RSNA Press Release

RSNA Margulis Award Honors AI Research in X-Ray Imaging

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OAK BROOK, Ill. (Nov. 8, 2022) — The 2022 Radiological Society of North America (RSNA) Alexander R. Margulis Award for Scientific Excellence will be presented to Ali Guermazi, M.D., Ph.D., M.Sc., for the *Radiology* article, "Improving Radiographic Fracture Recognition Performance and Efficiency Using Artificial Intelligence."

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Ali Guermazi, M.D., Ph.D., M.Sc.

Named for Alexander R. Margulis, M.D., a distinguished investigator and inspiring visionary in the science of radiology, this annual award recognizes the best original scientific article published in RSNA's flagship journal, *Radiology*.

"This year's Margulis Award recognizes the increasing importance of artificial intelligence in our field. The authors studied fracture detection by 24 radiologists and clinicians with and without AI," said *Radiology* editor David A. Bluemke, M.D., Ph.D. "Ten percent better fracture detection was present using AI, while reducing time for radiologists. This study validates the steady rise in the use of AI tools that are becoming a routine part of many clinical practices, particularly in musculoskeletal radiology."

In the study, Dr. Guermazi and colleagues retrospectively analyzed 480 X-ray examinations from various U.S.

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hospitals.

“AI can be a powerful tool to help radiologists and other physicians improve diagnostic performance and increase efficiency, while potentially improving patient experience at the time of hospital or clinic visit,” said Dr. Guermazi, director of the Quantitative Imaging Center, professor of radiology and medicine, and assistant dean in the office of diversity at Boston University Chobanian & Avedisian School of Medicine and chief of radiology at VA Boston Healthcare System.

The researchers included X-rays of limbs, pelvis, spine and rib cage. The exam group included adults over 21 years of age with indications of trauma and fracture prevalence of 50%. There were 240 patients with a total of 350 fractures, and 240 patients with no fractures.

The studies were analyzed twice by 24 U.S. board-certified readers from six different specialties including radiology, orthopedic surgery, rheumatology, emergency medicine (including physicians and physician assistants) and family medicine.

According to Dr. Guermazi, readings were performed both with and without a commercially developed software utilizing an algorithm trained on accurately annotated X-ray images from multiple institutions, acquired on a large variety of systems. Readers had a one-month period between the two analyses.

“The results of the study showed an absolute gain in sensitivity in the detection of fractures of 10.4% with the help of the software, with the software showing a sensitivity of 75.2% against 64.8% without the assistance of the software,” Dr. Guermazi said. The results also revealed an absolute gain in specificity—from 90.6% to 95.6%—for fracture detection with software assistance.

While not surprised by the algorithm’s sensitivity, Dr. Guermazi did not expect the gain in specificity.

“Computer-aided detection systems can be easily sensitive but usually bring significant loss in specificity. Here, the algorithm also helped reduce false-positive rates,” he said. “The time saving was a good surprise, given that the algorithm brings additional information to look at on top of the native images. It was not obvious that the algorithm would speed up interpretation time.”

Dr. Guermazi noted that one of the most important challenges the team faced during the study was training 24 readers with various backgrounds on reading with AI. Despite this challenge, he said the readers thought the use of the AI algorithm was easy, friendly and extremely intuitive.

Clinical validation studies are ongoing with a focus on specific body parts where, according to Dr. Guermazi, the gold standard is established using CT/MRI to evaluate the algorithm’s ability to detect radiographically visible and occult lesions.

“Ultimately, I believe my radiology colleagues will join in viewing AI as a friend rather than a foe,” Dr. Guermazi said. “As it becomes clearer that it can beat the human eye at certain specific and repetitive or tedious tasks, AI will be viewed as a great add-on to heavy clinical workflow.”

The Margulis Award will be presented during the RSNA 108th Scientific Assembly and Annual Meeting (RSNA 2022) in Chicago, Nov. 27-Dec. 1.

Read the *Radiology* study, “Improving Radiographic Fracture Recognition Performance and Efficiency Using Artificial Intelligence.”

Read the related *Radiology* editorial, “Using AI to Improve Fracture Detection.”

Radiology is edited by David A. Bluemke, M.D., Ph.D., University of Wisconsin School of Medicine and Public Health, Madison, Wisconsin, and owned and published by the Radiological Society of North America, Inc. (https://pubs.rsna.org/journal/radiology)

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