

Daily Bulletin

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- Steroid Injections Worsen Knee Arthritis Two studies comparing injections for knee osteoarthritis found that corticosteroid injections were associated with the progression of the disease.



A Vision for the Future of Cancer Care

Collaboration between different medical specialties and appropriate use of new tools like AI will drive progress in the fight against cancer, a celebrated oncologist and best-selling author told the audience in Arie Crown Theater Monday.

"Three Visions for the Future of Medicine"



In an almost hour-long address, Siddhartha Mukherjee, MD, assistant professor of medicine at Columbia University Medical Center, offered the large crowd a vision for the future of cancer care.

He echoed the thoughts of leading experts when he suggested that AI is best viewed not as a threat to radiology but a useful adjunct. Referencing the number of AI-derived cancer detection products in the exhibition hall upstairs, he shared research on AI's ability to improve breast cancer detection. Quality data is central to developing these algorithms, Dr. Mukherjee said, something that radiologists have helped provide.

"I want to particularly congratulate the radiology community for open sourcing hundreds of thousands of images so that they can be processed by the community at

CONTINUED ON PAGE 10

Langlotz Named RSNA Chair

Curtis P. Langlotz, MD, PhD, was named chair of the RSNA Board of Directors.

A renowned imaging informatics leader and committed advocate for improved clinical communication, Dr. Langlotz is professor of radiology, medicine and biomedical data science, director of the Center for Artificial Intelligence in Medicine and Imaging, and associate chair for information systems in the Department of Radiology at Stanford University. As a medical informatics director for Stanford Health Care, he sets strategy for the computer technology that supports the Stanford Radiology practice.

As RSNA chair, Dr. Langlotz will support the innovative work being done to advance medical imaging technologies particularly in the areas of informatics and artificial intelligence—and work with the Board of Directors to continue to deliver an outstanding annual meeting experience for attendees.

Dr. Langlotz received his medical degree, a master's degree in artificial intelligence and a doctorate in medical information science from Stanford University. He completed an internship and radiology residency at the University of Pennsylvania, where he remained on the faculty for 20 years. He accepted his current position at Stanford in 2014.

A longtime RSNA member, Dr. Langlotz served for many years on RSNA's Radiology Informatics Committee and has served the Society as an informatics advisor. He led the development of numerous RSNA informatics initiatives, including the RadLex terminology standard, the LOINC-RadLex Playbook of standard exam codes and the RSNA imaging AI certificate program.

Dr. Langlotz has also served as a member of the RSNA Publications Council, the Research Development Committee, the Radiology Editor Search Committee and the Steering Committee for the RSNA Digital Roadmap. He has served on the RSNA Board since 2016 as the Liaison for Information Technology and Annual Meeting.

His biomedical informatics research laboratory aims to reduce diagnostic errors and improve the accuracy and consistency of clinical communication by developing novel AI algorithms that provide real-time assistance to radiologists, clinicians and patients. In addition to over 150 scholarly publications, Dr. Langlotz authored numerous peer-reviewed research articles, reviews, committee publications and editorials, as well as The Radiology Report: A Guide to Thoughtful Communication for Radiologists and Other Medical Professionals. He co-edited Cancer Informatics: Essential Technologies for Clinical Trials.

Dr. Langlotz is a principal investigator for several projects funded by the National Institutes of Health (NIH), including the Medical Imaging and Data Resource Center (MIDRC), an open-source database containing medical images from over one hundred thousand COVID-19 patients to



Langlotz

help doctors better understand, diagnose, monitor and treat COVID-19.

The founder and past president of the Radiology Alliance for Health Services Research, Dr. Langlotz received its career achievement award in 2017. He served as chair of the Society for Imaging Informatics in Medicine and as a board member of the Association of University Radiologists and the American Medical Informatics Association. He has served on the external advisory board of the National Cancer Institute's Imaging Data Commons for the past two years.

Dr. Langlotz has founded three health care information technology companies, most recently Montage Healthcare Solutions, which was acquired by Nuance Communications in 2016.

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Tuesday At a Glance

Plenary Lecture 11 a.m. – Noon | Arie Crown



Designing Radiology for Patients, Communities & the Planet Dr. Omary will discuss the responsibility of today's radiology professionals to create the best possible experience for patients, communities and beyond.

Reed Omary, MD

Support the R&E Foundation on Giving Tuesday

The RSNA R&E Foundation is participating in #GivingTuesday, a day of generosity celebrated around the world.

Celebrate the radiologic community on #GivingTuesday by making a donation to the R&E Foundation at *RSNA.org/Donate* or by visiting the R&E Foundation Booth in the Connections Center. Stop by the RSNA Shop and pick up an R&E beverage tumbler as a souvenir that will also support the Foundation.

Your donations fund the future of radiology by supporting advances in research and innovative teaching methods. In 2022, the Foundation directed more than \$4 million in funding to individuals at 46 institutions, and since the Foundation's inception, over 1,600 individuals have received funding.

Please contribute to the Foundation today and share your support across social media with the #GivingTuesday and #RSNA22 hashtags. 6:30 – 9 a.m. Fun Run Arvey Field 8-9:30 a.m. **Chile Presents** From the End of the World: Female Empowerment in Radiology (E350) 8 a.m. – 9 a.m. **Science and Education Sessions** 9 a.m. – 9:30 a.m. **Poster Discussions** Learning Center 9 a.m. – 3 p.m. **Cutting-Edge Research Presentations** Learning Center Theater 9:30 a.m. - 10:30 a.m. Science and Education Sessions 10 a.m. - 5 p.m. **Technical Exhibits Industry Presentations** 10 a.m. – 5 p.m. **Professional Portrait Studio** South Hall, Booth 1031 10:15 a.m. – 10:45 a.m. How To's of Publishing Your **Research: Ask the Trainee Editors** Discovery Theater 10:30 a.m. – 11 a.m. Fast 5 Arie Crown Theater 10:30 a.m. - 5 p.m. **RSNA AI Theater Presentations** South Hall. Both 5149

11 a.m. – 11:15 a.m. Image Wisely: To Shield or Not To Shield Discovery Theater 12:15 - 1:15 p.m. **Poster Discussions** Learning Center 1 p.m. – 2 p.m. Meet the RSNA Journal Ed Charles E. Kahn. MD Radiology: Artificial Intellige South Hall, Booth 1007 1:30 p.m. – 2:30 p.m. Medicare and U.S. Healthca A National Conversation E450A 1:30 p.m. – 2:30 p.m. Science and Education Sess 1:30 p.m. - 2 p.m. RadioGraphics TEAM Editorial Board for Trainees **Discovery Theater** 3 p.m. – 4:30 p.m. **Argentina Presents** Developments and Improven Diagnostic Imaging (E350) 4 p.m. – <u>5 p.m.</u> **Residents Reception** Lakeside Ballroom View the full program and add so your calendar at Meeting.RSNA.

DailyBulletin

The RSNA 2022 *Daily Bulletin* is the official publication of the 108th Scientific Assembly and Annual Meeting of the Radiological Society of North America. Published Sunday, November 27–Thursday, December 1.

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Tuesday Press Releases

Press releases are distributed to the media throughout the week highlighting research presented at RSNA 2022. RSNA's media outreach helps increase public awareness of radiology and its role in personal health care. Attend these sessions today or access on demand at *Meeting.RSNA.org*.

High Deductible Leads Women to Skip Testing after Abnormal Mammogram

Over 21% of women would forgo additional testing after an abnormal mammogram if they had to pay a deductible, according to a new study. Researchers also found that 18% of women would skip their screening mammogram if required to pay out-of-pocket. The demographic groups with the highest percentage of responses indicating they would skip additional imaging were Hispanic, high school educated or less, household income less than \$35,000 and Medicaid/uninsured.

"Effect of a High Deductible Health Plan on Patients Willingness to Undergo Indicated Breast Imaging" (T7-SSBR06-3)

Steroid Injections Worsen Knee Arthritis

Two studies comparing injections commonly used to relieve knee osteoarthritis pain found that corticosteroid injections were associated with disease progression. In the first study, researchers directly compared 210 patients who received corticosteroid or hyaluronic acid injections to a control group of 140 who did not. Statistical analysis showed that corticosteroid knee injections were significantly associated with the overall progression of osteoarthritis in the knee. In the second study, researchers compared the radiographic progression of osteoarthritis in 100 patients who received injections of corticosteroids and hyaluronic acid with 50 patients who did not. Researchers found that patients injected with corticosteroids had significantly more osteoarthritis progression.

"Impact of Intra-Articular Knee Injections on the Progression of Knee Osteoarthritis: Data From the Osteoarthritis Initiative (OAI) Cohort" (T1-SSMK05-5)

"Medial Joint Space Narrowing and Kellgren-Lawrence Progression following Intraarticular Corticosteroid Injections compared to Hyaluronic Acid Injections and Nontreated Patients" (TI-SSMK05-04)

AI Predicts Heart Disease Risk Using Single X-Ray

Researchers have developed a deep learning model that uses a single chest X-ray to predict the 10-year risk of death from a heart attack or stroke, stemming from atherosclerotic cardiovascular disease. Researchers trained the deep learning model and developed it to predict the risk of cardiovascular disease death. There was a significant association between the risk predicted by the CXR-CVD risk deep learning model and observed major cardiac events.

"Deep Learning to Predict 10-year Cardiovascular Risk from Chest Radiographs" (T3-SSCH04-1)



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Al Theater: Sun, Nov. 27, 2:30-2:45pm

Booth:

"How AI-based CT Denoising Impacts Imaging Workflow Efficiency: An Experience at Tübingen University Hospital"

Booth 4932 South Hall Level 3, AI Showcase



Holistic Recruitment Process Boosts Numbers of Female Radiology Residents

by Richard Dargan

Standardization of radiology residency recruitment processes with an emphasis on diversity in faculty participation and a holistic application review was associated with increased proportions of matched female residents, according to research presented Monday.

Female radiology residents are persistently under-represented in U.S. radiology residency programs, despite parity in medical school admissions. Standardized recruitment processes have been described as a tool to reduce biases and increase diversity in admissions processes.

Mai A. Elezaby, MD, associate professor in the Department of Radiology at the University of Wisconsin School of Medicine and Public Health in Madison, and colleagues developed a standardized holistic recruitment process and evaluated its impact on the matching of female radiology residents into an academic diagnostic radiology residency program.

The standardized process was devised and implemented in the summer of 2020 to increase residency program diversity. The plan included implementation of a holistic application review process, standardized behavioral interview questions and a more diverse faculty selection committee.

'We updated our recruitment goals and values, and we used those updated metrics to mirror our metrics for scoring our applicants," Dr. Elezaby said. "We also built a

more diverse search committee with representation from the entire department."

With the new process in place, the researchers collected and compared recruitment process data pre- and post-implementation.

New Protocol Leads to More Interviews for Women

A total of four years of recruitment data were included. There were no statistically significant

differences in the percentage of female applicants before and after implementation of the recruitment process. However, the proportion of female applicants interviewed after the implementation climbed from 26.7% to 44%. Before implementation of the standardized recruitment process, two out of 16 matched applicants (12.5%) were female. Post-implementation, eight out of 16 matched applicants (50%) were female, a statistically significant increase.



Elezaby

"Standardization of our radiology residency recruitment processes focused on increasing the visibility of female faculty and a holistic application review was associated with a statistically significant increase in female matching applicants."

Mai A. Elezaby, MD

"Standardization of our radiology residency recruitment processes focused on increasing the visibility of female faculty and a holistic application review was associated with

a statistically significant increase in female matching applicants," Dr. Elezaby said. Among the measures implemented, Dr.

Elezaby credited conducting virtual interviews with helping to expand the number of female applicants.

"Virtual interviews have really helped us in improving the interview cycle," she said. "They allow us to increase the participation of residents and faculty members from diverse backgrounds.'

While the study results are encouraging, Dr. Elezaby emphasized that boosting female representation in radiology will require much more work.

'Continued efforts to promote earlier exposure to radiology in medical school are still needed to increase the pipeline of female applicants to radiology programs," she said.

Access the presentation, "Impact of a Standardized Holistic Radiology Residency Recruitment Process on the Matching of Female Radiology Residents," (M1-SSNPM01-4) on demand at Meeting. RSNA.org.

Continued Integration of New Technology to Fuel Future of Neuroimaging

By Lynn Antonopoulos

As AI in medical imaging continues to advance, opportunities for machine learning applications continue to expand across the spectrum of neurological disease imaging.

"Machine learning is a broad field that has many potentially powerful methods and techniques," said moderator Yvonne Lui, MD, professor and vice chair of research in the Department of Radiology at NYU Langone Health/ Grossman School of Medicine in New York

In a Monday education session, three presentations centered on current and future considerations for AI in clinical neuroimaging.

Making the Call for More, Better Automation

Opening the discussion, Christopher Filippi, MD, chair of the Department of Radiology at Tufts University School of Medicine in Medford, MA, shared several studies demonstrating applications of AI in glioma diagnosis treatment and follow-up He noted that deep learning use in the field of glioma is exploding, but more can be done to improve AI tools for radiologists.

Making an appeal to vendors and AI developers, Dr. Filippi said segmentation tools that automatically extract imaging features and provide tumor classification and other useful information would be most helpful. "This could easily be incorporated onto a PACS environment and should be done in a way that's automated," he said.

Dr. Filippi called on radiologists to be better at data sharing and working with



Left to right Ho, Lui, Chow, Filippi

PACS providers to develop tools that can be made universally available. He emphasized the importance of focusing on clinical efficacy when using AI models. Looking ahead, he said work should be done to push automated PACS forward and increase collaboration between imaging groups to remove siloes. Metrics for efficacy must be determined and arranged. "It's all about process, and we still have a lot of work to do," Dr. Filippi said.

Defining Measures of Success in AI

How do we define the correct measures of success in using AI in clinical practice? In his session, Daniel Chow, MD, MBA, vice chair of innovation and entrepreneurship at University of California, Irvine (UCI), and chief of neuroradiology and co-director at the UCI Center for AI in Diagnostic Imaging, questioned whether success should be measured on a given tool's sensitivity and specificity or on its clinical benefit.

"A lot of the work right now has really been centered on diagnostic and technical efficacy but there's been a relative lack of effort in trying to figure out if it's actually improving patient outcomes," Dr. Chow said.

Focusing on applications of AI in stroke and vascular imaging, Dr. Chow highlighted the accelerated increase in AI products on the market. "We've seen very rapid turnover," he said. "It's not about having enough solutions but about what is the solution that makes the most sense.'

To ensure that solutions add real value, radiologists have the opportunity to position themselves as leaders in the space. "One of the things that we are starting to struggle with is that there may be a paradigm shift. How we practice radiology right now might not be the future of the way we practice," Dr. Chow said.

Shifting from Big Data to "Small and Wide"

"Children are not little adults," began Mai Lan Ho, MD, director of radiology research and director of advanced neuroimaging core and lead for imaging genomics at Nationwide Children's Hospital in Columbus, OH.

In a talk that drew a parallel between limited data availability in pediatric medical innovation and limitations of small data sets in AI applications, Dr. Ho noted that compared to many other areas of

hysics Quiz



Without person-specific training dictation software often performs better for native English speaking men than women and those with strong accents. This is:

a. Historical Bias

- c. Group/Aggregation Bias
- [Answer on page 9.]

sets are relatively small. "There's been a shift from this idea of big data to small and wide," Dr. Ho said. To overcome common challenges pre-

sented by small data, like overfitting and scalability, Dr. Ho shared solutions including feature extraction, transfer learning, federated learning and meta learning.

industry and development, health care data

She provided a literature review of the use of AI across several pediatric applications including in prenatal, tumor, white matter, epilepsy, trauma and stroke imaging. She emphasized the importance of bringing together genomics and imaging to deliver precision health care.

Looking ahead, Dr. Ho said the next stage of the information age is human/ machine collaboration. "So the future radiologist will be a driver of tech innovation providing quality, safety and value to patients and will incite integration in terms of activities between specialties and between," Dr. Ho said.

Access the presentation, "AI: Intelligent Clinical Neuroimaging on the Horizon," (M3-CNR10) on demand at Meeting. RSNA.org.

Disparities in Cancer Imaging Trends During the COVID-19 Pandemic and Recovery

By Mary Henderson

Research from four hospitals in Massachusetts identified the groups most affected by delays in cancer imaging during COVID-19.

Ottavia Zattra, MD, researcher in the MESH Incubator at Mass General Brigham, presented new data exploring these socio-economic disparities in cancer imaging utilization during a Monday morning session.



"During the pandemic, medical institutions reduced non-

essential specialty health care services to curb COVID-19 transmissions," said Dr. Zattra, a resident physician at the Hospital of the University of Pennsylvania, Philadelphia. "Cancer care delivery was severely impacted, with declines in cancer-related visits, chemotherapy sessions, surgeries and cancer screenings."

Zattra

Previously published research has demonstrated that cancer imaging utilization declined significantly from March through May of 2020.

"Our objective was to look at the differential trends based on socio-economic and demographic factors," she said.

Study Looked At Four Different Time Periods During the Pandemic

In the study, Dr. Zattra and colleagues retrospectively analyzed cancer imaging utilization among patients by age, race, language and insurance type at Massachusetts General Hospital (Mass Gen) and three affiliated community hospitals during four time periods between January 2020 and October 2021:

- Pre-COVID, January 2020 March 2020
 COVID = 1 M = 1 2020 – M = 1
- COVID peak, March 2020 May 2020
 Post COVID peak, May 2020
- Post-COVID peak, May 2020 November 2020
- Post-Vaccination period, December 2020 October 2021

Patients were categorized by age (18 – 64 and 65+); race (white or non-white), language (English or Non-English speaking), and insurance type (private insurance, Medicare or Medicaid).

Overall, cancer-related CT volumes declined an average of 42.2% during the COVID peak period compared to the pre-COVID baseline. CT volumes returned to the pre-COVID baseline during the postpeak period and increased an average of 11.1% above pre-COVID baseline during the post-vaccination period.

"The overall trends we observed in our study weren't surprising as they mirrored previously published research," she said. "The increase in cancer-related imaging utilization during the post-peak and postvaccination periods could reflect both a

vaccination periods could reflect both a return to full access to care as well as an increase in cancer incidence.

Disparities Noted in Certain Groups

However, the analysis of cancer-related CTs performed per person revealed disparities across race, language, and insurance categories. Patients who were white, English-speaking, or who had private insurance or Medicare experienced an increase in the number of CTs performed per person (CTs/ person) across all time periods.

Physics Tip

"This was not the case for non-white, non-English speaking, and Medicaid patients, which is very concerning," she said. The number of CTs/person

remained the

same as the pre-COVID baseline for nonwhite, non-English speaking and Medicaid patients across all the study periods.

"The increase in CTs/person experienced by the white, English-speaking, and private insurance/Medicare patients may indicate that these patients were sicker when presenting for care," she said. "It also could reflect system or provider bias in favor of these patients or a lack of resources to connect non-white, non-English and Medicaid patients to care."

In response to the results, the study's senior author, Marc Succi, MD, said Mass General has created outreach and language translation initiatives to mend the disparities in cancer-related imaging.

American Association of Physicists in Medicine

Each vendor currently implements dual-energy CT in a different way. This means that each vendor's version will have advantages and disadvantages compared to its competitors.





RSNA 2022 award recipients were recognized at a special luncheon in their honor. From left to right, Gold Medalists, Vijay M. Rao, MD, James A. Brink, MD, and Katherine P. Andriole, PhD; RSNA President Bruce G. Haffty, MD; Ali Guermazi, MD, PhD, MSc, accepting the Margulis Award; Outstanding Educator Dennis M. Balfe, MD; Outstanding Researcher Maryellen Giger, PhD; and Honorary Members Evis Sala, MD, PhD, FRCR, FRCP, Michael Fuchsjäger, MD, and Evelyn Lai Ming Ho, MBBS, MMed.



Co-moderator Erik England, MD, welcomes teams to the RSNA 2022 Resident Competition. This lively contest kicked off in the Discovery Theater where residency programs matched wits answering questions and identifying challenging diagnoses.



Trainees gather to relax and connect in the Residents Lounge.



Residents and trainees in the Residents Lounge enjoyed a fast-paced Kahoot! trivia game.





Ultimate bragging rights were earned Monday by residents from Albany Medical Center who are the RSNA 2022 Resident Competition winners. The winning team is pictured here with Erik England, MD, (far right) who co-moderated the competition.

RSNA Recognizes Honorary Members, **Outstanding Educator and Outstanding Researcher**

During RSNA 2022, RSNA presented awards for significant achievement in the field of radiology.

Honorary Members Michael Fuchsjäger, MD

An international authority on breast imaging and intervention techniques, Michael Fuchsjäger, MD, is chair of the Department of Radiology at the Medical University of Graz, Austria, where he has also held professorship since 2012. Previously he served as chair of the Clinical Imaging Institute at Al Ain Hospital in Abu Dhabi, UAE

Dr. Fuchsjäger's academic and clinical interest is primarily focused on breast radiology and intervention, including minimally invasive therapy as well as assessment of 4D blood flow and tissue characterization by cardiac MRI. He has published more than 100 peer-reviewed scientific manuscripts, held over 200 scientific lectures and poster presentations and presented more than 600 educational lectures worldwide.

Past president of the European Society of Radiology, Dr. Fuchsjäger hosted the 2021 European Congress of Radiology as president and held various committee appointments since 2012. He is also an executive board member of the International Society for Strategic Studies in Radiology and has served as an executive board member of the European Society of Breast Imaging and as a board member of the Austrian Society of Senology and the Austrian Roentgen Society.

Dr. Fuchsjäger's many contributions to the field have been recognized with over 100 awards, including the Schering and Wolf-Dieter Sager awards of the Austrian Roentgen Society, Excellence in Imaging and Diagnostics from Arab Health and the Science Award by the city of Vienna honoring his body of scientific research. He received the Radiology Editor's Recognition Award in 2011 and 2012. He holds honorary membership in the Israel Radiological Society.

Dr. Fuchsjäger received his medical degree from the University of Vienna in Austria and completed his residency at the Medical University of Vienna's Department of Radiology. He completed a post-doctoral research fellowship at the Department of Radiology at Memorial Sloan-Kettering Cancer Center in New York.

Evis Sala, MD, PhD, FRCR, FRCP

A world-renowned cancer researcher, Evis Sala, MD, PhD, FRCR, FRCP, has significantly advanced the field's understanding of ovarian cancer. Dr. Sala is a professor of radiology at Università Cattolica del Sacro Cuore and chair of the Department of Radiology at Fondazione Policlinico Universitario Agostino Gemelli IRCC, Rome, Italy. Previously, she was the professor of oncological imaging in the Department of Radiology at the University of Cambridge, U.K. and co-led the Cambridge Cancer Centre's Advanced Cancer Imaging Programme and the Integrated Cancer Medicine Programme. From 2013 to 2018, she served as the chief of body imaging service at Memorial Sloan Kettering Cancer Center.

Dr. Sala's research focuses on the development and validation of functional imaging biomarkers to rapidly evaluate treatment

response using physiologic and metabolic tumor habitat imaging. Her research in the field of radiogenomics has focused on understanding the molecular basis of cancer by demonstrating the phenotypic patterns which result from multiple genetic alterations that interact with the tumor microenvironment to drive the disease in several tumor types. Her contributions to cancer imaging span the development of functional imaging biomarkers to the creation of novel imaging-

based virtual biopsy methods. A widely respected mentor, educator and orator, Dr. Sala three times earned the RSNA Honored Educator Award. Her leadership extends to the most important international bodies in the field. She is a fellow of the International Cancer Imaging Society, the International Society for Magnetic Resonance in Medicine, the European Society of Urogenital Radiology and the Royal College of Physicians, U.K.

Dr. Sala serves as an associate editor of Cancer Research Communications and a senior consulting editor to Radiology: Artificial Intelligence.

After earning her medical degree at the University of Tirana Medical School in Albania, Dr. Sala earned a master's and PhD in epidemiology at the University of Cambridge. She completed fellowships at the World Health Organization in cancer research and cancer epidemiology.

Evelyn Lai Ming Ho, MBBS, MMed

A passionate advocate for breast health and palliative care, Evelyn Lai Ming Ho, MBBS, MMed, believes the patient's interests should always be at the core of medical care. Dr. Ho practices as a consultant radiologist in Park City Medical Centre Kuala Lumpur, where she was instrumental in establishing the radiology department.

After earning her medical degree from the University of Malaya, Dr. Ho served under the Ministry of Health of Malaysia in Sarawak, East Malaysia, and in Kota Bahru before returning to Kuala Lumpur in 1990. Therefore, by the time she entered her residency, Dr. Ho was familiar with the geographic health disparities patients face.

Dr. Ho has served internationally in leadership roles, including as secretary treasurer of the ASEAN Association of Radiology from 2004-2006. As the first female president of the College of Radiology (CoR) under the Academy of Medicine Malaysia (AMM), she catalyzed the CoR and National Heart Association of Malaysia collaboration to create the first Consensus Statement on Utilization of Cardiac CT. She served as a member of the expert panel for the first edition of the Clinical Practice Guidelines for Management of Breast Cancer. Dr. Ho organized and helmed the CoR website from 2001 until 2014. Dr. Ho was involved in the first QAP study on mammography in Malaysia in 2005.

In 2010, she was elected to the AMM council, and appointed Bursar from 2014-2016. While serving the AMM, Dr. Ho was involved in the early days of setting up the continuing professional development system



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in Malaysia. She is president of the Asian Oceanian Society of Radiology, serves on the RSNA News Editorial Board, chairs the RSNA Regional Committee for Asia Oceania, and is an executive committee continental member of the International Society of Radiology.

Dr. Ho is a Fellow of the AMM, Honorary Fellow of the Academy of Medicine, Singapore, and Honorary Member of the Chinese Society of Radiology. Recognized for her leadership in breast health advocacy, she was voted The Malaysian Women's Weekly Great Women of Our Time Awards "Most Inspiring Woman" in 2010. Her World magazine featured her in 2018 in the "Inspire Change" Avon series.

Outstanding Educator Dennis M. Balfe, MD

Revered educator Dennis M. Balfe, MD, has mentored countless radiologists during his tenure spanning four decades at Washington University School of Medicine's Mallinckrodt Institute of Radiology in St. Louis.

Currently emeritus professor of radiology at Mallinckrodt, Dr. Balfe began his career there as an instructor in radiology, became a tenured professor in 1992 and served as the radiology residency program director from 1992 to 2006.

A leader in organized radiology, Dr. Balfe is past president of the Society of Computed Body Tomography and Magnetic Resonance Imaging (SABI) and of the Society of Abdominal Radiology. He also served as chair of the American Board of Radiology Board of Trustees in 2004 and as an oral examiner.

Dr. Balfe was awarded the Residents' Distinguished Teaching Award at Mallinckrodt by his students multiple times throughout his career. He received the SABI Hounsfield Award and American College of Radiology fellowship in 1994. Dr. Balfe was recognized by the Barnes Jewish Hospital with its lifetime achievement award, Distinguished Clinician, in 2016.

For two decades, Dr. Balfe served as associate editor for body imaging of *RadioGraphics* and he has reviewed articles for several radiology journals including the American Journal of Roentgenology and Radiology.

Dr. Balfe obtained a bachelor's degree at the University of Santa Clara in California and completed his medical degree at the Medical College of Wisconsin in Milwaukee. Following an internship and residency in diagnostic radiology at St. Mary's Hospital in San Francisco, he completed a fellowship in the abdominal section at Mallinckrodt.





Outstanding Researcher

Maryellen Giger, PhD Esteemed researcher Maryellen Giger, PhD, has worked for decades on computer-aided diagnosis, machine learning, and deep learning in medical imaging.

Dr. Giger is the A.N. Pritzker Distinguished Service Professor of Radiology, the Committee on Medical Physics, and the College at the University of Chicago. She is also the vice-chair of radiology (basic science research) and the prior director of the Graduate Program in Medical Physics/chair of the Committee on Medical Physics.

Her AI research in breast cancer for risk assessment, diagnosis, prognosis and therapeutic response has yielded various translated components, and she has used these "virtual biopsies" in imaging-genomics association studies. She has extended her AI in medical imaging research to include the analysis of COVID-19 on CT and chest radiographs and is the contact principal investigator on the National Institute of **Biomedical Imaging and Bioengineering** (NIBIB)-funded Medical Imaging and Data Resource Center (MIDRC; midrc.org).

Over the course of her career, Dr. Giger has published more than 260 peer-reviewed articles and obtained more than 30 patents. She has mentored over 100 trainees. She was cofounder of Quantitative Insights, now Qlarity Imaging, which produces QuantX, the first FDA-cleared, machine-learning driven CADx (AI-aided) system. Dr. Giger is a former president of AAPM and of the International Society for Optics and Photonics (SPIE). She is a member of the NIH NIBIB Advisory Council and is editor-inchief of the Journal of Medical Imaging.

Dr. Giger has been awarded the AAPM William D. Coolidge Gold Medal, the SPIE Director's Award, and the SPIE Harrison H. Barrett Award in Medical Imaging. She served as an RSNA third vice president and, in 2010, was elected to the National Academy of Engineering (NAE). She has also been recognized with the Society of Directors of Academic Medical Physics Programs Lifetime Achievement Award. She received the RSNA Honored Educator Award and is a fellow of AAPM. American Institute for Medical and Biomedical Engineering, Chinese Optical Society, IEEE, International Academy of Medical and Biological Engineering and SPIE. In 2013, Giger was named by the International Congress on Medical Physics (ICMP) as one of the 50 medical physicists with the most impact on the field in the last 50 years.

Dr. Giger completed a master's degree in physics at the University of Exeter in England, and a PhD in medical physics at the University of Chicago.





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Empowering Patients and Partners in Care

Radiologists at the Center of Diagnosing and Treating Pregnancy-Associated Cancer

By Nick Klenske

Although rare, affecting about one in 1,000 pregnant women, the prevalence of pregnancy-associated cancer (PAC) is rising, a result of postponed childbearing and older maternal age at conception.

PAC is defined as any cancer detected during pregnancy and up to one year postpartum. The most common PACs are breast cancer, lymphoma, uterine cervical cancer, leukemia and ovarian cancer.

"Pregnancy-associated cancer is one of the most difficult and stressful clinical scenarios for the patient, her family and the medical team caring for them," said Marcia Javitt, MD, an adjunct professor of radiology at the George Washington University Medical Center. "Imaging, clinical management and treatment require a carefully choreographed, multidisciplinary team approach."

Dr. Javitt, who co-authored a recent *RadioGraphics* article on imaging cancer in pregnancy, made her remarks during a Monday session.

Weighing Fetal Risks With Maternal Benefits

Imaging and management of PAC requires weighing fetal risks with maternal benefits.

"The risk-benefit of every imaging modality, the strategies to balance the safety of the mother and fetus, and the support of the patient and family at every step are crucial," Dr. Javitt said.

As Dr. Javitt explained, imaging modalities should be selected for safety and personalized care according to the primary cancer



site, gestational age and tumor biology. As such, US and MRI are the generally preferred imaging modalities due to their lack of ionizing radiation.

While in some cases imaging with ionizing radiation may be

entertained after accounting for gestational age, Dr. Javitt cautioned that radiation dose concerns must be addressed in advance of these studies and reviewed after each examination. She also explained that abdominal shielding is usually not recommended during pregnancy because most of the dose to the uterus and fetus is from internal scatter.

However, studies such as mammography or radiography outside the abdominopelvic cavity may be performed selectively for urgent concerns as they have negligible exposure to the uterus and fetus.

Furthermore, CT ionizing radiation may be required for life-threatening conditions

such as trauma or suspected pulmonary embolism during pregnancy.

"In general, intravenous iodinated contrast material should be avoided in pregnancy tent of contrast media has the potential to produce neonatal hypo-

thyroidism," Dr. Javitt said. "Gadolinium-based contrast material should also be avoided because of teratogenic effects seen in animal studies."

Radiology Is Essential For Detecting Pregnancy-Associated Cancer

Cancer-related signs and symptoms of PAC are often masked by physiologic gestational challenges that can delay diagnosis. According to Dr. Javitt, this is problematic because early and accurate diagnosis has a direct impact on management decisions and treatment options such as surgery and chemotherapy.

"Radiology is essential for cancer detection, determining gestational age, imageguided biopsy, staging, monitoring treatment

Pregnancy-associated cancer is one of the most difficult and stressful clinical scenarios for the patient, her family and the medical team caring for them. Imaging, clinical management and treatment require because the iodine con- a carefully choreographed, multidisciplinary team approach.

Marcia Javitt, MD

targets, and guide further cancer site-specific imaging. "To date, there is no evidence in the peer-

response and over-

seeing follow-up,"

mends the use of

whole-body MRI

weighted sequences

to screen for primary

and metastatic sites,

stage, identify biopsy

determine disease

with diffusion-

Dr. Javitt explained.

Dr. Javitt recom-

reviewed medical literature of harm to the fetus from MRI performed at 1.5T or 3T field strengths," Dr. Javitt added.

Keeping Patients Informed

According to Dr. Javitt, a key takeaway is that radiologists play a central role in optimizing the treatment of pregnancy-related cancer.

"A multidisciplinary team, including the radiologist, should counsel the patient about safe and effective diagnostic testing followed by informed treatment selection for both the mother and fetus," she concluded. "Doing so may prevent delays that threaten maternal and fetal well-being."

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AI Can Help Researchers Tap Into Decades Of Electronic Medical Records, But Challenges Remain

By Melissa Silverberg

AI has applications across the radiology spectrum, including the use of natural language processing algorithms to help collect and process data for clinical research. The power of the algorithm may be limited by the way electronic medical records are organized however, said Marta Flory, MD, clinical assistant professor at Stanford University, in her Monday presentation.

"Machine learning and AI improves quality in radiology by advancing understanding of disease processes, enabling analysis of vast archives of data, helping us generate cohorts of the population of interest and extracting straightforward data," Dr. Flory said. "But there are challenges."

Using Natural Data Processing To Determine Which Cysts **Turned Into Cancer**

During the session, Dr. Flory discussed a research project she led to use natural language processing for evaluating pancreatic cysts, which can present normally, but may develop into cancer. Often, patients are observed with additional imaging for ten years so there is a lot of data in the electronic medical record about cysts that were found and observed over a number of years. Researchers can use this data to see which did or did not turn into cancer.

"Our clinical question was, let's use all this data we have stored electronically over



30 years and try to mine it and shed some insight into those pancreatic cysts so we know what features may predict future malignancy," Dr. Flory said.

The first step was to write a natural language processing algorithm to create a cohort of cases. The team had to choose words they thought radiologists would have chosen to describe the cysts or lesions and have the software to look at all reports for those words.

This step turned out to be more difficult and time consuming than Dr. Flory expected.

"The algorithm performed really well, but our real challenge was in how our data is actually stored," she said.

The way things are coded and stored in the electronic medical record typically aligns with billing, not pathology. It was challenging to know how to find the right words without knowing all the right billing codes that might lead to a report that included what the team was looking to include.

unifying and standardizing present-day

"Together, we plan to develop the

are present-day solutions and determine

guidelines for what is one of the most

prevalent cancers in men worldwide.

best prostate-AI models for this task,

establish how diagnostically accurate

whether prostate-AI is truly ready for

Challenge Seeks to Standardize Present

More than 220 AI algorithms have been

clinical adoption," Saha said.

Prostate Cancer Guidelines

Tips For Researchers Looking at Data

She advised that research teams allow for more resources for cohort generation. "As a clinical radiologist you are not

that intimately familiar with the coding, and it is a very complicated system. It takes time and money," Dr. Flory said. "The codes can

be different across *"Our clinical question* different hospiwas, let's use all this data tal systems. In a country with a we have stored electroninational health cally over 30 years and try care system, all the different hosto mine it and shed some pitals are using insight into those pancrethe same codes, atic cysts so we know what but that is not the case in the United features may predict future States. There is a malignancy." lot of variability that can make it difficult to trans-

late this work from one institution to the next."

Once the team had their cohort, they wrote another algorithm to look at the size of the largest cyst in the report and evaluate it over time.

"We found that the current recommendation for following pancreatic cysts is a little more aggressive than it needs to be," Dr. Flory said.

But even that question was a bit of a challenge as the algorithm was looking at the text of the report not the images

so there was not a clear link labeling which lesion might have grown over time if there were multiple.

Templated reports and standardized dictation can go a long way toward helping solve some of these research problems, but they need to be widely adopted to make a difference, Dr. Flory said.

"Natural language processing offers promise to Marta Flory, MD be able to use electronic

> "We hope to make more people are aware of the

resources that we have made

publicly available through the PI-CAI challenge, including a

public dataset of 1,500 pros-

tate MRI exams, open-source

libraries for training prostate-

for independent validation of

prostate-AI models on a com-

ability of such resources will

encourage others to participate

AI models, and a platform

mon testing cohort," Saha said. "We hope that the avail-

and contribute to this cause."

medical records to do research, there is a lot of data we can use, but researchers should also know about the limitations as well," she concluded.

Visit RSNA.org/Bulletin to watch an interview with Dr. Flory.

International Prostate Cancer Challenge Studies Potential AI Solutions

By Melissa Silverberg

Prostate cancer detection through MRI is difficult and can be prone to reader variability among radiologists, but AI solutions are demonstrating the potential to assist, according to research presented at a Monday session.

Until recently, most existing studies on using AI for prostate cancer have suffered from having a small sample size or issues with their evaluation formats, said Anindo Saha, MSc, PhD candidate in the Department of Radiology, Nuclear Medicine and Anatomy at Radboud University Medical Center in the Netherlands, who presented, Artificial Intelligence and Radiologists at Prostate Cancer Detection in MRI: The PI-CAI Challenge.

The PI-CAI (Prostate Imaging: Cancer AI) is a challenge with more than

10,000 carefully curated prostate MRI exams to validate modern AI algorithms. The initiative is also facilitating a reader study with 79 international prostate radiologists (55 centers in 22 countries) to estimate clinicians' performance at this same task. Key aspects of the study have been established

"Together, we plan to develop the best prostate-AI models for this task, establish how diagnostically accurate are presentday solutions and determine whether prostate-AI is truly ready for clinical adoption."

Anindo Saha, MSc

research agenda in this

of these limitations, and in turn, support the research community at large."

> More than one million men are diagnosed with prostate cancer each year worldwide, so AI could have a significant impact on clinical routine by allowing radiologists to quickly and accurately assess prostate MRIs. In turn for patients, this could



reduce unnecessary biopsies and alleviate overdiagnosis.

Physics Quiz



[Question on page 4.]

b. Training for dictation software typically draws publicly available audio files with corresponding text such as audiobooks as part of its training set. In the USA, the preponderance of audiobooks is narrated by men with minimal accents, so sampling mainly these audio files for training means the software is best at transcribing similar voices out of the box.

with an international multi-disciplinary scientific advisory board with a goal of submitted from more than 50 countries. "Many research groups across industry and academia are

actively investigating prostate-AI models to support the clinical workflow of prostate cancer management. However, there is a lack of public resources to facilitate rigorous studies, and a lack of expert consensus guidelines to set the

domain," Saha said. "With the PI-CAI challenge, we are trying to alleviate both

Academic Radiology Leaders Can Improve Teamwork By Partaking in Formal Leadership Training

By Mary Henderson

For those in charge of academic radiology departments, formal leadership training can have a tremendous organizational impact on wellness, especially in preventing burnout.



"Burnout is a syndrome that occurs in the workplace in which chronic stress cannot be successfully managed," said lead researcher Jay Parikh, MD, professor of radiology at The University of Texas MD Anderson Cancer Center. As the radiology division's wellness lead, preventing burnout is a passion for Dr. Parikh.

A worker meets the definition of burnout when he or she is emotionally exhausted, feels that their work is depersonalized or experiences a decreased level of personal accomplishment.

"In the AMA model, an increased workload is one of the six drivers of burnout," Dr. Parikh noted in his poster presentation. "That's certainly a reality for many radiology departments today."

Burnout Felt Across All Radiology's **Subspecialties**

Dr. Parikh identified six peer-reviewed journal articles published between 2017 and 2022 that report

high rates of burnout within the field of radiology. Burnout rates for radiology subspecialties ranged from 49% to 88%, including:

- Musculoskeletal, 80.5%
- Neuroradiology, 49-75%
- Pediatric, 61-66%
- Cardiothoracic, 84-88%
- Breast Imaging, 78.4% Interventional Radiology, 71.9%

care, experience longer recovery times and feel less satisfied. For physicians, burnout can result in depression, substance abuse, decreased productivity, and higher turnover

> costs. "It's estimated that the loss of just one physician has direct and indirect costs of \$1 million," he said.

rates that ultimately increase health care

Dr. Parikh said burnout is critical

because the syndrome has been associ-

patient care, and the health care system.

ated with adverse outcomes for physicians,

When physicians and staff are burnt

out, patients may receive a lower level of

Dr. Parikh worked with his university's Leadership Institute to investigate whether providing the academic radiology leadership with formal training in leading wellness could improve burnout among the radiology faculty.

The university's 178 radiology faculty members received a weblink to a survey in April 2021 with validated questions on professional fulfillment, values alignment, teamwork, overload and work-family conflict. In May 2021, 27 of the university's 32 academic leaders participated in an instructor-led

"It's estimated that the loss of just one physician has direct and indirect costs of \$1 million."

Jay Parikh, MD

formal training on leading wellness focusing on five core skills-emotional intelligence, self-care, resilience support, demonstrating care and managing burnout.

A follow-up survey sent to the radiology faculty six months after the training showed a significant improvement in the aspect of teamwork. The results also demonstrated an inverse association between professional fulfillment and work exhaustion.

While Dr. Parikh and his team initially were hoping to notice some change in burnout rates, those scores did not statistically change following wellness training.

The formal training on leading wellness has been extended across the institution following the pilot.

"This is really encouraging and shows that if we design a formal wellness curriculum and engage leadership, we can make an impact on faculty," Dr. Parikh said.

CONTINUED FROM PAGE 1

A Vision for the Future of Cancer Care

large," he said. "You've set the way and you've done a real service to the entire community of physicians."

As reflected in his Pulitzer Prize-winning book, The Emperor of All Maladies: A Biography of Cancer, Dr. Mukherjee has spent much of his career studying a disease that continues to kill millions worldwide every year. He expressed cautious optimism over recent developments that are driving a better understanding of the disease.

For instance, a tumor's micro-environment is increasingly understood to be vital to its growth. The Cancer in a Dish project replicates this environment, allowing researchers to easily test different drugs on a 3D multicellular cancer-an approach that gives a more comprehensive picture than one provided by the cancer's genome.

"We do genetic analysis for that particular cancer, but more than that, we integrate that information with the individual patient's cancer and its sensitivities," Dr. Mukherjee said.

A Different Model of Care

Summing up his talk, Dr. Mukherjee stressed the importance of clinical trials performed with correct endpoints.

"If we cheat now and perform clinical trials with the wrong endpoints, we will pay later, not only in terms of the costs but really in terms of interventions on patients," he said.

The only way forward is to have a 'with patient' as opposed to a 'for patient' model of care.

Siddhartha Mukherjee, MD

In an informal question-and-answer session following the address, RSNA President Bruce G. Haffty, MD, asked Dr. Mukherjee what role the patient will play in the future of cancer care. In response, Dr. Mukherjee described the transformative power of bringing patients into the decision-making process. As an example, he described how discussions of concepts like risk models and false positive rates with prostate cancer patients assuages a patient's fear and suspicion.

'The only way forward is to have a 'with patient' as opposed to a 'for patient' model of care," he said.

Radiology's prominent role in the continuum of cancer care was never far from the discussion. Dr. Mukherjee said he intends to devote a chapter to risk assessment and diagnostic radiology in an updated version of the The Emperor of All Maladies, due for publication next year.

"Treatment is the tip of the triangle and prevention is the base," he said. "The people here," he said, gesturing to the crowd, "occupy the center."



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