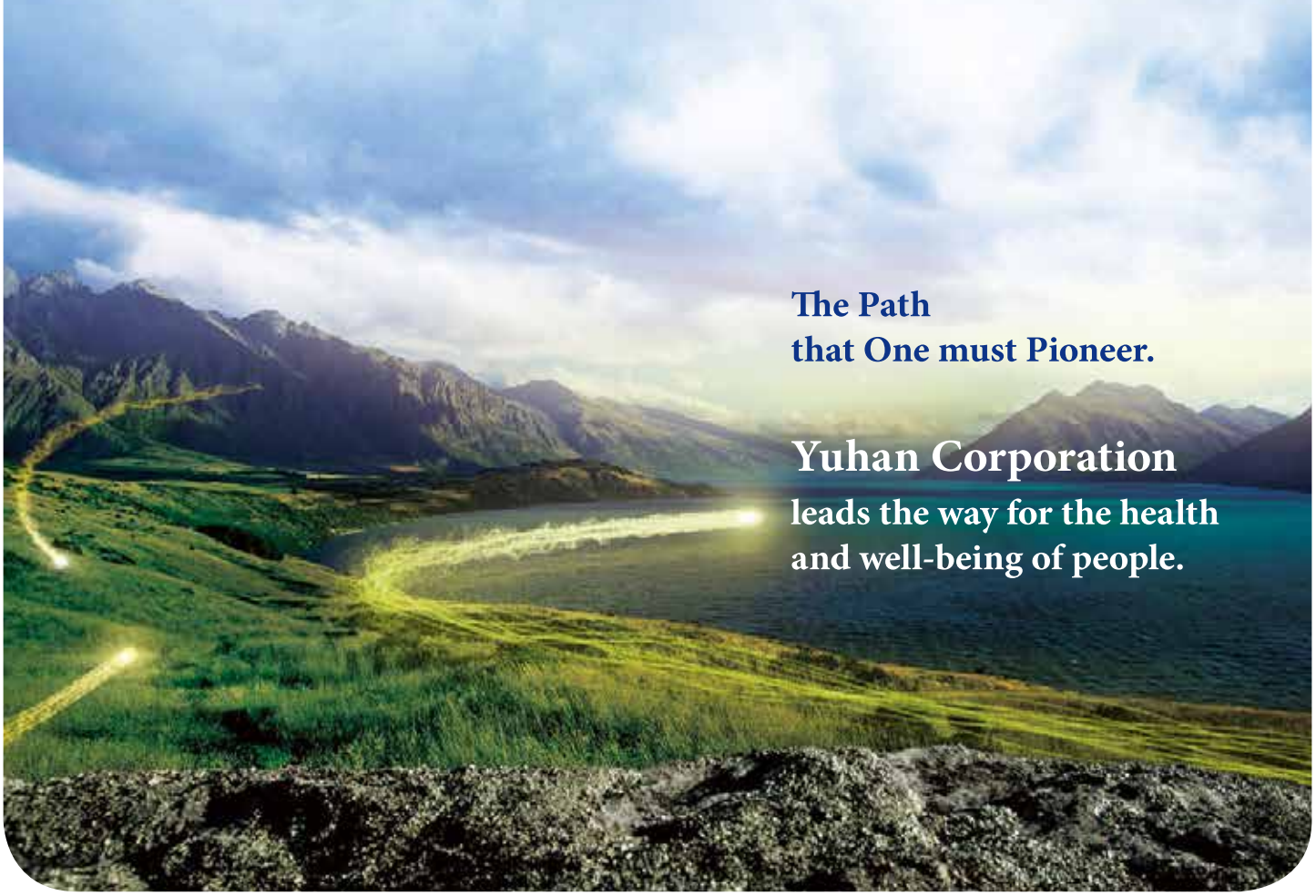
B15–19 Viral hepatitis **K70.0** Alcoholic fatty liver **K71.0** Toxic liver disease **K73.0** Chronic persistent hepatitis, NEC **K74.0** Hepatic fibrosis **K75.8** Other specified inflammatory liver disease, Nonalcoholic steatohepatitis **K77.0** Liver disorders in disease classified elsewhere

Reference 1. Lim CY et al., Effects of carnitine on peripheral blood mitochondrial DNA copy number and liver function in non-alcoholic fatty liver disease, *Korean J Gastroenterol 2010;55:384-389.*
2. Bae JC et al., Improvement of nonalcoholic fatty liver disease with carnitine-orotate complex in type 2 diabetes (CORONA), *Diabetes Care 2015;38:1245-1252.*

CELLTRION PHARM CELLTRION **Domestic Business Division** 82, 2sandan-ro, Ochang-eup, Cheongwon-gu, Cheongju-si, Chungcheongbuk-do, Republic of Korea **Service Center** +82-80-850-3611~2 www.celltrionph.com
CKD Pharm **Seoul Headquarters** 8, Chungjeong-ro, Seodaemun-gu, Seoul, Korea

GODEX® cap.

OT2025-20



The Way of Yuhan

Yuhan Corporation, a group loved by the people and grown together with the people
For the last 90 years, the corporate culture of honesty and integrity,
and the strong beliefs in social responsibility are what made Yuhan what it is today.

Looking back on the path that we moved on and thinking of the path ahead,
Yuhan will make the leap as a global pharmaceutical company through innovative new drug development,
and by enabling healthiness and happiness for all the people in the world.

In the next 100 years, Yuhan Corporation will follow the noble spirit of our founder, Dr. New Ilhan,
and write the history of challenge and development moving forward.

Our challenge has already begun.

YUHAN

VMA-23D008

Vemlia

tenofovir alafenamide 25mg tabletes

B형 간염 치료를 향한 진심,

베믈리아에 담아 동아ST가 선생님들께 다가갑니다.

TDF제제 대비 비열등한 항바이러스 효과[1]

TDF제제로 감소한 BMD, CrCL 호전[2]

2,474원의 저렴한 약가[3]

요일약통 적용을 통해 복약순응도 개선 기여[4]

1. Agarwal K, et al. J Hepatol. 2018, 68, 672–681
2. Lampertico P, et al. Lancet Gastroenterol Hepatol. 2020 May;5(5):441-453.
※ 상기 자료는 타사 제제(테노포비르알라페나미드헤미푸마르산염)로 실시한 임상자료입니다
3. https://www.health.kr/searchDrug/result_drug.asp?drug_cd=2022122100010 약학정보원, 베믈리아 의약품 상세정보, accessed on April 2023
4. Vervloet M, et al. J Am Med Inform Assoc 2012;19(5):696-704.

동아ST

GODEX® cap.

Carnitine Complex의
MASLD 치료 효과

Beyond ALT/AST normalization effect

- ✓ Carnitine 성분의 **미토콘드리아 회복** 효과[1]
- ✓ 영상학적으로 입증된 **지방간 개선**효과[2]
- ✓ **인슐린 저항성 개선**효과[2]

고덱스®캡슐

| 성상 | 황갈색의 분말이 들어있는 상 · 하 적갈색 불투명의 경질캡슐제 **| 성분함량 |** 1캡슐 중 Carnitine orotate 150mg Liver extract antitoxic fraction 12.5mg Pyridoxine HCl 25mg Riboflavin 0.5mg Cyanocobalamin 0.125mg Biphenyl Dimethyl Dicarboxylate 25mg Adenine HCl 2.5mg **| 효능·효과 |** 트란스아미나제(SGPT)가 상승된 간질환 **| 용법·용량 |** 통상 성인 1회 2캡슐, 1일 2~3회 복용. 연령, 증상에 따라 적의 증감. **| 사용상의 주의사항 |** 1. 다음 환자는 투여하지 말 것. 1) 이 약 및 이 약에 포함된 성분에 과민반응이 있는 환자 2) 레보도파를 투여 받고 있는 환자 2. 다음 환자는 신중히 투여할 것. 1) 만성 활동성 간염 환자 2) 간경화 환자 3. 이상반응 1) 간혹 입안마름, 메스꺼움, 발진, 가려움증, 발적 등이 생길 수 있으며, 이러한 이상반응은 투약을 중지하거나 항과민약을 병용 투여하면 소실된다. 2) 일과성 황달이 나타날 수 있으나 투약을 중지하거나 황달치료제를 병용투여하면 소실된다. 3) 드물게 구역, 복부팽만, 변비, 메스꺼움, 상복부 불쾌감이 나타날 수 있다. **| 보험코드 |** 693900080 **| 포장단위 |** 100캡슐, 300캡슐(병) / 100캡슐(PTP) **| 저장방법 |** 기밀용기, 실온보관(1~30°C)

고덱스®캡슐 상병코드

B15-19 바이러스성 간염(Viral hepatitis) **K70.0** 알코올성 지방간(Alcoholic fatty liver) **K71.0** 독성 간질환(Toxic liver disease) **K73.0** 달리 분류되지 않은 만성 지속성 간염(Chronic persistent hepatitis, NEC) **K74.0** 간섬유증(Hepatic fibrosis) **K75.8** 기타 명시된 염증성 간질환, 비알코올성 지방간염(Other specified inflammatory liver disease, Nonalcoholic steatohepatitis) **K77.0** 달리 분류된 질환에서의 간장애(Liver disorders in disease classified elsewhere)

Reference 1. Lim CY et al., Effects of carnitine on peripheral blood mitochondrial DNA copy number and liver function in non-alcoholic fatty liver disease, *Korean J Gastroenterol 2010;55:384-389.*
2. Bae JC et al., Improvement of nonalcoholic fatty liver disease with carnitine-orotate complex in type 2 diabetes (CORONA), *Diabetes Care 2015;38:1245-1252.*

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OT2025-13

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☑ Effective immediately

☑ Comfortable

※ 부작용이 있을 수 있으니, 첨부된 '사용상의 주의사항'을 잘 읽고, 의사·약사와 상의하십시오.

놀텍정 놀텍플러스정

BORYUNG

Oral Suspension Megace® F

(megestrol acetate, USP)

Reformulation of MG OS by utilizing NanoCrystal® Technology.
50 times smaller particles increased surface area

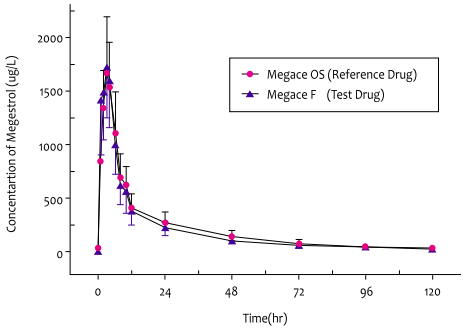
rapid dissolution & increased absorption.
Improved bioavailability

I. Originality

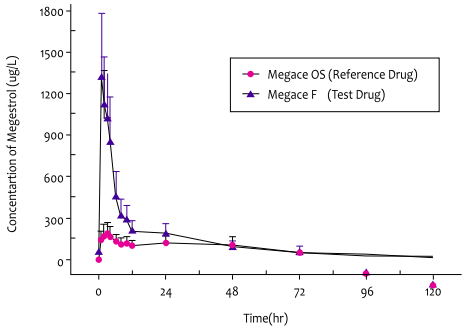
- licensed the Megace® name from Bristol-Myers Squibb Company
- High Quality

II. Improved Bioavailability!

*** Food effect differences between a nanocrystal dispersion of megestrol acetate 625 mg/5 mL and a micronized formulation of megestrol acetate oral suspension(MGOS) 800 mg/20 mL. ***



[Fed condition]



[Fasting condition]

In-house data(Boryung pharm)

III. Improved Efficacy!

- Weight gain occurred more rapidly at each time point
- Patients in the nanocrystal dispersion arm gained an average of 10% of the baseline weight over 12 weeks (Vs 6% weight gain in MG OS arm)

International Journal of Nanomedicine 2009:4 185–192

IV. Improved Convenience!

	Megace F-OS	Megace-OS
Recommended dose [1,17]	1 teaspoon 625 mg/5mL	4 teaspoon 800 mg/20mL
Viscosity[5]	10 cP*	163 cP*

*cP=centipose, a measure of viscosity, with higher numbers indicating greater viscosity.

- 1/4 the total volume per dose
- 94% less viscous → easier to take

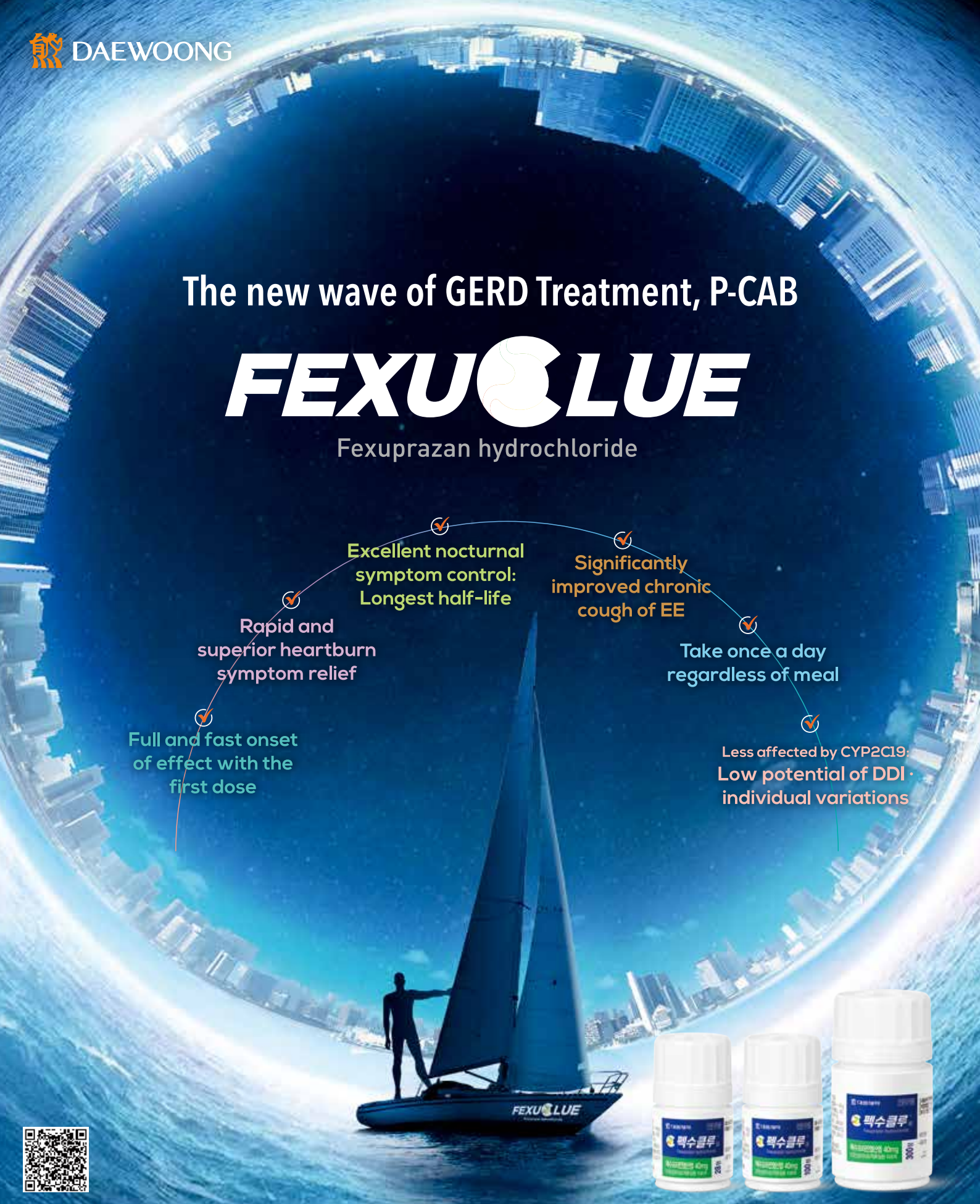
DAEWOONG

The new wave of GERD Treatment, P-CAB

FEXULUE

Fexuprazan hydrochloride

- Excellent nocturnal symptom control: Longest half-life
- Significantly improved chronic cough of EE
- Rapid and superior heartburn symptom relief
- Take once a day regardless of meal
- Full and fast onset of effect with the first dose
- Less affected by CYP2C19: Low potential of DDI · individual variations



【Product name】Fexulue Tab. 40mg【Formulation】Active Pharmaceutical Ingredient: Fexuprazan HCl 40 mg Additives: lactose hydrate (bovine, milk), Yellow No.4, Microcrystalline Cellulose, Magnesium stearate, Opadry Green AMB2 88A610038, Opadry White 03B28796, Croscarmellose Sodium, Yellow Iron Oxide.【Appearance】Pale-green, Oblong film-coated tablet with the breaking line on the tablet【Indication】Treatment of erosive esophagitis (EE)【Dosage and Administration】The Product is administered to adults as follows. -Treatment of erosive esophagitis (EE) - 40 mg is administered orally once a day for 4 weeks. - In the case of patients with untreated esophagitis or symptoms persisting, the administration given for another 4 weeks, The Product can be administered with or without meals.【Contraindications】1) Patients who have a history of hypersensitivity to the Product or its components 2) Patients taking a drug containing atazanavir, nelfinavir, or ritonavir (refer to '5. Interactions') 3) Pregnant and lactating women (refer to '6. Administration to Pregnant and Lactating Women') 4) Patients who have congenital conditions for lactose such as galactose intolerance, Lapp lactase deficiency or glucose-galactose malabsorption, as this medicine contains lactose【The following patients should be administered with care.】1) Patients with hepatic impairment (no experience of use) 2) Patients with renal impairment (no experience of use) 3) Elderly (refer to '8. Geriatric Use') 4) Patients who have a history of hypersensitivity or allergy to Yellow 4 Tartrazine【Storage】Store at temperatures not exceeding 30℃ in an airtight container【Shelf-life】36 Months【Availability】28T/Box (7T/PTP*4), 56T/Box (7T/PTP*8), 28T/Btl, 100T/Btl, 300T/Btl【Manufactured by】Daewoong Pharmaceutical Co., Ltd./ 1, Osongsaengmyeong 2-ro, Osong-eup, Heungdeok-gu, Cheongju-si, Chungcheongbuk-do, Republic of Korea ※ This medicine has passed strict quality control. If the use-by date or expiration date has passed at the time of purchase, or if the drug is spoiled, contaminated, or damaged, it can be exchanged or refunded through the pharmacy or drug distributor where it was purchased in accordance with the Fair Trade Commission Notice (Consumer Dispute Resolution Standard) ※ Report side effects and apply for damage relief: Korea Pharmaceutical Safety Management Agency (14-3330, 1644-6223)
※ For detailed and up-to-date approval information, please refer to the Ministry of Food and Drug Safety's integrated drug information system (https://nedrug.mfds.go.kr) or the product label.

* TDF : Tenofovir disoproxil fumarate, ** Knodell necroinflammation score

REFERENCE
1. MFDS Lable(2023.05) 2. Song DS, et al. Clin Mol Hepatol. 2021;27(2):346-359 3. Ahn SH, et al. Clin Gastroenterol Hepatol.2019;17(9):1850-1859.
4. Ahn SH, et al. J Hepatol.2017;1(66):S88-S89

BES2304A1-2504

Besivo® Tab. (Besifovir dipivoxil maleate 183mg [Besifovir dipivoxil 150mg])[1]

ETC

[Indication and Usage] Treatment of chronic hepatitis B in adults **[DOSAGE AND ADMINISTRATION]** One tablet containing 150 mg besifovir dipivoxil once daily orally with or with or without food in adults. When taking this medicine, take 660mg of L-Carnitine to -gether to prevent a decrease in serum L-Carnitine level. (Patients with nephropathy) Patients with mild renal impairment: dose adjustment is not required. Patients with moderate, severe renal impairment: It is recommended to administer one tablet once every two days for moderate symptoms and one tablet once every four days for severe symptoms are recommended. Patients with end-stage renal disease: administration of this drug is not recommended because there is no treatment experience. **[WARNINGS AND PRE -CAUTIONS]** 1) Lactic acidosis and sever hepatomegaly with steatosis, including fatal cases, have been reported with the use of nucleoside analogs of in combination with other antiretrovirals. Treatment should be suspended in any patient who develops clinical or laboratory findings suggestive of lactic acidosis or pronounced hepatotoxicity (which may include hepatomegaly and steatosis even in the absence of marked transaminase elevations). 2) Discontinuation of anti-HBV therapy may be associated with severe acute ex -acerbations of hepatitis. Patients infected with HBV who discontinue Besivo should be closely monitored with both clinical and laboratory follow-up for at least several months after stopping treatment. If appropriate, resumption of anti-hepatitis B therapy may be warranted. 3) HIV-1 antibody testing should be offered to all HBV-infected patients before initiating therapy with Besivo. Limited clinical experience suggests there is a potential for the development of HIV if Besivo is used to treat chronic hepatitis B virus (HBV) infec -tion in patients with HIV infection that is not being treated. Therapy with Besivo is not recommended for HIV/HBV co-infected patients. 4) Since this drug contains lactose, it should not be administered to patients with genetic problems such as galactose intoleran -ce, Lapp lactose deficiency, or glucose-galactose malabsorption.

NEXT PIECE FOR BEST PEACE

나음을 위해 찾은 다음 조각,

VEMLINO

Samil

베믈리노 28.51mg
Tenofovir Alafenamide Hemimalate

Control
Fluid
Control
Diarrhea[1]

하이드라섹은 장운동에 영향을 주지 않고
과분비된 수분을 정상화시키는
항분비성 지사제입니다.[2]

HIDRASEC®
RACECADOTRIL

Reference. 1. data on file Racecadotril CCDS July 2017. 2. Hidrasec(Racecadotril) SmPC

하이드라섹캡슐 100 mg (라세카도트릴)

[원료약품 및 그 분량] 이 약 1캡슐(286 mg) 중 • **유효성분:** 라세카도트릴(EP)…100 mg • **첨가제(동물유래성분):** 유당수화물(소의우유) • **기타첨가제:** 스테아르산마그네슘, 전호화전분, 캡슐, 콜로이드성이산화규소 **[성상]** 흰색의 분말이 충진된 상하부 미황색의 경질캡슐제 **[효능·효과]** 성인의 급성 설사 증상 치료 **[용법·용량]** • 성인: 1일 3회 1캡슐씩 복용하며, 식전에 복용하는 것이 권장된다. 정상적인 배변이 2회 있을 때까지 투여하며, 치료기간은 7일을 초과하지 않는다. • 고령자에서 특별한 용량 조절이 필요하지 않다. • 간장애 환자, 신장애 환자의 경우 주의하여 사용한다. **[사용상의 주의사항] 1. 경고** 1) 중증 피부 반응이 이 약 투여한 환자에서 보고되었다. 대부분 경미한 반응이었고 추가 치료를 필요로 하지 않았으나, 일부 생명을 위협할 수 있는 심각한 사례가 있었다. 이 약과의 관련성이 완전히 배제될 수 없으며, 이와 같은 심각한 피부 이상 반응이 발생하면 이 약 투여를 즉시 중단해야 한다. 2) 과민증, 혈관부종이 이 약 투여한 환자에서 보고되었다. 이 약으로 치료하는 동안 언제든 유발될 수 있다. 라세카도트릴 사용과 무관하게 혈관부종이 발생했던 환자에서는 혈관부종의 위험성이 증가할 수 있다. **2. 다음 환자에게는 투여하지 말 것.** 1) 라세카도트릴 또는 이 약의 첨가제에 과민증이 있는 환자 2) 임부 및 수유부 3) 3개월 미만 소아(임상자료가 없다.) 4) 혈변 또는 화농성 변과 발열이 있는 경우 또는 항생제 관련한 설사가 있는 경우(5. 일반적 주의 항 참조) 5) 만성 설사 환자(이러한 환자에 대한 자료가 충분치 않다.) 6) 생체이용률이 감소할 수 있으므로 지속적인 또는 조절되지 않는 구토 증상이 있는 경우 이 약을 투여해서는 안된다. 7) 이 약은 유당을 함유하고 있으므로, 갈락토오스 불내성(galactose intolerance), Lapp 유당분해효소결핍증(Lapp lactase deficiency) 또는 포도당-갈락토오스 흡수장애(glucose-galactose malabsorption) 등의 유전적인 문제가 있는 환자에게는 투여하면 안된다. 8) 안지오텐신 변환효소 저해제(Angiotensin converting enzyme inhibitors: 예)캅토프릴, 에날라프릴, 리시노프릴, 페린도프릴, 람피프릴)로 인한 혈관부종이 보고된 환자 **3. 다음 환자에게는 신중히 투여할 것.** 1) 신장애 및 간장애 환자(이러한 환자에 대한 자료가 충분치 않다.) **4. 이상 반응** 다음의 이상 약물 반응은 위약에 비해 이 약에서 더 많이 발생하였거나 시판 후 조사에서 보고된 것들이다. 부작용의 빈도는 다음의 기준을 사용하여 정의한다: 매우 흔함(≥ 1/10), 흔함(≥ 1/100 - < 1/10), 흔하지 않음(≥ 1/1,000 - < 1/100), 드물게 발생 (≥ 1/10,000 - < 1/1,000), 매우 드물게 발생 (< 1/10,000), 알 수 없음 (입수된 자료로 예측할 수 없음). **5. 일반적 주의** 1) 이 약의 투여로 일반적인 수분공급법을 변경하지 않는다. 2) 혈변 또는 화농성 변과 발열이 있는 경우는 설사의 원인이 침습적인 박테리아의 존재 또는 다른 심각한 질병의 존재를 의미할 수 있다. 또한 이 약은 항생제로 인한 설사에 대해서도 연구되지 않았다. 따라서, 이러한 상태에서는 이 약을 투여해서는 안된다. 3) 이 약은 운전 및 기계 작동 능력에 영향이 없거나 무시할 정도이다. **6. 상호작용** 1) 안지오텐신 변환효소 저해제(Angiotensin converting enzyme inhibitors: 예)캅토프릴, 에날라프릴, 리시노프릴, 페린도프릴, 람피프릴)가 혈관부종을 일으키는 것으로 알려졌다. 이러한 위험성이 이 약 투여로 인해 상승할 수 있다. 2) 로페라미드나 니푸로사지드와 병용 시 이 약의 약물동태에 영향을 주지 않았다. **7. 임부 및 수유부에 대한 투여** 1) 임신한 여성에게 이 약의 자료가 충분하지 않다. 동물 연구 결과 임신, 배태자 발달, 출산, 산후 발달 측면에서 직접적인 또는 간접적인 해로운 영향이 나타나지 않았다. 그러나, 특정 임상 시험을 실시하지 않았으므로, 이 약은 임신 한 여성에게 투여해서는 안된다. 2) 이 약의 모유로의 이행 여부는 알려지지 않았으므로 수유 중인 여성에게 투여해서는 안된다. **8. 과량투여 시의 처치** 과량투여 사례는 보고되지 않았으며, 성인에서 치료 용량의 20배와 동등한 2g 이상을 단회 투여한 경우 유해한 영향이 나타나지 않았다. **9.보관 및 취급상의 주의사항** 1) 어린이의 손이 닿지 않는 곳에 보관한다. 2) 다른 용기에 바꾸어 넣는 것은 사고원인이 되거나 품질유지면에서 바람직하지 않으므로 주의한다. **[포장단위]** 10캡슐(10캡슐/블리스터x1) **[저장방법]** 기밀용기, 실온(1~30℃) 보관 **[사용기간]** 제조일로부터 36개월 **[제조자]** SOPHARTEX, 21 rue du Pressoir, 28500 Vernouillet, 프랑스 **[수입판매원]** 한국애보트 유한회사, 서울시 강남구 영동대로 421, 전화: 02-3429-3500, 전송: 02-3429-3779 **[공동판매원]** 코오롱제약, 경기도 과천시 코오롱로 11 코오롱타워, 전화: 080-203-6000 **[교환 및 제품문의]** 본 의약품은 엄격한 품질관리를 필한 제품입니다. 만약 구입시 유효기한 또는 사용기한이 경과되었거나, 변질, 변패 또는 오손된 제품이 발견될 경우에는 구입한 약국을 통하여 교환하여 드립니다. 첨부문서 내용변경에 대한 자세한 사항은 식품의약품안전처 '의약품통합정보시스템(http://nedrug.mfds.go.kr)'을 참조하시기 바랍니다. 부작용 피해구제 신청: 한국의약품안전관리원(1644-6223)

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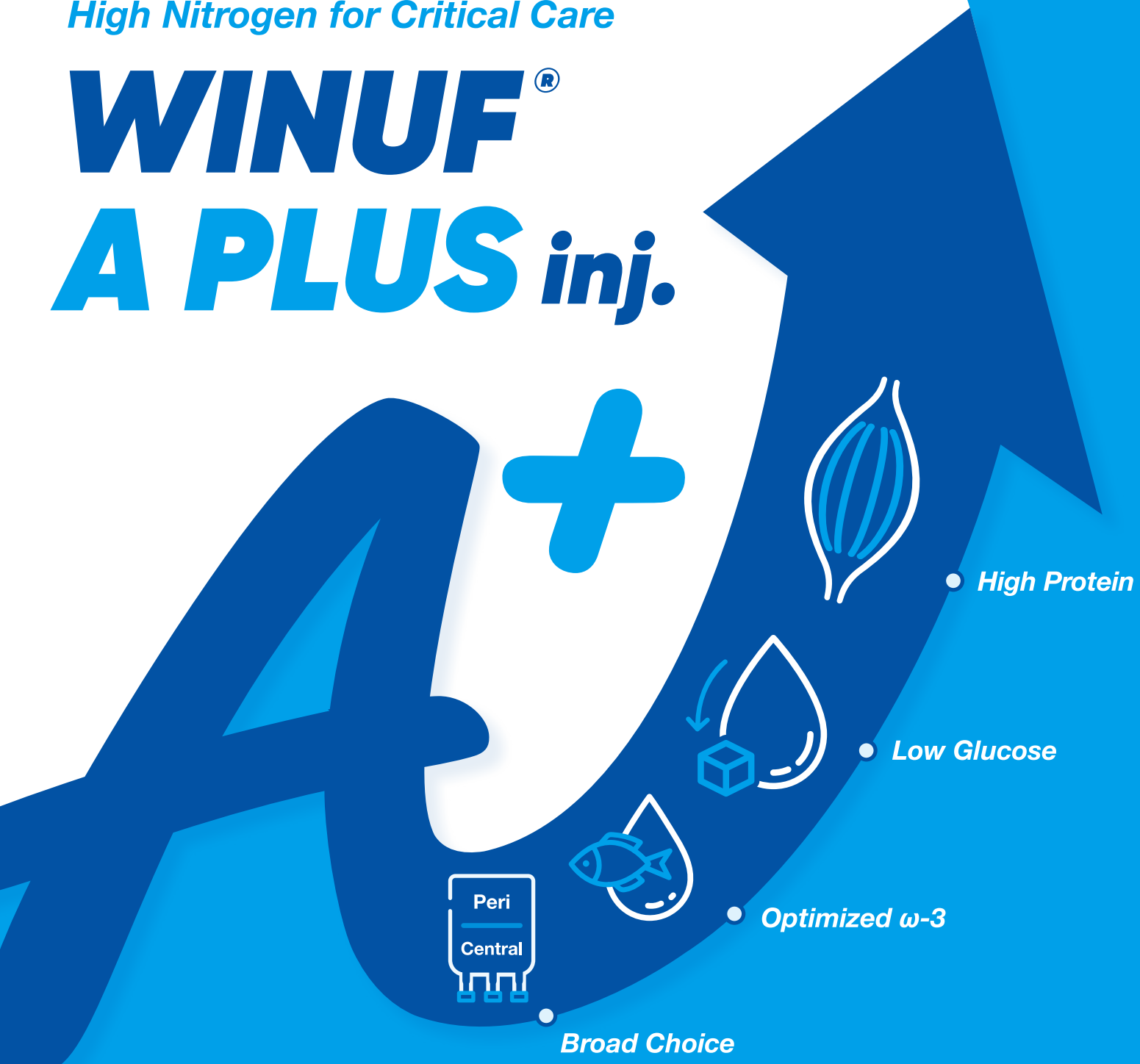

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Reference. Fish oil in critical illness: mechanisms and clinical applications. Crit Care Clin 2010 Jul;26(3):501-14.

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JAQ-2410-C-056

Abbreviation. P-CAB Potassium-Competitive Acid Blocker.

Reference. 1. Hwang I *et al.*, Randomised clinical trial: Safety, tolerability, pharmacodynamics and pharmacokinetics of zastaprazan (JP-1366), a novel potassium-competitive acid blocker, in healthy subjects. *Aliment Pharmacol Ther.* 2023;57(7):763-772.

[MA holder] Onconic Therapeutics 11F, 12 Teheranro-26-gil, Gangnam, Seoul, (06236), Korea **[Manufacturer and Distributor]** Jeil Pharmaceutical Co., Ltd. Factory: 7, Cheongganggachang-ro, Baegam-myeon, Cheoin-gu, Yongin-si, Gyeonggi-do, (17172), Korea. Seoul Headquarters : 343, Sapyeong-daero, Seocho-gu, Seoul, (06543), Korea. Tel. +82-2-549-7451 **[Co-distributor]** DONG-A ST 64 Cheonhodaero, Dongdaemun-gu, Seoul, (02587), Korea. Tel. +82-2-920-8111

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[Ingredients] Chronics hepatitis with continuously elevated ALT level
[Directions] Take 1 or 2 capsules each time, 3 times a day, after meals

Diagnostic Code
B15-19 Viral hepatitis K70.0 Alcoholic fatty liver K71.0 Toxic liver disease K73.0 Chronic persistent hepatitis, NEC
K74.0 Hepatic fibrosis K75.8 Other specified inflammatory liver disease,
Nonalcoholic steatohepatitis K77.0 Liver disorders in disease classified elsewhere

SK Albumin Inj. 5%/20%

Human serum albumin

- Maintenance of Intravascular pressure[1]
- Acid-base balance[1]
- Drug transport[1]
- Transport of ions, fatty acids, bilirubin and hormones[1]

Heated as a liquid at 60 0.5 ℃ for 10–11 hours[2]

SK plasma

ECO Lab, 310 Pangyo-ro, Bundang-gu, Seongnam-si, Gyenggi-do, Republic of Korea
Tel +82-2-2008-2901 www. skplasma.com

Prescription drug

Summary of Prescribing information[3]

【PRODUCT NAME】 SK Albumin 5%/20% Inj. 【CONTENTS】 Each 100 mL contains 5 g and 20 g of Human Serum Albumin as active ingredient, for 5% Inj. and 20% Inj. respectively 【INDICATION AND USAGE】 Hypoalbuminemia caused by albumin loss (burn, nephrotic syndrome, etc.) and dysfunction of albumin synthesis (liver cirrhosis, etc.), hemorrhagic shock 【DOSAGE AND ADMINISTRATION】 1. 5% Inj.: 500 mL, equivalent to human serum albumin 25 g should be administered by intravenous drip infusion or by slow direct intravenous injection. The recommended infusion rate is 2–4 mL/min. The dosage may be adjusted according to body weight, age and symptoms. 2. 20% Inj.: 125–375 mL, equivalent to human serum albumin 25–75 g should be administered by intravenous drip infusion or by slow direct intravenous injection. The recommended infusion rate is 2–4 mL/min. It may be diluted with 5 % glucose when necessary. The dosage may be adjusted according to body weight, age and symptoms. 【CONTRAINDICATION】 Patients with a history of hypersensitivity reactions to this drug and its components 【MANUFACTURER】 SK Plasma Co., Ltd. (36618) 157 Saneopdanjigil, Pungsan-eup, Andong-si, Gyeongsangbuk-do, Republic of Korea 【MA HOLDER】 SK Plasma Co., Ltd. (13494) 310 Pangyo-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, Republic of Korea

* For the details, you are recommended to check on prescribing information. The latest approved label is available on the website following. http://drug.mfds.go.kr

References 1. Haroldo Falcao et al. Albumin in critically ill patients: controversies and recommendations. Rev Bras Ter Intensiva. 2011; 23(1) **2.** SK Albumin 5%/20% Inj. product license, Data on file, SK Plasma **3.** SK Albumin 5%/20% Inj. Approval information, MFDS [Cited 2021.11.17] Available from: https://nedrug.mfds.go.kr

ABM-HA03-202111-01

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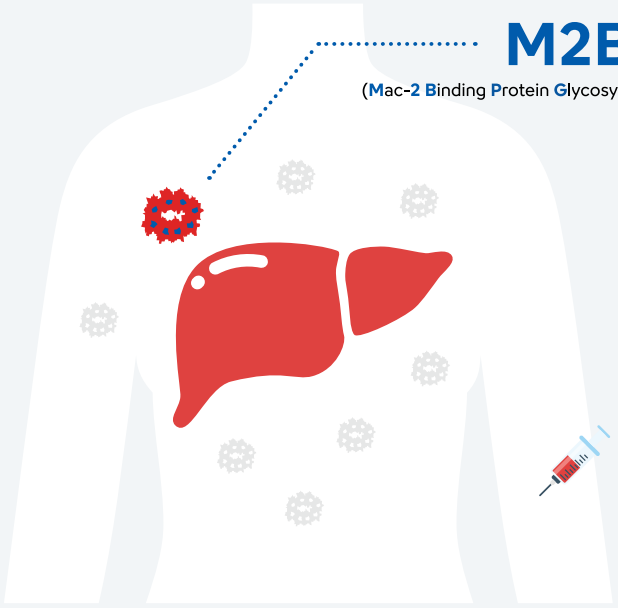
- Mesenchymal stem cell
- Dendritic cell

문의사항 담당자 안내

전화번호 : 02-3496-0107

E-mail : andjoo@pharmicell.com(전영주 차장)

Liver Fibrosis Single Biomarker

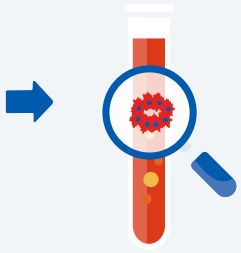


M2BPGi

(Mac-2 Binding Protein Glycosylation isomer)

M2BPGi forms in blood when hepatic fibrosis occurs

Collect blood for M2BPGi test



Measure with full **automated system**

Sysmex "HISCL-800"

The only single biomarker that is approved reimbursement (Code: D1980)

Pick up only 10μℓ of serum

Test time **17min**

Included in the KASL clinical practical guidelines for managing NAFLD and CHB

Subject & Utility of M2BPGi Test

Diabetes: There is a high possibility of advanced hepatic fibrosis with an abnormal M2BPGi level (>1.0).[1]

NAFLD patients: Serum M2BPGi could serve as a reliable biomarker for diagnosing advanced fibrosis and cirrhosis.[2]

Liver fibrosis risk population: Serum M2BPGi has proven to be a dependable, non-invasive surrogate marker for predicting advanced fibrosis.[3]

CHB patients receiving long-term antiviral treatment: The serum M2BPGi level functions as an independent predictor of HCC and complements the stratification of HCC risks.[4]

CHB with oral antiviral therapy: A baseline M2BPGi level above 1.73 consistently demonstrated predictive value for higher HCC risk.[4]

TACE treatment for HCC: The combination of M2BPGi and up-to-seven criteria could serve as a surrogate marker for predicting CP grade deterioration.[5]

CHB: The M2BPGi level can predict HCC development independently.

References

1. Park H, *et al. Ann Transl Med.* 2020;8(23):1583 **2.** Jang SY, *et al. Ann Lab Med.* 2021;41(3):302-309. **3.** Kim M, *et al. J Clin Med.* 2020;9(4):1119. **4.** Tseng TC, *et al. Liver Cancer.* 2020;9(2):207-220. **5.** Eso Y, *et al. Cancers (Basel).* 2019;11(3):405. **6.** Kim SU. *et al. Liver Int.* 2016; 1-9.

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‡Cure=sustained virologic response (SVR12), defined as HCV RNA less than the lower limit of quantification at 12 weeks after the end of treatment.
§GT 1–6 treatment-naïve, non-cirrhotic and compensated-cirrhotic patients. MAVIRET is not indicated in decompensated cirrhosis.

MAVIRET is contraindicated in patients with moderate or severe hepatic impairment (Child-Pugh B or C).[1]
MAVIRET is indicated for the treatment of chronic hepatitis C virus (HCV) infection in adult and adolescent patients over 12 years of age.[1]

References 1. MAVIRET® Product information(Revised from 16th Feb 2023).

[Product name] Maviret® Tab. **[Ingredients and quantity]** Glecaprevir 100.0mg, pibrentasvir 40.0mg
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※ For the latest and full product information, please refer to the QR code or product information.
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- Terlipressin increases the survival rate of type 1 HRS (Hepatorenal syndrome) patients by improving kidney function.
- Terlipressin has little adverse reaction in commercial volume because the increase in blood concentration is not rapid.

Teripin®, Teripin-S® contains 1mg terlipressin

Usage and dosing : 1) esophageal varicose veins : In adults, 1 to 2 mg of terlipressin is intravenously injected whileobserving blood pressure and heart rate in the initial dose. About 1mg of this is administered every 4-6 hours as a maintenance dose. The administration period is limited to 2 or 3 days depending on the course of the disease. The maximum dose per day is 6 times, 20 g per kg of weight, and blood pressure and heart rate are sufficiently observed. 2) Hepatorenal syndrome : Divide 3 to 4 mg per day into 3 to 4 times and administer it. If serum creatine does not decrease after 3 days of administration, it is recommended to stop administration. The goal of the treatment is to use serum creatinine less than 130umol/L or serum creatinine until it is at least 30% lower than when it was diagnosed as hepatorenal syndrome. It is usually treated for 10 days.

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Not actual patients.

※ For more information about Epclusa®, please refer to the prescribing information.

[*]Adults treated with SOF/VEL 400/100 mg, without ribavirin, were included. All HCV patients reaching Week 12 or 24 post-treatment were assessed for SVR12/24. Factors associated with not achieving SVR12/24 for virological reasons were evaluated using logistic regression analysis. Overall, 5552 patients were included: 13.3% treatment-experienced; 20.7% compensated cirrhotic; 30.2% genotype 1; 29.5% genotype 2; 32.9% genotype 3; 4.7% genotype 4; 3.7% HIV coinfection; 13.4% current/former intravenous drug use. SVR12/24 in the effectiveness population (n = 5,196; excluding patients who did not achieve SVR12/24 due to non-virologic or unknown reasons) was 98.9%. SVR12/24 in the overall population was 92.6%. All patients with unknown genotype (n = 42), unknown fibrosis score (n = 82) and unknown treatment history (n = 33) achieved SVR12/24 with Epclusa® for 12 weeks. The low discontinuation (<2%) and LTFU rates (4%) in this real-world analysis are consistent with previous clinical studies. Additionally, where information was available, few of the discontinuations were due to adverse events linked to SOF/VEL therapy, which is consistent with the Phase 3 data. This underlines the favourable safety and tolerability profile of SOF/VEL as a protease inhibitor-free DAA, as also shown previously in clinical trials.[1]

[†]Epclusa® monotherapy for 12 weeks in previously treatment-naïve and treatment-experienced patients without cirrhosis or with compensated cirrhosis (Child-Pugh A). Epclusa®+ribavirin combination therapy for 12 weeks in previously treatment-naïve and treatment-experienced patients with decompensated cirrhosis (Child-Pugh B or C).

[§]Pediatric patients aged 12 years or older or weighing 30 kg or more

AE, adverse event; **DAA,** direct acting antiviral; **HCV,** hepatitis C virus; **HIV,** Human Immunodeficiency Virus; **PI,** protease inhibitor; **SOF,** sofosbuvir; **SVR12/24,** sustained virological response 12/24 weeks after the end of treatment; **VEL,** velpatasvir

References 1. Mangia A, et al. Global real-world evidence of sofosbuvir/velpatasvir as simple, effective HCV treatment: Analysis of 5,552 patients from 12 cohorts. Liver Int 2020;40:1841 - 52. **2.** Ministry of Food and Drug Safety, Drug Safety (https://nedrug.mfds.go.kr) Epclusa® tablet, Prescribing Information.

Scan the QR code to view Epclusa® PI

GILEAD YUHAN

KR-EPC-0399_v1.0(10/June/2025)

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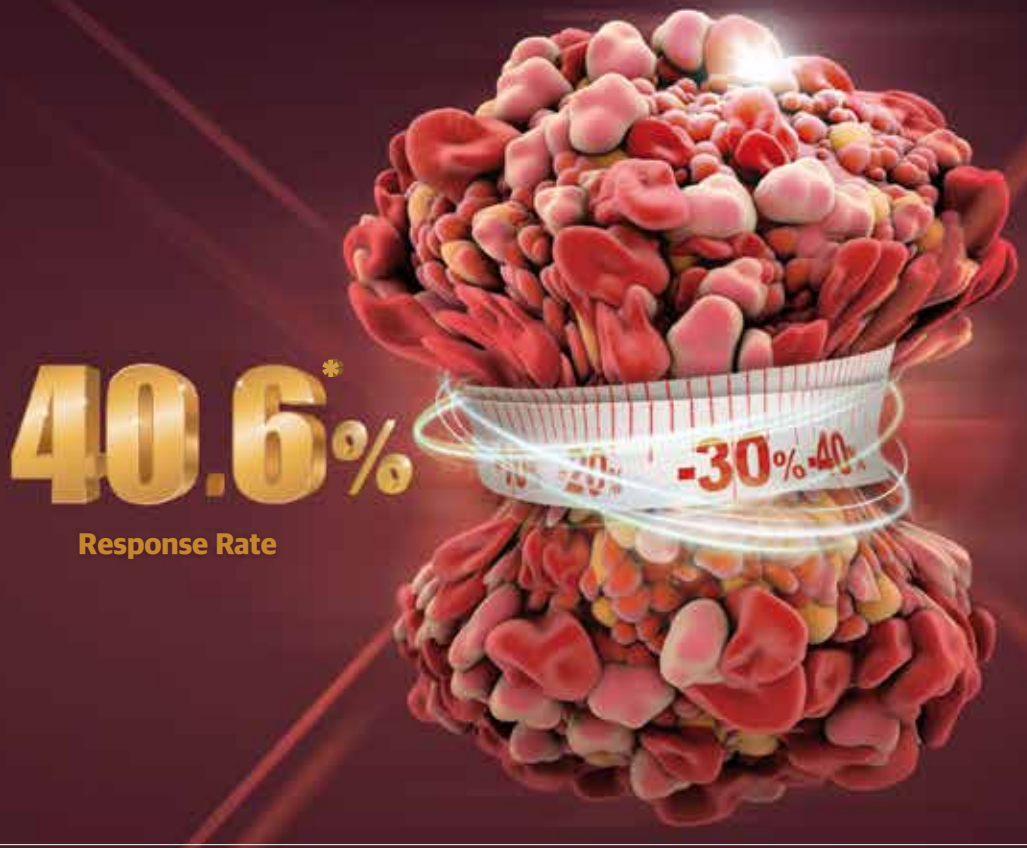
RESPONSE THAT MATTERS

Remarkable Response

Lenvatinib은 대조군 대비 약 3배 **높은 객관적 반응률(ORR)***을 입증하였으며,[1]

약 41%의 환자*에서 **30% 이상**의 **종양 크기 감소**를 보였습니다.[1,2]



[Study design] (REFLECT study) 2013년 3월 1일~2015년 7월 30일 사이에 등록된 uHCC 환자 954명을 대상으로 Lenvatinib (n=478, ≥60 kg 경우 12 mg 하루 한 번, <60 kg 경우 8 mg 하루 한 번)과 Sorafenib (n=476, 400 mg 하루 두 번) 간 1차 항암 요법의 유효성과 안전성을 비교평가한 다국가, 다기관, 1:1 무작위 배정, 공개, 비열등성 3상 임상 시험입니다. 해당 임상 시험에서 Lenvatinib(median OS 13.6개월, 95% CI 12.1-14.9)은 Sorafenib(median OS 12.3개월, 95% CI 10.4-13.9) 대비 1차 평가변수인 전체생존기간에서 비열등성을 입증하였습니다(HR 0.92, 95% CI 0.79-1.06).[1]

	Lenvatinib (n=478)	Sorafetinib (n=476)	Effect size (95% CI)	*P* value
Investigator review according to mRECIST				
Objective response (%, 95% CI)	115 (24.1%, 20.2-27.9)	44 (9.2%, 6.6-11.8)	OR 3.13 (2.15-4.56)	<0.0001
Masked Independent Imaging review according to mRECIST				
Objective response (%, 95% CI)	194 (40.6%, 36.2-45.0)	59 (12.4%, 9.4-15.4)	OR 5.01 (3.59-7.01)	<0.0001
Masked Independent Imaging review according to RECIST 1.1				
Objective response (%, 95% CI)	90 (18.8%, 15.3-22.3)	31 (6.5%, 4.3-8.7)	OR 3.34 (2.17-5.14)	<0.0001

* 해당 결과는 2차 평가 변수로, post-hoc exploratory tumor assessment로 진행된 mRECIST에 따른 IIR 평가 결과이며, 자세한 내용은 문헌 전문(Kudo M, *et al.* 2018)에서 확인 바랍니다.

mRECIST, modified Response Evaluation Criteria in Solid Tumors; IIR, Independent imaging review; ORR, Objective Response Rate; CI, Confidence Interval; uHCC, unresectable hepatocellular carcinoma; OR, Odds ratio; OS, Overall Survival

[References]1 . Kudo M et al. Lancet. 2018 Mar 24;391(10126):1163-1173 **2**. Lencioni R, Llovet JM. Semin Liver Dis. 2010 Feb;30(1):52-60

Product Information [제품명] 렌비마캡슐 4mg, 10mg (렌바티닙메실산염) [원료약품 및 분량] 렌비마®캡슐 4mg 이 약 1캡슐 중 유효성분 - 렌바티닙메실산염(별규) 4.90mg (렌바티닙으로써 4.0mg) 렌비마®캡슐 10mg 이 약 1캡슐 중 유효성분 - 렌바티닙메실산염(별규) 12.25mg (렌바티닙으로써 10.0mg) **[효능·효과]** 1. 방사성 요오드에 불응한, 국소 재발성 또는 전이성의 진행성 분화 갑상선암 2. 절제불가능한 간세포성암 환자의 1차 치료 3. 이전에 전신 치료를 받은 경험이 있고 질병이 진행하였으며, 수술적 치료 또는 방사선 치료가 부적합한, MSI-H (microsatellite instability high) 또는 dMMR (mismatch repair deficient) 상태가 아닌 진행성 자궁내막암 환자의 치료로서, 렘브롤리주맙과의 병용요법 **[용법·용량]** 1) 권장용량 및 용법 · 분화갑상선암 성인에서 이 약의 권장 투여용량은 1일 1회 24mg이다. 이상반응 관리를 위하여 1일 투여량은 필요에 따라 조절할 수 있다. 이 약은 매일 같은 시간에 식사와 관계없이 경구로 복용한다. · 간세포성암 이 약의 권장 투여용량은 체중을 기준으로 한다. - 60kg 이상인 환자: 12mg - 60kg 미만인 환자: 8mg 질병이 진행되거나 수용할 수 없는 독성이 나타날 때까지 이 약 1일 1회 투여를 지속한다. 간세포성암에서 10mg 용량의 사용에 대한 임상적 근거는 없다. · 자궁내막암 이 약의 권장 투여용량은 1일 1회 20mg을 경구투여 하는 것으로 질병이 진행되거나 수용할 수 없는 독성이 나타날 때까지 투여하며, 병용 투여하는 렘브롤리주맙은 3주마다 30분 동안 200mg을 정맥 점적주입한다. 렘브롤리주맙의 권장 용량 정보는 렘브롤리주맙의 허가사항을 참고한다. **[사용상의 주의사항]** 1. 다음 환자에는 투여하지 말 것 1) 이 약의 주성분 혹은 부형제에 대한 과민증이 있는 환자 2) 모유수유를 하고 있는 환자 2. 다음 환자에는 신중히 투여할 것 1) 고혈압환자 2) 혈전색전증 또는 병력이 있는 환자 3) 뇌전이 환자 4) 외과적 수술 후 상처가 치유되지 않은 환자 5) 경동맥, 경정맥 등에 종양 침윤이 있는 환자 **[수입자]** 한국에자이㈜ 서울특별시 강남구 봉은사로86길 6 빌딩레베쌍트 10층 TEL)02-3451-5500 - 첨부문서 작성연월일: 2021년 7월 1일 - 기타 자세한 사항은 제품설명서 전문을 참고하여 주십시오.

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한국에자이주식회사 서울시 강남구 봉은사로 86길 6 빌딩 레베쌍트 10층 TEL : 02-3451-5500

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37% 감소

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79% 감소

Reference.
1. Lee JH, et al. *Gastroenterology*. 2015;148(7):1383-1391.e6.

GCC-ONC-MT-24040021

전문의약품

· 제품명

이뮨셀엘씨주
(엘씨자가혈액유래티림프구)

· 성상

미황색의 혼탁한 액이 불투명한 폴리에틸렌백 또는 폴리염화비닐백에 든 수액제

· 효능·효과

간세포암 제거술(수술, 고주파절제술, 경피적에탄올 주입술) 후 종양제거가 확인된 환자에서 보조요법

· 원료약품의 분량(200mL 중)

순번	성분명	분량	단위	규격
1	엘씨자가혈액유래티림프구	$1.0x10^{7}$~$2.0x10^{10}$	개	별규

첨가제: 복합전해질주사액I형, 사람혈청알부민

· 용법·용량

투여 전 백을 부드럽게 3~4회 정도 잘 흔들어 세포가 용제에 완전히 부유될 수 있게 한다. 투여 시 22G 이하의 주사침으로 정맥점적 주사하여 1시간 이내에 투여될 수 있도록 한다. 1회 투여용량은 $1.0x10^{7}$~$2.0x10^{10}$ 세포가 포함된 200ml이며, 투여주기 및 횟수는 다음과 같다. 1주 간격 4회, 2주 간격 4회, 4주 간격 4회, 8주 간격 4회, 총 투여횟수 16회

· 포장단위

1팩/상자(팩(200mL))

· 급여기준정보

비급여(676600031)

· 저장방법 및 사용기간

저장방법: 밀봉용기, 보관온도 2~25°C | 사용기간: 제조일시로부터 36시간

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[PIVOTAL STUDY]

Solution II Study
Met에 Gemi/Dapa 동시 투여시
HbA1c 1.34%†† 감소[4]

Solution I Study
Met/Dapa에 제미글로®정 병용시
HbA1c 0.86%†† 감소[2,3]

†† 기저대비 HbA1c 감소

Met, Metformin; **Gemi,** Gemigliptin; **Dapa,** Dapagliflozin; **HbA1c,** Glycated hemoglobin.

[References] 1. 식품의약품안전처 의약품통합정보시스템 (https://nedrug.mfds.go.kr). **2.** Data on file, Clinical Phase III trial in Korea (Pivotal Study), LG-DPCL019 (2022). LG Chem. **3.** Lee BW et al., (2022). Efficacy of Gemigliptin Add-on to Dapagliflozin and Metformin in Type 2 Diabetes Patients: A Randomized, Double-blind, Placebo-controlled Study (SOLUTION I)(Unpublished manuscript). **4.** Data on file, Clinical Phase III trial in Korea (Pivotal Study), LG-GLCL001 (2023), LG Chem.

제미다파®정 (제미글립틴/다파글리플로진) 50/10 mg (제품 허가일: 2022.06.21, 제품 출시일: 2023.04.08 / 제품의 Product Information 전문은 QR 코드를 통해 참고 하시기 바랍니다.)

[효능·효과] 이 약은 제미글립틴과 다파글리플로진의 병용투여가 적합한 제2형 당뇨병 환자의 혈당조절을 향상시키기 위해 식사요법 및 운동요법 보조제로 투여. **[용법·용량]** 이 약은 제미글립틴 50 mg과 다파글리플로진 10 mg을 투여하는 환자에게 식사와 관계없이 1일 1회 1정을 투여. 추정 사구체 여과율(eGFR)이 45 mL/min/1.73㎡ 미만인 경우에는 이 약의 투여는 권장되지 않음. 중증 간장애 환자 대상으로 이 약의 안전성과 유효성은 연구된 바 없음. **[사용상 주의사항]** 이 약의 주성분인 제미글립틴이나 다파글리플로진, 또는 첨가제에 대한 과민반응 병력이 있는 환자. 제1형 당뇨병 및 당뇨병성 케톤산증 환자, 갈락토오스 불내성, Lapp 유당 분해효소 결핍증 또는 포도당-갈락토오스 흡수장애 환자. 투석중인 환자에게 금기. **[이상반응]** 메트포르민과 다파글리플로진에 제미글립틴을 24주간 추가 병용 투여한 임상시험에서 1% 이상의 환자에서 보고된 이상반응은 리파아제 증가, 만성위염, 어지러움, 요로감염, 기침, 당뇨성 신장병증, 위염, 치은염, 대장용종, 두드러기, 소화불량임. 24주 이후 52주까지 연장하여 진행한 기간 (주반 28주)동안 새롭게 확인된 이상반응 (인관관계 평가와 관계없이 보고된 이상반응)은 고혈당증과 두통임 **[제품 허가일 2022.06.21].**

보건의료전문가용

GEDA-BR-K2306-01-MAY23

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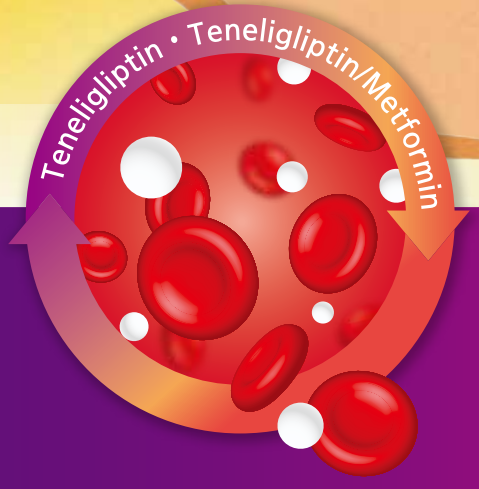

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- **당화혈색소** 및 **식후혈당수치 감소**
- **적정혈당유지시간 비율 증가**

하나제약(주)

아스라베캡슐 100/5밀리그램

(아스피린 100mg, 라베프라졸 나트륨 5mg)

아스라베캡슐 100/5밀리그램은

1 복약편의성

아스피린과 라베프라졸 성분 복합제로 **1일 1회 1캡슐**로 복용이 편리한 제품입니다.

2 심혈관 보호 효과

아스피린은 급성 심근경색 또는 불안정 협심증 등 폐쇄성 혈관 사건의 위험이 높은 대부분의 환자 유형에서 **보호 효과**가 있습니다.[1]

3 위장관 손상 예방

PPI는 **NSAID 및 아스피린 관련 위장관 손상의 치료 및 예방**을 위해 선호되는 약제입니다.[2]

Reference 1. *BMJ 2002;324:71-86,* **Reference 2.** *Am J Gastroenterol. 2008;103(11):2890-2907*

Drug Information

제품명	**아스라베캡슐 100/5 밀리그램** (아스피린, 라베프라졸) 		
성분·함량	Aspirin 100mg, Rabeprazole sodium 5mg	분류번호	219 [기타의 순환계용약]
성상	흰색의 장용성 정제 및 노란색의 장용성 정제가 든 연한 노란색의 경질캡슐		
효능·효과	위·십이지장 궤양 과거력이 있으면서 다음과 같이 아스피린을 투여해야 하는 환자 ○ 아스피린 1. 다음 질환에서 혈전 생성 억제 · 심근경색 · 뇌경색 · 불안정형 협심증 2. 관상동맥 우회술(CABG) 또는 경피경관 관상동맥 성형술(PTCA) 후 혈전 생성 억제 3. 고위험군환자(허혈성 심장질환의 가족력, 고혈압, 고콜레스테롤혈증, 비만, 당뇨 등 복합적 위험인자를 가진 환자)에서 심혈관계 위험성 감소		
용법·용량	성인 1일 1회 1캡슐(아스피린/라베프라졸나트륨 100/5mg)을 복용한다.		
저장방법	기밀용기, 실온(1-30°C)보관	포장단위	30 캡슐/병, 300 캡슐/병
청구코드	670609400	보험약가	339 원/캡슐

※ 자세한 허가사항은 제품설명서 전문을 참고하시기 바랍니다. ※ 본 의약품은 엄격한 품질관리를 필한 제품입니다. 유통 중 유효기간이 경과하였거나, 변질/변패 또는 오염 및 손상된 제품이 발견될 경우에는 구입처를 통하여 즉시 교환해 드립니다.

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