

Sung Eun Kim

- **Research Professor**, National Strategic Technology Research Institute, Biomedical Research Institute, Seoul National University Hospital
- **Postdoctoral Research Fellow**, Department of Biomedical Informatics, Harvard Medical School

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Professional Profile:

Orthopedic surgeon and researcher specializing in sports medicine, arthroplasty, and the integration of **artificial intelligence** in orthopedic imaging and diagnostics. Currently a **Postdoctoral Research Fellow** in the **Department of Biomedical Informatics, Harvard Medical School**, and a **Research Professor** at the **Biomedical Research Institute, Seoul National University Hospital**. Expertise includes developing AI-driven models for knee pathology detection and predicting surgical outcomes, with a strong track record of publications in high-impact journals. Research interests span sports medicine, knee arthroplasty, osteoarthritis progression, cartilage regeneration, and **big data analysis**. Committed to advancing orthopedic research through interdisciplinary approaches, innovation in AI applications, and global collaborations.

Education:

Ph.D. Candidate in Orthopedic Surgery

Seoul National University, College of Medicine, Seoul, Republic of Korea

March 2023 - Present

- Advisor: Prof. Hyuk-Soo Han

Master of Science in Orthopedic Surgery

Seoul National University, College of Medicine, Seoul, Republic of Korea

February 2023

- Thesis: "Dedifferentiated Liposarcoma of the Extremities: Characteristics and Outcomes"
- Advisor: Prof. Ilkyu Han

Board-Certified Orthopedic Surgeon

Seoul National University Hospital, Seoul, Republic of Korea

March 2022

Doctor of Medicine (M.D.)

Seoul National University, College of Medicine, Seoul, Republic of Korea

February 2014

Professional Experience:

Clinical and Research Fellow (Knee surgery)

Mar 2022 – Jul 2024

Department of Orthopedic Surgery, Seoul National University Hospital, Seoul, Republic of Korea

Advisors: Du Hyun Ro, M.D., Hyuk-Soo Han, M.D., Ph.D., and Myung Chul Lee, M.D., Ph. D.

Resident

Mar 2018 – Feb 2022

Department of Orthopedic Surgery, Seoul National University Hospital, Seoul, Republic of Korea

Intern

May 2017 – Feb 2018

Seoul National University Hospital, Seoul, Republic of Korea

Publications:

1. Luo L*, Kim SE*, Zhang X, Kernbach JM, Kenia R, Acosta JN, Nathanson L, Haimovich A, Rodman A, Goh E, Chen J, Shah N, Kim D, Zou J, Mahmood F, Kather JN, Lungren M, Karthikesalingam A, Natarajan V, Topol E, Rajpurkar P. A Clinical Environment Simulator Framework for Healthcare AI Performance Assessment. Under revision at Nature Medicine. (*first author).
2. Banerjee O, Kernbach JM, **Kim SE**, Alomaish AR, Alghamdi RAS, Alomaish HR, Baharoon M, Zhang X, Acosta JN, Rajpurkar P. Beyond the Scanner: A Benchmark for Medical Photograph Understanding. Under review for MIDL 2026.
3. Lee JY, Park JE, **Kim SE**, Choi BS, Lee MC, Chang CB, Han HS, Park HY, Ro DH. Preoperative low cognitive function and somatic psychological symptoms are associated with an increased risk of postoperative delirium following total knee arthroplasty: a prospective cohort study. (Accepted J Bone Joint Surg Am)
4. Kwak D*, Kim SE*, Park J, Han H-S, Choi BS, Ro DH. Posterior tibial slope as a risk factor for anterior cruciate ligament tears: a retrospective study using automated measurement. **Arthrose Orthop Sports Med.** 2025 Nov 1;12:64-69. doi: 10.14517/aosm25006 (*first author).
5. Sambara S*, **Kim SE***, Zhang X, Luo L, Johri S, Baharoon M, Ro DH, Rajpurkar P. 3DReasonKnee: Advancing Grounded Reasoning in Medical Vision Language Models. Pacific Symposium on Biocomputing (PSB) 2026. (*first author)
6. Baharoon M, Raissi S, Jun JS, Heintz T, Alabbad MH, Alburkani AM, **Kim SE**, Kleinschmidt K, Alhumaydhi AO, Alghamdi MMG, Palacio JF, Bukhaytan M, Prudlo NM, Akula R, Chrisler B, Galligos B, Almutairi MO, Alanazi MM, Alrashdi NM, Hwang JJ, Jaliparthi SSD, Nelson LD, Nguyen N, Suryadevara S, Kim S, Mohammed MF, Semenov Y, Yu K-H, Aljouie A, Alomaish H, Rodman A, Rajpurkar P. RadGame: An AI-Powered Platform for Radiology Education. Machine Learning for Health (ML4H) 2025. doi.org/10.48550/arXiv.2509.13270
7. Baharoon M, Luo L, Moritz M, Kumar A, **Kim SE**, Zhang X, Zhu M, Alabbad MH, Alhazmi MS, Mistry NP, Bijnens L, Kleinschmidt KR, Chrisler B, Suryadevara S, Jaliparthi SSD, Prudlo NM, Marino MD, Palacio J, Akula R, Zhou D, Zhou H-Y, Hamamci IE, Adams SJ, AlOmaish HR, Rajpurkar P. ReXGroundingCT: A Dataset for Free-Text Finding Segmentation in Chest CT. Under consideration at NEJM AI. arXiv preprint arXiv:2507.22030
8. Acosta J, Adams SJ, Kernbach JM, Hardy R, **Kim SE**, Luo L, Zhang X, Johri S, Baharoon M, Rajpurkar P. Voice-guided Orchestrated Intelligence for Clinical Evaluation (VOICE): A Voice AI Agent System for Prehospital Stroke Assessment. Proceedings of the 2025 IEEE International Conference on AI for Medicine and Healthcare Computing (AIxMHC). Taichung, Taiwan, October 13-15, 2025. IEEE Computer Society Press.
9. Baharoon M, Luo L, Moritz M, Kumar A, **Kim SE**, Zhang X, Zhu M, Kleinschmidt K, Jaliparthi SSD, Suryadevara S, Akula R, Marino M, Lei W, Hamamci IE, Rajpurkar P. State-of-the-art text-prompted medical segmentation models struggle to ground chest CT findings. Proceedings of the 10th Machine Learning for Healthcare (MLHC) Conference, in Proceedings of Machine Learning Research, Vol. 298, 2025. <https://proceedings.mlr.press/v298/baharoon25a.html>

10. Hardy R, **Kim SE**, Ro DH, Rajpurkar P. ReXTrust: A Model for Fine-Grained Hallucination Detection in AI-Generated Radiology Reports. <https://doi.org/10.48550/arXiv.2412.15264>
11. Heiman A, Zhang X, Chen E, **Kim SE**, Rajpurkar P. FactCheXcker: Mitigating Measurement Hallucinations in Chest X-ray Report Generation Models. Conference on Computer Vision and Pattern Recognition (CVPR) 2025, <https://doi.org/10.48550/arXiv.2411.18672>
12. Gimm G, Jeon B, **Kim SE**, Kim BS, Han HS, Kim S. A development of machine learning models to preoperatively predict insufficient clinical improvement after total knee arthroplasty. J Orthop Surg Res. 2025 Aug 20;20(1):778. doi: 10.1186/s13018-025-06206-z.
13. Park J, Chaar O, Narayananakurup J, Abdelhamead ASA, Ro DH, **Kim SE**. Do knee alignment patterns differ between Middle Eastern and East Asian populations? A propensity-matched analysis using artificial intelligence. Knee Surg Relat Res. 2025 Mar 3;37(1):11. doi: 10.1186/s43019-025-00261-w (corresponding author).
14. Ryu B, Nam JW, Ro DH, Martin RK, Inderhaug E, Persson A, Haaland S, **Kim SE**. Automated Posterior Tibial Slope Measurement Using Lateral Knee Radiographs: A Novel Landmark-Based Approach Using Deep Learning. Orthop J Sports Med. 2025 Apr 22;13(4):23259671251331067. doi: 10.1177/23259671251331067 (corresponding author).
15. Martin RK, Haaland S, Persson A, **Kim SE**, Ryu B, Nam JW, Ro DH, Inderhaug E. External validation of a novel landmark-based deep learning automated tibial slope measurement algorithm applied on short radiographs from ACL injured patients. Orthop J Sports Med. 2025 May 5;13(5):23259671251333607. doi: 10.1177/23259671251333607.
16. Zheng Z, Ryu, B, **Kim SE**, Song D, Kim SH, Park JW, Ro DH. Deep learning for automated hip fracture detection and classification: achieving superior accuracy. Bone Joint J. 2025 Feb 1;107-B(2):213-220. doi: 10.1302/0301-620X.107B2.BJJ-2024-0791.R1.
17. Kim JS, Choi BS, **Kim SE**, Lee YS, Lee DW, Ro DH. Machine learning-based prediction of contralateral knee osteoarthritis development using the Osteoarthritis Initiative and the Multicenter Osteoarthritis Study dataset. J Orthop Res. 2025 Mar;43(3):576-585. doi: 10.1002/jor.26018.
18. Park J, **Kim SE**, Kim B, Lee S, Lee JJ, and Ro DH. A deep learning based automatic two-dimensional digital templating model for total knee arthroplasty. Knee Surg Relat Res. 2024 Nov 27;36(1):38. doi: 10.1186/s43019-024-00240-7.
19. **Kim SE**, Kim SH, Lee JI, Han HS, Lee MC, Ro DH. Primary total knee arthroplasty for treating knees with neglected patellar dislocation. Medicina (Kaunas). 2024 Sep 13;60(9):1492. doi: 10.3390/medicina60091492.
20. Park JH, **Kim SE**, Kim W, Kim Y, Kim JH, Seo SW, Kim HS, Kim S, and Han I. Dedifferentiated Liposarcoma of the Extremities: A Korean Multi-Center Study of 107 Cases. BMC Cancer. 2024 Oct 10;24(1):1259. doi: 10.1186/s12885-024-13021-y.).
21. **Kim SE**, Ro DH, Lee MC, Han HS. Can individual functional improvements be predicted in osteoarthritic patients after total knee arthroplasty? Knee Surg Relat Res. 2024 Oct 14;36(1):31. doi: 10.1186/s43019-024-00238-1.
22. **Kim SE**, Shin HS, Han HS. Superior Forgotten Joint Scores with Cruciate-Retaining Mobile bearings Versus Posterior-Stabilized Mobile and Fixed bearings in a contemporary Total Knee System. Knee. 2025 Mar;53:118-125. doi: 10.1016/j.knee.2024.11.003.

23. **Kim SE**, MacDessi S, Song D, Kim JI, Choi BS, Han HS, Ro DH. Coronal plane alignment of the knee (CPAK) type shifts towards constitutional varus with increasing Kellgren and Lawrence grade: a deep learning radiographic analysis of 17,365 knees. *J Bone Joint Surg Am*. 2024 Dec 04. doi: 10.2106/JBJS.24.00316.
24. Hussain I*, **Kim SE***, Kwon C, Hoon SK, Kim HC, Ku Y, Ro DH. Estimation of patient-reported outcome measures based on features of knee joint muscle co-activation in advanced knee osteoarthritis. *Sci Rep*. 2024 May 30;14(1):12428. doi:10.1038/s41598-024063266-7 (*first author)
25. Lee JY*, **Kim SE***, Kwon OH, Lee MC, Han HS, Ro DH. Shallow trochlear groove and narrow medial trochlear width at the proximal trochlea in patients with trochlear dysplasia: A three-dimensional computed tomography analysis. *Knee Surg Sports Traumatol Arthrosc* 2024;32(6):1434-1445. doi:10.1002/ksa.12166 (*first author)
26. **Kim SE**, Choi BS, Ro DH, Lee MC, Han HS. Fixed bearing and higher postoperative knee flexion angle as predictors of satisfaction in Asian patients undergoing posterior stabilized total knee arthroplasty. *Clin Orthop Surg*. 2024 Apr;16:e19. <https://doi.org/10.4055/cios23166>
27. **Kim SE**, Hwang S, Lee JH, Gimm G, Han HS, Choi BS, Ro DH. Minimal impact of beam projection angle deviations in skyline (Laurin) view and the efficacy of the anterior border of proximal tibia as a guiding landmark. *Skelet Radiol*. 2024;53(7):1399-1406. doi:10.1007/s00256-024-04619-1
28. **Kim SE**, Han HS. Robotic arm-assisted total knee arthroplasty in a patient with osteopetrosis: a case report and review of literature. *Orthop Rev (Pavia)*. 2024 Mar 1:16:94238. doi:10.52965/001c.94238
29. **Kim SE**, Nam JW, Kim JI, Kim JK, Ro DH. Enhanced deep learning model enables accurate alignment measurement across diverse institutional imaging protocols. *Knee Surg Relat Res*. 2024;36(1):4. doi:10.1186/s43019-023-00209-y
30. **Kim SE**, Kwak J, Ro DH, Lee MC, Han HS. The use of medial joint opening rather than mechanical axis deviation to determine the clinical outcomes after high tibial osteotomy. *Bone Joint J* 2024;106-B(3):240-248. doi:10.1302/0301-620X.106B3.BJJ-2023-0337.R3
31. **Kim SE**, Lee JH, Choi BS, Han HS, Lee MC, Ro DH. Performance of ChatGPT on Solving Orthopedic Board-Style Questions: a Comparative Analysis of ChatGPT 3.5 and ChatGPT 4. *Clin Orthop Surg*. 2024 Mar;16:e13. <https://doi.org/10.4055/cios23179>
32. **Kim SE**, Yun KR, Lee JM, Lee MC, Han HS. Preserving coronal knee alignment of the knee (CPAK) in unicompartmental knee arthroplasty correlates with superior patient-reported outcomes. *Knee Surg Relat Res*. 2024;36(1):1. doi:10.1186/s43019-023-00204-3.
33. **Kim SE**, Kim K, Lee MC, Han HS, Choi BS, Ro DH. An accurate method for measuring knee joint space width despite variations in beam projection angles. *Knee*. 2023;45:85-91. doi:10.1016/j.knee.2023.09.006
34. Choi BS, **Kim SE**, Yang M, Ro DH, Han HS. Functional alignment with robotic-arm assisted total knee arthroplasty demonstrated better patient-reported outcomes than mechanical alignment with manual total knee arthroplasty. *Knee Surg Sports Traumatol Arthrosc*. 2023;31(3):1072-1080. doi:10.1007/s00167-022-07227-5
35. **Kim SE**, Han HS. Robotic-assisted unicompartmental knee arthroplasty: historical perspectives and current innovations. *Biomed Eng Lett*. 2023;13(4):543-552. doi:10.1007/s13534-023-00323-6
36. **Kim SE**, Ro DH, Lee MC, Cholewa JM. Early- to Mid-Term Review of a Prospective, Multi-Center, International, Outcomes Study of an Anatomically Designed Implant with Posterior-Stabilized Bearing in

Total Knee Arthroplasty. *Medicina*. 2023; 59(12):2105. <https://doi.org/10.3390/medicina59122105>

37. **Kim SE**, Lee MH, Cho CH, Lee J-I, Han H-S, Lee MC, Ro DH. Risk Factors and Clinical Outcomes of Osteotomy Plane Violation by D-Hole Screws in Medial Open Wedge High Tibial Osteotomy: A Simulation and Comparative Study. *Medicina*. 2023; 59(12):2104. <https://doi.org/10.3390/medicina59122104>
38. **Kim SE**, Jung H, Ro DH, Lee MC, Han HS. Anatomic Patellar Design Has No Clinical Superiority Over Dome Patellar Design in Total Knee Arthroplasty: A Randomized Clinical Trial. *J Arthroplasty*. 2023;38(9):1742-1747. doi:10.1016/j.arth.2023.03.056
39. **Kim SE**, Han HS, Lee MC, Ro DH. Single shot adductor canal block combined with intravenous patient-controlled analgesia can be effective as continuous adductor canal block in reducing opioid consumption and breakthrough pain after total knee arthroplasty. *J Exp Orthop*. 2022;9(1):84. Published 2022 Aug 23. doi:10.1186/s40634-022-00523-6
40. Park JY, **Kim SE**, Lee MC, Han HS. Elastic pneumatic tourniquet cuff can reduce postoperative thigh pain after total knee arthroplasty: a prospective randomized trial. *BMC Musculoskelet Disord*. 2020;21(1):565. Published 2020 Aug 21. doi:10.1186/s12891-020-03579-6
41. Rahim MK, **Kim SE**, So H, et al. Recent Trends in PET Image Interpretations Using Volumetric and Texture-based Quantification Methods in Nuclear Oncology. *Nucl Med Mol Imaging*. 2014;48(1):1-15. doi:10.1007/s13139-013-0260-2

Presentations:

Kim SE, MacDessi S, Song D, Kim JI, Choi BS, Han HS, Ro DH. Coronal Plane Alignment of the Knee (CPAK) Classification According to Kellgren and Lawrence grade, The 18th Annual Congress of Korean Society of Computer Assisted Orthopaedic Surgery. October 28, 2023, Republic of Korea

Kim SE, Kwak J, Ro DH, Lee MC, Han HS. Medial joint opening rather than mechanical axis deviation determined clinical outcomes after high tibial osteotomy, The 67th Annual Congress of Korean Orthopaedic Association, October 12-14, 2023, Republic of Korea.

Kim SE, Jung H, Ro DH, Lee MC, Han HS. Anatomic Patellar Design Has No Clinical Superiority Over Dome Patellar Design in Total Knee Arthroplasty: A Randomized Clinical Trial, The 67th Annual Congress of Korean Orthopaedic Association, October 12-14, 2023, Republic of Korea.

Kim SE, Lee MC, Ro DH, et al. Prospective Multi-center Outcomes Study of Persona Knee System in Total Knee Arthroplasty : Mid-term outcomes, The 66th Annual Congress of Korean Orthopaedic Association, October 13-15, 2022, Republic of Korea.

Kim SE, Hwang DH, Han HS, Lee MC, Ro DH, Low muscle mass is an independent risk factor for postoperative blood transfusion in total knee arthroplasty: A retrospective, propensity score-matched cohort study, The 40th Annual Congress of the Korean Knee Society, May 13-14, 2022, Republic of Korea.

Kim SE, Kwon SB, Jeon S, Kim M, Ro DH, Lee MC, Han HS, Relationship between Muscle Activation and Sagittal Knee Joint Biomechanics in Patients with Patellofemoral Pain Syndrome: a cross-sectional study, The 65th Annual Congress of Korean Orthopaedic Association, October 14-16, 2021, Republic of Korea.

Kim SE, Han HS, Lee MC, Ro DH, Pain control after TKA: Comparison between IV Patient controlled anesthesia, continuous adductor canal block, and single adductor canal block, The 64th Annual Congress of Korean Orthopaedic Association, October 15-17, 2020, Republic of Korea.

Kim SE, Ro DH, Kang T, Han DH, Lee DY, Han HS, Lee MC, Quantitative Evaluation of Gait features after Total Knee Arthroplasty: Comparison with Age and Sex-matched Controls, The 63rd Annual Congress of Korean Orthopaedic Association, October 17-19, 2019, Republic of Korea.

Luo L, Zhang X, **Kim SE**, et al., Assessment of Large Multimodal Reasoning Model Performance and Chain-of-Thought Quality in Chest Radiograph Interpretation, RSNA Cutting edge 2025

Professional Membership:

Member, The Korean Orthopaedic Association 2022-present

Member, The Korean Knee Society 2022-present

Member, The Korean Arthroscopy Society 2022-present

Member, The Korean Society of Computer Assisted Orthopaedic Surgery 2022-present

Member, American Academy of Orthopaedic Surgeons 2022-present

Member, Orthopaedic Research Society 2022-present

Awards:

Academic Awards

- **Awarded Trainee Position**, *Harvard Medical School - Seoul National University Hospital – Seoul National University College of Medicine Collaborative Research Program*, Oct 2024
 - Selected for advanced AI development in knee MRI: Enhancing diagnostic accuracy and predictive capabilities.
 - Trainee: Sung Eun Kim, PI: Pranav Rajpurkar (Harvard Medical School).
- **Best Paper Award**, *Knee Surgery & Related Research*, May 2024
 - Awarded for research on an enhanced deep learning model enabling accurate alignment measurement across diverse institutional imaging protocols.
- **Best Oral Presentation Award**, *The 18th Annual Congress of Korean Society of Computer-Assisted Orthopaedic Surgery*, Oct 2023.
- **Citation Award**, *Knee Surgery & Related Research*, May 2025
 - Awarded for publishing two highly cited articles in 2024, significantly contributing to the field of knee surgery and imaging research.
- **3rd Place**, *SNU Medicine Graduate Student Best Paper Award*, Aug 2023
 - Recognized for research: *Anatomic Patellar Design Has No Clinical Superiority Over Dome Patellar Design in Total Knee Arthroplasty: A Randomized Clinical Trial*.
- **Best Resident Award**, *Department of Orthopedic Surgery, Seoul National University Hospital*, Dec 2020
 - Honored for exemplary academic and clinical performance, inspiring fellow residents.
- **2010–2011: Superior Academic Performance Scholarship, Seoul National University**
- **2012: Merit-Based Scholarship, Seoul National University**
- **2012–2013: Scholarships Granted by Each College, Seoul National University**

Professional Awards

- **Highest Commendation from the Minister of Health and Welfare, Republic of Korea**, Apr 2017
 - Recognized for dedication and effective disease control measures as an Epidemic Intelligence Service Officer during the MERS crisis, significantly contributing to preventing the spread of the virus.

Extracurricular Awards

- **Winner**, *National Medical Doctors Tennis Tournament*, Oct 2023
 - Represented Seoul National University College of Medicine Alumni. Acknowledged for outstanding sportsmanship and teamwork as co-captain, leading to victory.
- **Runner-Up**, *Korean Orthopedic Association Tennis Tournament*, Sep 2023
 - Achieved second place in a highly competitive event, demonstrating skill and dedication in the sport.

- **Grand Prize**, *The Seoul National University Hospital Group Slogan Contest*, Oct 2023
 - Created the slogan “*Beyond Excellence*” for the Seoul National University Hospital Group.

Editorial and Peer Review Service

Ad hoc Peer Reviewer

Reviewed **40+ manuscripts** for high-impact international journals in orthopedic surgery, musculoskeletal research, and medical artificial intelligence, including *The Journal of Bone and Joint Surgery*, *npj Digital Medicine*, *Scientific Reports*, *The Knee*, *Knee Surgery & Related Research*, *Clinical Orthopaedic Surgery*, and related specialty journals.