**Report from the AAPM Liaison to the RSNA Education Council**

**Jim Dobbins**

**3/20/19**

Verbal comments delivered by liaison Jim Dobbins to the RSNA Education Council meeting on March 20, 2019

1. We very much appreciate the great relationship AAPM has with RSNA. This is a very significant relationship to us that has gone on for many years and we are very grateful for the wonderful way in which our two organizations partner and collaborate on a number of important initiatives related to imaging.
2. In terms of our collaborations related to educational matters, there are three items that I would like to mention briefly.
	1. AAPM members provide a number of physics courses during the RSNA meeting. I have listed these in the AAPM Liaison report. These are generally of very high quality (I know because I organized a categorical course for three years a few years back) and provide important scientific content to meeting attendees, both physicists and radiologists.
	2. The RSNA/AAPM online educational modules. These provide online educational content for use by both radiologists and physicists and are again, generally of very high quality. They are particularly useful in the education of radiology residents. These modules have been revised and updated, which is a joint effort of RSNA and AAPM.
	3. There has been wonderful support by RSNA to start new residencies in imaging physics. About 5-6 years ago RSNA provided funding to enable us to start 8 new imaging residencies. These residencies were jointly funded by RSNA and AAPM and have resulted in 8 CAMPEP-accredited residency programs in imaging physics. And just this past year additional funding has been provided jointly by the RSNA and AAPM boards for 12 additional residency slots. More about that in a minute.
3. In terms of educational themes that are important to both AAPM and RSNA, let me give you an idea of my three top priorities for the EC of AAPM. Our top three goals are:
	1. To evaluate the balance of educational program output (number of graduate students and residents) versus the workforce needs. There has anecdotally been the opinion expressed by some that we are producing more graduate students than can be supported by the marketplace. This has some reality in that not all graduates get residencies, but this is a bit misleading in that not all physicists in medicine work in clinical practice. We are trying to emphasize with our students the variety of career options available to them including doing academic research to push the frontiers of medicine, work in industry, and work in government, such as at the FDA. We are partnering with the Professional Council at AAPM on several task groups to collect data on the workforce issue.
	2. The second goal is to understand if additional residencies still need to be created. We currently have 54 accredited graduate programs; 126 total accredited residency programs, with an average of about 1.5 resident slots per year per program in radiation oncology physics and about 1.1 residency slots in imaging physics; and 5 DMP programs. This number of residencies represents a major accomplishment, starting from about 25 residency slots a decade ago to a total of about 170-180 total residency slots now. We have essentially met the need identified 10 years ago for the number of residency slots in radiation oncology physics. However, we have only 27 accredited programs in imaging physics, with roughly 30 imaging residency slots per year. We hear from individuals that they have a hard time finding credentialed and certified diagnostic physicists to hire, so our sense is that there is an undersupply of qualified imaging physicists. This is likely to become worse as a large number of imaging physicists are over the age of 55. Therefore, we feel that it is important to increase the number of imaging physics residencies or else we face a significant shortage in the coming years. In order to address this shortage of imaging physics residencies, the boards of AAPM and RSNA have committed $420,000 each over a 6-year span to produce 12 new imaging residency slots; that is 6 two-year slots funded by AAPM and 6 two-year slots funded by RSNA. The RSNA board committed half the money for this with an evaluation partway through before releasing the remaining funds. We have funded two such residencies already (Medical and Radiation Physics, Inc and Boston Children’s Hospital) for the 2019-20 academic year and the deadline for next year’s awards is May 3, with funds to be disbursed for the next round in 2020. This funding will be given to programs to develop sustainable programs that will live beyond the funding period, and will involve cost sharing with the recipient institutions. We believe this funding from RSNA and AAPM to provide 12 new imaging residency slots is very valuable in producing the kind of expertly trained physicists who can bring real value to radiology departments, and we are very grateful for the partnership of RSNA in this venture. I should also point out that we are looking at ways to increase residency training specifically in nuclear medicine physics, since only 10 accredited physics residency programs have a nuclear medicine option, so we plan to continue to work on that as well.
	3. The third major theme of the AAPM EC is to address changes in the direction of physics in medicine. As medicine evolves, and we expect more molecular therapeutics and diagnostics, the role that physicists may play in developing medicine of the future is likely to be different that it is today. We need to be determining what role physics should play in medicine in the next 30 or 40 years. This is an important initiative of AAPM. There will be educational implications from these new directions in medicine, and we need to know how to plan so that we can produce the scientists needed to advance the field and the clinical physicists to implement that.
4. This brings me to a comment on the balance of science versus professional practice. The field of medical physics has undergone a significant professionalization in the past 20 years. This was largely driven by the requirement of the ABMS that we develop a standardized residency practice to accompany our board certifications by the ABR. As a result, we have developed a number of new residencies and so our new graduates receive a level of clinical training that is much more consistent that is was a few years ago. However, we need to be sure that we do not diminish our role as scientists that will move forward innovations in medicine. I’m afraid that some of the emphasis on professionalization has caused a diminished view of the role we play in science, but there are some of us at the highest levels of AAPM pushing back against that. This will involve active work in identifying the role that physics can play in developing and accelerating quantitative, biomarker-based medicine of the future. We also have developed a new educational and professional approach called MP 3.0 to train new physicists how to offer better value as part of the team in radiology and radiation oncology departments, including providing quantitative and scientific approaches to improving image quality and diagnostic performance.
5. A few other items:
	1. I want to mention is that we are working to enhance our public education effort as well, and we have received grant funding from the America Institute of Physics to support the development of an ask-the-expert online web resource. We are developing that tool as a complement to existing tools that are available in order to address questions that are specific to physics in medicine.
	2. Global affairs – we are working to better integrate our international affairs including both research as well as clinical and research. We have substantial connections regarding education in medical physics in LMICs and I and others have interest in research to address global health care disparities. We are reorganizing how we handle global issues under one umbrella for better coordination.
6. I want to again thank RSNA for the great cooperation we have had in educational and scientific ventures in the past, and we look forward to that continuing. I would be happy to answer any questions.

Summary of discussion points from the RSNA Education Council meeting on March 20, 2019

1. **Exec Director report** (Mark Watson). Covered current membership trends, corporate sponsorship, and new initiatives including global activities.
2. **2018 Education Summit summary and next steps.**
	1. They discussed how to address new paradigms in education. Want to de-emphasize long didactic forms. Want to spend maybe 20% of their effort on non-interpretive skills (soft skills). Incorporated micro-learning. Working on ‘index of essential knowledge.’
	2. There has been a slight decline in conversion of members from learner to full members. There is some generation effect that younger radiologists don’t feel obligated to join RSNA but still think it does good work; they just don’t see how they are responsible to support it. Resident attendance at the meeting is increasing, however, but their membership rate is not.
	3. The purpose of the Summit was to address educational strategy outside of the annual meeting content.
3. **Education Committee update**
	1. Development of knowledge index. Difficult to define what is the core knowledge required – it is disease based, or anatomical based, or findings based, etc. Difficult problem.
	2. Development of “microlearning.” There is a move away from hour-long lectures into small 5 min segments, for example. Discussed various ways to implement this across RSNA educational initiatives.
4. **Subcommittee for overall program planning update** – looked at things such as how to sunset different refresher courses.
5. **AAPM liaison summary**
6. **Annual meeting proposals**
	1. “Ask the expert” at the meeting.
	2. Continuation of perception lab
	3. Committee on Scientific Affairs program request – discussed expanding content to Saturday afternoon. Decided to allow Sat afternoon session.
	4. Input on AAPM/RSNA/ISMRM symposium idea – they felt that it would be important to hear more before they could decide whether to approve this proposal; challenges are that finding such a long session would be difficult and would potentially compete with other sessions, would not allow a separate registration fee, and some reluctance to highlight one organization (ISMRM) since they can’t extend the same highlighting effort to every organization that requests this type of thing. There was lukewarm support but willingness to hear a more formal proposal.
	5. Manuscript review session proposal
7. **Annual meeting educational programming** – there is an issue of how to handle occasions when scheduled speakers are unable to attend at the last minute.
8. **2018 PHI implementation update –** they need a policy on what to do if there are 3D reconstructions, for example, that show the facial aspects of a patient – what to do if they find this in content at the meeting? May need a document waiver to ask for patients or subjects to allow their images to be shown.
9. **Radiology informatics committee** – AI classroom, etc. Nvidia builds GPUs that are used in machine learning – they had an AI classroom at RSNA.
10. ***Radiographics* update** – there are now CME tests associated with many of the articles published. There is also now an index of the articles by AAPM for residency use.
11. ***Radiology* update** – trying to bridge the gap between scientific issues and educational issues. There is about a year delay for publication and they are working now to reduce that down to less than half a year. Also discussed website and social media.
12. **Content codes for review** – no recommended changes
13. **CME update –** approved the learning objectives.
14. **Annual mtg data review** – looked at a lot of data collected by and about attendees.

**Report to RSNA Education Council**

**March 20, 2019**

**James T. Dobbins III, PhD**

**Chair, AAPM Education Council**

**RSNA AAPM Educational 2018 Activities: 2018 RSNA Program**

**AAPM/RSNA Medical Physics Tutorial Session 1**

Organizer: Thaddeus A. Wilson, PhD

PET/CT Introduction and Clinical Applications, Osama R. Mawlawi, PhD

PET/MR Introduction and Clinical Applications, Robert A. Pooley, PhD

Quantitative SPECT, Benjamin M. Tsui, PhD

**AAPM/RSNA Medical Physics Tutorial Session 2**

Organizer: Thaddeus A. Wilson, PhD

The Nuts and Bolts of Dosimetry in Medicine and its Application, Michael G. Stabin, PhD

Theranostics Introduction and Applications, Hossein Jadvar, MD, PhD

**AAPM/RSNA Basic Physics Lecture for the RT**

Organizer: Scott J. Emerson, MS

Basic Dual Energy CT Applications in Radiation Therapy, Jessica Miller, PhD

**Physics Symposium: Highlights of Medical Physics Leadership Academy (MPLA) Summer School**

Organizer: Holly Lincoln, MS

Jennifer Lynn Johnson, PhD

Daniel Pavord, MS

Robert J. Pizzutiello JR, MS

Michael Howard, PhD

**Case of the Day: Physics** (Karen Brown)

**PHYSICS TRACKS**

**TRACK 21**

**RC121 Advances in CT: Technologies, Applications, Operations-Quantitative CT (QIBA)**

Coordinators: Ehsan Samei, PhD and Lifeng Yu, PhD

Volumetry, Michael F. McNitt-Gray, PhD

Material Identification, Daniele Marin, MD

Texture Characterization, Samuel G. Armato III, PhD

Texture Characterization, Maryellen L. Giger, PhD

**RC221 Advances in CT: Technologies, Applications, Operations-Special Purpose CT**

Coordinators: Ehsan Samei, PhD and Lifeng Yu, PhD

Breast CT applications, John M. Boone, PhD

MSK CT applications, Wojciech Zbijewski, PhD

Interventional CT applications, Tobias Struffert

**RC321 Advances in CT: Technologies, Applications, Operations-Spectral CT**

Coordinators: Ehsan Samei, PhD and Lifeng Yu, PhD

Data Acquisition and Rendition Methods, Cynthia H. McCollough, PhD

Applications, Sebastian T. Schindera, MD

Future Prospects - Photon Counting, Taly G. Schmidt, PhD

**RC421 Advances in CT: Technologies, Applications, Operations-Functional CT**

Coordinators: Ehsan Samei, PhD and Lifeng Yu, PhD

Contrast Administration for Cardiovascular Imaging and Beyond, Dominik Fleischmann, MD

Perfusion Techniques and Applications - Stroke and Cancer, Ting-Yim Lee, MSc, PhD

Perfusion Techniques and Applications - Cardiac, Aaron So, PhD

**RC521 Advances in CT: Technologies, Applications, Operations-CT Performance**

Coordinators: Ehsan Samei, PhD and Lifeng Yu, PhD

Image Quality Characterization, Guang-Hong Chen, PhD

Performance Evaluation , Yakun Zhang, PhD

Performance Evaluation , Ehsan Samei, PhD

Performance Optimization, Justin Solomon, PhD

Performance Optimization, Ehsan Samei, PhD

**RC621 Advances in CT: Technologies, Applications, Operations-CT Practice**

Coordinators: Ehsan Samei, PhD and Lifeng Yu, PhD

Practice management, Tim Szczykutowicz, PhD

Practice optimization, Mannudeep K. Kalra, MD

Practice monitoring, Joshua Wilson, PhD

Practice monitoring, Ehsan Samei, PhD

**RC721 Advances in CT: Technologies, Applications, Operations-CT Systems**

Coordinators: Ehsan Samei, Ph.D. and Lifeng Yu, Ph.D.

MDCT systems and acquisitions, Lifeng Yu, PhD

Cone-beam systems and acquisitions , Jeffrey H. Siewerdsen, PhD

Statistical and iterative reconstruction , Frederic Noo, PhD

**TRACK 22**

Director: Kristy Brock, PhD

**RC122 Anatomical MR Imaging for Radiotherapy Planning and Guidance**

State of the Art in Anatomical MR imaging, Aradhana M Venkatesan, MD

Clinical need for Anatomical MR imaging in Radiation Therapy , Cynthia Ménard, MD

Technical Challenges in the Integration of Anatomical MR Imaging into Radiotherapy , Carri Glide-Hurst, PhD

**RC222 Functional MR Imaging for Tumor Targeting in Radiotherapy**

State of the Art in Functional MR imaging for Tumor Targeting , Jason Stafford, PhD

Clinical need for Functional MR imaging for Tumor Targeting in Radiation Therapy, Michelle M. Kim, MD

Technical Challenges in the Integration of Functional MR Imaging for Tumor Targeting into Radiotherapy, Ning Wen, PhD

**RC322 Functional MR Imaging for Normal Tissue Response Assessment in Radiotherapy**

State of the Art in Functional MR imaging for Normal Tissue Assessment, Kiaran P. McGee, PhD

Clinical need for Functional MR imaging for Normal Tissue Assessment in Radiation Therapy , Clifton David Fuller, MD, PhD

Technical Challenges in the Integration of Functional MR Imaging for Normal Tissue Assessment into Radiotherapy, Martha M. Matuszak, PhD

**RC422 Dual Energy CT for Radiotherapy Applications**

State of the Art in Dual Energy CT Technology , Kruse, Jon J., PhD

Clinical Need for Dual Energy CT in Proton Radiotherapy, Jessica Miller, PhD

Technical Challenges in the Integration of Dual Energy CT into Radiotherapy Treatment Planning , Kruse, Jon J., Ph.D.

**RC522 Advanced PET Imaging for Radiotherapy Planning and Response Assessment**

State of the Art in PET Imaging , Paul Kinahan, PhD

Technical Challenges in the Integration of PET imaging into Radiotherapy Treatment Planning, Steven Bowen, PhD

**RC622 Advances in CBCT Acquisition and Reconstruction in Radiotherapy**

State of the Art in Advanced CBCT Acquisition and Reconstruction, Wojciech Zbijewski, PhD

Clinical Need for advanced CBCT imaging in Radiotherapy, Tianyu Zhao, PhD

Technical Challenges in the Integration of CBCT imaging into Radiotherapy , Doug Moseley, PhD

**RC722 Machine Learning for Radiotherapy Applications**

Deep Learning for Image Segmentation, Analysis and Reconstruction, Jonas Teuwen, MSc, PhD

Machine Learning tumor classification, Jayashree Kalpahy-Cramer, PhD

Machine Learning for Automated treatment planning, Laurence Court, PhD

**TRACK 23**

**RC123 ACR Accreditation Updates I**

Coordinator: James M. Kofler, PhD

ACR CT Accreditation Update, Chad Dillion, PhD

ACR MRI Accreditation Update, Donna Reeve, PhD

ACR Nuclear Medicine and PET Accreditation Update, Beth Harkness

ACR Accreditation Updates II, James M. Kofler, PhD

**RC223A ACR Breast X-Ray Imaging Accreditation Update, Eric Berns**

Coordinator: James M. Kofler, PhD

ACR US Accreditation Update, Zhengfeng Lu, Ph.D.

ACR Accreditation: Preparing for a Site Visit, Heidi Edmonson, PhD

**RC323 Evolving Perspectives on Ultrasound Safety**

Coordinator: J. Brian Fowlkes, PhD

Ultrasound Safety: Understanding the Potential Bioeffects, J. Brian Fowlkes, PhD

Ultrasound Safety: What the clinician should know, Jacques S. Abramowicz, MD

Ultrasound safety-What you should know about therapeutic ultrasound, Ken Bader, PhD

**RC423 Making Patients and Staff Safer in Interventional** Procedures

Coordinators: William F. Sensakovic, PhD and Thaddeus A Wilson, Ph.D.

Patient Doses (in lab) and patient dose management, Steve Balter, PhD

Staff Protection- Cataract and potential cancers, Madan Rehani, PhD

Dose tracking and audits- Institution-wide program, Pei-Jan Lin PhD

**RC523 Optimization and Technology in Interventional Radiology**

Coordinators: William F. Sensakovic, PhD and Thaddeus A Wilson, Ph.D.

Dose Optimization in the Interventional Suite, Robert G. Dixon, PhD

Using Ultrasound in Place of CT and Fluoroscopy in the Interventional Suite, Patrick Warren, MD

Advances in Interventional Use of CT, Chuck Mistretta, PhD

**RC623 Advanced Ultrasound Technology and Applications**

Coordinators: William F. Sensakovic, PhD and Thaddeus A Wilson, Ph.D.

Contrast Agents, Peter Burns, PhD

Strain Imaging, Steve McAleavey, PhD

Practical Clinical Advice on the use of Contrast and Strain Imaging, Richard Barr, PhD

**RC723 Diagnostic Imaging: Contrast Makes all the Difference**

Coordinator: Charles E. Willis, PhD

Diagnostic Imaging: Contrast Makes all the Difference: 1, Andrew D. A. Maidment, PhD

Diagnostic Imaging: Contrast Makes all the Difference: 2, J. Anthony Seibert, PhD

Diagnostic Imaging: Contrast Makes all the Difference: 3, Robert L. Dixon, PhD

**RC823 CT radiation dose reduction: techniques and clinical implementation**

Coordinator: Lifeng Yu, PhD

Overview of technology for radiation dose reduction, Joseph W. Stayman, PhD

Dose optimization strategy and clinical implementation in adult CT, Lifeng Yu, PhD

Dose reduction and protocol optimization in pediatric CT, Robert D. MacDougall

**TRACK 25**

**RC125 Medical Physics 3.0: Re-envisioning Medical Physics in the Era of Value-based and Precision Healthcare**

Coordinators: Todd Pawlicki, PhD and Ehsan Samei, PhD

Medical Physics 3.0: Re-envisioning Medical Physics in the Era of Value-based and Precision Healthcare, Todd Pawlicki, PhD

Medical Physics 3.0: Re-envisioning Medical Physics in the Era of Value-based and Precision Healthcare, Ehsan Samei, PhD

**RC225 Mini-course: Image Interpretation Science -- Clinical Foundations of Medical Image Perception: Why Study Radiologists**

Coordinators: Elizabeth Krupinski and Ehsan Samei, PhD

Clinical Relevance of Perceptual Issues in Radiology, Francine L. Jacobson, MD, MPH

A Short History of Image Perception in Radiology, Elizabeth A. Krupinski, PhD

**RC325 Mini-course: Image Interpretation Science -- Radiologic Expertise: Incorporating Perception into Training**

Coordinators: Elizabeth Krupinski and Ehsan Samei, PhD

On the Development of Expertise in Image Interpretation, Elizabeth A. Krupinski, PhD

Using Expert Interpretation Strategies to Teach Trainees, William Auffermann, MD, PhD

Formal Assessment of Practicing Radiologists, Alastair G. Gale, PhD

**RC425 Mini-course: Image Interpretation Science -- Computational Perception**

Coordinators: Elizabeth Krupinski and Ehsan Samei, PhD

AI in Clinical Radiology, Maryellen L. Giger, PhD

Intersection of Imaging Informatics and Perception, Katherine P. Andriole, PhD

Radiologist Interpretation in the Era of AI, Curt Langlotz

**RC525 Mini-course: Image Interpretation Science -- Perception in the Clinic**

Coordinators: Elizabeth Krupinski and Ehsan Samei, PhD

Impact of Fatigue on Radiologists' Performance, Elizabeth A. Krupinski, PhD

Perception of Volumetric Image Data, Geoffrey D. Rubin, MD

Role of Image Quality in Visual and Computational Perception, Justin B. Solomon, PhD

Role of Image Quality in Visual and Computational Perception, Ehsan Samei, PhD

**RC625 Mini-course: Radiation safety for patients and staff -- Emerging advances in patient radiation protection**

Coordinator: Madan M. Rehani, PhD

Emerging concepts of integration of image quality, radiation dose, and artificial intelligence, Ehsan Samei, PhD

Practical aspects of integration of clinical image quality and patient dose optimization, Madan M. Rehani, PhD

**RC725 Mini-course: Radiation safety for patients and staff -- Practice tools and approaches for radiation safety**

Coordinator: Madan M. Rehani, PhD

Decision support systems as effective tools, James A. Brink, MD

Safety in CT of children, Donald P. Frush, MD

Safety in nuclear medical procedures, Andrew J. Einstein, MD, PhD

Safety in interventional fluoroscopic procedures, Donald Miller, PhD

**RSNA AAPM Educational 2019 Activities**

**AAPM/RSNA Medical Physics Tutorial Session 1**

Organizer: Thaddeus A. Wilson, PhD

Nuts and Bolts of Informatics, Tony Seibert, PhD, Thomas Loehfelm, MD, PhD

Standards and System Integration, Nabile Safdar, MD

Digital Radiography 2D image analysis, Adel Mustafa, PhD

**AAPM/RSNA Medical Physics Tutorial Session 2**

Organizer: Thaddeus A. Wilson, PhD

Nuts and Bolts of Machine Learning and Artificial Intelligence, Katherine Andriole, PhD

AI in Healthcare: Advanced Topics, Luciano Prevedello, MD, MPH, Paras Lakhani, MD

**AAPM/RSNA Basic Physics Lecture for the RT**

Organizer: Scott J. Emerson, MS

Radiation Safety Refresher Course, Rebecca Marsh

**Physics Symposium: Best of Summer School: Brachytherapy**

Organizer: Holly Lincoln, MS

*The directors from the 2017 Summer School are securing speakers for a summary of the 2017 Summer School program on Brachytherapy. Speakers and titles should be provided soon.*

**Case of the Day: Physics** (Karen Brown)

**PHYSICS TRACKS**

**TRACK 21**

Director: Lifeng Yu, Ph.D.

 **Innovations in Hybrid Imaging**

 Coordinator: Osama Mawlawi, PhD

 Innovations in PET/CT, Osama Mawlawi, PhD

 Opportunities in PET/MR, Thomas Beyer, PhD

 SPECT/CT quantitation, Cheenu Kappadath, PhD

 **Innovations in Cone-beam CT**

 Coordinator: Jeffrey H. Siewerdsen, PhD

 Innovations in CBCT for Image-Guided Interventions, Jeffrey H. Siewerdsen, PhD

 Innovations in CBCT for Breast Imaging, John M. Boone, PhD

 Innovations in CBCT for Musculoskeletal / Orthopedic Imaging, Wojciech Zbijewski, PhD

 **Innovations in MR**

 Coordinator: Matthew A. Bernstein, PhD

 New Directions in Fast MR, Kawin Setsompop, PhD (Harvard)

 New Directions in CEST, Peter van Zijl, PhD (Johns Hopkins)

 New Directions in MR Scanners, Yunhong Shu, PhD

 **Innovations in Medical Imaging Physics with Deep Learning**

 Coordinators: Guang-Hong Chen, PhD, Lifeng Yu, PhD

 Applications of Deep Learning in CT Image Formation, Guang-Hong Chen, PhD

 Applications of Deep Learning in MRI and PET/MRI Image Formation, Fang Liu

 Applications of Deep Learning in CT Image Quality Evaluation, Lifeng Yu, PhD

 **Practical Aspects of MR**

 Coordinator: Matthew A. Bernstein, PhD

 MR Safety, Robert Watson, MD

 MR Artifacts and How to Solve Them, Xiaohong Joe Zhou

 MR Site Planning and Acceptance Testing, Lisa Lemen, Ph.D.

 **Innovations in dual- and multi-energy CT**

 Coordinator: Lifeng Yu, PhD

 Dual- and multi-energy CT systems, Taly G. Schmidt, PhD

 Dual- and multi-energy data processing, TBD

 Clinical applications of dual- and multi-energy CT, Joel G. Fletcher, MD

 **Innovations in MR and CT perfusion**

 Coordinator: Roland Bammer, PhD (confirmed, but still awaiting communication)

 TBD

 TBD

 TBD

**TRACK 22**

Director: Kristy Brock, Ph.D.

**Anatomical MR Imaging for Radiotherapy Planning and Guidance**

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Machine Learning tumor classification, Jayashree Kalpahy-Cramer, PhD

Machine Learning for Automated treatment planning, Laurence Court, PhD

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 ACR CT Accreditation Update, Jessica Clements, MS

 ACR MRI Accreditation Update, Donna M. Reeve, MS

 ACR Nuclear Medicine and PET Accreditation Update, Beth Harkness, MS

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 Dose Tracking and Audits: Institution-wide Program, Pei-Jan P. Lin, PhD

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 Coordinator: J. Brian Fowlkes, PhD

 Ultrasound Safety: Understanding the Potential Bioeffects, J. Brian Fowlkes, PhD

 Ultrasound Safety: What the Clinician Should Know, Jacques S. Abramowicz, MD

 Ultrasound Safety: What You Should Know About Therapeutic Ultrasound, Kenneth Bader, PhD

 **CT Radiation Dose Reduction: Techniques and Clinical Implementation**

 Coordinator: Lifeng Yu, PhD

 Overview of Technology for Radiation Dose Reduction, Joseph W. Stayman, PhD

 Dose Optimization Strategy and Clinical Implementation in Adult CT, Lifeng Yu, PhD

 Dose Reduction and Protocol Optimization in Pediatric CT, Robert MacDougall, MSc

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 ACR Breast X-Ray Imaging Accreditation Update, Eric A. Berns, PhD

 ACR US Accreditation Update Presenter, Zheng Feng Lu, PhD

 ACR Accreditation: Preparing for a Site Visit, Heidi A. Edmonson, PhD

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 Contrast Agents, Peter N. Burns, PhD

 Elasticity Imaging, Stephen McAleavey, PhD

 Practical Clinical Advice on the Use of Contrast and Strain Imaging, Richard G. Barr, MD, PhD

**TRACK 25**

Director: Michael McNitt-Gray, Ph.D.

 **Quantitative Imaging: Promise and Challenges**

 Coordinator: Michael McNitt-Gray, PhD

 The Perspective of the RSNA Quantitative Imaging Biomarker Alliance (QIBA), Ed Jackson, PhD

 NCI's Quantitative Imaging Network (QIN) Perspective, Bob Nordstrom, PhD

 Clinical Trials Perspective, Larry Schwartz, MD

 **Quantitative Imaging: Image Modality Specific Issues**

 Coordinator: Michael McNitt-Gray, PhD

 Quantitative Imaging for Computed Tomography: Applications and Future Directions, Sam Armato, PhD

 Quantitative Imaging for PET-CT: Applications and Future Directions, Robert Jeraj, PhD

 Quantitative Imaging for DCE-MRI: Applications and Future Directions, Yue Cao, PhD

 **Quantitative Imaging: Modality Independent Issues**

 Coordinator: Michael McNitt-Gray, PhD

 The Role of Physical Phantoms in Quantitative Imaging, Bill Erwin, MS

 Digital Reference Objects, Dan Barboriak, MD

 Radiomic analysis and sources of variation, Binsheng Zhao, PhD

 **Quantitative Imaging: Statistical Analysis/Metrology Issues**

 Coordinator: Michael McNitt-Gray, Ph.D

 The Role of Metrology in Quantitative Imaging, Grace Kim, PhD

 Methods for Technical Performance Assessment: What to Assess and How, Nick Petrick, PhD

 Statistical Methods and Principles for Algorithm Comparison, Gene Pennello, PhD

 **Radiomics : Promise and Challenges**

 Coordinator: Sandy Napel, PhD

 An Overview of Radiomics, Maryellen Giger, PhD

 From Radiomics to Radiogenomics, Hugo Aerts, PhD

 Challenges for Radiomics and Radiogenomics, Karen Drukker, PhD

 **Radiomics: Informatics Tools and Databases**

 Coordinator: Sandy Napel, PhD

 The Role of Challenges and their requirements, Jayashree Kalpathy-Cramer, PhD

 Quantitative image analysis tools: communicating quantitative image analysis results, Adriy Federov, PhD

 Public Databases for Radiomics Research: Current Status and Future Directions, Justin Kirby

 **Radiomics: Oncologic Applications**

 Coordinator: Sandy Napel, PhD

 Breast Cancer with PET-CT, Rich Wahl, MD

 Radiogenomics of Lung Cancer, Neema Jamshidi, MD, PhD

 Brain Cancer: Radiomics, Radiogenomics, and Big Data, Rivka Colin, MD

 **Radiomics: From Image to Radiomics**

 Coordinator: Sandy Napel, PhD

 Image Annotation and Semantic Labeling, Daneil Rubin, MD

 Image Feature Computation and Considerations, Sandy Napel, PhD

 Correlating Image features with Multi-Omics Data, Olivier Gevaert, PhD