AMERICAN ASSOCIATION of PHYSICISTS IN MEDICINE

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AAPM NEWSLETTER

IMPROVING HEALTH THROUGH MEDICAL PHYSICS

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AMERICAN ASSOCIATION of PHYSICISTS IN MEDICINE

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Improving Health Through Medical Physics

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CHAIR OF THE BOARD'S REPORT

Bruce Thomadsen, PhD | Madison, WI

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The Board's Vision for the Future from the Spring Clinical Meeting of the Board

At the AAPM Board meeting on April 3, the Board addressed the future of the AAPM and medical physics, looking nominally 20 years ahead. To do this they addressed three questions, based on the suggestion of Paul B. Brown at the President's Symposium at the last Annual Meeting: What is the future we want, what are the impediments to achieving it, and what steps do we take right now to begin to bring about that future?

To start, on the evening of April 2, the Board broke into five groups to answer these questions. The groups' responses are shown at the end of this document. Photographs of the actual flipcharts are posted on the Board's website. We reconvened the next day, presented the work from the evening before and then made this consolidated list:

Visions of a Good Future

1. Looked for (or the person who is seen as knowledgeable, capable and wise)
2. Medical physicists as disruptors (or the ones who initiate and cause change))
3. Decision makers
4. Leaders in sciences
5. Quality (Very high quality of medical-physics practice)
6. Patient-facing
7. Patient communicators
8. Medical physics and AAPM more multidisciplinary (molecular biology, IT-data-comp sci, business, integrators-SI)
9. Jobs for all medical physicists
10. Know about low-dose radiation response
11. AAPM becomes Global

12. Enfranchising global members of the AAPM

I did reorder the lists to group common themes. For the visions of a good future, several themes stand out. The first is that medical physicists would be leaders and drivers in health care (items 1–4) and do so by accentuating quality, patient interaction (items 5–7) and broadening our profession (item 8). This would lead to a plentiful supply of jobs in medical physics. The future also entails understanding biological effects of low-dose radiation. The final two items reflect expanding the AAPM activities and influence globally.

Impediments

1. Risk-averse
2. Medical physics inertia
3. AAPM's inertia
4. Silos
5. Finance
6. Lack of evidence
7. Dogma
8. Monoculture
9. Lack of publicity
10. Ill-informed regulators
11. Transformation
12. Travel (?)

The impediments to reaching our desired future include medical physicists being risk-averse and having great inertia and that the AAPM also has considerable inertia. This makes it difficult to make progress. Medical physics and the AAPM suffer from silos and divides that also inhibit progress.

Financing our future also presents challenges. Some of the issues for radiotherapy physics include the potential for large reductions in reimbursements and research funding. Imaging physics has suffered from lack of clinical funding for a long time. Fortunately, research funding for imaging physics is obtainable at the present. The AAPM, while financially sound, is faced with rising fixed costs (I understand that does sound contradictory) and a mostly level income stream. We are also faced with a lack of evidence that proves the benefit of medical physics involvement in clinical care. Yes, we all know that is true, but we cannot point to a study that we can hand to administrators. We not only strongly believe that we do is extremely valuable to patients, but we tend to believe strongly most things about our field and that most things we believe are true. That makes it hard to change what we believe and do. And, we spend a lot of time talking with ourselves, which reinforces our dogmas.

Item 9 highlights a major impediment: the population at large do not know who we are, and administrators misunderstand us. We have not gotten our message out effectively.

In general, we, as a field, are not prepared to accept, first that major changes are coming to the field, second that those changes will have major effects on what we do, and finally, that if we do not take appropriate steps now the final results will be determined by others and likely be very different from what we would like.

What We Need to Do Now

1. Expose members to healthcare changes
2. Sponsor more events
3. Training that prepares for the future
4. Interactions with sister societies
5. Joint symposia with other disciplines
6. Joint symposia with international sister societies
7. AAPM seed funding
8. Seed funding to address disparities in health care globally
9. Funding internships
10. Aggressive fundraising
11. Marketing strategy and budget
12. Collaboration with organizations that recommend radiotherapy
13. Target aging populations
14. Entice bright minds
15. Chapters more involved in publicity
16. Make TED-Talk-like videos and podcasts (possibly based on slams)
17. Outreach to administration
18. International jobs
19. Administrative curricula for international
20. Work to have medical physics higher on web searches
21. Design of data system
22. Establish quality metrics
23. Address understanding of low-dose radiation
24. External reviews of strategic plan
25. Non-member physicists on the Board

From where we left off in the impediments, the first action in the list of what we need to do now is to expose the members of the AAPM to the forces at work that will be changing our practices in major ways. This would entail sponsoring more events dealing with our future. Training for medical physics, particularly in graduate programs, will need to change to prepare students to be more flexible to adapt to the future. We need to attract the smartest STEMM students into medical physics.

Relations with our sister societies will be important supporting medical physics in the future, including joint programs crossing disciplines.

Funding the future will be very important, of course. Some funding should be from AAPM seed grants for domestic and global projects and for internships. Providing this funding will require aggressive fundraising initiatives and a marketing strategy, and all of that will require a dedicated budget.

One major problem for medical physics is that we are not well known. We need to work with and educate the organizations that refer patients for radiotherapy as well as the potential patient population, particularly the elderly. The regional chapters could take a lead in spreading the word about medical physics, with help from the Public Information Committee. A collection of TED-like-talk videos could be useful. Hospital administrators are another group with whom we need to work. We also should work to improve our visibility in web searches.

The international arena will become increasingly important in the future. We should address international jobs and develop curricula for radiological administrators that stress the importance of medical physics.

Items 21 through 23 address important fields for medical physics. The last two recommendations deal with the organization of the AAPM.

Summary

The Board retreat gave just enough time to produce the materials summarized here. We still have to go through the Appendix to incorporate any ideas that did not make it into the joint list. From all of this, we need to make an action plan, sending the suggested actions to the appropriate committees to evaluate and possibly develop concrete proposals for those steps considered worth pursuing.

Appendix: The preliminary lists compiled by the five groups.
Each group is identified by a color.
Analysis
Value = (Outcomes + Patient Experience) / Costs

Visions of a Good Future

1. Very similar to today but doing way cooler stuff
2. Radiation will be a sensitizer
3. Radiation oncology and imaging will merge
4. There will not be any machine commissioning
5. AI will help patient care
6. Mathematics and statistics will become part of cancer care through radiomics and outcomes
7. Radiomics and genomics will become part of cancer management
8. No conventional simulators
9. Real-time treatment planning
10. Treating in space
11. Gene therapy

12. Personalized medicine
13. CMS(??)
14. Less government and politicians involved with us
15. AAPM → Global Association of Physicists in Medicine
16. 2035 AAPM must become the leading society to produce leaders to manage data, personnel, money, technology and outcomes in the diagnosis and therapy of disease
17. Physicists become the prime leaders in interpreting complex systems as medicine becomes more molecular and data driven
18. Physicists with more than 30% engagement rate
19. Functional governance
20. Leaders in collecting and using databases in medicine to make machine learning and AI choices (No data left behind)
21. AAPM savvy enough and big enough so that we are able to define ourselves and our own agenda and not be the RSNA's little bro
22. 2035 → AAPM membership > 25k and AAPM defining standard of care in medical physics
23. A report card on every patient treated with radiotherapy (how well the prescription was filled)
24. On treatment weekly physics report to augment physician's OTV
25. Every clinic is a smart clinic leveraging technology such as AI and advanced analytics
26. All data are structures based on common data elements and consensus taxonomy
27. Instant walk-in therapy at CVS, fully QA'd by physicists
28. More MR linacs
29. AAPM premier organization for medical computing
30. AAPM will be the champion of spreading the good news of hormesis
31. More visibility in health care – Med Phys 3.0
32. Contribute beyond physical dosimetry (informatics, biophysics, biology, outcomes, molecular imaging, etc.)
33. Eliminate all QA measurements
34. National Repository of all treatment plans along with all the images, contours and doses delivered.
35. Image → plan → treat in 1 hour at 300 Gy/s is the norm
36. All treatments 1 to 5 fractions

Impediments

1. We are risk averse
2. Greater membership among other societies
3. Professional competition for leadership, risk and credit
4. Limitation on funding
5. Time allotment (to 24 hours per day)
6. We are currently well paid and change is a threat
7. Status of physicists among colleagues

8. The number of radiation oncologists and how they interact with physicists
9. Insurance companies are *#IL
10. Physicists play the second fiddle in the healthcare hierarchy
11. Lack of leadership skills
12. PMI/PII challenges in creating big data
13. Lack of resources
14. Perception in C-suite that medical physicists are an expense, not a revenue source
15. Narrow focus as a profession on what we do now
16. Regulatory burden
17. Greed for money
18. Divide between imaging and therapy
19. Information in many places
20. Relation of treatment plans to outcomes
21. Public doesn't know what a medical physicist does

What We Need to Do Now

1. Integrate disciplines and sciences (Computations science, biology, nanotechnology, data science
2. Become an international leader (in the above)
3. Think outside the box
4. Adoptions of best practices
5. Fill the training gaps
6. Training in soft skills such as dealing with administrators
7. Leverage physicists' perspective to improve value throughout continuum of care
8. Rejection of LNT
9. Focus on other aspects of imaging
10. Work to modernize regulations
11. New approaches to therapy
12. Advocate for clinical trials that include radiotherapy
13. Highlight and market precision radiotherapy and the science behind it
14. Changes to payment models
15. Management and oversight of technical application to humans (BME)
16. Data management (Organize, Analyze, Distribute)
17. Do something different
18. All QA programmed and sent automatically at a minimum
19. Automate (Image review, metrics, segmentations)
20. Develop advanced phantoms with intrinsic dosimeters, robotic arms, sophisticated feed-back loops for imaging calibration and output measurements
21. Use FMEA to test what matters
22. Do more than level 1 equipment performance evaluations

23. Advanced on-line analysis with advanced analytics
24. Physicists to become technical administrators (Med Phys 3.0)
25. Become active in population health, such as opportunistic screening and healthy aging
26. International Outreach (such international services as Automated distance support, chart checks, dosimetry, treatment planning) supported through interoperability

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EXECUTIVE DIRECTOR'S REPORT

Angela R. Keyser | Alexandria, VA

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AAPM supports MedTech10

As a new initiative in 2019, AAPM provided travel awards through Science Council for two early-career investigators to participate in the 10th Annual Medical Imaging Technology Showcase in Washington, D.C., also called MedTech. The Academy of Radiology and Biomedical Imaging Research (http://www.acadrad.org/) hosts the annual event to educate members of Congress and their staff about the impact of imaging technology. Early career investigators (http://www.acadrad.org/wp-content/uploads/2019/04/2019_CECIs-One-pager-w-Headshots.pdf), including AAPM travel award recipients **Emily Marshall** and **Brian Taylor**, met with NIH Institute and Center directors and staff, visited with Capitol Hill representatives and staff and presented their research. I'm pleased to report that they represented AAPM well!

AAPM was also invited to the Academy Leadership Research Roundtable held during MedTech10. The stated goal of the roundtable was "to create a better understanding of mutual worlds and how academia, industry and government agencies can work more effectively together, beyond commercial transactions, to leverage one another and be more impactful. Attendees included academia, society and industry leadership and representatives from government agencies. Medical physics was well represented by **Erin Angel**, **John Hazle**, **Mahadevappa Mahesh**, along with me and **Shaya Knazik** from HQ.

The general consensus of those who participated is that this is a very worthwhile event and AAPM should continue to support and engage with the Academy on future MedTech events.

My newsletter article is typically focused on relaying important AAPM information to members. I'm going to stray a bit from the norm in this issue as I would like to share a few personal reflections on MedTech10. I've attended many events during my 25+ years of service on your AAPM HQ team, but for some reason, I left this event feeling especially pleased to be a part of the AAPM community. I am very

proud of AAPM as an organization and the impact of the efforts of 1,900+ volunteers in support of the profession. And, while I feel so fortunate to lead your HQ team, it can be easy to lose sight of the bigger picture of "why I do what I do."

Shortly after I arrived at the opening reception, I met Rachelle (Berger) Crescenzi from Vanderbilt whose first words to me were something like "I want to tell you my great AAPM story." (Music to my ears!) Rachelle went on to share how her career path was significantly impacted through her 2008 experience as an AAPM Summer Undergraduate Fellow (SUFP) (http://gaf.aapm.org/), working with **Andrew Maidment** at the University of Pennsylvania. Then, travel award winner Brian Taylor joined the conversation and I learned that he too participated in the 2005 SUFP, working with **Sanjiv Samant** at St. Jude Hospital. As I listened to them, their energy was contagious, and I was struck by the tangible evidence that Education Council's SUFP and DREAM programs are making a difference. Powerful!

The Medical Imaging Technology Showcase was held the next evening and the 36 early career investigators presented their research. One of the highlights for me was the patient keynote speakers (http://www.acadrad.org/2019-patient-keynote-speakers-2/) because as one speaker stated so well, "*stories stick*." Kristine Zakarison (http://www.acadrad.org/wp-content/uploads/2019/04/Kristine-Zakarison-Remarks.docx), who suffers from epilepsy and Stacey Matvya (http://www.acadrad.org/wp-content/uploads/2019/04/Stacey-Matvya-Remarks.pdf), whose daughter Charlee was diagnosed with stage 5 cancer at age 4, shared their compelling stories. *Their stories stuck*. While I sincerely hope that our members are often uplifted by stories just like this, your HQ team doesn't often get the opportunity to engage in this way. This did my heart good. The Academy compiled two videos, one of the testimonials and one of the MedTech highlights. Need a boost? I encourage you to take a few moments to soak it in:

The Academy's Patient Testimonial "How does imaging impact your life? (http://www.acadrad.org/2019-medtech-highlights/)" Highlights of MedTech10 (https://youtu.be/Ea0XUrMClpw)
It was great to come back to HQ and share with members of our team the testimonials from the SUFP and how "a whole lot of imaging" saved Kristine. Yes, team, processing those SUFP applications, dealing with the applicant questions, the volunteers and reviews, the challenges...our efforts matter and are making a difference. Think we all had a bit more pep to our step after our team meeting that day!

Mahadevappa Mahesh, John Hazle, Brian Taylor, Shayna Knazik, Emily Marshall, Angela Keyser and Christiane Burton #TalkRADtome at the MedTech10 Reception.

#AAPM2019 – ANNUAL MEETING NEWS

Building Bridges, Cultivating Safety, Growing Value (https://w3.aapm.org/meetings/2019AM/)

Come and build lasting partnerships with colleagues and vendors, learn how to cultivate a safety culture, and increase your value to those you work with and to the patients you serve.

If your schedule allows, please attend AAPM committee meetings that may be of interest to you. The schedule is online (https://w3.aapm.org/meetings/2019AM/specialEvents/committeeSchedule.php). Remember, according to the AAPM Rules: 3.3.2 – *Any AAPM member may attend any meeting of the Board, any council, any committee except the Executive Committee, any subcommittee, any working group or any task group except for executive sessions*.

Tuesday, July 16 9:30 AM – 11:00 AM is dedicated time to **Visit the Vendors**. An online Buyers Guide (https://w3.aapm.org/meetings/2019AM/attendeeInfo/buyersGuideDetails.php) is available, with information about the exhibiting companies. Exhibit hours are:

— Sunday, July 14 – 12:30 – 5:00 PM
— Monday, July 15 – 9:00 AM – 5:00 PM
— Tuesday, July 16 – 9:00 AM – 5:00 PM
— Wednesday, July 17 – 9:00 AM – 2:00 PM

New this year — **Entrepreneur Start-Up Showcase**

The AAPM annual meeting is offering an exhibiting opportunity to new entrepreneur start-up businesses. As medical technology spurs new innovations, an increasing number of start-up companies in the radiation oncology and radiology imaging sector are seeking to present their products or services to potential investors. We are very pleased with the response and hope that you will visit these companies:

1. ProtonVDA, Inc.
2. Medscint, Inc.
3. QalibreMD
4. Multi Leaf Consulting
5. Macromedics, LLC
6. Pymedix, Inc.

The **2019 Night Out** on Tuesday, July 15 will once again not be a dinner event. You are encouraged to meet your colleagues at the venue for limited light snacks and then make your way to one of the many restaurants in the area for dinner. Or, dine first and make your way to the event for a bite of something sweet at the end of the evening!

Some of you may remember the fun Night Outs at La Villita Historic Arts Village during the 1988 and 1998 meetings. We will be back there for the event this year as well. La Villita, settled nearly 300 years ago as one of the city's first neighborhoods, now serves as an artists' market with tree-lined walkways, shops and galleries.

The outdoor Arneson River Theater will feature live music by the Juke Box Heroes Quartet (https://vimeo.com/234437373). Known for their acoustic guitar, acoustic drum (Djembe) and three-part harmonies, the band specializes in the greatest Motown hits and classic rock of the 70's.

Inside Venue Villita, The Pictures Band (https://vimeo.com/249433256) will cover a variety of songs starting from the 50's to the 90's, plus the Top 40, Disco songs, funk and country. Look for outdoor games, including giant Jenga and ladder golf just outside on Venue Villita's patio.

Each adult Night Out ticket will include 1 drink ticket, good for beer or a glass of wine. No ticket is required for soft drinks. Please make your plans in advance and dine at a restaurant of your choice and favorite cuisine! We encourage you to either make reservations on your own, or with help from the restaurant desk at the Convention Center.

New this year! A "Meet the Editors Reception" will be held on Wednesday, July 17 from 3:45 PM - 4:30 PM in Room 220. Then, make your way to Outstanding Science Published in 2018: Medical Physics and JACMP (https://w3.aapm.org/meetings/2019AM/programInfo/programSessions.php?t=all&sid=8260), in Room 225BCD. Sweet and savory refreshments will be served.

Don't miss your opportunity to be heard by AAPM leadership. The 2019 **Annual Business and Town Hall Meeting** will be held on Wednesday, July 17 6:15 PM – 7:30 PM in the - Stars at Night Ballroom 2-3 of the Henry B. González Convention Center. AAPM's President **Cynthia McCollough** and Treasurer **Mahadevappa Mahesh** will report on the status of the organization. What should AAPM be working on? How can the organization better serve you? Members of the AAPM Board of Directors want to hear directly from the membership.

AAPM HQ Team at your Service

Who does what on the AAPM HQ Team? See a list with contact information and brief descriptions of responsibilities online (https://www.aapm.org/org/contactinfo.asp). An Organization Chart (https://www.aapm.org/intranet/board/documents/orgchart.pdf) is also provided.

Staff Recognition

I firmly believe that part of the success of AAPM HQ operations is our ability to attract and retain an excellent team of high performing association management professionals. The following AAPM team members celebrated an AAPM anniversary in the first half of 2019. I want to publicly thank them and acknowledge their efforts.

Nancy Vazquez	23 years of service
Zailu Gao	18 years of service
Jennifer Hudson	18 years of service
Karen MacFarland	16 years of service
Lisa Schober	14 years of service
Laurie Allen	12 years of service
Viv Dennis	9 years of service
Melissa Liverpool	8 years of service
Rachel Smiroldo	8 years of service

Shayna Knazik	5 years of service
Richard Martin	5 years of service
Robert McKoy	5 years of service
Jaime Hoza	3 years of service
Jill Moton	2 years of service
Aaron Rudd	2 years of service
Ashely Zhu	2 years of service

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SCIENCE COUNCIL'S REPORT 1

Issam El Naqa | Ann Arbor, MI, Lei Xing | Stanford, CA and Ceferino Obcemea | Bethesda, MD

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NCI Workshop on Artificial Intelligence in Radiation Oncology: New opportunities for medical physicists.

The tremendous possibilities that artificial intelligence (AI) can bring to medicine have recently attracted much attention both in the popular press and the scientific literature. To explore the emerging opportunities and meet the challenges facing the community of medical physics and radiation oncology, the *NCI Workshop on AI in Radiation Oncology* was convened on April 4 to 5, 2019 at the NCI Campus in Bethesda, MD. Over 80 attendees from diverse fields, including computer science, biomedical data engineering, medical physics, radiology, and radiation oncology, actively participated in the workshop. The workshop began with comprehensive overviews of AI and some significant issues of AI in medicine, namely causality, interpretability, scalability, and AI infrastructure. Applications of AI in imaging, medical physics and radiation oncology were also highlighted and vigorously debated at the workshop. The multidisciplinary and panoramic view of the workshop provided valuable resource to all attendees and allow them to gain new perspectives and possibly device strategies that may fuel future clinical innovations. The experience and insights of many thought-leaders from various fields of AI and Machine Learning converged in this workshop, which would surely stimulate novel applications to radiation oncology. A more detailed summary of the workshop and selected manuscripts will be published soon in the International Journal of Radiation Oncology, Biology, Physics.


NCI Workshop on Artificial Intelligence in Radiation Oncology
April 4,5, 2019
NCI campus, Bethesda MD

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SCIENCE COUNCIL'S REPORT 2

John D. Hazle, PhD | Houston, TX and Mahadevappa Mahesh, PhD | Baltimore, MD

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Report on Medical Imaging Technology Showcase coordinated by the Academy of Radiology and Biomedical Imaging Research (Academy)

The Academy of Radiology and Biomedical Imaging Research (the Academy) coordinated its Medical Imaging Technology Showcase (Med Tech Day) on Capitol Hill April 28–30, 2019. This event has 2 main components, a day for the Council of Early Career Investigators in Imaging (CECI^2) to meet with leaders and members of the National Institutes of Health and to attend a networking reception hosted by the Coalition for Imaging and Bioengineering Research (CIBR), followed by a day on Capitol Hill advocating for medical imaging research with elected officials and their staff with members of the Academy leadership. The CECI^2 members included 32 early-stage investigators (those deemed to have high research potential, but who not obtained their own R01 type grant yet) nominated by member institutions of the Academy and representing several member organizations, including the AAPM. The AAPM Science Council funded two early-stage investigators, **Drs. Emily Marshall** from the University of Chicago and **Brian Taylor** from Virginia Commonwealth University. A third AAPM member, **Dr. Christiane Sarah Burton** from Beth Israel Deaconess Medical Center, was nominated by her chair and selected by the Academy to participate in the events. **Drs. John D. Hazle** and **Mahadevappa Mahesh**, along with **Angela Keyser** and **Shayna Knazik**, represented AAPM at the events.

The Day on the Hill was exciting for all of us (John, Mahesh, Angela and Shayna), as well as our CECI^2 members! The teams were developed based on their home institution district. The day was capped off with a showcase for legislators and their staff. Congresswoman Anna Eshoo (D-CA) and Senator Richard Burr (R-NC) attended the event and spoke about the impact of and need for increased funding for biomedical research. The CECI^2 representatives all had iPad/laptop presentations of their work at high-tops that the approximately 200 staffers in attendance seemed to really enjoy.

It was an outstanding event and learning experience for all. We hope that this advocacy promotes increased visibility for and funding of biomedical imaging research! As senior members of AAPM, Mahesh and I feel proud of AAPM supporting our young members. In fact, we should continue and even increase our support for such young investigators who are the future of our profession. Now, the stories of the AAPM young investigators who participated in these events.

Emily Marshall:
This fall I became interested in the intersection of science and public policy. It was in this mindset that I learned of the AAPM's pilot program seeking to send two early career investigators as participants in the Academy for Radiology and Biomedical Imaging Research. The Academy offers a two-pronged approach towards increasing scientist engagement at the national policy level.

Our first day was spent at the NIH focusing on the first prong of the Academy's approach. The morning was reserved for program director meetings within an institute of our choosing and the afternoon was spent learning more about grant writing at the NIBIB. During my one-on-one meeting with NCI's **Dr. Robert Nordstrom**, we discussed mechanisms for young investigators to begin engagement with the NIH process. He recommended a variety of tasks to increase exposure, such as grant reviewing and connecting with program officers. In the afternoon we met with a team at NIBIB. We discussed what it means to be a young investigator, and how this classification can help our grant writing endeavors. The second prong focuses on bringing scientists and policymakers together. We spent the next day discussing the importance of funding the NIH and the NIBIB with members of Congress and their staff. We ended the day with the 10th annual MedTech event, where we presented our current research studies to policymakers in the Senate building.

This experience was positive and helpful. I spent three days surrounded by some of the countries most motivated minds in radiology research. This time spent together, learning about one another's research, offers a unique space to connect with like-minded individuals. I now have a strong network of people I may reach out to, to connect my colleagues and fellow AAPM members with. I strongly support the AAPM continuing this commitment and relationship with the Academy. So, thank you to our AAPM members for sponsoring an important and informative trip to our nation's capital.

Brian Taylor:
I'm thankful to AAPM for sponsoring us to join the Council of Early Career Investigators in Imaging (CECI) as part of the Academy for Radiology and Biomedical Imaging Research. We joined a group of over 30 CECIs from all over the country to visit the National Institutes of Health and advocate for NIH funding during the day at Capitol Hill. At NIH, I was able to meet with leaders in imaging including the Chief of Radiology at the NIH clinical center, Dr. Brad Wood. I was also able to meet with program officers and officials to learn more on the NIH grant application process and funding opportunities. We also had the opportunity to spend a day at Capitol Hill with leaders in the imaging field. Together, we talked with congressional members and their staff on the importance of funding NIH to advance medical research discoveries at many of our institutions and how imaging greatly contributes to that mission. This cumulated to an open event where we were able to present our own research in a showcase with

congressional members and staff. Overall, this was a great experience to learn more on NIH opportunities and to learn how to communicate your research to a diverse group who makes important decisions that can impact research productivity for years to come.

Christiane Sarah Burton:
I moved to the United States 2 years and 7 months ago from Canada and I have found opportunity around every corner. Being part of Council for Early Career in Imaging (CECI) was one of my favorite opportunities. I'm grateful to have been selected through the Academy for Radiology & Biomedical Imaging Research, and I would like to thank **Dr. Jonathan B. Kruskal**, the chairman of Radiology at Beth Israel Deaconess Medical Center, for my nomination. It was nice to be part of a group of people with a common goal of having their own research grant and who spoke so passionately about their research. It seemed like most people were keen on getting an R01 grant or some type of NIH funding in the future. I found the 2 full days in Washington DC was very well organized. There were three main highlights: my time at the National Institute of Biomedical Imaging and Bioengineering (NIBIB), my time on Capitol Hill and listening to stories from people who have ultimately benefited from imaging in medicine.

I think my time spent at the NIBIB was productive and I felt that the organizers assigned me with the correct person which I appreciated! I met with the director there who was keen to learn specifically what my research was about and offered to help write an R01 grant. I walked away feeling motivated to get started writing my specific aims section and I have kept in touch with him.

My day on Capitol Hill was a lot fun. I got to meet Representative Joseph Kennedy III in person, and I met with legislators who work for other representatives and senators within the state of Massachusetts, where I currently reside. We actually have a follow up meeting with Representative Ayanna Pressley herself who wants to come tour the major hospitals in the greater Boston area.

Lastly, I felt the stories I heard from patients who have ultimately benefited from imaging in medicine were impactful. One story involved a small child who had suffered from stage 5 cancer in her right kidney and the physicians were able to get a 3D print of her right kidney to better navigate the treatment. The child was there physically holding up said 3D print of her kidney. The physicians weren't able to save her right kidney, however she still has her left kidney and she ultimately survived the treatment. I have used 3D in the past and it is useful for creating realistic anthropomorphic phantoms so that realistic studies can be done on phantoms before attempting it on patients. At the University of Wisconsin-Madison, I used 3D printing to construct a 3D model of a pulmonary artery and fill it with iodine so that we could simulate catheter tracking using dual-energy imaging. The good news is that with the current US-China trade deal, the added tariffs are boosting the 3D printing industry in the United States because Americans can use 3D printing as an alternative to manufacturing products in China. We have really come a long way in medical imaging and I'm proud to be part of this movement.

I find it useful and necessary to keep up with politics, science and the human element of healthcare, and the Academy delivered all of that on the 2 days I was there. And I am grateful to have been part of such a wonderful and devoted group of people!


The ACADEMY for Radiology & Biomedical Imaging Research
#TalkRADtome

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LEGISLATIVE & REGULATORY AFFAIR'S REPORT

Richard Martin, JD | Alexandria, VA

AAPM Newsletter — Volume 44 No. 4 — July | August 2019

AAPM CRCPD Subcommittee Participates in 51st CRCPD Conference

The Conference of Radiation Control Program Directors (CRCPD) convened its 51st National Conference on Radiation Control in Anchorage at the beginning of May. AAPM members were there in force to engage regulators and other experts on the current issues impacting radiation control as well as to enjoy all things Alaskan. What an amazing experience!

Leading up to the meeting. the AAPM's CRCPD Subcommittee presented the AAPM educational program for state agency staff addressing "Didactics-Checklist Evaluations" and "Medical Physics Practice Guidelines and Their Impact on Regulatory Affairs."

The educational program included field trips to Alaska Radiology Associates and Alaska Cancer Treatment Center, which focused on "Checklists in Action." Special thanks to **Ward Hinger, CAO**, Alaska Radiology Associates, and **Larry Daugherty, M.D.**, Medical Director and Iditarod Racer, and **Austin Hadley, Ph.D.**, Chief Physicist, Alaska Cancer Treatment Center.

The Honorable **Kristine Svinicki**, Chairman of the U.S. Nuclear Regulatory Commission (NRC), gave the keynote address looking at current regulatory issues and giving recognition to the strong working relationships within the regulatory community. The following day, our own president, **Cynthia McCollough**, Ph.D., gave the opening presentation of the Healing Arts Session entitled, "When the "way we've always done it" isn't the way we will be doing it." In her well-received presentation, Cynthia talked about many of the concerns we all have within the regulatory community.

This important conference examined many of the current and cutting-edge issues that GRAC is working on. For example, **Lisa Dimmick**, Medical Team Leader NRC, talked about the NRC's training and experience (T&E) evaluations and the open comment period on T & E evaluations for radio-pharmaceutical administrations.

If you have any questions or comments, please contact **Richard J. Martin** (mailto:richard@aapm.org), JD, Government Relations Program Manager.

CRCPD Subcommittee Liaisons and Staff. Left to right: Kyle Jones, Jessica Clements, Melissa Martin, Mary Fox, Kate Hintenlang, Richard Martin, Bette Blankenship

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ABR NEWS

Matthew B. Podgorsak, PhD | Buffalo, NY

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New Blueprint and Content Guide for the 2020 Therapy Medical Physics Part 3 Exam

A recent newsletter article described the complex process followed by a medical physics question before it is deemed eligible to be included in an ABR exam (The "Lifecycle of ABR Medical Physics Exam Items (https://w3.aapm.org/newsletter/posts/2018/sept-oct/4305_5.php)"). ABR exam questions are selected using a "blueprint" that defines the coverage of subject matter being evaluated. Using the same blueprint to assemble an exam from year-to-year enables consistency of subject matter in different years.

Blueprints for the discipline-specific exams (Parts 2 and 3) are based on the overall scope of clinical practice specific to each medical physics discipline: diagnostic medical physics (DMP), nuclear medical physics (NMP), and therapeutic medical physics (TMP), and are aligned with the CAMPEP core-curricula for graduate programs and residency programs. Blueprints for the Part 2 (written) and Part 3 (oral) exams for an individual discipline are very similar, although not identical.

All Part 2 and Part 3 blueprints are initially developed by committees that include a diverse group of members with expertise in each discipline. Once a blueprint is approved by the ABR Medical Physics Trustees, an exam content guide for each exam based on the associated blueprint is posted to the ABR website. These content guides form a resource that a candidate can use to establish the subject material included in each discipline-specific exam.

Periodic review of an existing blueprint is necessary to ensure that ABR exams evaluate a candidate's knowledge of contemporary clinical practice. ABR policy requires a blueprint review every five years. Recently, the blueprint for the TMP Part 3 exam underwent a major review and revision. This process was initiated in 2016 by **Geoff Ibbott** and **Mike Herman**, and was completed earlier this year by the current Part 3 exam committee members (**Frank Ascoli**, **John Bayouth**, **Katja Langen**, **Moyed Miften**, **Matthew Podgorsak**, and **Richard Popple**). The resulting blueprint includes five new categories with multiple new subcategories.

In developing the blueprint, future categorization of any currently developing clinical technology and treatment techniques was taken into consideration, with the hope that the blueprint will remain current for at least five years. New questions representing any technologies and techniques that become routine clinical practice in the next few years will thus have a place in the blueprint.

The content guide based on the new blueprint has been posted to the ABR website (https://www.theabr.org/medical-physics/initial-certification/part-3-exam/content-guide) (see the category description for TMP). The categories within the content guide based on the new blueprint are:

Category 1: Reference and relative dosimetry
Category 2: Treatment machines
Category 3: External beam treatment planning, uncertainty management, and treatment planning system QA
Category 4: Brachytherapy, radiation protection, radiation biology
Category 5: Patient safety, data transfer and integrity, professionalism and ethics

The new Part 3 blueprint and associated content guide will be implemented starting with the 2020 oral exam. Every candidate will be examined with questions from the new categories, including but not limited to questions specific to:

- traditional treatment units (e.g., linac, CT-simulator, etc.);
- proton therapy;
- non-traditional treatment units (e.g., MR-guided linac, robotic linac, SRS-dedicated unit, etc.);
- management of treatment uncertainties;
- quality control and error prevention;
- incident learning systems and medical event reporting;
- computing and IT; and
- professionalism and ethics.

It is important to note that a candidate who has conditioned will be re-examined with questions in the same category that he/she conditioned previously.

Please contact (mailto:information@theabr.org) the ABR with questions regarding the new TMP Part 3 blueprint or content guide.

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ACR ACCREDITATION: FREQUENTLY ASKED QUESTIONS FOR MEDICAL PHYSICISTS

Dustin A. Gress, MS | Reston, VA

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In each issue of this newsletter, I'll present frequently asked questions (FAQs) or other information of particular importance for medical physicists. You may also check out the ACR's accreditation web site portal (http://www.acraccreditation.org/) for more FAQs, accreditation application information, and QC forms.

Last November, the ACR released its 2018 Digital Mammography QC Manual with 2D and Digital Breast Tomosynthesis. Below is a single but important FAQ that corrects a typographical error in the manual. As always, our current and FDA-approved FAQs can be found on the ACR Digital Mammography QC Manual Resources (https://www.acraccreditation.org/resources/digital-mammography-qc-manual-resources) web page, where you can also find updated Microsoft Excel forms for technologist and medical physicist QC (free to download), and recordings and slides from webinars pertaining to the manual. Please contact us (mailto:mamm-accred@acr.org), if you have questions.

Q. While performing SNR during my survey I noticed a discrepancy in the manual. On page 170, the Performance Criteria and Corrective Actions section states that "The SNR must be ≥40.0 for the 4.0 cm phantom in the DBT mode." However, the Precautions and Caveats section also states, "It is recognized that the SNR is not strictly defined for DBT images." Which is correct?
A. The ACR recognizes that this is a typographical error in the manual, and it will be corrected in a revision. The SNR Performance Criteria and Corrective Actions should state, "The SNR must be ≥40.0 for the 4.0 cm phantom in the 2D Contact mode." For DBT, the SNR is not strictly defined.

On Friday, May 31, Michael Simanowith, MD, ACR's director of registries, sent an email to selected Dose Index Registry (DIR) participants. I share it with my AAPM colleagues below because I believe medical physicists can provide value to their imaging clinics by assisting with the upcoming change in how the DIR will be receiving and processing dose index data. Our FAQs on the NEMA XR-29 Standard can be found here (https://www.acr.org/-/media/ACR/Files/Radiology-Safety/NEMA-XR29-FAQ.pdf?la=en).

Dear DIR Participant,

Thank you for your ongoing participation in the American College of Radiology's (ACR) Dose Index Registry (DIR). Your participation in the registry not only affects quality improvement at your own facility, but also establishes benchmarks that other facilities use for performance comparison and ultimately to reduce unnecessary patient radiation exposure across all participant sites.

When we launched the DIR in 2011 few CT scanners were capable of generating Radiation Dose Structured Reports (RDSRs). Therefore, we accepted exams directly from a RDSR as well as from secondary capture images (without RDSR). In the years since the registry launch, and with the implementation of the XR-29 standard on CT scanners, most scanners submitting DIR data are now capable of producing RDSRs. In addition, the secondary capture method has proven to be less effective than RDSR in terms of data quality, information processing time, and resource support requirements. In response to the industry technology changes, and to the overall limitations of secondary capture, we would like to transition DIR support to RDSR submission only. Consequently, we are requesting that all sites shift submission of all of their registry data to the RDSR format as soon as possible.

Your site is one of several identified as sending secondary capture images without RDSRs in the past three months. As such, we ask that you switch over to RDSR transmission by **September 3, 2019**. Though we would prefer to receive the RDSR message exclusively, we can accept an accompanying secondary capture (it will not be processed) in the event your system mandates sending both.

The continued success of the Dose Index Registry and the resulting improvement in radiological quality is dependent on active participation by sites such as yours. We realize that making this change may result in modifications to your processes/systems with potential effort required by you. ACR thanks you in advance for your willingness to consider this change. If you have barriers to sending the RDSR we will be more than happy to work with you in an attempt to overcome these issues. Please contact the National Radiology Data Registry (mailto:nrdrsupport@acr.org) support team for assistance.

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HEALTH POLICY & ECONOMIC ISSUES

Jonas Fontenot, PhD | Baton Rouge, LA

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Bundled Payment for Radiation Oncology in 2020

The current model of reimbursement in radiation oncology, as with most other specialties, is such that an episode of care generates many billing (CPT) codes that are generated incrementally throughout the treatment course as each procedure or service is provided. The Centers for Medicare and Medicaid Services (CMS) has long been concerned that this "fee-for-service" model incentivizes providers to generate more care instead of focusing on providing quality care. The problem is particularly acute in radiation oncology because of the protracted nature and volume of services required for the typical radiation oncology patient. CMS therefore has interest in reducing financial incentives associated with the current fee-for-service model.

An alternative payment model (APM) is defined by CMS as a payment approach that incentivizes providers and hospitals to provide high-quality and cost-efficient care. CMS has invested considerable resources in developing and testing APMs, in part through the establishment of the Center for Medicare and Medicaid Innovation (CMMI), an entity established by legislative statute within CMS that exists for the sole purpose of creating and testing innovative payment models to replace the traditional fee-for-service model. CMS has in fact been testing one such APM in medical oncology called the Oncology Care Model (OCM), where providers are paid prospectively for each episode of care they provide to a beneficiary and receive incentive payments by meeting specified cost and quality metrics. Importantly, OCM participation has been voluntary and limited. Analysis of cost and outcomes for patients receiving care under this model is still ongoing.

As CMS has asserted APMs as a priority for future agency rulemaking, a number of other specialties have proposed creating and implementing their own APMs. The risk to radiation oncology is that, as a downstream referral service, associated services may be pulled into the APM of a different specialty (e.g., surgery, medical oncology) with reimbursement terms that undervalued or are otherwise unfavorable to radiation oncology. Recognizing this risk, ASTRO submitted their own proposal for a radiation oncology APM in 2017.

In anticipating an upcoming radiation oncology APM, ASTRO had been working with CMMI to continue dialogue on the framework of such a model through 2018 when, somewhat unexpectedly, US Health and Human Services Secretary Alex Azar announced during a speech in October 2018 that CMS was developing an episode-based model for radiation oncology and that such a model may include mandatory participation. No other specific information regarding the radiation oncology APM referenced by Secretary Azar had been heretofore provided by CMS, nor has any been officially released since then.

There was some hope following Secretary Azar's speech that the announcement would elevate the profile of collaborative discussion between CMMI and stakeholders on the details of the radiation oncology APM, including revisiting the position that participation in a new APM should be mandatory. Unfortunately, CMS inadvertently revealed an internal transmittal in February 2019 to its regional Medicare Administrative Contractors that a radiation oncology APM was moving forward and suggested that participation for selected providers would be mandatory. The transmittal also outlined a few details of the radiation oncology APM that CMS is considering:

- CMS is proposing bundled payments for all included radiation therapy services, instead of using Medicare fee-for-service payments, provided in certain randomly selected geographic areas, the transmittal states. The agency would like to include 17 types of cancer in the model.
- The agency envisions a 90-day episode for the bundle. The first half of the payment would come when providers bill an initial code triggering the model, and the second half would come when a modified version of the code is billed to trigger the end of the episode. CMS says payment for the technical component would be made through either the physician fee schedule or the hospital outpatient payment system, as both freestanding radiation therapy centers and hospital outpatient departments would participate.
- Following a 90-day episode, CMS says participants would be able to bill radiation therapy services as fee-for-service for the same beneficiary for 28 days before a new episode could be triggered.
- If a beneficiary dies or enters hospice once the episode has been initiated, providers would still get full payment under CMS' proposal, even if the beneficiary didn't finish treatment.

Note that among the many important details omitted from the transmittal were the specific cancer diagnoses and payments that CMS would provide for these various episodes of care.

The expectation is that the details of the radiation oncology APM will be shared by CMS in a proposed rule this summer, likely in June or July. At that point, the various stakeholders, including AAPM, will begin their assessment in earnest to determine the impact(s) on their constituents. As with all rulemaking impacting the profession, AAPM will be interacting with ASTRO, ACR, ABS, and other societies to share information and coordinate a response to CMS. Legislative involvement may also be needed depending on the magnitude of the impact. Assuming CMS issues the proposed rule on their radiation oncology APM by July, the final policy outlining the model would be published in a final rule by November 1, 2019, with an expected implementation date of January 2020.

Until the proposed rule is issued, the extent to which the AAPM can provide guidance or assessment of impact is extremely limited. Other than the bulleted information provided above, which was inadvertently shared by CMS, there is very little that is known about the model. The AAPM Professional Economics Committee will continue to monitor the situation and provide membership with pertinent information regarding the radiation oncology APM.

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UPSTATE NEW YORK CHAPTER (UNYAPM) REPORT

Harish K. Malhotra | Buffalo, NY, Sanjay Raina | Buffalo, NY, Russel Kincaid | Syracuse, NY, Mubin Shaikh | Rochester, NY, Vikas Patel | Victor, NY

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The Upstate New York Chapter of the AAPM held its spring meeting at Jacobs School of Medicine, Buffalo, NY on April 12, 2019. During the business meeting, **Dr Harish Malhotra**, the AAPM board representative from the chapter, presented his report of the recently concluded AAPM spring retreat at Orlando, Fl and apprised the members about the various initiatives being taken by AAPM to help Chapters to achieve their goals. The Chapter's treasurer, **Dr Vikas Patel**, presented the balance sheet of the chapter.

The scientific program of the meeting had two invited presentations as well as SLAM & Young's investigator symposium. From the Canon Stroke & Vascular Research Center of University at Buffalo, three students described their research. **Chao Guo** talked about the accuracy of interpolating room scatter distributions between C-Arm geometric parameters for fluoroscopic procedures. **Alexander Podgorsak** discussed the use of a convolutional neural network for automatic treatment guidance for endovascular intervention of saccular aneurysms. **Sheng-Hsuan Sun** described dependence of skin dose on x-ray beam angle of incidence. **Weiyuan Sun**, from University at Albany, on the other hand, presented the results of x-ray phase imaging based on focusing polycapillary optics and quantitative phase retrieval. **Josh Kilian-Meneghin** from Roswell Park Cancer Institute presented his work on the development and initial testing of a geometric tool for patient-specific VMAT collimator optimization. **Joshua Mathews**, also from Roswell Park Cancer Institute, talked about further enhancing optimization of VMAT plans using Monte Carlo-based modifications to control Points.

In a distinguished speaker series, Dr. Vikas Patel from Upstate Medical Physics, shared his knowledge about the primary diagnostic monitors. **Dr. Sean Tanny** from SUNY Upstate Medical University presented their experience in transitioning from LDR to MR-guided gynecology HDR brachytherapy program. Both the talks were well received by the audience as demonstrated by various thought-provoking questions which were very nicely explained by the invited faculty.

The later part of the meeting was devoted to the Young Investigators competition. Eleven researchers from University at Buffalo, University at Albany & Roswell Park Cancer Institute fought in a keenly contested competition for Gold, Silver, & Bronze prizes. The presentations covered a broad spectrum of topics including diagnostic imaging physics as well as therapeutic physics and were well received by the capitating audience.

The meeting ended with customary awards ceremony. Chapter's president,**Dr. Sanjay Raina**, bestowed the prizes to the winners. Joshua Matthews from Roswell Park Cancer Institute bagged the coveted SLAM competition award as well as silver award of the Young's Investigator competition. He also became UNYAPM nominee for the national SLAM competition to be held at 2019 annual AAPM meeting. The gold and bronze prize for the Young's investigator competition were won by Alexander Podgorsak & **Mohammad Mahdi Shiraz Bhurwani**, respectively. The awards carried the cash prizes as well as appropriate citations.

The meeting had a good representation from the trade and multiple vendors demonstrated their products which were well appreciated by the meeting attendants.

The next chapter meeting will be held in the Fall of 2019. The highlight of the next meeting will be the presentation of the Upstate NY Chapter's Lifetime Achievement award in Medical Physics. By convention, this year the award will be given to a medical physicist having a distinguished career in Radiation Therapy Physics. Details of the meeting will be available shortly (//www.unyaapm.org).

Awards ceremony picture from UNYAPM spring 2019 meeting. From left: Mubin Shaik (immediate past president), Harish Malhotra (UNYAPM board representative at AAPM), Sanjay Raina (Chapter President), Vikas Patel (Treasurer), Joshua Matthews (SLAM competition & Silver prize winner), Mohammad Mahdi Shiraz Bhurwani (Bronze prize winner) Alexander Podgorsak (Gold prize winner) & Russel Kincaid (President-Elect).

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INTEGRATING HEALTHCARE ENTERPRISE - RADIATION ONCOLOGY (IHE-RO) REPORT

Mary Feng | San Francisco, CA

AAPM Newsletter — Volume 44 No. 4 — July | August 2019

IHE-RO: Addressing interoperability issues in radiation oncology to make our treatments safer and more efficient

Interoperability is a major challenge in radiation oncology due to the technical specialization of our field. Safety and efficiency of clinical care can be compromised when information exchange across software is not seamless. To address this issue, in 2004, ASTRO created Integrating the Healthcare Enterprise–Radiation Oncology (IHE-RO), an initiative that helps to ensure safe, efficient radiation treatments by improving system-to-system connections.

IHE-RO, now operated by the American Association of Physicists in Medicine in collaboration with ASTRO and other organizations, comprises physicists, physicians, software engineers, and others from private practice, academics, and industry, working together to identify and solve connectivity issues in radiation oncology. To assess and prioritize what technical challenges are most pressing to the radiation oncology community, we conduct biannual surveys of ASTRO and AAPM members and use this feedback to develop new use cases, which are the basis for the technical committee to develop industry standards for vendors to improve the system integration of their products, resulting in safer and more efficient patient care. Vendors can meet in annual Connectathons to test the success of product development and their ability to integrate with other hardware and software.

In this biannual survey, 295 responses were submitted by individuals from 6 continents. 67% reported difficulties with specific clinical workflows due to systems not working well together and entered up to 3 specific interoperability issues as free-text. These items were reviewed by the committee and categorized as challenges with oncology information system (rad onc OIS) and health information system interfacing (HIS), challenges with oncology information system and treatment machine integration, and software features of individual products or classes of products. Not surprisingly, common themes and issues emerged. Poor interoperability between radiation oncology and health information systems was noted as a frequent challenge, resulting in potentially degraded quality and

efficacy of clinical care. In the past year, IHE-RO has already been defining the problem and developing testing tools, which we anticipate making available in the coming year, so that vendors can initiate software enhancements to facilitate data sharing, supporting ASTRO's Minimum Data Elements initiative (https://www.astro.org/Patient-Care-and-Research/Clinical-Practice-Statements/Minimum-Data-Element).

Based on the most recent survey, new use cases for the coming year include:

1. Information transfer (including dose, shifts, and imaging data) from the treatment machine to the oncology information system for treatment dose verification
2. Radiation simulation scan and spatial dose information transfer to Radiology PACS to assist in tumor response/toxicity assessment and subsequent patient care
3. Beam data file format standardization for more efficient commissioning of treatment planning systems and machines

IHE-RO is a partnership between end users in the clinic and vendors, all working together to advance patient care in a safe and streamlined way. Please share your clinic's interoperability issues (https://www.aapm.org/IHERO) with us so that we can help.

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SOUTHERN CALIFORNIA CHAPTER REPORT

Steven Goetsch | Solana Beach, CA, Marianne Plunkett | New Port Beach, CA and Varun Sehgal | Orange, CA

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Southern California Chapter Student and Resident Awards

The Southern California Chapter of the AAPM held its annual Norm Baily Awards night at the University of California San Diego Moores Cancer Center on Tuesday, May 14, 2019. Many written abstract entries on original research were received this year in both the graduate student and resident/postdoc categories. Cash prizes were awarded to four winners.

The winning graduate student entry was submitted by Ryan Neph of UCLA titled "Deep Learning MC: Fast CNN-based Prediction of Monte Carlo Dose for MR-Guided Treatment Planning". Second place was awarded to John Ginn, also of UCLA. The first place award for residents and postdoctoral fellows was awarded to Ricardo Rademacher of Genesis Health in San Diego titled "A Compound Refractive Lens for Megavoltage Radiation Therapy". Second place was awarded to Kristin McConnell of UC San Diego.

The second annual SLAM contest was also held that night with four entrants. Entrants included Xenia Fave, Catherine Meyer, Akinyinka Omigbodun and Ricardo Rademacher. After a spirited competition judged by the audience, Ricardo also won this competition with a talk titled "We wouldn't spray paint the Mona Lisa, so why do we spray paint our patients?" He will receive a stipend from the chapter to attend the national SLAM competition in San Antonio in July.

Figure One: Norm Baily award winners: John Ginn, Ryan Neph, Education Director Steve Goetsch, Ricardo Rademacher and Kristin McConnell

Figure Two: SLAM contestants: moderator Marianne Plunkett, Ricardo Rademacher, Catherine Meyer, Xenia Fave, Akinyinka Omigbodun and secretary Varun Sehgal

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THE WORKING GROUP FOR NON-CLINICAL PROFESSIONALS (WGNC) REPORT

Nick W. Marsh, MS | Chandler, AZ

AAPM Newsletter — Volume 44 No. 4 — July | August 2019

The Working Group for Non-Clinical Professionals: Providing Resources

Professionals who do not work in a clinic may find that the resources they need are not available through the AAPM. Some of the goals of the AAPM Working Group for Non Clinical Professionals (WGNC) are to address the creation of these resources, to aid the growth and development of these career paths, and to be the voice of the non-clinical professionals inside of the AAPM—ensuring that, as we move forward as an Association, these needs are addressed. The WGNC has outlined ten primary objectives in its charge, which may be found on the AAPM website. If you have an idea or need that you believe the WGNC can address—or you'd like to volunteer with the WGNC—please contact the Working Group Chair, Christine Gnaster (mailto:cgnaster@yahoo.com). All ideas are welcome. We ask that you allow the WGNC to be your advocate in our Association by communicating where the AAPM may serve you better. The WGNC will be gathering at the Annual Meeting on Sunday, July 14th at 11:00 AM Central in the Travis CD room, 3rd floor.

Book Club

We have created a book club with the goals of fostering communication between professionals (both clinical and non-clinical), creating an opportunity for professional growth through self-guided education, and identifying more ways that the AAPM can better serve its non-clinical professional members. The first book to be read will be Mindset: The New Psychology of Success written by Carol S. Dweck, PhD. In this brilliant book, Dweck shows how success in school, work, sports, the arts, and almost every area of human endeavor can be dramatically influenced by how we think about our talents and abilities. To sign up for the book club, please email Alison Roth (mailto:alison.roth2020@gmail.com) at with your name and state.

Non-Clinical Events at the Annual Meeting

Non-Clinical Career Expo

Sunday, 10:00 AM – 11:30 AM at the stairs in the Night Ballroom Foyer

Breaking Out of the Clinic: Non-Clinical Careers in Medical Physics

Wednesday, 7:30 AM – 8:30 AM in room 302

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IROC HOUSTON REPORT

Jessica Lowenstein | Houston, TX

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50 Years of Supporting Clinical Trials and the Radiation Oncology Community

This past year the IROC Houston QA Center (formerly the Radiological Physics Center) celebrated its 50-year anniversary supporting NCI multi-institution clinical trials and the radiation oncology community. The RPC/IROC-Houston QA Center was funded and established in September 1968 in collaboration with the AAPM and under the leadership of **Dr. Robert Shalek**. It has, for the past 50 years, contributed to the development, conduct, and QA of NCI-funded clinical trials and their participating institutions in North America and 52 other countries. There have only been four Directors of this QA Center; Dr. Robert Shalek (1968-1986), **Dr. William Hanson** (1986-2001), **Dr. Geoffrey Ibbott** (2001-2010) and currently, **Dr. David Followill** (2010-present).

The Mission of the RPC/IROC-Houston QA Center has consistently been to 1) assure NCI and clinical trial groups that institutions participating in clinical trials deliver prescribed doses that are comparable and consistent, minimizing dose uncertainty, 2) help participating institutions to make any corrections to their dose determination and delivery processes that might be needed and 3) report findings to the radiation oncology community. All this while maintaining strict confidentiality. The implemented RPC/IROC-Houston QA program, which is the largest in the world, is designed to audit the radiation dose calculation/delivery chain from the NIST traceable reference beam calibration, to the dosimetry parameters used to calculate tumor doses, to the delivery of the treatment. The QA program includes 5 major components: 1) remote TLD/OSLD audit of machine output, 2) on-site dosimetry review visits, 3) credentialing for advanced technologies, 4) review of patient treatment records, and 5) approval and credentialing of proton therapy.

Over the years, key milestones and implementations have included the following:

Year	Milestone
1968	First onsite dosimetry visit conducted
1977	TLD program for photon beams
1982	TLD program for electron beams
1986	Conversion to TG21

Year	Milestone
1995	Laptops first used on site visits
1998	RADs relational database went live
2000	Conversion from TG21 to TG51
2001	Initiated end to end phantom program
2007	TLD program for proton beams
2010	Switched from TLD to OSLD
2010	First proton site visit
2015	Virtual site visit program begins
2018	First work on carbon ions begins

The number of institutions monitored by RPC/IROC-Houston QA Center has increased from 22 in 1968 to 2,214 by the end of 2018. There were over 4,000 therapy machines and 24,600 therapy beams monitored at institutions by 2018. A total of 301,719 beam output checks have been performed since 1968. Within the 17,000 photon, electron and proton beam outputs monitored annually with TLD/OSLD since 2000, 6–22% of the institutions have one or more beams outside the 5% criterion. Dosimetry site visits to institutions have continually resulted in 2–4 recommendations affecting key dosimetry parameters. One in four patient treatment records reviewed require their reported dose data to be corrected by >5%. End-to-end phantom audits currently exceed 700 annually with an average historical failure rate of 10–15%. Twenty-six of thirty-one clinically active proton centers have been approved to participate clinical trials. Since 1972, 342 peer reviewed articles have been published with a little less than 50% of these occurring since 2010.

The RPC/IROC-Houston efforts and findings over the past 50 years suggest that errors continue to manifest in radiotherapy, and that without its independent peer review QA program, many of these errors would go undetected. The clear value of IROC Houston's services over the past five decades in detecting errors and improving the quality of radiotherapy highlight the ongoing and continued need for these programs. Radiation oncology has changed dramatically over the past 50 years and continues to change with new technological advances and new cancer therapies. IROC Houston's services have also and will continue to evolve to address those changes to improve the quality and consistency of radiotherapy, clinical trials, and patient outcomes.

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MEDICAL PHYSICS 3.0 REPORT

Titania Juang | La Jolla, CA and Erika Chin | Victoria, BC

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The Physicist is IN: Responses from the AAPM Membership

In the past year, the Medical Physics 3.0 (MP3.0) Working Group has put forth a number of strategic goals[1] and a framework of "smart" initiatives[2] for tackling development, communication, and representation in areas that contribute not only toward a consistent high level of quality in our current clinical practices, but also toward the future growth of medical physics both as an interdisciplinary scientific field and as a profession.

The efforts of these initiatives include the following:

1. Create and curate resources and tools that medical physicists can readily implement in their everyday practice to improve efficiency and consistency (*Unit #40 - Smart Tools*).
2. Define and promote technical, clinical, and leadership competency (*Unit #41 - Smart Practitioners*).
3. Apply models of process improvement to clinical practices (*Unit #42 - Smart Models of Practice*).
4. Explore new avenues beyond radiation medicine where physics and physicists can contribute to the advancement of medicine and healthcare (*Unit #46 - Smart Expansion*).
5. Provide a voice for medical physicists in regulatory bodies with the intent of creating regulations, guidelines, and accreditation criteria that reflect best practices (*Unit #39 - Smart Regulations*).
6. Engage with the medical physics community to raise awareness of MP3.0 goals and related resources and opportunities for professional growth, as well as an avenue for active feedback (*Unit #44 - Smart Grassrooting*).
7. Advocate for medical physics by creating connections with our partners in healthcare, including administrators, other medical professionals, and patients (*Unit #43 - Smart Advocacy*).

Work falling under these areas can already be found across our profession, both within AAPM and through independent efforts at individual clinics and institutions. Given the diversity of disciplines and working environments in our field, there are also a variety of opportunities for improving practices,

further developing our skill sets, and advancing patient care by looking beyond the traditional role of medical physics.

With this in mind, visitors to the informational Medical Physics 3.0 booth at last year's AAPM Annual Meeting in Nashville, TN, were invited to participate in answering a set of open-ended questions that asked for our membership's experience with and thoughts on four of our initiatives. Over two days, 101 participants provided a wealth of input. Some highlights are summarized below:

Smart Practitioners & Smart Expansion

a. *Give an example of when your work or the work of another colleague successfully blended technical physics expertise with clinical knowledge in an innovative fashion resulting in better patient care. Conversely, are there examples of standard of care practices that could be further optimized to improve patient care?*
b. *Have you or someone you know worked on projects/collaborations in areas beyond your "standard" medical physics training? How did you get involved? What was the best way you found to gain new expertise efficiently? Conversely, are there interesting projects you wish you could work on but feel you lack the expertise?*

Responses to these two questions were wide-ranging with many overlaps. Topics included patient safety, dosimetry, implementation of new technology, quality assurance, clinical communications, workflow optimizations, treatment planning and delivery, patient setup, clinical trials, IT support and data science, machine learning, hospital administration, education, and more! However, the critical takeaway was that responses starkly demonstrated the wide variation in practice environments and mindsets in our field – wider than might be expected. What would be considered standard physics duties for one physicist (e.g., clinical workflow optimization) was not for another. It was a reminder for our committee to be continually cognizant of the variation in resources and experiences among AAPM members. These responses also showed that despite all our current online resources, there is still a huge unmet need for efficiently sharing and vetting resources and knowledge.

Smart Tools

In your work, are there any tools you have or wish you had that could improve your efficiency and your enjoyment of your job? Any benchmarking metrics that would help quantify the value of your work to other healthcare stakeholders? Conversely, are there any tools you must use that are frustrating and decrease your efficiency?

While no specific tools were named, the top 4 features physicists wished for were:

1. Updated and clinically-relevant physics QA tests with tolerances and testing frequencies based on TG-100 risk analysis.
2. Greater efficiency through equipment, test, and software designs that would allow for multiple tests to be accomplished simultaneously on a single compact and easily transportable system.
3. Greater automation for treatment planning, QA, plan quality checks, data analysis, and other repetitive tasks.

4. An electronic whiteboard or dashboard to provide real-time snapshots of the patient workflow to help identify bottlenecks, streamline the patient's treatment path, and better capture everyone's contributions to patient care.

The main frustrations were outdated tests, cumbersome and buggy software, lack of standardization in tests and reports, lack of metrics to measure physics clinical contributions, and lack of financial resources to acquire tools.

Smart Models of Practice

Think of the best place you've ever worked. What made it great? (E.g. Organization of the group, workload distribution, workflow streamlining, models of leadership, continuing education opportunities, etc.) Conversely, what practice models make your work environment more difficult?

The most commonly cited qualities of the best workplaces fell under the following categories:

1. **Personnel with the right attitude (35%)**. This included attitudes toward interpersonal interactions that foster a supportive, friendly workplace environment with a sense of genuine community and camaraderie; as well as attitudes toward work and our profession that include a focus on patient care, dedication, and the open-mindedness and motivation needed to promote growth, learning, and adaptation. Knowledge and a diversity of experiences and expertise were also cited as positive traits.
2. **Workplace culture (29%)**. Characteristics of a good workplace culture included open collaboration, communication, and teamwork; a culture of respect where physicists are treated as equal members of the healthcare team; good rapport with different work groups, such as with therapists, dosimetry, and management; and quality improvement through process improvement and continuing education.
3. **Workplace structure (17%)**, including good organization with clearly delineated goals and action items, balanced workloads, variety in the work, equal opportunities for all members, and mentorship.
4. **Workplace communication (15%)**. This was a common thread through many responses that overlapped with personnel and culture. Qualities of communication in the best workplaces included respect for all opinions regardless of seniority, willingness to share thoughts honestly, open communication between different groups, and the ability to bring up issues without fear of retribution.
5. **Management (15%)** that is invested in supporting and enabling staff to accomplish their personal and professional goals, such as by providing needed tools and equipment, and by allowing staff the freedom and flexibility to pursue big ideas and test new initiatives.
6. **Good leadership (14%)**. Characteristics of a good leader fell under two categories: personal traits, such as being empathetic, knowledgeable, supportive, encouraging, and hardworking; and actions, such as creating a collaborative environment, investing in their people and helping them to be

their best and succeed, intervening in unhealthy relationships, empowering personnel, and establishing an inclusive environment.

Qualities of a poor workplace environment largely fell under the same categories:

1. **Management (20%)**. Characteristics of poor management included a lack of oversight, micromanagement and interference with work, practices driven by the bottom line rather than best professional guidelines, uninformed decision-making, and not valuing physics.
2. **Workplace culture (15%)**. Qualities of a negative workplace culture included a lack of professional respect for others and their contributions, internal competition and distrust, poor teamwork, lack of collaboration, research silos, no mentorship, and a lack of motivation to deviate from existing practices.
3. **Workplace structure (6%)**. Workplace structure characteristics in poor workplace environments included overloaded schedules, too much time spent manually creating documentation for compliance and billing when the process could be automated, poor definition of duties and how they should be shared, and bottlenecks in decision-making.
4. **Poor leadership (5%)**, including an inability to interface directly with people.
5. **Poor communication (3%)** between physics and other staff.

Putting MedPhys 3.0 into Action

Our newly revamped website (https://www.aapm.org/MedPhys30/) outlines the purpose and goals of MP3.0, and provides guidelines for good practices, examples of opportunities for clinical growth, and articles showcasing the goals of MP3.0 in action through medical physics practice outside the box. Videos highlighting the roles of medical physicists in healthcare are posted on the site and freely available for you to share and distribute.

This website will also be the future home for MP3.0's goal of providing resources and links, including digital tools and instructional training material, that will be readily available for use by all medical physicists.

Additionally, an upcoming 3-day Medical Physics 3.0 workshop, where participants will have the opportunity for hands-on experience and implementation, is planned for 2020. Please keep an eye out for the registration announcement in the upcoming year!

Find us at our session at the 2019 AAPM Annual Meeting in San Antonio:

How International Actions Interface and Support Med Phys 3.0

Monday, July 15, 1:45 – 3:45 pm Room 302

References

1. Redefining and reinvigorating the role of physics in clinical medicine: A Report from the AAPM Medical Physics 3.0 Ad Hoc Committee. Samei, E. (https://aapm.onlinelibrary.wiley.com/doi/10.1002/mp.13087), et al. Med. Phys., 45: e783-e789 (2018). doi:10.1002/mp.13087

2. MedPhys 3.0 Report: What is it all About? Samei, E. (https://w3.aapm.org/newsletter/posts/2018/july-aug/4304_16.php) AAPM Newsletter, 43 (4), (2018).

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Improving Health Through Medical Physics

HORMESIS PODCAST

Alison Roth, MS | Madison, WI

AAPM Newsletter — Volume 44 No. 4 — July | August 2019

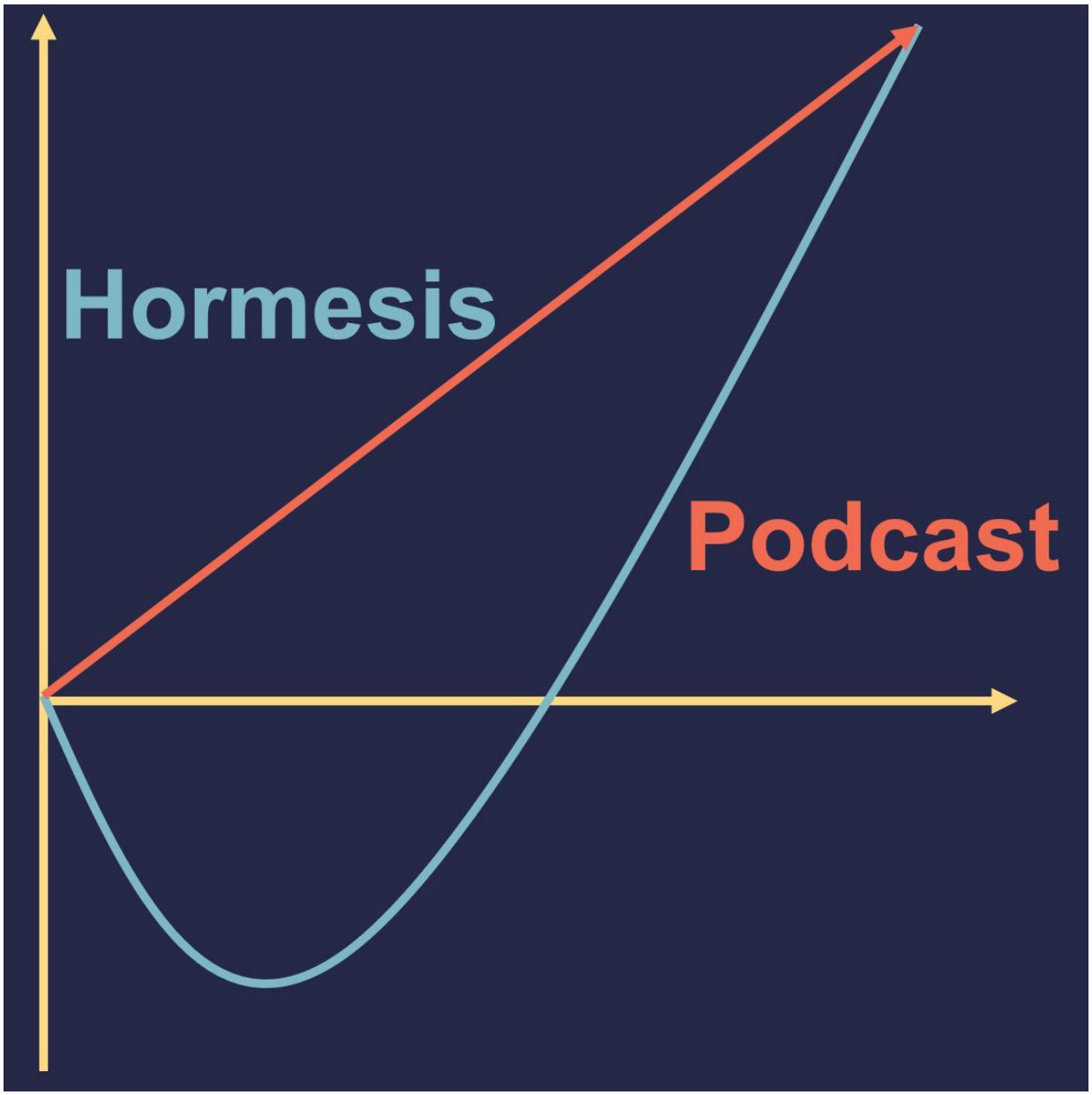
Small doses of medical physics is always good for you

A little over a year ago I received an e-mail from **Sean Tanny** asking whether I would be interested in starting a podcast talking about medical physics. It was timely as I was struggling with my PhD work (in medical physics of course) and reading a book - Radium Girls - about dial painters in radium watch factories. Needless to say, I was overwhelmed at the time and busy, but as my life seems to revolve around medical physics, I said, yes, of course, we need a podcast. After a few e-mails and phone calls the project was put on the backburner until Sean approached Andrea Herrick and Nicholas Sperling and two became four. A year later, our initial idea has become reality in Hormesis Podcast.

With our variety of experience, we strive to cover topics of interest to all sorts of different physicists from students to clinical and non-clinical physicists. Early episodes include whether or not there are enough residency slots (Is the Residency Crunch at an End?), IMRT QA (The Definition of Insanity ... and TG-218), Radiomics, and, of course, Radium Girls by Kate Moore.

We hope that you will tune in (//www.hormesispodcast.com) and join the conversation (//www.reddit.com/r/HormesisPodcast). Topics can be suggested on our website (//www.hormesispodcast.com/topic-suggestions).

The AAPM was kind enough to let us write an article but does not mean that they support our efforts, or the views expressed in the podcast.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Podcast

AMERICAN ASSOCIATION of PHYSICISTS IN MEDICINE

(//w3.aapm.org/newsletter/index.php)
Improving Health Through Medical Physics

OHIO RIVER VALLEY CHAPTER REPORT

Dennis Cheek | Nicholasville, KY and Ashley Cetnar | Columbus, OH

AAPM Newsletter — Volume 44 No. 4 — July | August 2019

Ohio River Valley Spring Educational Symposium 2019

The Ohio River Valley Chapter hosted our Spring Educational Symposium on March 15th and 16th in Louisville, KY. The Friday events started off by holding the chapter's annual mock oral event. This year we were happy to see 20 participants converge at the Crowne Plaza Hotel to practice conveying their knowledge of medical physics to volunteer examiners.

The official meeting events started Friday night at the historic Churchill Downs Kentucky Derby Museum. Physicists, residents, students, and vendors enjoyed socializing while taking in the museum. In addition to being able to tour the museum, the night out included a private tour of the Churchill Downs grounds and a mock horse racing activity.

The event on Saturday started with a presentation by **Dr. M. Saiful Huq** on the IAEA-AAPM code of practice for the dosimetry of static small photon fields. Ten residents and graduate students participated in MedPhys SLAM with 3-minute presentations aimed at communicating one's research to the public. The top three candidates then presented a 15-minute scientific presentation. Mychaela Coyne from Purdue University won the competition and will represent the ORVC chapter at the national AAPM meeting SLAM competition.

The honorary **James G. Kereiakes** Keynote Lecture was presented by **Dr. Vic Montemayor** regarding the teaching of medical physics. The afternoon sessions focused on professional and educational topics of interest in our region. **Dr. Matthew Meineke** presented on how to kick-start your career by honing your networking and job interviewing skills. A residency panel discussion was then held with residency directors from the University of Louisville, The Ohio State University, Indiana University, University of Kentucky, and the University of Toledo providing insight and advice regarding residency programs. **Dr. Michael Mills** concluded the meeting with a presentation regarding Clinical Scientific Publishing in an Open Access Environment; the Meaning of the JACMP.

We would like to thank all of the vendors that made this event possible. We appreciate all of the guest speakers and students that shared their research for the symposium. Finally we would like to thank the volunteer examiners that helped make the mock oral possible and all of the hard work of the chapter officers for another successful meeting.

Our fall meeting is scheduled for November 1st-2nd in Indianapolis, IN at the Downtown Crown Plaza. The Friday night social event will be held at the Indianapolis Zoo Oceans Exhibit. Please see the chapter's website (http://chapter.aapm.org/orv/meetings/next_meeting.html) for more details.

Figure 1: Friday night out at Churchill Downs.

Figure 2: Dr. M. Saiful Huq presenting on the dosimetry of static small photon fields.

Figure 3: ORVC Chapter President Ashley Cetnar with MedPhys SLAM competition winner, Mychaela Coyne.

Figure 4: ORVC Chapter Officers from left to right: Peter Sandwall (Past-President), Michael Gossman (Board Representative), Ashley Cetnar (President), Dennis Cheek (Secretary/Treasurer), and Ahmet Ayan (President-Elect).