BOARD OF DEPUTY EDITORS

Samuel G. Armato III, PhD, FAAPM
Associate Professor
Department of Radiology
The University of Chicago
Chicago, IL, United States

***Keywords**: machine learning and artificial intelligence; computer-aided diagnosis; texture analysis radiomics*

Bio: Samuel G. Armato III, PhD received both his undergraduate degree in physics and his PhD in medical physics from the University of Chicago, where he is currently an Associate Professor of Radiology and the Committee on Medical Physics. His research interests include the development and evaluation of computerized techniques for the quantitative analysis of medical images and the assessment of tumor response to therapy. More specifically, his research has involved the computerized detection and evaluation of lung nodules in thoracic computed tomography (CT) scans, the assessment of image quality and pathologic change in temporally subtracted chest radiographic images, the computerized evaluation of mesothelioma tumor and response to therapy in CT scans, critical analyses of image-based tumor response assessment for mesothelioma, the development of objective CT-based metrics for the quantification of mucosal inflammation due to sinusitis, the application of radiomics to the pre- and post-treatment CT scans of radiation therapy patients to predict normal lung tissue complications, and the evaluation of reference standards for computer-aided diagnosis (CAD) research.

Magdalena Bazalova-Carter, PhD
Assistant Professor
Physics and Astronomy
University of Victoria
Victoria, Canada

***Keywords:** emerging X-ray imaging modalities; emerging radiotherapy modalities; small animal radiotherapy*

Bio: Magdalena Bazalova-Carter, PhD received her B.Sc. degree in Dosimetry and Application of Ionizing Radiation at the Czech Technical University and her PhD in Medical Physics from McGill University. After holding a postdoctoral fellow and instructor position at Stanford University, she is now an Assistant Professor and Canada Research Chair in Medical Physics in the Department of Physics and Astronomy at the University of Victoria in British Columbia, Canada. Her research interests span the fields of x-ray imaging and novel radiotherapy techniques. She investigates x-ray fluorescence CT imaging and photon-counting CT imaging using an experimental table-top system in her lab and by means of Monte Carlo simulations. In the radiotherapy arena, Dr. Bazalova-Carter researches ways to improve the access to cancer care by developing a cost-effective kilovoltage x-ray beam radiotherapy machine. She investigates preclinical spatially-fractionated radiotherapy and FLASH radiotherapy and studies dosimetry techniques for these emerging treatment modalities. She also conducts small animal imaging and therapy research to improve the accuracy of dose delivery with conformal image-guided small-animal irradiators.
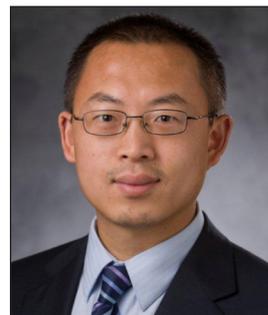
Jing Cai, PhD, FAAPM
Professor
Radiation Oncology
Hong Kong Polytechnic University,
Hong Kong, China

***Keywords:** magnetic resonance imaging; image-guided radiotherapy; artificial intelligence*

Bio: Jing Cai, PhD received his undergraduate degree in physics at Lanzhou University and his master's in physics at University of Georgia. He received his PhD in engineering physics and his medical physics residency training at University of Virginia. After faulty positions at Duke University in Durham, NC, he is now Professor at the Hong Kong Polytechnic University in Hong Kong, China. His research interests include the development and clinical implementation of novel medical imaging and radiotherapy technologies and methodologies, with

emphasis in MRI, image-guided radiotherapy, image analysis and processing, artificial intelligence, treatment response assessment and informatics. He has particular interest in implementing these techniques for clinical applications in lung cancer, liver cancer, nasopharyngeal cancer and gynecological cancer.

Guang-Hong Chen, FAAPM
Professor
University of Wisconsin
Madison, WI, United States

Keywords: X-ray and CT imaging; image reconstruction and imaging physics; machine learning and statistical modeling

Bio: Guang-Hong Chen, PhD received his undergraduate degree in Physics from Beijing Normal University, his master's of science in Mathematics from the Chern Institute of Mathematics at Nankai University, and his PhD in Semiconductor Physics from the University of Utah. After two years of postdoc research working in high energy string theory and condensed matter physics, he shifted his interest to medical physics and started his faculty position at the University of Wisconsin in Madison in 2003. Since 2012, Dr. Chen has been a tenured full professor of Medical Physics and Radiology at the University of Wisconsin in Madison. He teaches Principles of Computed Tomography, Radiation Physics and Dosimetry, and Artificial Intelligence and Machine Learning for Medical Physicists. His research interests include physics and mathematics in broad area of medical physics disciplines with emphases in applications of x-ray physics in imaging, image-guided therapy, and image-guided interventions. His research revolves around the development and clinical translation of innovative imaging methods (both algorithms and hardware system development) for medical diagnosis, intervention, and therapeutic procedures.
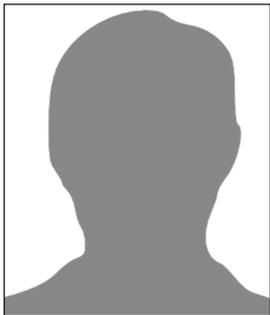
Kung-Shan Cheng, PhD
Professor
Food and Drug Administration
Division of Medical Devices and Cosmetics
Taipei, Taiwan

Keywords: ultrasound imaging; machine learning; image analysis and segmentation; mathematical and statistical imaging and therapy

Bio: Kung-Shan Cheng, PhD received his bachelor's and master's degrees in civil engineering at the National Taiwan University. He earned his doctoral degree in mechanical engineering at the University of Utah and completed his postdoctoral training at the Department of Radiation Oncology Physics, Duke University Medical Center. Then he worked in the Division of Medical Devices and Cosmetics, Food and Drug Administration, Department of Health, Executive Yuan, Taiwan. Dr. Cheng's interest lies in using the basic theories of physics and mathematics to solve medical problems and exploring the theoretical background behind medical problems. He is committed to the development of technology and the expansion of knowledge in the diagnosis and treatment of cardiovascular diseases and cancer. In particular, he is interested and specialized in the following medical physics problem areas: fluid dynamics, heat transfer, and the propagation of electromagnetic and acoustic waves in biological tissues. He tracks the development of technologies and problems in the following research areas: mathematical and numerical modeling, numerical simulation (for example, finite difference and finite element methods), optimization, control and treatment planning, parameter estimation and model identification, model reduction, and imaging problems such as image fusion, registration, segmentation, reconstruction and recognition, and deep machine learning.

Issam El Naqa PhD, FAAPM
Senior member and Chair
Machine Learning & Radiation Oncology
Moffitt Cancer Center
Tampa, FL, United States

Keywords: machine learning; image processing; radiobiological modeling

Bio: Issam El Naqa received his B.Sc. (1992) and M.Sc. (1995) in Electrical and Communication Engineering from the University of Jordan, Jordan. He completed his PhD (2002) in Electrical and Computer Engineering from Illinois Institute of Technology, Chicago, IL, USA, and an M.A. (2007) in Biology Science from Washington University in St. Louis, St. Louis, MO, USA, where he pursued a post-doctoral fellowship in medical physics. After faculty positions at Washington University, McGill University, and the University of Michigan, he is currently chair of Machine Learning, senior member in Radiation Oncology at Moffitt Cancer Center, and Professor at the University of South Florida. His research interests are in machine learning, image processing, and outcomes modeling.

Michael K. Fix, PhD
Associate Professor
Division of Medical Radiation Physics
Inselspital —University Hospital Bern
Berne, Switzerland

Keywords: Monte Carlo methods; dose calculation algorithms; optimization in radiotherapy

Bio: Michael K. Fix, PhD received his master's degree in physics and his PhD in medical physics at the Swiss Federal Institute of Technology (ETH) Zurich. After a faculty position at Virginia Commonwealth University in Richmond, VA, he is now Associate Professor of Medical Physics at Inselspital – University of Bern, Switzerland. His research activities have a strong focus on Monte Carlo methods in improving the efficiency of the Monte Carlo transport, for beam modeling and for dose calculations of electron, photon and proton radiotherapy beams, but also in the field of Brachy therapy and medical imaging. Further areas of research are inverse optimization in radiotherapy for modulated electron radiotherapy (MERT) and optimization of mixed beam radiotherapy (electrons, photons, protons) by Monte Carlo based simultaneous direct aperture optimization. Furthermore, he extended his research interest to investigate non-coplanar deliverable intensity modulated photon beams leading to dynamic trajectory radiotherapy (DTRT) as well as dynamic mixed beam radiotherapy (DYMBER). More recently, he is involved in research projects investigating the impact of magnetic fields on dose distributions in radiotherapy as well as exploring electron paramagnetic resonance imaging for dosimetric purposes.

Dietmar Georg, PhD
Professor
Department of Radiation Oncology
Medical University of Vienna
Vienna, Austria

Keywords: dose determination; image-guided radiotherapy; particle therapy

Bio: Dietmar Georg, PhD received his master's of science in physics and PhD at the Technical University of Vienna, Austria. After a research position at the University of Leuven, Belgium, he became Associate Professor at the Medical University of Vienna, Austria, and now holds a professorship in Medical Radiation Physics and Oncotechnology.

His research interests include dose determination by calculations, experimental dosimetry as well as Monte Carlo simulations for the various beam qualities in external beam therapy, i.e., photons, electrons, protons, ions, kV-based imaging and MRI (morphologic and functional) applications in radiation oncology for treatment planning, treatment verification and tissue characterization. His research group is also active in brachytherapy, medical image processing and related machine learning applications. His interests extend towards quality assurance including dosimetric audits, preclinical animal research, treatment outcome assessment and workflow automation in the context of adaptive radiotherapy (e.g, segmentation, treatment planning).
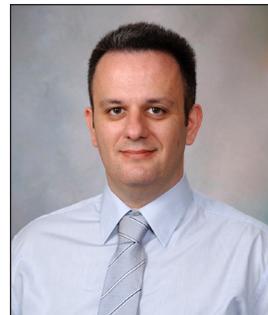
George C. Kagadis, PhD, FAAPM
Professor
Department of Medical Physics
University of Patras
Patras, Greece

Keywords: image processing/analysis and quantitative imaging; machine learning; Monte Carlo simulations and dose estimation

Bio: George C. Kagadis, PhD received his undergraduate degree in physics at University of Athens, Greece and his master's of science and PhD in medical physics at University of Patras, Greece, where he is now Professor of Medical Physics and Medical Informatics. His research interests include radiation dosimetry at the multiscale level incorporating advanced Monte Carlo simulations for imaging (PET/SPECT/CT), external and internal radiotherapy (RT/TRT), and radiobiology applications (DNA damage quantification, RBE). He has extended experience on medical image processing and analysis and he has been working on various noise reduction approaches, as well as design and implementation of 2D and 3D segmentation algorithms for ultrasound, CT, and MRI images. His group have applied pattern recognition and deep learning algorithms for various medical images towards chronic and focal liver disease prediction as well as peripheral endovascular network evaluation.

Hua Li, PhD
Research Associate Professor, Medical Physicist
Department of Bioengineering
University of Illinois at Urbana-Champaign,
Carle Cancer Center,
Carle Foundation Hospital
Urbana, IL, United States

Keywords: CT and image-guided radiation therapy; task-based image quality assessment; imaging science and medical image analysis

Bio: Hua Li, PhD received her undergraduate degree and PhD in electrical engineering at Huazhong University of Science and Technology, China. After the medical physics residency at Mayo Clinic and faculty position at Washington University in St. Louis, MO, she is now a Research Associate Professor in the Department of Bioengineering, Cancer Center at Illinois, and Carle Illinois College of Medicine at University of Illinois at Urbana-Champaign. She is also a medical physicist at Carle Foundation Hospital, Urbana, IL. She is certified in Therapeutic, Diagnostic, and Nuclear medical physics by the American Board of Radiology. The research work conducted in her lab focuses on image-guided radiation therapy, multimodal biomarkers for disease diagnosis and treatment outcome prediction, task-based image quality assessment, and advanced medical image analysis methods aiming to support clinical practice and improve patient care.

X. Sharon Qi, PhD, FAAPM
Associate Professor
Radiation Oncology
UCLA School of Medicine
Los Angeles, CA, United States

Keywords: image-guided radiotherapy and adaptive therapy; outcome modeling and response prediction; machine learning

Bio: MX. Sharon Qi, PhD received her undergraduate degree in physics and her PhD degree in Experimental Particle Physics from the Institute of High Energy Physics, Chinese Academy of Sciences in Beijing China. After her research scientist position at the Fermi National Accelerator Laboratory (Fermilab) in Batavia, Illinois, she completed her Medical Physics Postdoctoral Fellowship program at the department of Radiation Oncology, Medical College of Wisconsin. After her appointments at Medical College of Wisconsin and University of Colorado Denver as an Assistant Professor, she is now an Associate Professor at the department of Radiation Oncology, University of California Los Angeles (UCLA) in California. She is also affiliated and a faculty member of UCLA CAMPEP-accredited Physics and Biology in Medicine Interdisciplinary Graduate Program. Her research interests include biological/functional imaging guided radiation therapy and adaptive therapy, outcome modeling and response prediction, outcome-driven treatment planning, data mining & predictive analytics, and artificial intelligence/machine learning application in radiation therapy.

Yi Rong, PhD, FAAPM
Associate Professor
Radiation Oncology
Mayo Clinic Arizona
Phoenix, AZ, United States

Keywords: external beam radiotherapy, brachytherapy and gamma K; clinical workflow automation and data informatics; image guidance and adaptive radiotherapy

Bio: Yi Rong, PhD received her PhD in medical physics at University of Wisconsin–Madison. After her faculty positions at several institutions, she is now Consultant and Photon Lead Physicist in the Department of Radiation Oncology at Mayo Clinic Arizona. She has worked on a wide range of cancer radiotherapy related clinical and research projects and applications, with extensive experience in teaching and mentoring graduate students in the field of medical physics and biomedical engineering. She has authored more than 80 journal papers and multiple book chapters. Her clinical research focus includes clinical workflow automation, machine learning for auto-segmentation and image quality improvement, data informatics, radiomics for treatment and outcome improvement, etc. Dr. Rong has been serving as Associate Editors for multiple prestigious journals in the field of Medical Physics.

Ioannis Sechopoulos, PhD, FAAPM
Associate Professor
Department of Medical Imaging
Radboud University Medical
Centre
Nijmegen, the Netherlands

Keywords: breast imaging;
computed tomography; radiation
dosimetry

Bio: Ioannis Sechopoulos, PhD received his undergraduate degree in nuclear engineering at Worcester Polytechnic Institute, his M.S. in mechanical engineering at Stanford University, and his PhD in bioengineering at the Georgia Institute of Technology, performing his doctoral research on digital breast tomosynthesis at Emory University. After a faculty position at Emory University, he is now Associate Professor of X-ray Based Tomographic Techniques at the Department of Medical Imaging of the Radboud University Medical Center, and a Research Advisor at the Dutch Expert Centre for Screening (LRCB), both in Nijmegen, the Netherlands. His research interests include the development of advanced x-ray-based techniques, including digital breast tomosynthesis and dedicated breast CT, as well as in body CT. Dr. Sechopoulos has performed work in radiation dosimetry, image acquisition optimization and image reconstruction, as well as conventional and AI-based image processing and analysis algorithm development. He also performs patient trials to assess the clinical performance of these and other novel imaging technologies. Dr. Sechopoulos has also recently focused on optimizing the implementation of AI solutions for improving the interpretation of radiological imaging, especially in breast cancer screening.

Deshan Yang, PhD
Associate Professor
Radiation Oncology
Washington University in St. Louis
St. Louis, MO, United States

Keywords: medical image
processing; machine learning;
informatics

Bio: Deshan Yang, PhD, received his undergraduate degree in electronics engineering in Tsinghua University in Beijing, China, his master's degree in computer science in Illinois Institute of Technologies in Chicago, IL, and his master's and PhD degrees in Biomedical Engineering in University of Wisconsin–Madison. He is an associate professor at the department of radiation oncology, school of medicine, Washington University in St. Louis. His main research areas include medical image processing and analysis (deformable image registration, medical image segmentation, image reconstruction, motion management, and image guidance) for radiation oncology applications, machine learning and deep learning, adaptive radiotherapy, MRIGRT, treatment planning automation, patient safety, quality assurance, cardiac radiosurgery, health information technologies, and clinical applications for radiation oncology and medical physics.

Habib Zaidi, PhD, FAAPM
Professor
Nuclear Medicine and Molecular
Imaging
Geneva University Hospital
Geneva, Switzerland

Keywords: PET and SPECT;
multimodality quantitative
imaging; computational modeling
and radiation dosimetry

Bio: Habib Zaidi, PhD received his PhD and Habilitation (Privat-docent) in medical physics and from Geneva University. He is Chief physicist and head of the PET Instrumentation & Neuroimaging Laboratory at Geneva University Hospital and Professor at Geneva University. He also holds honorary faculty appointments as Professor of Medical Physics at the University of Groningen (Netherlands), and Adjunct Professor of Molecular Imaging at the University of Southern Denmark. He is actively involved in developing imaging solutions for cutting-edge interdisciplinary biomedical research and clinical diagnosis. His research centres on hybrid imaging instrumentation (PET/CT and PET/MRI), deep learning for various imaging applications, modeling medical imaging systems using the Monte Carlo method, development of computational anatomical models and radiation dosimetry, image reconstruction, quantification and kinetic modeling techniques in emission tomography as well as statistical image analysis, and more recently on novel design of dedicated PET scanners.