

Hwiyoung Kim, Ph.D.

Research Assistant Professor

Department of Biomedical Systems Informatics
Translational Artificial Intelligence Laboratory (TAILab)
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SUMMARY

- Data scientist/AI researcher interested in Medical domain and now working with medical staffs
- Biomedical engineer or Medical physicist with Clinical experiences (US board eligible)
- Educated and trained in clinical research at Seoul National University Hospital and Severance Hospital

EDUCATION

Doctor of Philosophy, Interdisciplinary program in radiation applied life science Mar 2010 – Aug 2016

Seoul National University College of Medicine, Seoul, Korea (CAMPEP Accredited)

Major Advisor: Prof. Sung-Joon Ye

Dissertation: *Development of a geometric uncertainty assessment system for precise radiotherapy*

Bachelor of Science, Computer science Mar 2000 – Feb 2005

Korea Advanced Institute of Science and Technology (KAIST), Seoul, Korea

Major Advisor: Prof. Jin Hyung Kim

Seoul Science High School Mar 1998 – Feb 2000

APPOINTMENTS

Research Assistant Professor *Department of Biomedical Systems Informatics, Yonsei University College of Medicine* Mar 2018 – Present

Center for Clinical Imaging Data Science (CCIDS)

Adjunct Professor *Graduate School of Artificial Intelligence, Yonsei University* Sep 2020 – Present

Adjunct Professor *Department of Convergence Medicine, Yonsei University College of Medicine* Mar 2020– Present

Visiting Scholar *Heart and Vascular Institute, Cleveland Clinic* Aug 2019 – Aug 2019

Senior Researcher *Artificial Intelligence Research Institute (AIRI)* Mar 2017 – Feb 2018

Medical Physicist *Department of Radiation Oncology, Jeju National University Hospital* Oct 2015 – Feb 2017

<u>Researcher</u>	<i>Biomedical Research Institute, Seoul National University Hospital</i>	Sep 2009 – Feb 2017
<u>Researcher</u>	<i>Institute of Radiation Medicine, Seoul National University College of Medicine</i>	Mar 2011 – Feb 2014

PUBLICATIONS

Scientific Journals

1. Namki Hong*, Sang Wouk Cho*, Sungjae Shin, Seunghyun Lee, Seol A Jang, Seunghyun Roh, Young Han Lee, Yumie Rhee, Steven R Cummings, *Hwiyoung Kim**, and Kyoung Min Kim*, “Deep-learning-based detection of vertebral fracture and osteoporosis using lateral spine X-ray radiography”, *Journal of Bone and Mineral Research* (2023, IF=6.390)
2. Suyon Chang, Kyunghwa Han, Yonghan Kwon, Rina Kim, Seung Hyun Hwang, *Hwiyoung Kim**, and Byoung Wook Choi*, “T1 map-based radiomics for prediction of left ventricular reverse remodeling in patients with non-ischemic dilated cardiomyopathy”, *Korean Journal of Radiology* (2023, IF=7.109)
3. *Hwiyoung Kim**, Kye Ho Lee*, Kyunghwa Han, Ji Won Lee, Jin Young Kim, Dong Jin Im, Yoo Jin Hong, Byoung Wook Choi, and Jin Hur, "Performance of Deep Learning-based Pulmonary Nodule Detection with Synthetic Bone-suppressed Chest Radiographs". *JAMA Network Open* (2023, IF=13.350)
4. Suh Young Kim, Young Joo Suh, Hye-Jeong Lee, *Hwiyoung Kim*, Hyungi Seo, Hee Jun Park, and Dong Hyun Yang "Influence of computed tomography slice thickness on deep learning-based, automatic coronary artery calcium scoring software performance" *Quantitative Imaging in Medicine and Surgery* (2022, IF=4.630)
5. So Hee Park, Dong Min Choi, In-ho Jung, Kyung Won Chang, Myung Ji Kim, Hyun Ho Jung, Jin Woo Chang, *Hwiyoung Kim**, Won Seok Chang, "Clinical application of deep learning-based synthetic CT from real MRI to improve dose planning accuracy in Gamma Knife radiosurgery." *Biomedical Engineering Letters* (2022, IF=3.920)
6. Yang Sujin, Hageong Lee, Byounghan Jang, Kee-Deog Kim, Jaeyeon Kim, *Hwiyoung Kim**, and Wonse Park. "Development and validation of a visually explainable deep learning model for classification of C-shaped canals of the mandibular second molars in periapical and panoramic dental radiographs." *Journal of Endodontics* (2022, IF=4.171)
7. Bio Joo, Hyunseok Choi, Sung Soo Ahn, Jihoon Cha, Soyeon Won, Beomseok Sohn, *Hwiyoung Kim*, Kyounghwa Han, and Seung-Koo Lee, “A deep learning model with high standalone performance for diagnosis of unruptured intracranial aneurysm”, *Yonsei Medical Journal* (2021, IF=1.914)
8. Chansik Ahn, Yae Won Park, Sung Soo Ahn, Kyounghwa Han, *Hwiyoung Kim*, and Seung-Koo Lee, “Radiomics machine learning study with small sample size: single random training-test set split may result in unreliable results”, *PLOS ONE* (2021, IF=3.240)
9. Namki Hong, Heajeong Park, Chang Oh Kim, Hyeon Chang Kim, Jin-Young Choi, *Hwiyoung Kim*, Yumie Rhee, “Bone radiomics score derived from DXA hip images enhances hip fracture prediction in older women” *Journal of Bone and Mineral Research* (2021, IF=5.854)
10. Yae Won Park, Jihwan Eom, Sooyon Kim, *Hwiyoung Kim*, Sung Soo Ahn, Cheol Ryong Ku, Eui Hyun Kim, Eun Jig Lee, Sun Ho Kim, Seung-Koo Lee, “Radiomics with Ensemble Machine Learning Predicts Dopamine Agonist Response in Patients with Prolactinoma” *Journal of Clinical Endocrinology & Metabolism* (2021, IF=5.605)

11. Suyon Chang*, *Hwiyoung Kim**, Young Joo Suh, Dong Min Choi, Hyunseok Cho, and Byoung Wook Choi “Development of deep learning-based algorithm for automatic detection and classification for aortic valve calcium” *European Journal of Radiology* (2021, *equal contribution, IF=3.110)
12. Jae-Young Kim, Dong Wook Kim, Kug-Jin Jeon, *Hwiyoung Kim*, and Jong-Ki Huh, “Using deep learning to predict temporomandibular joint disc perforation based on magnetic resonance imaging” *Scientific Reports* (2021, IF=4.011)
13. Yae Won Park, Dongmin Choi, Sung Soo Ahn, Ji Eun Park, *Hwiyoung Kim*; Jong Hee Chang, Se Hoon Kim; Ho Sung Kim, Seung-Koo Lee, “Differentiation of Recurrent Glioblastoma from Radiation Necrosis using Diffusion Radiomics with Machine Learning Model Development and External Validation”, *Scientific Reports* (2021, IF=4.011)
14. Ilah Shin*, *Hwiyoung Kim**, Chansik An, Sung Soo Ahn, Kyunghwa Han, Sang Wook Kim, Ji Eun Park, Ho Sung Kim, and Seung-Koo Lee, "Development and validation of a deep learning-based model to distinguish glioblastoma from single brain metastasis in conventional magnetic resonance images.", *American Journal of Neuroradiology* (2020, *equal contribution, IF=3.380)
15. Chan-Woo Park, Sung Wook Seo, Noeul Kang, BeomSeok Ko, Byung Wook Choi, Chang Min Park, Dong Kyung Chang, *Hwiyoung Kim*, Hyunchul Kim, Hyunna Lee, Jinhee Jang, Jong Chul Ye, Jong Hong Jeon, Joon Beom Seo, Kwang Joon Kim, Kyu-Hwan Jung, Namkug Kim, Seungwook Paek, Soo-Yong Shin, Soyoung Yoo, Yoon Sup Choi, Youngjun Kim, and Hyung-Jin Yoon, “Artificial Intelligence in Health Care: Current Applications and Issues”, *Journal of Korean Medical Science* 2:35(42) (2020, IF=1.705)
16. Chaejung Park, Kyunghwa Han, *Hwiyoung Kim*, Sung Soo Ahn, Yoon Seung Choi, Yae Won Park, Jong Hee Chang, Se Hoon Kim, Rajan Jain, and Seung-Koo Lee, “MRI features may predict molecular features of glioblastoma in isocitrate dehydrogenase wild-type lower-grade gliomas”, *American Journal of Neuroradiology* (2020, IF=3.380)
17. Yae Won Park, Yun Seo Choi, Song E Kim, Dongmin Choi, Kyunghwa Han, *Hwiyoung Kim*, Sung Soo Ahn, Sol-Ah Kim, Hyeon Jin Kim, Soo Mee Lim, Hyang Woon Lee, “Radiomics Features of Hippocampal Regions in Conventional and Diffusion Tensor Imagings can Differentiate Temporal Lobe Epilepsy Patients from Healthy Controls”, *Scientific Reports* (2020, IF=4.011)
18. Chaejung Park, Kyunghwa Han, *Hwiyoung Kim*, Sung Soo Ahn, Yoon Seung Choi, Yae Won Park, Jong Hee Chang, Se Hoon Kim, Rajan Jain, and Seung-Koo Lee, “Radiomics risk score may be a potential imaging biomarker for predicting survival in isocitrate dehydrogenase wild-type lower-grade gliomas” *European Radiology* 30:6464–6474 (2020, IF=4.101)
19. Yae Won Park, Chansik An, Kyunghwa Han, Dongmin Choi, Sung Soo Ahn, *Hwiyoung Kim*, Sung Jun Ahn, Jong Hee Chang, Se Hoon Kim, and Seung-Koo Lee, "Diffusion Tensor and Conventional Imaging Radiomics Features to Differentiate the Epidermal Growth Factor Receptor Mutation Status of Brain Metastases from Non-Small Cell Lung Cancer", *Neuroradiology* (2020, IF=2.370)
20. Hyunwoo Yang, *Hwiyoung Kim**, In-ho Cha, Young-Soo Jung, Woong Nam, Jun young Kim, Jin-Kyu Kim, Yoon Hyeon Kim, Tae Gyeong Oh, Sang-Sun Han, Hyung Jun Kim, and Dongwook Kim*, “Automated detection of cyst and tumors of the jaw using deep learning in panoramic radiographs”, *Journal of Clinical Medicine* (2020, *co-corresponding, IF=5.583)
21. Sohi Bae, Chansik An, Sung Soo Ahn*, *Hwiyoung Kim**, Kyunghwa Han, Sang Wook Kim, Ji Eun Park, Ho Sung Kim, and Seung-Koo Lee, "Robust performance of deep learning for distinguishing glioblastoma from single brain metastasis using radiomic features: Model development and validation", *Scientific Reports* (2020, *co-corresponding, IF=4.011)

22. Beomseok Sohn, Yoon Seong Choi, Sung Soo Ahn, *Hwiyoung Kim*, Sang Wook Kim, Kyunghwa Han, Seung-Koo Lee, and Jinna Kim, “Machine learning based radiomic HPV phenotyping of oropharyngeal SCC: a feasibility study using MRI”, *Laryngoscope* (2020, accepted for publication, IF=2.343)
23. *Hwiyoung Kim*, Dae Chul Jung, and Byoung Wook Choi, “Exploiting the Vulnerability of Deep Learning-Based Artificial Intelligence Models in Medical Imaging: Adversarial Attacks”, *Journal of Korean Society of Radiology* **80**:2 (2019, review article)
24. Donghoon Lee, *Hwiyoung Kim*, Byoung Wook Choi, and Hee-Joung Kim, “Development of a Deep Neural Network for Generating Synthetic Dual-Energy Chest X-Ray Images With Single X-Ray Exposure”, *Physics in Medicine and Biology* (2019, IF=3.030)
25. Dong Wook Kim, *Hwiyoung Kim*, Woong Nam, Hyung Jun Kim, In-Ho Cha, “Machine learning to predict the occurrence of bisphosphonate-related osteonecrosis of the jaw associated with dental extraction”, *Bone* **116** (2018, IF=4.360)
26. *Hwiyoung Kim*, Hyunseok Lee, Jong In Park, Chang Heon Choi, So-Yeon Park, Hee Jung Kim, Young Suk Kim, and Sung-Joon Ye, “Smartphone application for mechanical quality assurance of medical linear accelerators”, *Physics in Medicine and Biology* **62**:11, N254-270 (2017, IF=2.742)
27. Yang-Kyun Park, Tae-geun Son, *Hwiyoung Kim*, Jaegi Lee, Wonmo Sung, Il Han Kim, Kunwoo Lee, Young-bong Bang, and Sung-Joon Ye, “Development of real-time motion verification system using in-room optical images for respiratory-gated radiotherapy,” *Journal of Applied Clinical Medical Physics* **14**:5, 25–42 (2013, IF=1.679)
28. Yang-Kyun Park, Siyoung Kim, *Hwiyoung Kim*, Il Han Kim, Kunwoo Lee, Sung-Joon Ye, “Qusai-breath-hold technique using personalized audio-visual biofeedback for respiratory motion management in radiotherapy,” *Medical Physics* **38**:6, 3114–24 (2011, IF=3.317)
29. *Hwiyoung Kim*, Yang-kyun Park, Il Han Kim, Kunwoo Lee, Sung-Joon Ye, “Development of an optical-based image guidance system: Technique detecting external markers behind a full facemask,” *Medical Physics* **38**:6, 3006–12 (2011, IF=3.317)
30. *Hwiyoung Kim*, Yunseok Choi, So-Yeon Park, Yang-Kyun Park, and Sung-Joon Ye, “MOSFET Dosimetry for Evaluation of Gonad Shielding during Radiotherapy,” *Journal of Radiation Protection* **36**:1, 23–27 (2011)

Book Chapters

1. “White paper: Artificial Intelligence in Medicine,” *Korean Society of Artificial Intelligence in Medicine, Creation & Knowledge* (ISBN: 979-11-6003-205-5, 2020)
2. “Artificial Intelligence: for healthcare professionals,” *Koonja* (ISBN: 979-11-5955-565-7, 2020)
3. “Standards of Medical Artificial Intelligence Technology against Infectious Disease,” *ETRI* (ISBN: 978-89-5519-278-0, 2020)

CONFERENCE PRESENTATIONS

International Conferences

1. So Hee Park, Dong Min Choi, In-ho Jung, Kyung Won Chang, Myung Ji Kim, Hyun Ho Jung, Jin Woo Chang, *Hwiyoung Kim**, Won Seok Chang, "Clinical application of deep learning-based synthetic CT

from real MRI to improve dose planning accuracy in Gamma Knife radiosurgery." *15th International Stereotactic Radiosurgery Society Congress*, Jun 2022 (e-poster presentation)

2. Seunghyun Hwang, Hwiyoung Kim, Jihoon Cha, Hyukgi Kim, Kyungmi Lee, Hyunsuk Choi, and Seung-Koo Lee, "Deep Learning-based Fully Automated Detection and Quantification of Acute Infarcts", *Radiological Society of North America 106th Scientific Assembly and Annual Meeting*, Nov 2020 (oral presentation)
3. Yae Won Park, Ji Eun Park, Sung Soo Ahn, Hwiyoung Kim, Ho Sung Kim, and Seung-Koo Lee, "Differentiation of recurrent glioblastoma from radiation necrosis using diffusion radiomics: Machine Learning model development and external validation", *23th Medical Image Computing and Computer Assisted Interventions RNO-AI 2020 Workshop*, Oct 2020 (oral presentation)
4. Yae Won Park, Dongmin Choi, Kyunghwa Han, Sung Soo Ahn, Hwiyoung Kim, and Hyang Woon Lee, "Radiomics Features of Hippocampal Regions in Conventional and Diffusion Tensor Imagings can Differentiate Temporal Lobe Epilepsy Patients", *International Society for Magnetic Resonance in Medicine 28th Annual Meeting & Exhibition*, Apr 2020 (oral presentation)
5. Sohi Bae, Sung soo Ahn, Chansik An, Hwiyoung Kim, Kyunghwa Han, Bio Joo, Hanbum Jee, Ilah Shin, Soyeon Won, Seung-Koo Lee, Ho Sung Kim, Ji Eun Park, "Discrimination Between Glioblastoma and Single Brain Metastasis Using Radiomics and Machine Learning: Model Development and External Validation", *Radiological Society of North America 105th Scientific Assembly and Annual Meeting*, Nov 2019 (poster presentation)
6. Ilah Shin, Sung soo Ahn, Hwiyoung Kim, Kyunghwa Han, Seung-Koo Lee, "Deep learning-based Discrimination between Glioblastoma versus Single Metastasis on Conventional Magnetic Resonance Images", *Radiological Society of North America 105th Scientific Assembly and Annual Meeting*, Nov 2019 (oral presentation)
7. Suyon Chang, Young joo Suh, Hwiyoung Kim, Dongmin Choi, Hyunseok Cho, Byoung Wook Choi, "Development of Deep Learning-based Algorithm for Automatic Detection and Classification for Aortic Valve Calcium", *Radiological Society of North America 105th Scientific Assembly and Annual Meeting*, Nov 2019 (oral presentation, presenter)
8. Ye Ra Choi, Hwiyoung Kim, Kwang Nam Jin, "Determination of Active Tuberculosis and Inactive Fibronodular Opacity on Chest Radiographs using Deep Learning Algorithm", *Radiological Society of North America 105th Scientific Assembly and Annual Meeting*, Nov 2019 (poster presentation)
9. Hwiyoung Kim, Jiyun Choi, Chul-Young Jang, Jin Woo Lee, Sungjun Kim, and Seung Hwan Han, "Automatic grading of ankle osteoarthritis based on Takakura staging system: a deep learning-based approach", *American Orthopaedic Foot & Ankle Society Annual Meeting 2019* (oral presentation)
10. Donghoon Lee, Byoung Wook Choi, Hwiyoung Kim, and Hee-Joung Kim, "Development of Synthetic Chest Image Network for Implementing Dual Energy Chest X-ray Image with Single X-ray Exposure", *Society for Imaging Informatics in Medicine 2019 Annual Meeting*, Jun 2019 (oral presentation)
11. Jae Seok Bae, Jung Hoon Kim, Hwiyoung Kim, and Joon Koo Han, "Feasibility study of generating virtual contrast-enhanced CT images from noncontrast abdomen CT in patients with hepatocellular carcinoma using conditional generative adversarial networks", *Radiological Society of North America 104th Scientific Assembly and Annual Meeting*, Nov 2018 (poster presentation)
12. Yoonah Do, Jin Kyem Kim, Young Han Lee, Hwiyoung Kim, and Sungjun Kim, "Detection of Pacemaker and Determination of MRI-conditional Pacemaker Based on Deep-learning Convolutional Neural Networks to improve the Patients' MRI Safety", *Radiological Society of North America 104th Scientific Assembly and Annual Meeting*, Nov 2018 (poster presentation)

13. Jin Kyem Kim, Yoonah Do, Young Han Lee, Hwiyoung Kim, and Sungjun Kim, “Determination of Musculoskeletal Magnetic Resonance Imaging Protocol between Routine Protocol and Radiologist-Tailored Protocol Using Deep-learning Convolutional Neural Networks”, *Radiological Society of North America 104th Scientific Assembly and Annual Meeting*, Nov 2018 (poster presentation)
14. Byoung Wook Choi, Eun-Young Kang, Myung Jin Chung, Woocheol Kwon, Yookyung Kim, Jung Hwa Hwang, Chul Hwan Park, Soon Ho Yoon, Yoon Ki Cha, Kyunghwa Han, and Hwiyoung Kim, “Factors to evaluate artificial-intelligence-based automation clinical-decision-support-system for diagnosis of pulmonary tuberculosis in chest radiography ”, *Radiological Society of North America 104th Scientific Assembly and Annual Meeting*, Nov 2018 (oral presentation)
15. Hwiyoung Kim, Taeho Kim, Siyong Kim, and Sung-Joon Ye, “MR Image based Pseudo-CT Image Synthesis using Conditional Generative Adversarial Network”, *American Association of Physicists in Medicine 60th Annual Meeting*, Aug 2018 (oral presentation, presenter)
16. Jimin Lee, Hyungjoo Cho, Hwiyoung Kim, Hee-Dong Chae, and Sung-Joon Ye, “Development of a CT Metal Artifact Reduction Technique based on Deep Learning”, *American Association of Physicists in Medicine 60th Annual Meeting*, Aug 2018 (ePoster presentation)
17. Jong In Park, Jaegi Lee, Hwiyoung Kim, Chang Heon Choi, Il Han Kim, Sangmin Lee, and Sung-Joon Ye, “In Silico Modeling for the Dosimetric Effect of Metallic Shields On Artifact-Free CT Images Produced by Dummy Shields”, *American Association of Physicists in Medicine 59th Annual Meeting*, Aug 2017 (ePoster presentation)
18. Hwiyoung Kim, Il Han Kim, and Sung-Joon Ye, “Assessment of Inter- and Intra-fractional Motion for Extremity Soft Tissue Sarcoma Patients by using In-house Real-time Optical Image-based Monitoring System”, *American Association of Physicists in Medicine 58th Annual Meeting*, Aug 2016 (ePoster presentation, presenter)
19. Hwiyoung Kim, Il Han Kim, Hyunseok Lee, Sangmin Lee, and Sung-Joon Ye, “An Automated Mechanical Quality Assurance System for Medical Accelerators using a Smartphone”, *14th International Congress of International Radiation Protection Association*, May 2016 (poster presentation, presenter)
20. Hwiyoung Kim, Hyunseok Lee, Kwon Choi, and Sung-Joon Ye, “A Smartphone Application for Automated Mechanical Quality Assurance of Medical Accelerators”, *American Association of Physicists in Medicine 57th Annual Meeting*, 2015. 7 (oral presentation, presenter)
21. Jong In Park, Jaegi Lee, Hwiyoung Kim, Il Han Kim, Sung-Joon Ye, “Utilizing 3D Scanner and Printer for Dummy Eye-Shield: Artifact-Free CT Images of Tungsten Eye-Shield for Accurate Dose Calculation”, *American Association of Physicists in Medicine 57th Annual Meeting*, 2015. 7 (poster presentation)
22. So-Yeon Park, Hwiyoung Kim, Sung-Joon Ye, “Absorbed Doses Determined by Texture Analysis of Gafchromic EBT3 Films Using Scanning Electron Microscopy: A Feasibility Study”, *American Association of Physicists in Medicine 56th Annual Meeting*, Aug 2014 (poster presentation)
23. Jongin Park, Yang-Kyun Park, Jaegi Lee, Hwiyoung Kim, and Sung-Joon Ye, “Independent Evaluation of Respiratory-Gated Treatments Using In-House Quality Assurance Tool”, *American Association of Physicists in Medicine 55th Annual Meeting*, Aug 2013 (oral presentation)
24. Hwiyoung Kim, Kwon Choi, and Sung-Joon Ye, “Dual-Gated Radiotherapy with PTV Partition Technique: A Feasibility Study”, *American Association of Physicists in Medicine 55th Annual Meeting*, Aug 2013 (poster presentation)

25. Yang-Kyun Park, Hwiyoung Kim, So-Yeon Park, Hee Jung Kim, Kunwoo Lee, Il Han Kim, and Sung-Joon Ye, "Development of Real-time Motion Verification System for Respiratory-Gated Radiotherapy", *American Association of Physicists in Medicine 54th Annual Meeting*, Aug 2012 (poster presentation)
26. Hwiyoung Kim, Yang-Kyun Park, TaeGeun Son, Kunwoo Lee, Il Han Kim, and Sung-Joon Ye, "An Optical Image Guidance System: To Detect arbitrarily attached Markers behind a Full Facemask", *American Association of Physicists in Medicine 54th Annual Meeting*, Aug 2012 (poster presentation)
27. Hwiyoung Kim, Yunseok Choi, So-Yeon Park, Yang-Kyun Park, and Sung-Joon Ye, "MOSFET Dosimetry for Evaluation of Gonad Shielding during Radiotherapy", *13th International Congress of International Radiation Protection Association*, May 2012 (poster presentation)
28. Hwiyoung Kim, Yang-Kyun Park, Kunwoo Lee, Il Han Kim, and Sung-Joon Ye, "Development of an Optical Image based Guidance System for Head and Neck Cancer Patients by Detecting External Markers behind a Full Facemask", *American Society for Radiation Oncology 53rd Annual Meeting*, Oct 2011 (poster presentation)
29. Yang-Kyun Park, Siyong Kim, Hwiyoung Kim, Kunwoo Lee, Il-Han Kim, and Sung-Joon Ye, "Quasi-breath-hold technique using personalized audio-visual biofeedback for respiratory motion management in radiotherapy", *American Society for Radiation Oncology 53rd Annual Meeting*, Oct 2011 (poster presentation)
30. Jung-in Kim, Jong Min Park, Yang-Kyun Park, Chang Heon Choi, Yun Seok Choi, Hee Jung Kim, Hwiyoung Kim, So-Yeon Park, Woong Cho, and Sung-Joon Ye, "Monte Carlo Study of Absorbed Dose to Solid Water for External Auditing", *American Association of Physicists in Medicine 52nd Annual Meeting*, Jul 2010 (poster presentation)
31. Chang Heon Choi, Jung-in Kim, Jong Min Park, So-Yeon Park, Yun Seok Choi, Hee Jung Kim, Yang-Kyun Park, Hwiyoung Kim, and Sung-Joon Ye, "Dosimetry for An Ophthalmic Applicator of P-32", *American Association of Physicists in Medicine 52nd Annual Meeting*, Jul 2010 (poster presentation)

Domestic Conferences

1. So Hee Park, Myungji Kim, Hyun Ho Jung, Jin Woo Chang, Hwiyoung Kim, Won Seok Chang, "Artificial intelligence-based skull data extraction from brain magnetic resonance imaging to improve dose accuracy of gamma knife stereotactic radiosurgery", *The 59th Annual Meeting of the Korean Neurosurgical Society*, Oct 2019 (oral presentation)
2. Sohi Bae, Sung soo Ahn, Chansik An, Hwiyoung Kim, Kyunghwa Han, Bio Joo, Hanbum Jee, Ilah Shin, Soyeon Won, Seung-Koo Lee, Ho Sung Kim, Ji Eun Park, "Discrimination between glioblastoma and single brain metastasis using radiomics and machine learning: model development and external validation", *Korea Congress of Radiology 2019*, Sep 2019 (oral presentation)
3. Ilah Shin, Sung soo Ahn, Hwiyoung Kim, Kyunghwa Han, Seung-Koo Lee, "Deep learning-based discrimination between glioblastoma versus single metastasis on conventional magnetic resonance images", *Korea Congress of Radiology 2019*, Sep 2019 (oral presentation)
4. Hwiyoung Kim, Haesung Yoon, Hyun Joo Shin, Myung-Joon Kim, Taehoon Shin, Mi-Jung Lee, "Detection of pediatric humerus supracondylar elbow fractures using deep convolutional neural network", *Korea Congress of Radiology 2019*, Sep 2019 (oral presentation)
5. Suyon Chang, Young joo Suh, Hwiyoung Kim, Dongmin Choi, Hyunseok Cho, Byoung Wook Choi, "Development of deep learning-based algorithm for automatic detection and classification for aortic valve calcium", *Korea Congress of Radiology 2019*, Sep 2019 (oral presentation)

6. Ye Ra Choi, Hwiyoung Kim, Kwang Nam Jin, “Chest radiographs of tuberculosis: Determination of disease activity using deep learning algorithm”, *Korea Congress of Radiology 2019*, Sep 2019 (oral presentation)
7. Sang Wook Kim, and Hwiyoung Kim, “A Study on Effect of Data Augmentation by Image Processing in Medical Image Analysis Performance”, *Korean Institute of Communications and Information Sciences Fall Conference*, Nov 2018 (poster presentation, corresponding, excellent research award)
8. Hwiyoung Kim, Jiyun Choi, Seung Hwan Han, Young Han Lee, Sungwon Kim, and Sungjun Kim, “Automatic grading of ankle osteoarthritis based on Takakura staging system: a deep learning-based approach”, *Korea Congress of Radiology 2018*, Sep 2018 (oral presentation, presenter)
9. Jae Seok Bae, Hwiyoung Kim, Jung Hoon Kim, and Joon Koo Han, “Feasibility study of generating virtual contrast-enhanced CT images from abdomen non-enhanced CT in patients with hepatocellular carcinoma using conditional generative adversarial networks”, *Korea Congress of Radiology 2018*, Sep 2018 (oral presentation)
10. MeYoung Kim, Hwiyoung Kim, Chul-Won Choi, and Kyung Su Kim, “Image Pre-processing for the Predicted Tumor-regression CT Generation using Deep Learning”, *The 56th Annual Meeting of the Korean Society of Medical Physics*, Apr 2018 (poster presentation)
11. Kyung Su Kim, MeYoung Kim, Hwiyoung Kim, Chul-Won Choi, Kwang Mo Yang, “Generation of predicted tumor-regression computed tomography image during definitive concurrent chemo-radiotherapy of the lung cancer using deep learning technique”, *2017 Korean Association for Lung Cancer Fall Conference*, Nov 2017 (oral presentation)
12. Hwiyoung Kim, Sung-Joon Ye, “MR image based Pseudo-CT Image Synthesis using Deep Learning Technique”, *The 35th Annual Meeting of Korean Society for Radiation Oncology*, Oct 2017 (oral presentation, presenter, excellent research award)
13. Hwiyoung Kim, Sung-Joon Ye, “Deep Learning based pseudo-CT synthesis for MR-based radiation treatment planning”, *The 31st Annual Meeting of Korean Society of Imaging Informatics in Medicine*, Jul 2017 (oral presentation, presenter, excellent research award)
14. Hwiyoung Kim, Hyunseok Lee, Kwon Choi, and Sung-Joon Ye, “An Automated Mechanical Quality Assurance System for Medical Accelerators using a Smartphone”, *The 51st Annual Meeting of the Korean Society of Medical Physics*, Oct 2015 (oral presentation, presenter, best paper award)
15. Kwon Choi, Hiroshi Hirata, Jong Min Park, Hwiyoung Kim, Sung-Joon Ye, “Electron Paramagnetic Resonance Dosimetry using Synthetic Hydroxyapatite”, *Korean Association of Radiation Protection Annual Fall Symposium*, Nov 2014 (poster presentation)
16. Sanghyuk Song, Hwiyoung Kim, Suzy Kim, “Optical Margin for Dose Escalation with Conformal Radiation Therapy in Bone Metastasis”, *The 32nd Annual Meeting of the Korean Society for Radiation Oncology*, Oct 2014 (poster presentation)
17. Hwiyoung Kim, Yang-Kyun Park, TaeGeun Son, Kunwoo Lee, Il Han Kim, and Sung-Joon Ye, "An Optical Image Guidance System for Head and Neck Patients: Using arbitrarily attached IR Markers behind a Full Facemask", *The 31st Annual Meeting of the Korean Society for Radiation Oncology*, Oct 2013 (poster presentation)
18. Jung-in Kim, Hwiyoung Kim, Yun Seok Choi, Chang Heon Choi, Jin-Beom Chung, Joo-Young Song, Sung Kyu Kim, Won Hoon Choi, Byungchul Cho, Jin Sung Kim, Sung Jin Kim, and Sung-Joon Ye, "A multi-institutional study for tolerance levels of pre-treatment IMRT QA", *The 30th Annual Meeting of the Korean Society for Radiation Oncology*, Oct 2013 (oral presentation, presenter)

19. Hwiyoung Kim, Yang-Kyun Park, Kunwoo Lee, Il Han Kim, and Sung-Joon Ye, "Development of an Optical-based Image Guidance System: Technique Detecting External Markers behind a Full Facemask", *The 42nd Annual Meeting of the Korean Society of Medical Physics*, Apr 2011 (oral presentation, presenter)
20. Hwiyoung Kim, Yunseok Choi, So-Yeon Park, Yang-Kyun Park, and Sung-Joon Ye, "MOSFET Dosimetry for Evaluation of Gonad Shielding during Radiotherapy", *Korean Association of Radiation Protection Annual Spring Symposium and Workshop*, Apr 2011 (oral presentation, presenter, best paper award)
21. Hwiyoung Kim, Yang-Kyun Park, Il Han Kim, and Sung-Joon Ye, "Optical Image-guided Radiotherapy System for Head and Neck Cancer Patients during Immobilization with Thermoplastic Mask: Feasibility Study", *The 28th Annual Meeting of the Korean Society for Radiation Oncology*, Oct 2010 (poster presentation)
22. Yang-Kyun Park, Hwiyoung Kim, Siyong Kim, Il-Han Kim, and Sung-Joon Ye, "Feasibility Study for Feedback Guided Voluntary Breath Hold using Stereo Camera-based Monitoring System", *The 28th Annual Meeting of the Korean Society for Radiation Oncology*, Oct 2010 (poster presentation)

MEMBERSHIPS AND SERVICES

<u>Member</u>	<i>Regulatory Science Committee, Ministry of Food and Drug Safety (MFDS)</i>	Dec 2019 – Present
<u>Member</u>	<i>IEC TC 62 SNAIG Advisory Group</i>	Nov 2020 – Present
<u>Director</u>	<i>Korean Society of Artificial Intelligence in Medicine (KoSAIM)</i>	Jan 2019 – Present
<u>Director</u>	<i>Korean Society of Imaging Informatics in Medicine (KSIIM)</i>	Jan 2020 – Present
<u>Director</u>	<i>COVID-19 AI Consortium</i>	Sep 2020 – Present
<u>Assistant Administrator</u>	Commission of public relations and cooperation, <i>Korean Association for Radiation Protection (KARP)</i>	Jul 2014 – Feb 2016
<u>Member</u>	<i>American Association of Physicists in Medicine (AAPM)</i>	Sep 2010 – Present
<u>Member</u>	<i>Korean Society for Therapeutic Radiology and Oncology (KOSTRO)</i>	Sep 2010 – Present
<u>Member</u>	<i>Korean Association for Radiation Protection (KARP)</i>	Mar 2010 – Present

AWARDS AND SCHOLARSHIP

<u>Award</u>	Excellent Research Award , <i>The 35th Annual Meeting of Korean Society for Radiation Oncology</i>	Oct 2017
<u>Award</u>	Excellent Research Award , <i>The 31st Annual Meeting of Korean Society of Imaging Informatics in Medicine</i>	Jul 2017
<u>Award</u>	Best Paper Award , <i>The 51st Annual Meeting of the Korean Society of Medical Physics</i>	Oct 2015
<u>Award</u>	Best Paper Award , <i>Biomedical Convergence Contest</i> ,	Jun 2013

*Graduate School of Convergence Science and Technology,
Seoul National University*

<u>Award</u>	International Publication Award , <i>Institute of Radiation Medicine, Seoul National University College of Medicine</i>	Aug 2012
<u>Award</u>	Best Paper Award , <i>Biomedical Research Institute, Seoul National University Hospital</i>	Dec 2011
<u>Award</u>	Best Paper Award , <i>Korean Association for Radiation Protection Annual meeting</i>	Apr 2011
<u>Award</u>	Gold Award , <i>ACM ICPC Asia Regional Contest</i>	Nov 2001
<u>Scholarship</u>	Research scholarship , <i>Seoul National University College of Medicine</i>	Sep 2010 – Feb 2013
<u>Scholarship</u>	KAIST scholarship , <i>Korea Advanced Institute of Science and Technology(KAIST)</i>	Mar 2000 – Feb 2005

CERTIFICATION

The American Board of Radiology in Therapeutic Physics (Part I passed) Sep 2014

RESEARCH INTERESTS

- Image processing and machine learning (deep learning) for medical applications
- Radio-Patho-Genomics for precision medicine
- Informatics/advanced computing in medical domain

PATENTS

Medical Linear Accelerator System and Process Method using Mobile Terminal <i>Issued(Filed) country: Korea(10-2014-0105758)</i> <i>Role: Inventor</i>	<u>Filed:</u> Aug 14 th 2014 <u>Issued:</u> Dec 7 th 2015
Apparatus for classifying pacemaker using artificial neural network, method thereof and computer recordable medium storing program to perform the method <i>Issued(Filed) country: Korea(10-2018-0088546)</i> <i>Role: Inventor</i>	<u>Filed:</u> Jul 30 th 2018 <u>Issued:</u> Mar 15 th 2021
Method for Planning A Non-invasive Treatment using CT Image Generated from Brain MRI Image based on Artificial Intelligence <i>Issued(Filed) country: Korea(10-2019-0128738), PCT(KR2021/004773)</i> <i>Role: Inventor</i>	<u>Filed:</u> Oct 10 th 2019 <u>Issued:</u>
Method and Apparatus for Predicting Cerebral Infarction Based on Lesion Area Extraction Using a Deep Learning Model <i>Issued(Filed) country: Korea(10-2020-0128941)</i> <i>Role: Inventor</i>	<u>Filed:</u> Oct 6 th 2020 <u>Issued:</u>
Method and Apparatus for Predicting Cerebral Infarction Based on Cerebral Infarction Volume Calculation	<u>Filed:</u> Oct 6 th 2020 <u>Issued:</u>

Issued(Filed) country: Korea(10-2020-0128942)

Role: Inventor

Method and Apparatus for Predicting Cerebral Infarction Based on Cerebral Infarction Severity

Filed: Oct 6th 2020

Issued:

Issued(Filed) country: Korea(10-2020-0128943)

Role: Inventor

GRANTS (Extramural)

Artificial Intelligence-based medical image synthesis and its clinical application on rare brain diseases

2021.4 – 2023.12

Ministry of health and welfare (as a Principal Investigator, 71,520 USD)

Cloud-based clinical data platform and AI-based prognosis prediction model for infectious disease

2020.8 – 2023.12

Ministry of Science and ICT (as a Principal Investigator, 600,000 USD)

Development of international standards for AI-based medical device performance evaluation technology

2020.9 – 2022.12

Ministry of health and welfare (as a Principal Investigator, 400,000 USD)

Identifying of usefulness of cardiac magnetic resonance image analysis for risk prediction in patients with functional mitral regurgitation

2020.6 – 2021.5

Korea Research Foundation (as a Principal Investigator, 50,000 USD)

TEACHING EXPERIENCES

at Yonsei University College of Medicine

Advanced Artificial Intelligence in Medicine

Fall 2021

Role: Instructor

Introduction to Artificial Intelligence in Medicine

Spring 2021

Role: Instructor

Advanced Artificial Intelligence in Medicine

Fall 2020

Role: Instructor

Introduction to Artificial Intelligence in Medicine

Spring 2020

Role: Instructor

Introduction to Artificial Intelligence in Medicine

Fall 2019

Role: Instructor

Artificial Intelligence and Radiology Advanced Course

Spring 2019

Role: Instructor

Introduction to Artificial Intelligence in Medicine

Fall 2018

Role: Instructor

at Seoul National University

Monte Carlo Application of Radiation

Fall 2014

Role: Teaching Assistant, Lecturer (1 class)

Topics in Medical Radiation Physics

Spring 2014

<i>Role: Teaching Assistant</i>	
Monte Carlo Application in Medicine	Fall 2012
<i>Role: Teaching Assistant, Lecturer (1 class)</i>	
Introduction to Radiological Science	Fall 2011
<i>Role: Teaching Assistant</i>	
Computers on Radiotherapy	Fall 2011
<i>Role: Teaching Assistant, Lecturer (2 classes)</i>	
Monte Carlo Application in Medicine	Fall 2010
<i>Role: Teaching Assistant, Lecturer (1 class)</i>	
Radiation Therapy Physics Lecture for Therapist (Seoul National University Hospital)	2011-2012
<i>Role: Lecturer (3 classes)</i>	

REFERENCES

Sung-Joon Ye, PhD	Professor, <i>Seoul National University</i> Dean, <i>Graduate School of Convergence Science and Technology, Seoul National University</i>	sye@snu.ac.kr
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Yang-Kyun Park, PhD	Assistant Professor, <i>UT Southwestern Hospital</i>	theday79@gmail.com
Jin Hyung Kim, PhD	Professor Emeritus, <i>KAIST</i> Chaired Professor, <i>Chung-Ang University</i>	jkim@kaist.edu
Byoung Wook Choi, MD, PhD	Professor, <i>Yonsei University</i>	bchoi@yuhs.ac