

## Curriculum Vitae

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Name: **Min Woo Lee**

Date of Birth: Feb 28,1973

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### Education and Training

1993.3-1999.2 Seoul National University School of Medicine

2002.3-2004.2 M.S. at Seoul National University School of Medicine

2006.9-2009.2 D.S. at Seoul National University School of Medicine

1999.3-2000.2 Internship, Seoul National University Hospital

2000.3-2004.2 Residency, Department of Radiology, Seoul National University Hospital

2004.3-2005.8 Fellowship, Abdominal imaging, Department of Radiology, Seoul National University Hospital

### Professional Affiliations

2005.9-2006.8 Clinical instructor, Department of Radiology, Konkuk University Hospital

2006.9-2008.4 Instructor, Department of Radiology, Konkuk University Hospital

2008.5-2010.2 Clinical assistant professor, Samsung Medical Center

2010.3-2014.3 Assistant professor, Department of Radiology and Center for Imaging Science, Samsung Medical Center, Sungkyunkwan University School of Medicine

2014.4-2020.3 Associate professor, Department of Radiology and Center for Imaging Science, Samsung Medical Center, Sungkyunkwan University School of Medicine

2015.8-2016.7 Visiting scholar, Department of Radiological Sciences, David Geffen School of Medicine at UCLA

2020.4- Professor, Department of Radiology and Center for Imaging Science,

Samsung Medical Center, Sungkyunkwan University School of Medicine

**Main Research Interests:**

Local ablation therapy of liver tumors

Liver imaging

**Membership and Certifications**

2004 - Member, Korean Society of Abdominal Radiology

2006 - Member, Korean Society of Image-guided Tumor Ablation

2010 - Member, Korean Society of Ultrasound in Medicine

2012- Member, The Korean liver cancer study group

2012- Member, The Korean Association for the Study of the Liver

2018-2019 Academic director, Korean Society of Image-guided Tumor Ablation

2020-2021 Director of international relations, Korean Society of Image-guided Tumor Ablation

2022-2023 Director of general affairs, Korean Society of Image-guided Tumor Ablation

**Honors and Awards**

RSNA Cum Laude, 2010

Teacher of the year, Department of Radiology and Imaging Science, Samsung Medical Center, 2010

Best researcher of the year, Department of Radiology and Imaging Science, Samsung Medical Center, 2017

Best Academic Award, KSITA, 2017

Academic Award, KSITA, 2020

Best Academic Award, KSITA, 2022

Best researcher of the year, Department of Radiology and Imaging Science, Samsung Medical Center, 2023

Academic Award, KSUM, 2023

**Scientific Paper Publication (First or corresponding author)**

1. Lee MW, Lee JM, Koh YH, Chung JW. 2022 Korean Liver Cancer Association-National Cancer Center Korea Practice Guidelines for Local Ablation Therapy of Hepatocellular Carcinoma: What's New? Korean J Radiol 2023;24:10-14
2. Jo MG, Lee MW, Ahn S, Kang TW, Song KD, Cha DI, et al. Percutaneous radiofrequency ablation of hepatocellular carcinoma in a recent cohort at a tertiary

cancer center: incidence and factors associated with major complications and unexpected hospitalization events. *Ultrasonography* 2023;42:41-53

3. Cha DI, Lee MW, Ahn SH, Song KD, Kang TW, Sinn DH, et al. Rescue therapy for local tumor progression after radiofrequency ablation of small hepatocellular carcinoma: a comparison between repeated ablation and transcatheter arterial chemoembolization. *Br J Radiol* 2023;96:20211037

4. Cha DI, Ahn SH, Lee MW, Jeong WK, Song KD, Kang TW, et al. Risk Group Stratification for Recurrence-Free Survival and Early Tumor Recurrence after Radiofrequency Ablation for Hepatocellular Carcinoma. *Cancers (Basel)* 2023;15

5. Min JH, Lee MW, Park HS, Lee DH, Park HJ, Lee JE, et al. LI-RADS Version 2018 Targetoid Appearances on Gadoteric Acid-Enhanced MRI: Interobserver Agreement and Diagnostic Performance for the Differentiation of HCC and Non-HCC Malignancy. *AJR Am J Roentgenol* 2022;219:421-432

6. Lee MW, Rhim H. Research Highlight: How to Use Technical and Oncologic Outcomes of Image-Guided Tumor Ablation According to Guidelines by Society of Interventional Oncology and DATECAN? *Korean J Radiol* 2022;23:385-388

7. Lee HJ, Lee MW, Ahn SH, Cha DI, Ko SE, Kang TW, et al. Percutaneous radiofrequency ablation of solitary hepatic metastases from colorectal cancer: risk factors of local tumor progression-free survival and overall survival. *Ultrasonography* 2022;41:728-739

8. Kwak MH, Lee MW, Ko SE, Rhim H, Kang TW, Song KD, et al. Laparoscopic radiofrequency ablation versus percutaneous radiofrequency ablation for subphrenic hepatocellular carcinoma. *Ultrasonography* 2022;41:543-552

9. Ko SE, Lee MW, Min JH, Ahn SH, Rhim H, Kang TW, et al. Laparoscopic radiofrequency ablation of subcapsular hepatocellular carcinomas: risk factors related to a technical failure. *Surg Endosc* 2022;36:504-514

10. Ko SE, Lee MW, Ahn S, Rhim H, Kang TW, Song KD, et al. Laparoscopic Hepatic Resection Versus Laparoscopic Radiofrequency Ablation for Subcapsular Hepatocellular Carcinomas Smaller Than 3 cm: Analysis of Treatment Outcomes Using Propensity Score Matching. *Korean J Radiol* 2022;23:615-624

11. Jo MG, Lee MW, Ahn S, Kang TW, Song KD, Cha DI, et al. Percutaneous radiofrequency ablation of hepatocellular carcinoma in a recent cohort at a tertiary cancer center: incidence and factors associated with major complications and unexpected hospitalization events. *Ultrasonography* 2022

12. Cha DI, Lee MW, Song KD, Ko SE, Rhim H. Ablative Outcomes of Various Energy Modes for No-Touch and Peripheral Tumor-Puncturing Radiofrequency

Ablation: An Ex Vivo Simulation Study. *Korean J Radiol* 2022;23:189-201

13. Bae JW, Lee MW, Kang TW, Song KD, Cha DI, Min JH, et al. Percutaneous radiofrequency ablation for hepatic metastasis of colorectal cancer: assessment of tumor visibility and the feasibility of the procedure with planning ultrasonography. *Ultrasonography* 2022;41:189-197
14. Song KD, Lee MW, Rhim H, Kang TW. Hemostasis using re-radiofrequency ablation for hepatic tract bleeding after ultrasound-guided percutaneous radiofrequency ablation of hepatic tumors. *Br J Radiol* 2021;94:20210353
15. Lee DH, Lee MW, Kim PN, Lee YJ, Park HS, Lee JM. Outcome of No-Touch Radiofrequency Ablation for Small Hepatocellular Carcinoma: A Multicenter Clinical Trial. *Radiology* 2021;301:229-236
16. Ko SE, Lee MW, Lim HK, Min JH, Cha DI, Kang TW, et al. The semi-erect position for better visualization of subphrenic hepatocellular carcinoma during ultrasonography examinations. *Ultrasonography* 2021;40:274-280
17. Cha DI, Lee MW, Jeong WK, Ha SY, Ahn SH, Rhim H, et al. Comparison of ablation performance between dual internally cooled wet tip and conventional dual internally cooled tip radiofrequency electrodes: an experimental study in ex vivo bovine liver. *Int J Hyperthermia* 2021;38:332-340
18. Cha DI, Lee MW, Jeong WK, Ahn SH, Kang TW, Song KD, et al. Rim-arterial enhancing primary hepatic tumors with other targetoid appearance show early recurrence after radiofrequency ablation. *Eur Radiol* 2021
19. Yoo J, Lee MW, Lee DH, Lee JH, Han JK. Evaluation of a serum tumour marker-based recurrence prediction model after radiofrequency ablation for hepatocellular carcinoma. *Liver Int* 2020;40:1189-1200
20. Min JH, Lee MW, Park HS, Lee DH, Park HJ, Lim S, et al. Interobserver Variability and Diagnostic Performance of Gadoteric Acid-enhanced MRI for Predicting Microvascular Invasion in Hepatocellular Carcinoma. *Radiology* 2020;297:573-581
21. Lee MW, Kang D, Lim HK, Cho J, Sinn DH, Kang TW, et al. Updated 10-year outcomes of percutaneous radiofrequency ablation as first-line therapy for single hepatocellular carcinoma < 3 cm: emphasis on association of local tumor progression and overall survival. *Eur Radiol* 2020;30:2391-2400
22. Ko SE, Lee MW, Rhim H, Kang TW, Song KD, Cha DI, et al. Comparison of procedure-related complications between percutaneous cryoablation and radiofrequency ablation for treating periductal hepatocellular carcinoma. *Int J Hyperthermia* 2020;37:1354-1361

23. Kim J, Min JH, Kim SK, Shin SY, Lee MW. Detection of Hepatocellular Carcinoma in Contrast-Enhanced Magnetic Resonance Imaging Using Deep Learning Classifier: A Multi-Center Retrospective Study. *Sci Rep* 2020;10:9458
24. Kang TW, Lee MW, Cha DI, Park HJ, Park JS, Bang WC, et al. Usefulness of Virtual Expiratory CT Images to Compensate for Respiratory Liver Motion in Ultrasound/CT Image Fusion: A Prospective Study in Patients with Focal Hepatic Lesions. *Korean J Radiol* 2019;20:225-235
25. Song KD, Lee MW, Rhim H, Kang TW, Cha DI, Sinn DH, et al. Percutaneous US/MRI Fusion-guided Radiofrequency Ablation for Recurrent Subcentimeter Hepatocellular Carcinoma: Technical Feasibility and Therapeutic Outcomes. *Radiology* 2018;288:878-886
26. Lee MW, Lim HK, Rhim H, Cha DI, Kang TW, Song KD, et al. Percutaneous Radiofrequency Ablation of Small (1-2 cm) Hepatocellular Carcinomas Inconspicuous on B-Mode Ultrasonographic Imaging: Usefulness of Combined Fusion Imaging with MRI and Contrast-Enhanced Ultrasonography. *Can J Gastroenterol Hepatol* 2018;2018:7926923
27. Lee MW, Lim HK. Management of sub-centimeter recurrent hepatocellular carcinoma after curative treatment: Current status and future. *World J Gastroenterol* 2018;24:5215-5222
28. Song KD, Lee MW, Rhim H, Kang TW, Cha DI, Yang J. Chronological changes of radiofrequency ablation zone in rabbit liver: an in vivo correlation between gross pathology and histopathology. *British Journal of Radiology* 2017;90:7
29. Lee MW, Raman SS, Asvadi NH, Siripongsakun S, Hicks RM, Chen J, et al. Radiofrequency Ablation of Hepatocellular Carcinoma as Bridge Therapy to Liver Transplantation: A 10-Year Intention-to-Treat Analysis. *Hepatology* 2017;65:1979-1990
30. Lee MW, Park HJ, Kang TW, Ryu J, Bang WC, Lee B, et al. Image Fusion of Real-Time Ultrasonography with Computed Tomography: Factors Affecting the Registration Error and Motion of Focal Hepatic Lesions. *Ultrasound Med Biol* 2017;43:2024-2032
31. Kang TW, Lee MW, Song KD, Rhim H, Lim HK, Kang W, et al. Ultrasound-Guided Radiofrequency Ablation Using a New Electrode with an Electromagnetic Position Sensor for Hepatic Tumors Difficult to Place an Electrode: A Preliminary Clinical Study. *Cardiovasc Intervent Radiol* 2017;40:1891-1898
32. Kang TW, Lee MW, Song KD, Kim M, Kim SS, Kim SH, et al. Added Value of Contrast-Enhanced Ultrasound on Biopsies of Focal Hepatic Lesions Invisible on Fusion Imaging Guidance. *Korean Journal of Radiology* 2017;18:152-161

33. Cha DI, Lee MW, Song KD, Oh YT, Jeong JY, Chang JW, et al. A prospective comparison between auto-registration and manual registration of real-time ultrasound with MR images for percutaneous ablation or biopsy of hepatic lesions. *Abdominal Radiology* 2017;42:1799-1808
34. Cha DI, Lee MW, Kim AY, Kang TW, Oh YT, Jeong JY, et al. Automatic image fusion of real-time ultrasound with computed tomography images: a prospective comparison between two auto-registration methods. *Acta Radiologica* 2017;58:1349-1357
35. Cha DI, Lee MW, Kang TW, Oh YT, Jeong JY, Chang JW, et al. Comparison Between CT and MR Images as More Favorable Reference Data Sets for Fusion Imaging-Guided Radiofrequency Ablation or Biopsy of Hepatic Lesions: A Prospective Study with Focus on Patient's Respiration. *Cardiovascular and Interventional Radiology* 2017;40:1567-1575
36. Song KD, Lee MW, Rhim H, Kim YS, Kang TW, Shin SW, et al. Aggressive Intra-segmental Recurrence of Hepatocellular Carcinoma After Combined Transarterial Chemoembolization and Radiofrequency Ablation. *American Journal of Roentgenology* 2016;207:1122-1127
37. Kim AY, Lee MW, Cha DI, Lim HK, Oh YT, Jeong JY, et al. AUTOMATIC REGISTRATION BETWEEN REAL-TIME ULTRASONOGRAPHY AND PRE-PROCEDURAL MAGNETIC RESONANCE IMAGES: A PROSPECTIVE COMPARISON BETWEEN TWO REGISTRATION METHODS BY LIVER SURFACE AND VESSEL AND BY LIVER SURFACE ONLY. *Ultrasound in Medicine and Biology* 2016;42:1627-1636
38. Kang TW, Lee MW, Choi D, An C, Kim MJ, Joo I, et al. Safety of Percutaneous Biopsy for Hepatic Angiosarcoma: Results of a Multicenter Korean Survey. *Journal of Vascular and Interventional Radiology* 2016;27:846-851
39. Song KD, Lee MW, Park HJ, Cha DI, Kang TW, Lee J, et al. Hepatic radiofrequency ablation: in vivo and ex vivo comparisons of 15-gauge (G) and 17-G internally cooled electrodes. *British Journal of Radiology* 2015;88:6
40. Park HJ, Lee MW, Rhim H, Cha DI, Kang TW, Lim S, et al. Percutaneous ultrasonography-guided radiofrequency ablation of hepatocellular carcinomas: usefulness of image fusion with three-dimensional ultrasonography. *Clinical Radiology* 2015;70:387-394
41. Kang TW, Lee MW, Choi SH, Rhim H, Lim S, Song KD, et al. A Novel Electrode With Electromagnetic Tip Tracking in Ultrasonography-Guided Radiofrequency Ablation A Phantom, Ex Vivo, and In Vivo Experimental Study.

Investigative Radiology 2015;50:81-87

42. Park HJ, Lee MW, Song KD, Cha DI, Rhim H, Kang TW, et al. Comparison of therapeutic efficacy and safety of radiofrequency ablation of hepatocellular carcinomas between internally cooled 15-G and 17-G single electrodes. *British Journal of Radiology* 2014;87:8
43. Min JH, Lee MW, Rhim H, Cha DI, Lim S, Choi SY, et al. Local tumour progression after loco-regional therapy of hepatocellular carcinomas: Value of fusion imaging-guided radiofrequency ablation. *Clinical Radiology* 2014;69:286-293
44. Lee MW. Fusion imaging of real-time ultrasonography with CT or MRI for hepatic intervention. *Ultrasonography* 2014;33:227-239
45. Kang TW, Lee MW, Hye MJ, Song KD, Lim S, Rhim H, et al. radiofrequency ablation of hepatic tumours: Factors affecting technical failure of artificial ascites formation using an angiosheath. *Clinical Radiology* 2014;69:1249-1258
46. Cha DI, Lee MW, Kim YK, Kim SH, Park HJ, Rhim H, et al. Assessing Patients With hepatocellular Carcinoma Meeting the Milan Criteria: Is Liver 3 Tesla MR With Gadoteric Acid Necessary in Addition to Liver CT? *Journal of Magnetic Resonance Imaging* 2014;39:842-852
47. Song KD, Lee MW, Rhim H, Cha DI, Chong Y, Lim HK. Fusion Imaging-Guided Radiofrequency Ablation for Hepatocellular Carcinomas Not Visible on Conventional Ultrasound. *American Journal of Roentgenology* 2013;201:1141-1147
48. Park HJ, Lee MW, Lee MH, Hwang J, Kang TW, Lim S, et al. Fusion Imaging-Guided Percutaneous Biopsy of Focal Hepatic Lesions With Poor Conspicuity on Conventional Sonography. *Journal of Ultrasound in Medicine* 2013;32:1557-1564
49. Min JH, Lee MW, Cha DI, Jeon YH, Shin SW, Cho SK, et al. Radiofrequency Ablation Combined with Chemoembolization for Intermediate-Sized (3-5 cm) Hepatocellular Carcinomas Under Dual Guidance of Biplane Fluoroscopy and Ultrasonography. *Korean Journal of Radiology* 2013;14:248-258
50. Lee MW, Rhim H, Cha DI, Kim YJ, Lim HK. Planning US for Percutaneous Radiofrequency Ablation of Small Hepatocellular Carcinomas (1-3 cm): Value of Fusion Imaging with Conventional US and CT/MR Images. *Journal of Vascular and Interventional Radiology* 2013;24:958-965
51. Kim YJ, Lee MW, Park HS. Small hepatocellular carcinomas: ultrasonography guided percutaneous radiofrequency ablation. *Abdominal Imaging* 2013;38:98-111
52. Kim AY, Lee MW, Rhim H, Cha DI, Choi D, Kim YS, et al. Pretreatment Evaluation with Contrast-Enhanced Ultrasonography for Percutaneous Radiofrequency Ablation of Hepatocellular Carcinomas with Poor Conspicuity on Conventional.

Ultrasonography. Korean Journal of Radiology 2013;14:754-763

53. Cha MJ, Lee MW, Cha DI, Kim JH, Rhim H, Cho YK, et al. Size Discrepancy Between Sonographic and Computed Tomographic/Magnetic Resonance Imaging Measurement of Hepatocellular Carcinoma The Necessity of Tumor Size Measurement Standardization. Journal of Ultrasound in Medicine 2013;32:1703-1709

54. Cha DI, Lee MW, Rhim H, Choi D, Kim YS, Lim HK. Therapeutic Efficacy and Safety of Percutaneous Ethanol Injection with or without Combined Radiofrequency Ablation for Hepatocellular Carcinomas in High Risk Locations. Korean Journal of Radiology 2013;14:240-247

55. Min JH, Lee MW, Rhinn H, Choi D, Kim YS, Kim YJ, et al. Radiofrequency Ablation for Viable Hepatocellular Carcinoma around Retained Iodized Oil after Transcatheter Arterial Chemoembolization: Usefulness of Biplane Fluoroscopy Plus Ultrasound Guidance. Korean Journal of Radiology 2012;13:784-794

56. Lee MW, Rhim H, Cha DI, Kim YJ, Choi D, Kim YS, et al. Percutaneous Radiofrequency Ablation of Hepatocellular Carcinoma: Fusion Imaging Guidance for Management of Lesions With Poor Conspicuity at Conventional Sonography. American Journal of Roentgenology 2012;198:1438-1444

57. Kim JE, Lee MW, Moon JW, Song KD, Park Y, Park MJ, et al. CT Detection of Dry Peritoneal Seeding in Patients with Advanced Gastric Cancer. Hepato-Gastroenterology 2012;59:2202-2206

58. Park KJ, Lee MW, Koo JH, Park Y, Kim H, Choi D, et al. Detection of early gastric cancer using hydro-stomach CT: Blinded vs unblinded analysis. World Journal of Gastroenterology 2011;17:1051-1057

59. Min JH, Lee MW, Rhim H, Choi D, Kim YS, Kim YJ, et al. Recurrent Hepatocellular Carcinoma After Transcatheter Arterial Chemoembolization Planning Sonography for Radio Frequency Ablation. Journal of Ultrasound in Medicine 2011;30:617-624

60. Lee MW, Lim HK, Kim YJ, Choi D, Kim YS, Lee WJ, et al. Percutaneous Sonographically Guided Radio Frequency Ablation of Hepatocellular Carcinoma Causes of Mistargeting and Factors Affecting the Feasibility of a Second Ablation Session. Journal of Ultrasound in Medicine 2011;30:607-615

61. Lee MW, Kim YJ, Park SW, Yu NC, Choe WH, Kwon SY, et al. Biplane fluoroscopy-guided radiofrequency ablation combined with chemoembolisation for hepatocellular carcinoma: initial experience. Br J Radiol 2011;84:691-697

62. Chang IS, Lee MW, Il Kim Y, Choi SH, Kim HC, Choi YW, et al. Comparison Between Transauricular and Transfemoral Arterial Access for Hepatic Artery



Angiography in a Rabbit Model. *Journal of Vascular and Interventional Radiology* 2011;22:1181-1187

63. Lee MW, Kim YJ, Park SW, Yu NC, Park HS, Jung SI, et al. Sequential changes in echogenicity and conspicuity of small hepatocellular carcinoma on gray scale sonography after transcatheter arterial chemoembolization. *J Ultrasound Med* 2010;29:1305-1312

64. Lee MW, Kim YJ, Park HS, Yu NC, Jung SI, Ko SY, et al. Targeted sonography for small hepatocellular carcinoma discovered by CT or MRI: factors affecting sonographic detection. *AJR Am J Roentgenol* 2010;194:W396-400

65. Lee MW, Kim YJ, Park SW, Hwang JH, Jung SI, Jeon HJ, et al. Percutaneous radiofrequency ablation of small hepatocellular carcinoma invisible on both ultrasonography and unenhanced CT: a preliminary study of combined treatment with transarterial chemoembolisation. *British Journal of Radiology* 2009;82:908-915

66. Lee MW, Kim YJ, Jeon HJ, Park SW, Jung SI, Yi JG. Sonography of acute right lower quadrant pain: importance of increased intraabdominal fat echo. *AJR Am J Roentgenol* 2009;192:174-179

67. Lee MW, Kim SH, Park HS, Lee JG, Joo SM, An S, et al. An Anthropomorphic Phantom Study of Computer-Aided Detection Performance for Polyp Detection on CT Colonography: A Comparison of Commercially and Academically Available Systems. *American Journal of Roentgenology* 2009;193:445-454

68. Lee MW, Kim SH, Kim YJ, Lee JM, Lee JY, Park EA, et al. Gastrointestinal stromal tumor of the stomach: preliminary results of preoperative evaluation with CT gastrography. *Abdom Imaging* 2008;33:255-261

69. Lee MW, Lee JY, Kim YJ, Park EA, Choi JY, Kim SH, et al. Gastric hepatoid adenocarcinoma: CT findings. *Abdom Imaging* 2007;32:293-298

70. Lee MW, Lee JM, Lee JY, Kim SH, Park EA, Han JK, et al. Preoperative evaluation of hepatic arterial and portal venous anatomy using the time resolved echo-shared MR angiographic technique in living liver donors. *Eur Radiol* 2007;17:1074-1080

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