AMERICAN ASSOCIATION of PHYSICISTS IN MEDICINE

IMPROVING HEALTH THROUGH MEDICAL PHYSICS

AAPM NEWSLETTER

November/December 2019 | Volume 44, No. 6

Special Interest Feature:

Women's Professional Subcommittee

IN THIS ISSUE:

Improving Health QUALITY. Increasing Global IMPACT.

2020 JULY 12–16 VANCOUVER, BC

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AMERICAN ASSOCIATION *of* PHYSICISTS IN MEDICINE

IMPORTANT DATES:

January 15, 2020

- Website activated to receive electronic abstract submissions

March 5, 2020

- Meeting Housing and Registration will be available online
- ***8:00 PM Eastern (5:00 PM Pacific)***
  Deadline for receipt of abstracts and supporting data
  [This deadline recognizes other conference schedules. There will be NO EXTENSION OF THIS DEADLINE. Authors must submit their abstracts by this time to be considered for review.]

COMP Canadian Organization of Medical Physicists

OCPM Organisation canadienne des physiciens médicaux

AAPM NEWSLETTER is published by the American Association of Physicists in Medicine on a bi-monthly schedule. AAPM is located at 1631 Prince Street, Alexandria, VA 22314

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SUBMISSION INFORMATION

Please e-mail submissions
(with pictures when possible) to:
newsletter@aapm.org
AAPM Headquarters
Attn: Nancy Vazquez

Submission Information

PUBLISHING SCHEDULE

The AAPM Newsletter is produced bi-monthly.
Next issue: January/February
Submission Deadline:
December 6, 2019
Posted Online:
Week of January 6, 2020

CONNECT WITH US!

Editor's Note

I welcome all readers to send me any suggetions or comments on any of the articles or features to assist me in making the AAPM Newsletter a more effective and engaging publication and to enhnance the overall readership experience. Thank you.

DAILY QA
Finished before your first cup of coffee

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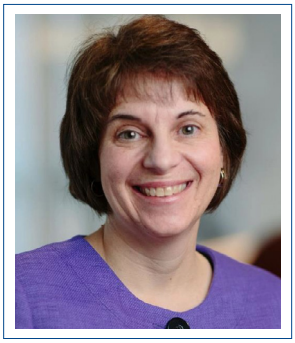
REFLECTIONS ON 2019

PRESIDENT'S REPORT Cynthia McCollough | Rochester , MN



As I approach the end of my year as President of AAPM, I want to share with our members some of the many things that I, my colleagues on the Executive Committee and the Board, our host of volunteers, and our terrific headquarters team have accomplished toward achieving AAPM's Vision, which is to improve health through medical physics.

It has been a privilege to serve as the president of our amazing organization. It's been a lot of work, filled with a calendar overflowing with GoToMeetings, face-to-face meetings, chapter visits, and speaking at many conferences on behalf of AAPM. While the final numbers are not in yet, I have been out of office (my day job) for over half of the working days this year! Although once a full-time clinical physicist, I am primarily now working in research and teaching. Had I had direct clinical responsibilities, I'm not sure how I would have managed to keep my job. 🤓 Suffice it to say, it's a big commitment, but it's also been a great experience and opportunity to move forward multiple initiatives within AAPM.

The year started with the retreats of each council being held at the AAPM Headquarters offices in Alexandria, VA. These are energetic meetings where committees discuss not only what they have accomplished in the prior year, but also their goals and priorities for the coming year. These priorities are discussed with the Strategic Planning Committee and a report provided to the Board during our April face-to-face meeting. Resources and volunteer bandwidth are finite, so we must be good stewards of both and make sure we are working on those things which do advance our mission.

One such priority is to equip our members for the future, which seems to be unfolding at an ever-increasing speed. Artificial intelligence (AI) and machine learning are here to stay, at some level, and the role that medical physicists will play in developing, training, validating, and clinically implementing these powerful technologies will be critical to ensuring high quality, safe, and effective health care. As with most new technologies, the pendulum can swing from "it's going to solve all our problems" to "it's creating more problems than it's worth" pretty quickly, with the truth being somewhere in the middle.

In March, I organized a Data Sciences Round Table at Headquarters to engage our many sister organizations and determine how we can work synergistically toward our common goals. External participants included representatives from the National Institute of Biomedical Imaging and Bioengineering (NIBIB), the National Cancer Institute (NCI), the National Institute of Standards and Technology (NIST), the Food and Drug

Thank you for taking the time to check out the newsletter this month. As always, if you have thoughts, suggestions or insights to share, please feel free to contact any member of leadership or headquarters staff. And remember, *Build Bridges*; they are the key to high quality, safe and effective patient care; advancing the science of our multi-disciplinary field; and finding joy in our jobs and in our volunteer work within AAPM!

Administration (FDA), the American College of Radiology (ACR), the Radiological Society of North America (RSNA), the Society for Imaging Informatics in Medicine (SIIM), the American Society for Radiation Oncology (ASTRO), and the Academy for Radiology & Biomedical Imaging Research (ARBIR). The goals of the roundtable meeting were to:

- make each other aware of the many and varied activities in data science underway, or planned, by each represented organization,
- identify overlaps, opportunities for collaboration, and gaps that need filling,
- establish mechanisms for staying informed and engaged,
- move these fields ahead in an effective, efficient, and collaborative manner, and
- harness the power of these new technologies for patient care.

A paper on the "The Essential Role of Medical Physics in the Development, Validation and Clinical Implementation of Artificial Intelligence Applications that use Medical Imaging Data" was developed and submitted for publication by AAPM speakers at the Round Table, who represented our leadership in our Data Science Committee and Subcommittees, as well as our Science Council. AAPM continues to meet with leaders at the NIH about practical issues, such as standardization of metadata and ontologies, and clinical implementation issues, such as ensuring that cases not well represented in the training data do not yield ineffective or inaccurate results.

My theme this year, and the theme of our 2019 Annual Meeting, revolved around building bridges — *when we communicate well across disciplines we can better ensure patient safety and improve patient outcomes, thereby demonstrating our value to our clinical colleagues*. Our in-depth discussions with organizations such as the ACR Data Science Institute, the RSNA, and the NIBIB are doing just that.

I have also focused on building bridges across our various specialties and practice environments, for example, academic and clinical, therapy and imaging, MS and PhDs, across genders, gender identities, age groups, and various racial and ethnic backgrounds. To build a better bridge with our MRI colleagues, we held our first Joint Educational Symposium on MR Safety during the summer Annual Meeting in sunny San Antonio. We also had a small booth at their annual meeting and prepared flyers specific to the role of the medical physicist in MRI. Plans are in the works for another joint symposium at each of our meetings in 2021.

Speaking of brochures, I led an effort to refresh our various materials that describe our roles and responsibilities. These are available for free download off of the AAPM website. Please share these with colleagues, your department chairs, or friends and family to help educate them on what it is we do and why it is so important.

Our long-standing positive relationship with the Canadian Organization of Medical Physicists (COMP) continues to deepen, and we look forward to working with our Canadian colleagues in preparation for the exciting Vancouver 2020 Joint AAPM/COMP Meeting, taking place July 12–16, 2020. The officers participated in COMP's annual meeting by moderating sessions, judging the young investigators' symposium, and having face-to-face meetings with COMP's officers. If you've not attended one of their meetings previously, please be sure to learn more about the AAPM/COMP collaboration in Vancouver.

This year AAPM published its first joint task group report with the European Federation of Organizations For Medical Physics **(EFOMP)**, which has led to the development and execution of a Memorandum of Understanding with them. We are looking to repeat this collaboration model with many additional groups.

We continue to have a very positive relationship with many professional organizations in our field and are particularly grateful for **RSNA**'s partnership in developing addition medical imaging residency programs. We are also working closely with the **Society of Directors of Academic Medical Physics Programs (SDAMPP)**, the **Commission on Accreditation of Medical Physics Education Programs (CAMPEP)**, and our student and trainees groups to consider

PRESIDENT'S REPORT, Cont.

suggestions for improving the MedPhys Match Program.

If you missed the Presidential Symposium, I really encourage you to check it out through the Online Learning Center. I provided educational material on the topics of diversity, inclusion, equality, and equity (they don't all mean the same thing) and shared personal examples of the many ways that we do, and sometimes don't, have Everyone at Our Table. Our keynote speaker, Amy Lynch, provided a high-energy engaging look at the differences that each of the three generations active in today's workplace brings to the table. The styles and world views of the Baby Boomers, Gen Xers, and Millennials can indeed be quite different — not better or worse, just different.

There are so many more special activities and efforts that have taken place this year, including but not limited to: ongoing discussions on the role of MPAs in AAPM, increasing the number of diagnostic medical physicist imaging residencies, streamlining of task group report review processes, reorganization of AAPM's international activities, evolving the implementation of the AAPM Policy Against Harassment and Disruptive Behavior at Meetings (new and improved version coming soon) and Code of Ethics of the AAPM, and initiating the development a conflict-of-interest (COI) management committee. The work of various ad hoc committees has also been moving forward, with reports submitted already, or coming soon, from many of our current ad hoc committees. Of special note, the Ad Hoc Committee on Education and Implementation Efforts for Discontinuing the Use of Patient Gonadal and Fetal Shielding (AHPGFS) committee (also known as the CARES committee), chaired by **Rebecca Marsh**, has been building bridges and gaining endorsements from Radiology, Radiation Safety, and Medical Physics organizations across the globe!

Thank you again for allowing me the privilege to be your president in 2019. Wishing you all a fulfilling, productive, and safe conclusion to this year and a wonderful holiday season.

God bless, Cynthia


Happy Holidays!
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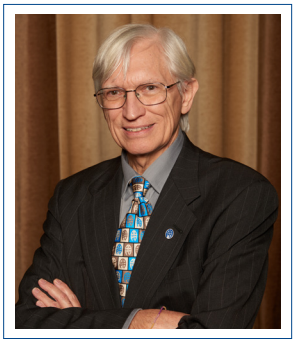
Lisa G.
Tammy
Angela
Lisa
From the
AAPM HQ Team!

THOMADSEN'S FAREWELL ADDRESS (WITH APOLOGIES TO WASHINGTON)

CHAIR OF THE BOARD'S REPORT Bruce Thomadsen, PhD | Madison, WI



Writing this column is bittersweet. The last three and a half years have been some of the best of my life – enjoyable, rewarding, challenging, demanding, but always interesting. I will miss the adrenaline rush and intense interactions with other members. I thank you for putting your trust in me to care for ***your*** society.

But first, the thing that usually comes last, but is really very important: I could not have done any of what we have accomplished without the hard work and vigilant attention of the AAPM staff. They are truly unique and talented. They knew what I needed well before I did and had it done and ready. Throughout my experience in the presidential chain, I have interacted with, and been supported by, each member of the Headquarters team, and all have gone above and beyond anything I would have expected. **Angela**, in particular, and as the handler for EXCOM, kept me in line (well, most of the time, but she tried) and made me look good. I will miss my frequent interactions with her and with all of the team.

Bruce Thomadsen,
soon to be past Chair of the Board
(i.e., a proud member)

I was tempted to give a review of all that has been accomplished during my years in EXCOM, but decided that it would be boring reading about it; the things we did were not. However, instead, I will just highlight some things that are important ***to you***.

1. We started to do real strategic planning. The Board did. All the Board. All 50 of them. For the last two years, the Board has used the Spring Clinical Meeting as a time to focus on the large picture. In 2018, the Board hammered out the current strategic plan. The 2019 meeting was spent contemplating the more distant future, such as 20 years ahead, and thinking about what we would like AAPM and medical physics to be like, what obstacles will be in the way, and what we need to do now to make the future more like what we would like it to be. The action that came in as the top priority was to make AAPM and medical physics more well-known, that is, to raise our profile. To that end, we found that there are at least 35 committees in AAPM that communicate with 17 classes of outside entities. We are working on ways to coordinate our messages and to make us more visible. With challenges such as bundling of out-patient radiotherapy payments, this initiative becomes much more immediate and important.
2. Even though the survey of the membership from 2016 indicated that, for the most part, AAPM members were quite happy with the Association, EXCOM went through all of the less-than-positive comments and charged the appropriate committees to see if the issues raised can be alleviated. One of the more often repeated comments was the difficulty in breaking

into the society's committees. To help with that, all committee chairs were asked to add to their committee as a guest a student or resident, and a new professional or member who had not participated in an AAPM group before. Headquarters staff is also revamping the committee classifieds to make them more effective and easier to use.

3. We have also started to try to overcome the effects of the silo structure of AAPM. For the last two years, an ad-hoc committee has been working on suggestions for facilitating working across boundaries, such as between imaging and therapy, or work in Science Council and Professional Council. There is already work going on to unify all the international efforts of AAPM under one committee. The ad-hoc committee should report very soon.

EXCOM has worked very hard to close the divide between membership and leadership. I feel that we have made tremendous progress. We work for you, so when you have something on your mind, e-mail or call a member of the Board or EXCOM. We like hearing from you! It keeps us in touch with how things are going. AAPM is your organization. Please take care of it well. [Stage direction: Ride into the sunset.] ■

A VOLUNTEER MENTORSHIP PROGRAM WITHIN AAPM TO BUILD TOMORROW'S LEADERS TODAY

PRESIDENT-ELECT'S REPORT M. Saiful Huq, PhD | Pittsburgh, PA

Dear AAPM Members,

It has been a great privilege for me to attend many chapter meetings during the past year as your President-Elect. I have enjoyed immensely the opportunity to meet many of you in person and to engage with the work of your local chapters. AAPM's Annual Meeting that was held in July in San Antonio provided me another energizing opportunity to speak with hundreds of you about your interests, passions, and vision for our field. This was a rewarding experience that I will cherish forever. Thank you all for taking the time to speak to me about your pride for our wonderful organization. I asked almost every one of you one key question: what new initiatives would you like to see AAPM leadership undertake that will benefit the membership and future of our organization? A common theme emerged very quickly in these conversations: our leadership team should create opportunities for early and mid-career professionals to participate in AAPM's councils, committees, sub-committees, working groups, and task groups. You wanted to see a formal structure put in place to facilitate participation by new volunteers and to help break through traditional hierarchies of the organization.

This vigor and spirit of volunteerism resonated with me, as it reminded me of how I began my own career in medical physics. I first volunteered to be a member of the Ethics Committee of AAPM. This initial step of putting myself out there opened up a series of unforeseen doors that altered the trajectory of my career. I soon learned that **Dr. Peter Almond** was forming a task group on calibration of high energy photon and electron beams (TG51). I had just finished my postdoctoral training in medical physics with a background in calibration physics, so I applied to become a member of TG51. I was surprised and admittedly intimidated when Dr. Almond accepted my application, as I was the youngest of the group and surrounded by my idols in the field. I sought to apply my background to the unique problems presented by this group and contributed wherever I could. These efforts ultimately led me to **Dr. Pedro Andreo**'s initiative within the International Atomic Energy Agency to develop a new code of practice on high energy photon, electron, and other beams (TRS398). Meanwhile, I continued to volunteer in other AAPM activities and make the most of every opportunity I was given.

To many in our ranks, these are your stories, too; to the early and mid-career professionals, I admire your enthusiasm for participating in in the task group

"I am eager to continue listening to your ideas for our organization and profession, and I look forward to our work together in the days and months ahead."

and committee activities. Your leadership team has heard your concerns about barriers to getting involved within AAPM. These same concerns had in fact inspired me to make a commitment to you in my presidential mandate:

- Develop more effective mentorship programs for young members so that they can become effective leaders, scientifically and professionally
- Develop a transparent process which will ensure participation of early and mid-career medical physicists on various AAPM committees and task groups

In response to your call, your leadership consisting of the EXCOM and the Council Chairs has developed a new program entitled **"A volunteer mentorship program within AAPM: building tomorrow's leaders today." The goal of this program is to expose early career and student members of AAPM to the operations and inner workings of the AAPM and thus prepare them for active participation and leadership roles in our organization. The program also applies to longer-term members who have never been involved in AAPM committees but would like to break into that structure. To make this program effective, participants will be paired with leaders of councils/committees/sub-committees/working groups/task groups of interest in order to facilitate one-on-one mentorship and provide opportunities to engage in organized scientific and professional activities.** This initiative will also lay the foundation for building tomorrow's leaders today; the younger generation will have the opportunity to learn the intricacies of our organization, learn from current leaders' leadership tactics, and bring their own leadership skills and ideas to bridge the gap between generations and make their marks in moving the organization into the future. Please note that this program is intended to complement existing initiatives that allow participation by our membership in various committee activities. It does not replace these ongoing initiatives. We will continue to encourage, with new vigor, students and other volunteers to participate in their existing activities and to seek out new opportunities for involvement in AAPM. The Chairs of all AAPM committees have been engaged in building the program and look forward to your participation. **This program will be formally launched on January 1, 2020.**

AAPM is one of those unique organizations in the world that has set an example of how to effectively harness the energy and volunteer efforts of its members. This passion to advance our field is the envy of many other organizations. To bolster these efforts even more, I challenge each of you to avail yourselves of this new mentorship initiative and to become meaningfully involved in the activities of our organization. Let us continue to work together to lead our organization to meet the demands and unique challenges that we face today and into the future.

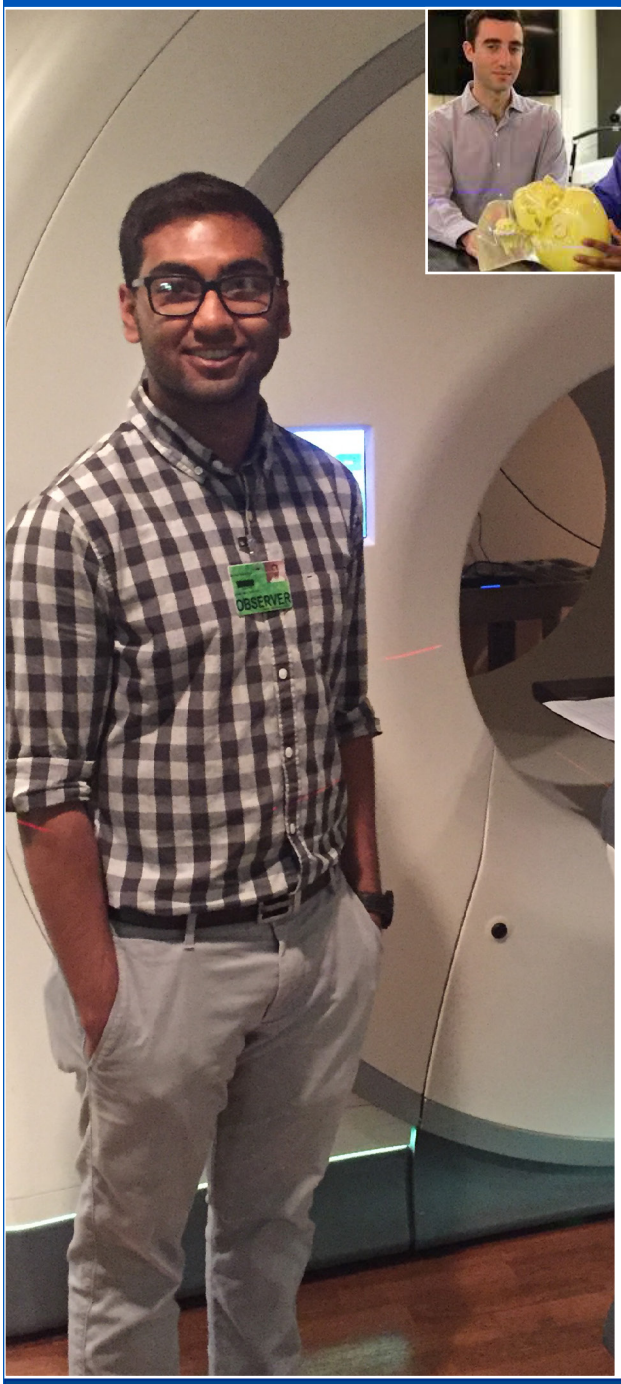
I have been working with the AAPM HQ staff to disseminate the details of this initiative electronically to the Chairs of all the councils, committees, sub-committees, working groups, task groups, and the entire membership. I will also work with the Chair of the Working Group on Student and Trainee Research (WGSTR) to publicize this initiative through social media platforms. Please stay tuned for this announcement.

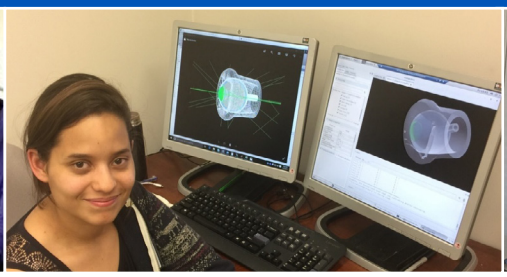
I am eager to continue listening to your ideas for our organization and profession, and I look forward to our work together in the days and months ahead. ■

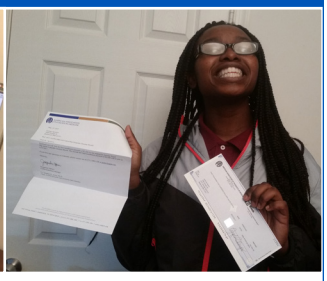
AMERICAN ASSOCIATION of PHYSICISTS IN MEDICINE

DIVERSITY RECRUITMENT through EDUCATION AND MENTORING

DREAM







THE DREAM PROGRAM is a competitive 10-week summer program designed to train the next generation of diverse medical physicists and increase the number of underrepresented groups in medical physics by creating new hands-on research and clinical opportunities, outreach, and mentoring both during and after the program has completed. In addition, this is a paid fellowship offering recipients at least $5,500 each.

ELIGIBILITY

- Undergraduate sophomores, juniors, and seniors majoring in physics, engineering, or other science
- US Citizens, Canadian Citizens, or Permanent Citizens of the US.

HOW TO APPLY

- Complete and upload the application
- Upload an official transcript
- Provide two letters of recommendation
- Provide a self statement

APPLICATION DEADLINE: **February 3, 2020**

FOR MORE DETAILS, VISIT:
http://gaf.aapm.org/index.php#DREAM

PROGRAM CONTACT: Jacqueline Ogburn, jackie@aapm.org or (571) 298-1228

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WHAT'S NEW AT AAPM HEADQUARTERS?

EXECUTIVE DIRECTOR'S REPORT Angela R. Keyser | Alexandria, VA

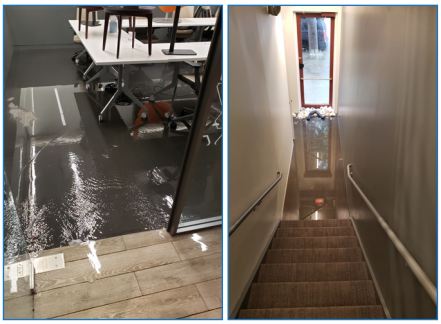
HQ Recovers from July 8 Flood

On Monday, July 8 the Alexandria, VA region received approximately 3.3 inches of rain in less than one hour. The sudden storm quickly filled the drains and flooded streets around the AAPM HQ offices which led to flooding in the lower level of the building and garage. The AAPM team sprang into action, moving furniture and trying desperately to protect our 3.5-year-old new home from the rising water!

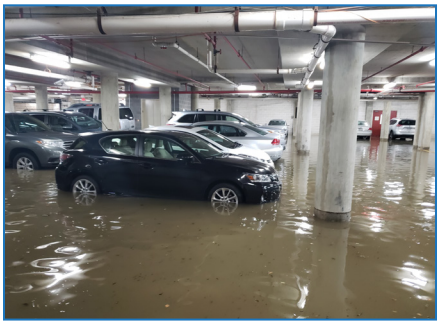
Once we gave in to the rising waters and headed for safety on the 2nd floor, we watched three cars float down Prince Street right outside our windows and a water/boat rescue from the Hilton Garden Inn parking garage across the streets. We were finally forced to evacuate the building when fire alarms malfunctioned. It was several hours before the waters receded. Unfortunately, the cars belonging to several members of the team were "totaled" due to water damage. And, this was just days before we left for the 2019 AAPM Annual Meeting. I was so very proud of the "can-do spirit" of all the team members, but especially those dealing with insurance agents etc., while traveling for work and putting in very long days.

The recovery/rebuild has been long and stressful, but I'm pleased to report that our first floor conference space has re-opened for business. We still have a few punch list items to deal with, and of course the back-and-forth with insurance claims, but AAPM is now "whole" again.

AAPM HQ team reacted quickly to save AAPM's HQ from rising floodwaters.



Floodwater in AAPM's Large Conference Room and stairwell.



Floodwaters in HQ garage, starting to recede.

Showing line of floodwater in HQ garage.

Less than six hours after the rains stopped, clean up well underway!

Return to business. (I like our new carpet better!)

AAPM Events During RSNA 2019

REMINDER! AAPM's Headquarters during the RSNA meeting will be located at:

The Hyatt Regency Chicago, 151 E. Upper Wacker Drive.

AAPM Committee meetings and annual Reception will be held at the Hyatt. Make plans to join your colleagues on Tuesday, December 3 from 6:00–8:00 pm for the annual AAPM Reception.

Make plans to attend the RSNA/AAPM Symposium: Integrated Diagnostics: Why Does it Matter and How Do We Get There? on Tuesday, December 3, 10:30–12:00 pm.

Visit AAPM at Booth 1109 in McCormick Place — South Building — Hall A to pick up information on association programs, the current list of AAPM publications, and complimentary copies of *Medical Physics*. In addition, check out the recent advancements in the AAPM Virtual Library.

The most up-to-date schedule for AAPM meetings during the RSNA meeting is available online.

PhysCon 2019

AAPM will be represented at PhysCon 2019 in Providence, RI November 14–16. This meeting, hosted by the Society of Physics Students (SPS) and with the theme "Making Waves & Breaking Boundaries," will bring together over 1,500 physics undergraduates, their mentors, and other scientists. The program consists of five plenaries, over 20 breakouts, two poster sessions, workshops, a career fair, and assorted social activities. AAPM is supporting PhysCon by participating in the exhibits, and also with **Eric E. Klein** and a team of colleagues providing an interactive tour of Rhode Island Hospital to attendees interested in medical physics.

2020 Funding Opportunities

ASTRO-AAPM Physics Resident/Post-Doctoral Fellow Seed Grant (*Application deadline: February 15, 2020*)

AAPM and the American Society of Radiation Oncology (ASTRO) are jointly funding a research seed grant for Medical Physics Residents and Post-Doctoral Fellows. The goal of the joint seed grant is to advance the field of radiation oncology in novel ways through the support of talented early-career scientists performing physics and radiation oncology-related research. The Physics Seed grant aims to support the next generation of researchers. One grant of up to $25,000 will be awarded. The start date for the 2020 award will be July 1, 2020.

View additional information and access the online application »

AAPM/RSNA Imaging Physics Residency Grant (*Application deadline: May 4, 2020*)

AAPM Board of Directors has approved $420,000 in support over six years ($70,000/year starting in 2019) to fund six spots in existing or new imaging residency programs. The RSNA Board of Directors approved $210,000 in funding for three additional slots in existing or new imaging residency programs. The purpose of the AAPM funding is to provide 50% support of a resident's salary for two imaging physics residents. The awardee institution(s) will provide the other 50% support. After the period of the award is over, the intent is that the awardee institution(s) will continue to fully support this new imaging physics residency position. CAMPEP accreditation is expected within the first year of the funding period if a program is not currently accredited. Open to existing or new imaging residency programs.

View additional information and access the online application »

Research Seed Funding Grant (*Application Deadline: May 4, 2020*)

Three $25,000 grants will be awarded to provide funds to develop exciting investigator-initiated concepts, which will hopefully lead to successful longer-term project funding from the NIH or equivalent funding sources.

Funding for grant recipients will begin on July 1 of the award year. Research results will be submitted for presentation at future AAPM meetings.

Applicants must be a member of AAPM at time of application (any membership category).

View additional information and access the online application »

EXECUTIVE DIRECTOR'S REPORT, Cont.

AAPM Graduate Fellowship
(Application Deadline: May 18, 2020)

The AAPM Graduate Fellowship is awarded for the first two years of graduate study leading to a doctoral degree in Medical Physics (PhD or DMP). Both BSc and MS holders are eligible to apply. Applicants must be a member of AAPM at the time of application, (any membership category). Pending membership status not eligible. A stipend of $13,000 per year, plus tuition support not exceeding $5,000 per year will be assigned to the recipient.

Graduate study must be undertaken in a Medical Physics Doctoral Degree program accredited by CAMPEP.

View additional information and access the online application »

Did You Know……

AAPM includes "AAPM Reports Authored" in the AAPM Membership Directory listing of each AAPM Member. Ever want to find an AAPM Report, don't remember all the details, but remember the name of one of the authors? Log in and check it out!

AAPM provides links to **ACR-AAPM Practice Parameters and Technical Standards** from AAPM's Publication page.

A very important service provided by the American Institute of Physics (AIP) is the FYI science policy bulletins with a focus on the physical sciences. The sign-up is free, and it is an easy way to stay on top of what is happening within the administration and Congress. Subscribe here.

There are 47,000+ photos on AAPM's Flickr site, where you will find pictures grouped by event. AAPM's history has been well documented through the photographic efforts of many members. Take some time to stroll down memory lane!

You can get your **AAPM Swag** through a partnership with Knotty Tie Company. Go online to order customized, handmade ties and scarves that incorporate AAPM's signature logo.

EXECUTIVE DIRECTOR'S REPORT, Cont.

Your Online Member Profile

This is a reminder to keep your AAPM Membership Profile information up to date by going to the AAPM Member Profile page and making any changes necessary. **Please, upload your picture** if you have not already done so.

Remember to review the "Conflict of Interest" area of the Member Profile to self-report conflicts per the AAPM Conflict of Interest Policy.

Staff News

Justin Stewart joined the AAPM HQ team on September 23 as the Programs Manager focusing on communications-related initiatives as well as the Corporate Affiliates program. He also provides support to the Development Committee and the Education and Research Fund programs. With 13+ years working with the American Institute of Physics (AIP), Justin is well known to the HQ team and many volunteers. He has attended many AAPM Annual Meetings as part of the AIP team working on the AAPM Career Services program and staffing the "Placement Services" booth. Justin hit the ground running and is an excellent addition to the team.

Who does what on the AAPM HQ Team? See a list of contact information and brief descriptions of responsibilities online. An Organization Chart is also provided.

AAPM's Headquarters Team

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 years of service documented below is very telling; the AAPM HQ team is very committed to serving the AAPM membership. The following AAPM team members have celebrated an AAPM anniversary in the last half of 2019. I want to publicly thank them and acknowledge their efforts.

Lisa Rose Sullivan	26 years of service
Michael Woodward	23 years of service
Farhana Khan	21 years of service
Yan-Hong Xing	13 years of service
Tammy Conquest	12 years of service
Corbi Foster	12 years of service
Jackie Ogburn	12 years of service
Abby Pardes	6 years of service
Rohan Tapiyawala	4 years of service
Nick Wingreen	4 years of service
Janelle Priestly	2 year of service

The AAPM Headquarters offices will be closed Thursday, November 28 – Friday, November 29, Wednesday, December 25 and Wednesday, January 1. I wish you and your loved ones all the joys of the season and happiness throughout the coming year. ■

OUR CONDOLENCES

Robert Barish** • **Lincoln B. Hubbard, PhD** • **Robert J. Kriz, MS** • **William G. Van de Riet, PhD** • **Glenn P. Glasgow, PhD, FAAPM

Our deepest sympathies go out to the families. We will all feel the loss in the Medical Physics community.

If you have information on the passing of members, please inform HQ ASAP so that these members can be remembered appropriately. We respectfully request the notification via e-mail to: 2019.aapm@aapm.org
(Please include supporting information so that we can take appropriate steps.)

VIABILITY OF THE 2020 MEDICAL PHYSICS MATCH

EDUCATION COUNCIL REPORT Joann Prisciandaro, PhD | Ann Arbor, MI

Prior to development of the MedPhys Match (MPM), residency program directors voluntarily agreed to make the resident recruitment process as fair as possible, to both applicants and programs,[1] by setting a uniform offer date, which was the earliest date on which offers could be made by programs to candidates. However, given that the agreement was non-binding, it was not uncommon for some programs to extend early offers to highly ranked candidates. Once word of these offers circulated, other programs followed suit. In response to this issue, AAPM was asked by program directors to develop a match system.[1] Following a significant investment of volunteer time and effort, and a significant financial investment from AAPM and SDAMPP, the first MPM was carried out in 2015.

Over the last few months, some concerns have been raised regarding the viability of the MPM, including that several large residency programs had elected not to participate in the 2020 MPM. In this letter, we would like to reaffirm our support for the MPM and to help alleviate the concerns of program directors and students regarding the sustainability of the MPM.

Since its inauguration in 2015, participation in the MPM has remained steady. In 2019, 70% of all CAMPEP accredited residency programs participated in the MPM (Table 1). Additionally, based on recently released data from National Matching Services Inc. (NMS), the company that runs the MPM, 91 residencies are participating in the 2020 MPM, which again represents about 70% of CAMPEP accredited programs. Since the first year, participation has remained

Table 1. Summary of the MedPhys Match (MPM) statistics for residency program participation from the inception of the MPM in 2015. (Data from National Matching Services Inc. (NMS)[3] and CAMPEP annual residency reports.[4])

Match participation	2015	2016	2017	2018	2019	2020
Participating Residencies	77	74	81	87	90	91
Participating Programs*	86	77	86	92	101	96
Positions Offered	112	111	114	129	138	131
CAMPEP Accredited Residencies	94	107	123	125	128	130
% of Accredited Residencies	94	107	123	125	128	130
Participating in the MPM	82%	69%	66%	70%	70%	70%

**Note: A residency may offer more than one "program," such a 2-year and 3-year programs, identified by a unique code through the NMS match.*

very stable at about 70%. The number of residency programs participating has, however, increased. Thus, there are no objective data to indicate a decline in the sustainability of the MPM program.

At the July 2019 meeting of AAPM's Education Council at the AAPM Annual Meeting, concerns were shared from the Student and Trainee Subcommittee of AAPM regarding the decision of several large residency programs to not participate in the MPM. Subsequent to a discussion on the topic, a motion was passed to have the Subcommittee on the Oversight of MedPhys Match (SCOMM) seek information from program directors that have pulled out of the match to better understand why they decided not to participate. In August of this year, SCOMM reached out to these programs and the following responses were collected.

- *Our program must recruit Canadian citizens and permanent residents over US residents.*
- *Our program is part of the military, and we can only recruit through military channels.*
- *We have a hybrid program and are looking for academically-oriented individuals.*
- *The MPM does not filter out applicants that may not be interested in our program.*
- *We believe there is a problem with the matching algorithm, we have not matched with our top choices.*
- *We have experienced issues with the match, we have not been paired with our top choices.*
- *PhD students finish throughout the year, so we need to be able to start the residency whenever they finish.*
- *We prefer to make an offer as soon as we find an acceptable applicant, the process is easier for the applicants and us.*
- *We currently recruit from our graduate student pool.*
- *The pressure to match, on both residents and programs, results in both attempting to play games to "win" the match.*
- *We receive too many applicants and prefer recruiting outside of the MPM.*
- *There is a fee associated with the MPM.*

On September 11, 2019, SDAMPP shared their position statement on the MPM with the medical physics community.[5] The statement provided a possible explanation regarding the current concern for the MPM's viability, a summary of how the MPM works, as well as a case for staying in the match.

On October 1, 2019, AAPM's Education Council met with leadership from CAMPEP, SDAMPP, AAPM's Medical Physics Residency Training and Promotion subcommittee, and the AAPM Student and Trainee subcommittee via teleconference to discuss the concerns expressed about the viability of the MPM. During this meeting, the responses of the non-participating program directors were reviewed and discussed. Based on this and several follow-up discussions, the following summarizes Education Council's responses to the comments received:

- **Specific or limited eligibility requirements concerns:** Tools are now readily available within MPM to customize one's posting (e.g., citizenship, military status, academic/research preferences, as well as multiple postings). Additionally, we encourage programs to explicitly state their eligibility requirements or preferences to ensure the appropriate candidates apply to their programs.
- **Algorithm robustness concerns:** A description of the matching algorithm used by NMS is available on their website[6] and detailed within a number of references.[7-13] As stated in SDAMPP's position statement,[5] the algorithm has proven to be robust and has been thoroughly tested. NMS, an external vendor, was intentionally selected to avoid introducing a bias in the match selection. The same algorithm used to compute the results for the MPM is also used to compute the results for the National Resident Matching Program (NRMP) for physicians. Furthermore, the 2019 NRMP Match was celebrated as the largest in history, offering greater than 35,000 positions.[14] However, one should be mindful that the algorithm is designed to place an applicant into the program that is most preferred on the applicant's list, rather than prioritizing the residency program's rank order. The algorithm will proceed through the applicant's rank order list until a match is achieved or the applicant's list is exhausted.[6] As such, depending on an applicant's rank order, residency programs may not always match with their top choices.

EDUCATION COUNCIL REPORT, Cont.

- **Variable graduation dates for PhD candidates:** Although PhD students do graduate throughout the year, rather than strictly during the June timeframe as do medical students, graduate students are aware that the vast majority of medical physics residency programs begin in or around July. In response, many students make the adjustments necessary to complete their dissertation and defense ahead of the July timeframe.[15] Others have negotiated temporary post-doctoral positions with their research mentor to bridge the gap until their residency commences. Further, some residency programs offer flexibility in start dates.
- **Desire to recruit outside of the MPM and quickly make offers:** Some programs have indicated that they prefer to recruit outside of the MPM and to make offers as soon as an acceptable applicant is identified. Although the match is not mandated, recruiting outside of the match has several consequences. First, although this process may be convenient for the program, this is not always in the best interest of the candidate. A candidate may accept an offer not necessarily because they believe it is the best fit, but rather because they have been offered a position.[15] In the long run, such a decision may not work well for either the program or the candidate. Second, candidates may apply to these programs as well as programs participating in the match. If given and accepting an early offer, these candidates then withdraw from the match, which may result in ill will toward the student from programs who had dedicated the time and resources to review the candidate's application material and/or interview him or her. Further, given the potentially late timing in the process that such "out of match" offers can occur, a student's withdrawal from the MPM may leave some programs in the match little time to seek alternative candidates.
- **Gaming the match:** The optimal strategy for matching is for both programs and candidates to submit their rank lists based only on their preferences.[7,16] Some programs and candidates have attempted to game the match system by adjusting their rank order based on the likelihood a program or candidate will rank them highly.[16] This is often based on post-interview communications, in which a program may contact a candidate to inform the candidate that the program intends to rank the candidate highly, or vice versa. As a consequence, the other party may adjust its initial rank order, elevating the rank of the program or candidate in their rank list. However, this information may not be truthful. For instance, candidates may feign interest in a program or conversely, programs may overstate their interest in a candidate, in the hopes that this will improve their rank.[16] By overstating one's preference, the other party may alter its ranking, and the actually-preferred program or candidate may receive a lower ranking. Thus, when true preferences are not used to determine rankings, the resulting matching outcomes will be suboptimal. For the match to function as intended, parties should submit their rank order based on their true preferences.[16]
- **Too many applications are received through the MPM:** Receiving more applicants is primarily a function of using the Medical Physics Residency Application Program (MP-RAP) for applications. Although most programs that participate in the MPM also use MP-RAP, this is not a requirement. MP-RAP is intended to provide a common application platform for programs; however, programs may choose to use their employer's application system or another preferred process. The matching process is independent of the application process. As such, if programs feel overwhelmed with the number of applicants they receive, they can choose to post their position outside of the MP-RAP while still participating in the MPM.
- **Fees associated with the MPM**: Both programs and applicants are required to pay a fee to participate in the MPM. NMS charges approximately $50,000 per match. The fees are used to cover the cost to run the match and to maintain the MPM infrastructure.

In keeping with AAPM Policy PP 28-A,[17] AAPM Education Council believes "that a matching program is the best way to optimize the placement of qualified applicants into accredited residency programs" and endorses the MPM "for medical physics residencies and encourages accredited programs and qualified applicants to participate." Based on the NMS published statistics, the MPM has been shown to be viable and successful, with an average of 71% of CAMPEP accredited programs participating in the MPM since its inception in 2015.

However, the Education Council and AAPM leadership acknowledge that refinements and enhancements to the current implementation of the MPM are needed, and are committed to working with program directors, the AAPM Students and Trainees Subcommittee, CAMPEP, and SDAMPP to better understand and address the concerns of each stakeholder group. Discussions have already begun to define tangible steps that we can take to together accomplish this goal.

It is our hope that the provided data will reassure medical physics graduate and residency training programs that the MPM continues to enjoy broad participation from accredited residency programs. In response to concerns that have been expressed by some programs and students, the Education Council of AAPM has begun working with program directors, students, CAMPEP, SDAMPP, and other relevant committees within AAPM to better understand the reasons for non-participation, to take efforts to respond to concerns raised by program directors and candidates, and to improve the overall MPM process. We welcome your comments and feedback on this matter. ■

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INTERVENTIONAL ONCOLOGY AND MEDICAL PHYSICS—HIT THE TARGET

SCIENCE COUNCIL REPORT
Rebecca Fahrig | Forchheim, Germany ■ Elena Nioutsikou, PhD Forchheim, Germany

In 2018, there were 18.8 million radiation therapy procedures in the U.S. alone, carried out across 2,270 radiation therapy sites.[1] The number of interventional oncology treatments is much less, about 786,000 worldwide. Interventional oncology covers a broad field of therapies, including endovascular delivery of embolic and/or radioactive material, percutaneous needle-based ablation via delivery of radiofrequency, cryoablation, microwave ablation or irreversible electroporation and non-invasive high-intensity focused ultrasound (HIFU). Interestingly, these interventional therapies are growing at a rate of ~ 9% each year,[2] being used especially when surgery is not possible due to the size, number or location of the tumor(s), and/or status of the patient. As stated by the European Conference on Interventional Oncology "... the minimally invasive nature of the treatments means they cause less pain, (have) fewer side effects and (have) shorter recovery times. Many IO procedures can be performed on an outpatient basis, freeing up hospital beds and reducing costs."

Although such treatments are not within the traditional arena of radiation-based medical physics, there are in fact many similarities between the workflow steps for external beam radiation therapy, and a typical minimally invasive interventional procedure. Figure 1 below provides a high-level view of the workflow in interventional oncology, and for those familiar with radiation oncology workflows, there are similarities and a few differences between the two therapy approaches. As Rebecca pointed out, "We recognized that a lot of the tools built by medical physicists for radiation therapy delivery, like auto organ contouring, identification of organs/vessels at risk, and tumor contouring with automatic margin expansion were exactly what was needed for planning interventions like ablation and embolization. Medical physicists have also invested a lot of time into optimizing patient positioning, and pushed intra-therapy tracking of patient motion. In other words, in radiation oncology the tools already exist for most of the planning work that is needed for interventions like ablation and embolization. We'd like to leverage this foundation to automate the therapy planning process, and hopefully speed up the adoption of these new interventional oncology therapy options."

A quick look at future trends and challenges further highlight opportunities for cross-fertilization between radiation therapy and interventional oncology. Below, we outline three big-picture challenges and opportunities shared by the two fields.

Rebecca Fahrig (VP of Innovation for Advanced Therapies) and **Elena Nioutsikou**, (Cancer Therapy) are long-standing members of AAPM who work at Siemens Healthineers. Four years ago Siemens Healthineers established 'Advanced Therapies' as a separate business area, combining the topics of radiation oncology treatment planning, proton therapy, radiation therapy, and interventional oncology. Rebecca and Elena have been working together to identify the overlaps and synergies that bring the fields of radiation therapy and interventional oncology together. In this article, some of the opportunities and the challenges in intersecting the two fields are highlighted. Importantly for AAPM members, there are opportunities to increase the adoption of interventional oncology procedures, providing another tool in the fight against cancer.

The Research Spotlight highlights projects, people, and emerging science in medical physics. Suggestions for future articles are welcome. This article is arranged and edited by the AAPM Research Committee.

a) Cinematic Rendering of CT image of the thorax, including segmented small lung lesion overlay in yellow.
b) Simulation of radiation therapy treatment beams.
c) Simulation of ablation needle access path, and simulated ablation zone.
Image Courtesy of MAASTRO Clinic, Maastrich, The Netherlands; Rendering image and plans are for illustration purposes only.

Therapy pathways

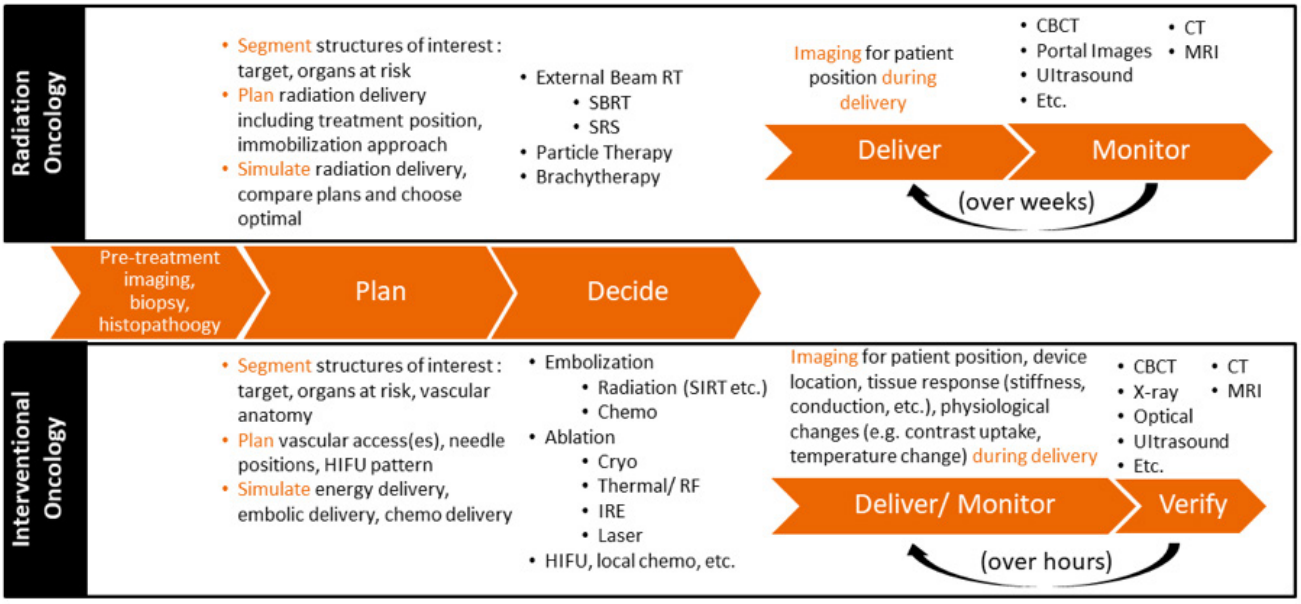

Figure 1: (top) Simulation of a radiation therapy plan and a percutaneous needle ablation plan for a small lung nodule. (bottom) A high level comparison of therapy workflows for radiation oncology and interventional oncology.

SCIENCE COUNCIL REPORT, Cont.

First, radiation therapy and interventions today are often administered with an intent to palliate rather than cure. The question is, how can we improve therapy delivery to offer more curative options to the patient? In radiation oncology, we've seen decades-long efforts aimed at improved targeting which leads to a maximization of the therapeutic ratio. In external beam therapy, these efforts have led to highly targeted techniques such as stereotactic body radiation therapy (SBRT), and in turn to dramatic improvements in 5-year survival of non-small cell lung cancer (NSCLC).[3] Similarly, in the last few years combination of needle-based radiofrequency (RF) ablation with advanced planning and intra-procedural guidance and imaging, has led to a drop in local recurrence rates within 6 months from 30 to near 10%.[4] If medical physicists take on a larger role in interventional therapy planning, then they can partner with the planning and guiding of the patient triage process between different or combined therapy options. Judicious combinations of radiation and interventional approaches may move a patient's plan from palliative to curative, with a lower morbidity than surgical approaches. Interestingly, both ablation therapy and radiation therapy have recently shown to be valuable in 'priming' the body's immune system to respond to immunotherapy, which opens the door to many fascinating possibilities and questions.[5]

A second challenge faced by both radiation therapy and interventional oncology is the increase in technical complexity, which can perhaps be seen as a consequence of high-precision patient-specific therapy delivery. To quote **Dr. David Jaffray** speaking at the 2016 ICEC workshop "Design Characteristics and Implementation of a Novel Linear Accelerator for Challenging Environments," "...we need to bury the complexity!"[6] How can technology be both more enabling and also open to less skilled operators? The move towards fully automatic treatment planning is one step along the road, but this requires automatic calibration and outcomes validation procedures, as well as streamlined human-machine interfaces so that more patients can access the highest level of care. This is of course one area where medical physicists have already made several strong contributions, for example knowledge-based treatment planning and decision support tools. However, as technological complexity seems to develop at least as fast as the tools to deal with it, it is clear this will be an important area of research and clinical implementation for the foreseeable future.

The third, but perhaps the most important challenge, is the fact that the treating physician is faced with making a treatment modality choice amongst a multitude of different options. At the moment, the number of patients who could benefit from potentially curative interventional oncology techniques is much larger than the number that receive them. The choice of treatment for a particular patient is often based on non-patient-related factors, such as availability of an interventional radiologist trained in the technique, reimbursement opportunities, release of particular systems/devices/materials in a specific market, access to the image guidance platform, etc. And in fact, interventional treatments have been slow to make their way into international treatment guidelines. From Elena's perspective, "As a radiation therapy [RT] physicist, I see a strong synergy in the way that medical physicists can contribute to establish interventional oncology as a valid treatment option, just as they have been doing for RT over decades. Firstly, interventional oncology is a discipline that could benefit from a comprehensive QA program to provide consistency and assure safety along every step of care delivery. Second, because interventional oncology continues to be a rapidly evolving field from a technical point of view, we need structured clinical studies that incorporate imaging into planning as well as treatment adaptation to establish validated outcomes. Third, better integration of modalities such as MR can even enable biological guidance intra-procedurally, providing quantitative therapy endpoints."

Interventional oncology is an exciting and rapidly growing field comprising a number of therapeutic interventions. Many of the challenges that must be met for successful interventional oncology align closely with those for successful radiation oncology treatments. To put it simply: find the tumor, hit the tumor! The audience of this article will appreciate that this theme is easy to say, but in practice requires careful planning and effort to do well.

Despite their common ground, radiation oncology and interventional oncology are not closely associated in most hospitals for a variety of historical and structural reasons. However, increased cooperation would bring mutual

benefit to both disciplines. In particular, interventional oncology is a clinical discipline that could benefit from the skill set of medical physicists as they seek to expand their role and presence in a rapidly changing health care landscape. Looking to the future, it is clear that some of the 'big questions' facing these disciplines will also be shared: How can we incorporate diagnostic data (imaging and biopsy based) to predict which patients will respond well to different treatment approaches and plan accordingly? How can we best 'mine' our clinical data and use it to improve our performance? What will be our role in the rapidly developing field of immunotherapy? How can we make advanced technological solutions available to the global population? Medical physicists are well placed to help address these questions, and should seek out opportunities to further engage with the field of interventional oncology, with an ultimate goal of unification of the technical basis of these two disciplines. ■

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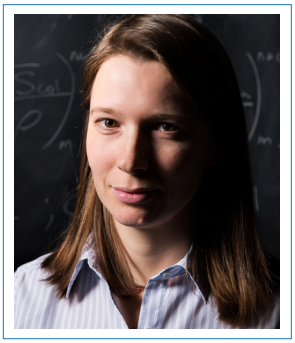
SPECIAL INTEREST FEATURE: Women's Professional Subcommittee

ACTIONS TO ADVANCE EQUITY, DIVERSITY, AND INCLUSION IN MEDICAL PHYSICS

Rowan M. Thomson, PhD | Ottawa, ON | Twitter: @CLRPhysics, @CarletonMedPhys



Worldwide, the gender gap persists in science and medicine. Recent research considered 36 million authors publishing in >6000 journals in Science, Technology, Engineering, Mathematics, and Medicine (STEMM) and quantified the gender gap among researchers and disciplines, as well as its rate of change [1]. In physics, 13% of authors in the senior author position are women and this is rising by only 0.1% per year. Modelling suggests that "it will be 258 years (95% CI 194-383) before the gender ratio of senior physicists comes within 5% of parity." [1] The current rate of progress means that closing the gender gap in physics will take generations! Medical physics outperforms some other physics subdisciplines with 22% women as authors on journal papers in 2016, rising by 1% per year.

Various factors contribute to the disparities in representation of women and other groups in STEMM [2,3], and recent research provides more insights and data. Witteman et al (2019) analyzed application success for 23918 grant applications from 7093 principal investigators in the Canadian Institute of Health Research (CIHR) grant programs between 2011 and 2016, contrasting results for two new grant programs, one with and one without an explicit review focus on the calibre of the principal investigator [4]. Across competitions, application success was 15.8%. The probability of success in traditional programs was 0.9 percentage points lower for female applicants than males, and this persisted in the new program with an explicit review focus on the proposed science. However, in the new program "with an explicit review focus on the calibre of the principal investigator, the gap was 4.0 percentage points." [4] Witteman *et al* conclude that "gender gaps in grant funding stem from women being evaluated less favourably as principal investigators, not from differences in the quality of proposals by men and women." They further note that "Bias in grant review, whether individual or systemic, prevents the best research from being funded. When this occurs, lines of research go unstudied, careers are damaged, individual rights and potential go unrealized, and funding agencies are unable to deliver the best value for money both within funding cycles and longer term as small differences compound into cumulative disadvantages." [4]

This research appeared in a February 2019 issue of *The Lancet* dedicated to advancing women in science, medicine, and global health, recognizing "that women are under-represented in positions of power and leadership, undervalued, and experience discrimination and gender-based violence in scientific and health disciplines across the world." [2] Besides providing data demonstrating disadvantages and challenges for women, the issue provides powerful articles to debunk myths as well as suggesting actions directed at institutional-level change in order to achieve lasting consequences.

Reflecting on biases, while critical to addressing the gender gap, "can be difficult for professions like science and medicine that are grounded in beliefs of their own objectivity and evidence-driven thinking." [2] Kang and Kaplan address five myths about diversity and inclusion, underlining the importance of debunking the myth that promoting diversity contravenes meritocracy [5]: "One of the most commonly cited explanations that people provide for rejecting diversity initiatives is that their organisations are meritocratic… However, an abundance of research evidence shows our so-called meritocracies are not so meritocratic… if anything, underlying biases appear to be causing the current meritocratic systems to bypass many highly capable women and members of other minority groups." They argue for the need for comprehensive interventions enabling structural and systemic changes.

Addressing the gender imbalance in medicine and science "is not only a matter of justice and rights, it is crucial for producing the best research and providing the best care to patients.

If the fields of science, medicine, and global health are to hope to work towards improving human lives, they must be representative of the societies they serve. The fight for gender equity is everyone's responsibility." [2]

Medical physicists are well poised to be part of comprehensive actions to effect lasting changes, and member organizations, such as AAPM, universities and colleges, research institutions, hospitals and others must take action. The following are some ideas for the journey towards advancing equity, diversity, and inclusion (EDI):

1. *Strategic priority:* Make advancing equity, diversity, and inclusion a strategic priority, included in the organization's mission statement, underscoring that collective effort is required to effect broad-based lasting change.
2. *Leaders must visibly support EDI initiatives:* "engaged leaders who actively and visibly challenge long-held beliefs around gender and merit are essential, particularly male leaders and those with power, privilege, and social capital." [6]
3. *Gender-balanced and diverse scientific/professional meetings:* Women continue to be overlooked as invited and keynote speakers at conferences, workshops and seminar series. Seeking gender balance in these contexts (i) enriches the development of highly qualified personnel, (ii) enhances researcher career progression, and (iii) advances research [7]. Practices to achieve more diversity include: collecting data on gender balance and diversity at meetings/conferences, and reporting the data; developing a speaker policy regarding this issue and making it visible; ensuring organizing committees are balanced and informed; building databases of speakers; providing support [7].
4. *Mentor-mentee networks:* Facilitate and foster mentor-mentee connections to provide students, trainees and more junior professionals with role models and support to remain in the field. For example, in October 2019, the Women's Committee of the Canadian Organization of Medical Physicists facilitated pairing of mentors and mentees in medical physics.
5. *Allyship:* Empower colleagues to become allies. Allyship is an action that can involve "speaking up in support of women, amplifying their voices, and calling out discrimination when it happens rather than remaining silent. Effective allyship requires self-awareness, hard work, practice, humility, respect, commitment, and accountability." [6]
6. *Visibility:* Make women's contributions to science and medicine visible, e.g., through online galleries highlighting contributions, through events such as Ada Lovelace Day and the United Nations' International Day of Women and Girls in Science (#iamaphysicist campaign). This will help challenge broader societal stereotypes and reduce/eliminate early-life stereotyping of boys and girls that limits their perceptions of career and life options.
7. *EDI Training for all professionals:* Make training on the principles of equity, diversity, and inclusion mandatory for all leaders and supervisors, and for organizations as a whole. Online training is readily available, e.g., links at Canada Research Chairs Secretariat's Equity, Diversity and Inclusion website, "Understanding unconscious bias video" by the Royal Society.
8. *Criteria for awards and employment:* Ensure that criteria for awards, fellowships, promotions, and hiring are balanced, fair, explicit, and equitable. For example, rigidly requiring award applicants to be within a certain number of years of their PhD or other degree may disadvantage certain applicants, predominantly women, who may have had career interruptions or slowdowns due to maternity leave and family responsibilities.
9. *Practice equity, diversity and inclusion within all committee work*: committee membership should be balanced, and work informed by EDI principles.

10. *EDI awareness for students:* Undergraduate and graduate training programs in science and medicine should include "awareness and education around gender stereotypes, intersectionalities, and the value of diversity in improving outcomes in science and medicine." [6]

As a major organization with a diverse membership of more than 8000 medical physicists worldwide, the AAPM can play a major role in advancing EDI, providing a united voice for the importance of EDI in science and medicine. As concluded by *Coe et al*, "We need leadership, awareness, education, actions, intentionality, accountability, and, perhaps, most of all, courage." [6] I believe that AAPM members have all the skills to embark and continue on the journey of advancing EDI in the diverse practices of Medical Physics. I challenge fellow AAPM members to find the courage to question the status quo, and collaborate to advance Equity, Diversity, and Inclusion in medical physics. ■

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DIVERSITY IN PHYSICS: COMMENTARY AND REMEMBRANCE OF ANN NELSON

Jennifer Pursley, PhD | Boston, MA

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Commentary: Diversity in physics: Are you part of the problem?

Ann Nelson, Seattle, WA

Many leading academic physics departments have no underrepresented-minority faculty members. My own department at the University of Washington has never had an African American tenure-track faculty member. That state of affairs is taken for granted, but it should be regarded as shameful.

At Stanford University in the late 1980s, I was the first tenure-track woman hired in physics; the applied physics department and SLAC still had none. Yet my appointment (granted to increase diversity in the physics department) immediately made the percentage of female physics faculty at Stanford well above the national average. At that time, having no women in a physics department was viewed as normal.

I often get asked, "Why are there so few women in physics?" That anyone would ask that question shows how oblivious many people are to the sexism and bias that permeate our society and physics culture.[1] I may not be able to fully answer the question, but I can tell you why there are women like me in physics. Because we love math and nature. Because we like doing computations and figuring things out, step by systematic step. We love the flashes of insight and the excitement of revelations from new data. We revel in breathtaking moments of awe. And we had support, mentors, encouragement, opportunities, and colleagues who gave us a positive view of ourselves as physicists.

Still, there are very few of us in the US. Many great articles are filled with infuriating anecdotes about the obstacles women scientists face.[1] I suspect few of my colleagues have read them. Even when they do read studies addressing gender issues, white men typically devalue them. My impression is that many physicists think the issue is complicated, is "not my fault," and likely has nothing to do with them. Publications about bias often use the word "subtle" for effects that are obvious to those who experience them.[2]

African Americans, Native Americans, and Latinx and Hispanic Americans are particularly underrepresented in physics, even more so than white and Asian American women. The underrepresentation is even more egregious for African American, Native American, and Latina women. We physicists love data, and the numbers are shocking.[3] The reasons for underrepresentation are complex, but they are not subtle. A successful career in science is a difficult achievement; it requires that opportunities, abilities, and interests align and that pitfalls be avoided.

The effects of impediments are magnified for minorities. Without support mechanisms in place, a single conversation, setback, or harassment incident can be inordinately damaging, and every minority physicist I know has received multiple such wounds. Although the problem is entangled with class, early education, culture, and history, simply dismissing it as difficult, throwing a few programs at it, and hoping for gradual progress

I first heard of Ann Nelson when I was a graduate student in experimental particle physics; she was a brilliant theoretical physicist who made major contributions to many areas of particle physics – electro-weak symmetry breaking, supersymmetry, neutrinos, cosmology, and more! But it wasn't until I saw her 2017 article in Physics Today on diversity that I learned she was also passionate about social justice and promoting women in physics. When I asked her for permission to reprint her article, she immediately agreed. Tragically, Ann died in a hiking accident this August. Her obituary published in *Physics Today* includes many touching comments from her husband, friends and former students, memorializing the tremendous impact she had on their lives. She will be sorely missed not only for her scientific brilliance but also for her unselfconscious efforts to make the world of physics more welcoming and diverse.

is a cop-out and a major failure. Despite several excellent programs and the publicly avowed goal of increasing diversity in physics, the percentages of underrepresented groups are increasing excruciatingly slowly if at all. The percentage of faculty members who are African American actually decreased[3] between 2008 and 2012. Even though a similar percentage of incoming African American undergraduates express an interest in physics, as do members of other groups, black Americans at the physics PhD level are underrepresented relative to white Americans by a factor of 8.5.

Addressing the covert and overt racism and the unwelcoming culture in most physics departments is a great place to start correcting the problem. Often, I hear physicists say they don't pay attention to race, sex, or discrimination and only are concerned with scientific merit, but problems are not difficult to notice if you pay attention.

Blatant examples of hostility and discrimination are frequent. Classic examples include minority physicists being told they only got into some program or received some award because of their race and female physicists being asked about marital status and childbearing plans. One woman accidentally overheard her mentors expressing disappointment that she had married, because "married women always drop out." Mishandled or covered-up sexual harassment cases have made the news recently (see, for example, *Physics Today*, June 2016, page 30), but the publicly reported ones are the tip of the iceberg.

Slightly more ambiguous instances, such as being mistaken for a secretary, a janitor, or a criminal, are even more numerous. Colleagues will tell me that such incidents only happen occasionally, and that people should quit being so sensitive. Often, I am told about white male physicists who have also encountered serious difficulties—a way to push the blame away. I have been told that more subtle cases of poor treatment are due to individual characteristics of the victim. For instance, if only a woman dressed or presented herself differently, she would not be harassed, or someone has just not accomplished enough or has a difficult attitude, as if that would justify disrespecting someone.

Implicit bias is prevalent even among members of underrepresented groups. We all have biases and privileges that we aren't unaware of. A famous example of unconscious bias occurs in orchestra auditions. When they are done "blind," so that decisions are made without judges knowing the applicant's gender, 50% more women are selected.[4]

It is not enough for each of us to be supportive and to strive to overcome our unconscious biases. Members of underrepresented groups often justifiably feel tremendous anxiety and lack of confidence. They can feel alienated by the hostile and competitive culture of science and academia, the lack of encouragement, disparaging comments, and harassment. As a result of the lack of diversity in the field, most physics departments have no faculty members with the sensitivity and knowledge to encourage and mentor students who experience the effects of racism and discrimination.

I saw firsthand, as a faculty member at Stanford in the late 1980s, how the presence of even one African American faculty member who is an effective mentor can foster a supportive community and make a huge difference. While **Arthur Walker** was a professor there, Stanford produced more than 40 African American PhD physicists, far more than any other leading research university. Walker was also the PhD adviser of **Sally Ride**, the first female astronaut. Similarly, the presence of **James Young** on the MIT physics faculty was critical to fostering a climate that allowed for the success of many African American PhD students, including **Shirley Ann Jackson**, MIT's first African American female PhD and the current president of Rensselaer Polytechnic Institute, and **Sylvester James Gates Jr**, the first African American physicist to hold an endowed chair in physics.

I have heard many times that the lack of diversity in faculty hiring is entirely a pipeline issue. However, a good deal of data and anecdotes show otherwise.[2,3] The attrition rate for minority PhDs is horrendous, even among those who have received PhDs from top-ranked physics departments. In multiple physics departments, I have witnessed tremendous attachment to the idea that faculty hiring should be an exercise in evaluating scientific merit according to objective criteria. The fact that some candidates have to meet those criteria while contending with bias, hostility, and barriers is

generally viewed as a secondary consideration, as is a candidate's ability to improve the departmental environment for underrepresented minorities.

A frequently used measure of objectivity that is actually discriminatory is for faculty members to informally poll their friends at other universities. The old-boy network of people hiring according to friends' recommendations still flourishes. It is well documented that people feel more comfortable with and rate more highly those who are like them.[5] The fact that university administrations typically apply pressure to ensure diversity in candidate short lists is viewed by many faculty with cynicism and may subject minority candidates to additional scrutiny. If we truly care, we must go beyond standard operating mode and place a much higher priority on the ability of faculty members to mentor students from underrepresented groups and to foster an inclusive physics culture. To do that, we must change our attitudes in hiring decisions and hold our colleagues accountable to do the same.

Let me be clear. If your career is established and you are not making an explicit and continual effort to encourage, mentor, and support all young physicists, to create a welcoming climate in your department, and to promote the hiring of diverse faculty members, you are part of the problem. This is a critical issue of civil rights in our field. Albert Einstein, an activist on the issue of racism, is an excellent example that no matter how great a physicist you might be or what obstacles you have overcome, you have not earned the privilege of ignoring our diversity problem.[6]

In addition to offering encouragement, collaboration, and mentorship, you should be ensuring racial and gender diversity on speakers' lists, committees, and job short lists and making increased diversity a high priority for all faculty hiring. Not only is the lack of inclusion unfair, but it fails to maximally exploit the talents of a great humanity. ■

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2019 WOMEN'S PROFESSIONAL SUBCOMMITTEE MEETING AND HAPPY HOUR

Jennifer Pursley, PhD | Boston, MA

The WPSC met on Saturday July 13, 2019, before the start of the AAPM Annual Meeting in San Antonio, TX. Attendees included committee members and guest members of AAPM, who are always welcome to join the meeting. **Laura Cerviño**, Committee Chair, led the discussion, which started with a round of introductions including introduction of the incoming Chair, **Kristi Hendrickson**. The first topic was the annual WPSC luncheon scheduled for later in the week; despite increasing capacity this year, the event was again sold out with a waiting list. The luncheon working group, led by **Jaclyn Marcel**, noted that it was more challenging to fundraise enough to cover the increased cost of a larger event, despite increasing the registration cost this year. Several solutions were debated, including advertising more prominently the option for members to donate to defray luncheon costs and including a donation question on the post-luncheon survey. The recent revision of Professional Policy 31, the AAPM Policy against harassment and disruptive behavior at meetings, was also brought up. The Ethics Committee, which has not yet received any complaints covered by PP-31, asked for the WPSC's feedback on the policy and to participate in the ongoing discussion of appropriate AAPM responses to incidents. On a related note, the group discussed the prevailing misconception that sexual harassment and gender-based discrimination are not an issue in AAPM; many members have personal stories of their own or of a friend experiencing a form of harassment. Sometimes stories are more powerful than statistics, and the most effective demonstration that this is an ongoing concern may be to share anonymized stories of real incidents; this could be the topic of a future WPSC newsletter. As for the newsletter, the group decided to once again propose the formation of a newsletter working group, to keep the newsletter going strong even after the current editor, **Jennifer Pursley**, rotates off the WPSC. Several meeting guests offered to help with newsletter content and their articles are featured in the fall 2019 issue! Planning also continued for a leadership conference targeted for mid-career women; the proposed date is in 2021, just before that year's AAPM Annual Meeting in Columbus, OH. The workshop proposal has been drafted and is currently under review. The meeting took the full two allotted hours and members continued discussions throughout the week. There's a lot going on, and members interested in any of these topics are encouraged to reach out to the committee. Please make plans to join us for the meeting next year in Vancouver!

The WPSC is working on many new initiatives and always looking for members interested in contributing! To learn more, contact the Chair, Laura Cerviño, or reach out to all committee members. ■

As an extra opportunity for socializing and networking, on the afternoon of Tuesday, July 16 the WPSC and Diversity and Inclusion Subcommittees hosted their Third Annual Joint Happy Hour. Everyone in AAPM was invited to meet up for drinks at Guadalajara Grill in La Villita before the AAPM Night Out. This year we had an amazing turnout of new and familiar faces, occupying every seat on the outdoor patio and giving attendees the chance to reconnect or meet new people. We look forward to organizing a similar event at next year's Annual Meeting in Vancouver, BC; the exact location and date will be advertised in the spring WPSC newsletter and posted on the meeting website, under the link for "Special Events — Women Physicists Luncheon and More."

WPSC NEWS BITES

Jennifer Pursley, PhD | Boston, MA

CONGRATULATIONS to all new AAPM fellows and awardees! The WPSC would particularly like to recognize the exceptional group of women who received the distinction of FAAPM: **Bette W. Blankenship, MS; Rebecca Fahrig, PhD; Anne W. Greener, PhD; Amy S. Harrison, PhD; Katja M. Langen, PhD; Jessica R. Lowenstein, MS; Martha M. Matuszak, PhD; Xiangrong (Sharon) Qi, PhD; Donna M. Reeve, MS; Donna M. Stevens, MS; Iris Z. Wang, PhD**; and **Sharon White, PhD**. Special congratulations also to **Ellen D. Yorke, PhD**, for receiving the Edith H. Quimby Lifetime Achievement Award!

If you're attending this year's RSNA in Chicago, check out these events sponsored by the American Association for Women Radiologists (AAWR). In particular, there is a panel discussion on tackling imposter syndrome on Monday Dec 2 and several other networking events requiring advance registration.

MAKING A DIFFERENCE! Graduate student **LaNell Williams** is only the third African-American woman to pursue a PhD in physics at Harvard, and when she graduates she will be one of fewer than 100 African-American women to have received a doctorate in physics in the US since 1973. She knows the feeling of not seeing anyone around who looks like her, and of being discouraged from "reaching too high" by applying to prestigious programs. In response, Williams co-founded the Women+ of Color Project while a student at Wesleyan University to encourage and support women of color in STEM fields. Recently the group ran a three-day workshop at Harvard attended by 20 African-American, Latinx, and Native American women interested in pursuing careers in physics and related fields — a great example of how to promote change!

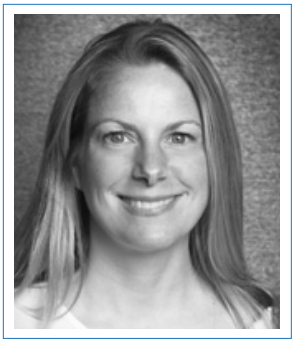
The American Institute of Physics (AIP) publishes *Physics Today*, the most closely followed magazine in the world for physics research updates and physics-related topics. This year *Physics Today* has featured several interesting articles related to women in physics. One is a Q&A with Kandice Tanner, a PhD physicist who went on to learn more about biology and now works at the NIH leading a group investigating tumor microenvironments and their role in cancer spread. Another thought-provoking article posits that the media portrayal of Katie Bouman after the release of the first black hole image highlighted subtle cultural stereotypes of women in physics. **Jami Valentine Miller** shared her motivation for forming the group AAWIP, African-American Women in Physics, as a resource for each other and departments searching for diverse representatives in their field. A related publication, *Physics* from the American Physical Society, shared this viewpoint on studies showing that sexual harassment is still a major factor discouraging women from continuing in physics and how the physics community could strive for change.

HOW TO BE AN ALLY: the Association for Women in Science (AWIS) is one of the leading advocates for women in STEM and one of their newsletters featured this article aimed at men who want to help address gender and equity disparities, but don't know how to start. It's a quick and interesting read and can easily be passed along to colleagues as a starting point for a discussion about providing support for diversity in the workplace.

SEEKING CONTRIBUTORS! The WPSC Newsletter is published biannually in the spring and fall, and we are always on the lookout for news, stories, ideas, and features related to women in medical physics to include in future editions. Contributions and suggestions can be sent directly to the WPSC. ■

ONSITE CHILDCARE AT 2019 AAPM ANNUAL MEETING IN SAN ANTONIO

Kristi Hendrickson, PhD | Seattle, WA



Onsite childcare was available for the second year in a row at the AAPM Annual Meeting in San Antonio. Camp AAPM was located in a large and secure conference room within the San Antonio Convention Center. The program was managed onsite again by Accent on Children's Arrangements, Inc., a national childcare provider that works with many professional and medical organizations at their national meetings, including RSNA.

Sixteen families utilized the services, with a total of 19 kids from six months to 12 years (see Figure 1). Children participated in age-appropriate activities including arts and crafts, active games, and more. All staff were trained childcare providers, and the supervisors located onsite at all times were CPR and pediatric First Aid certified. Registration was available for half and full days during the general hours of 7:00 am to 6:30 pm, starting on Saturday July 28 through the end of the meeting on Thursday, August 2. Registration was available for any or all of the available dates. This year the dates were extended to include committee meeting dates that precede the official start of the annual meeting. ■

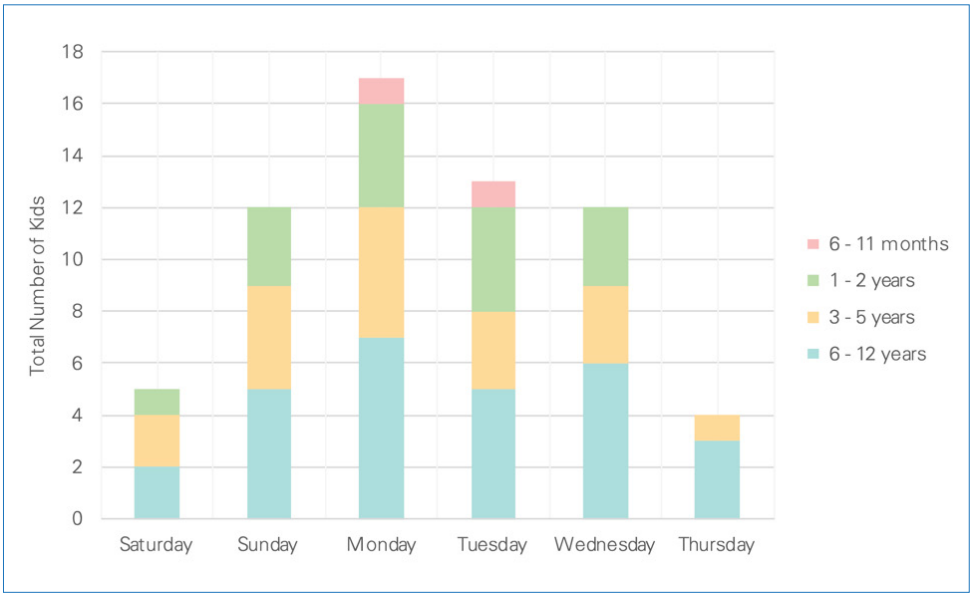


Figure 1: The graph shows the number and age range of children who attended Camp AAPM in 2019 at the Annual Meeting in San Antonio.

"For the 2nd year we again found the on-site childcare to be extremely convenient. They are open from 30 minutes before the first session until 30 minutes after the last session. If you sign up for the full day, you can drop off and pick up any time you want, and even take the kids out for a while and bring them back later. Just designed to be convenient for us.

Our daughter made a friend with another child there and was sad when the AAPM meeting was over and she had to say goodbye."

—Chuck Bloch

"I think the on-site AAPM childcare is one of the smartest features in the AAPM annual meeting. Attending the annual meeting is a great source of my continuing education, learning the state-of-the-art clinical and research programs, and networking with fellow physicists. However, being away from home for many days makes my childcare extremely difficult at home. I'm very thankful to the on-site childcare that allows me to attend the meeting without having to worry about my childcare. My son really enjoyed playing with other physicists' kids and he's looking forward to the next meeting!"

—Minsun Kim

Accent will return to provide childcare services for the 2020 Joint AAPM/COMP Meeting in Vancouver, Canada. Preregistration is advised and can be completed when you register for the annual meeting. Look for the childcare tab under annual meeting information.

ASSESSMENT OF EQUITY, DIVERSITY, AND INCLUSION CHALLENGES AND STRENGTHS IN THE MEDICAL PHYSICS FIELD

Yiwen Xu, PhD | Boston, MA

Upon entering the conference room hosting this session at this year's AAPM meeting, I was kindly instructed to have a seat at a round table with unfamiliar faces. At conferences we are supposed to network, but usually, we end up sticking with people we already know. Unfortunately, I am especially guilty of such conduct. This demonstrates how some aspects of equity, diversity, and inclusion (EDI) may be challenging to initiate, but that is why we are at this session, to educate ourselves on how to attain an inclusive behavior in our multicultural country and now work environment.

Drs. Julianne Pollard-Larkin and **Laura Cerviño** welcomed the audience to the session with an introduction to different committees within AAPM and their goals. EDI was then explicitly defined to help alleviate misunderstandings and also address the question of why these topics need to be discussed. They then presented statistics which both demonstrated positive trends of increasing diversity, but at the same time leave much room for improvement.

Personally, I was already aware of the existence of the Women's Professional Subcommittee but not the Diversity and Inclusion Subcommittee (formerly the Women and Minority Recruitment Subcommittee). I have seen, first hand, friends of mine give up their dream of being an engineer because they could not overcome their belief that women, including themselves, could not be good at math. To see that there is a group of individuals working to increase the numbers of women and minorities in medical physics through establishing collaborations and diversity focused recruitment activities was very uplifting.

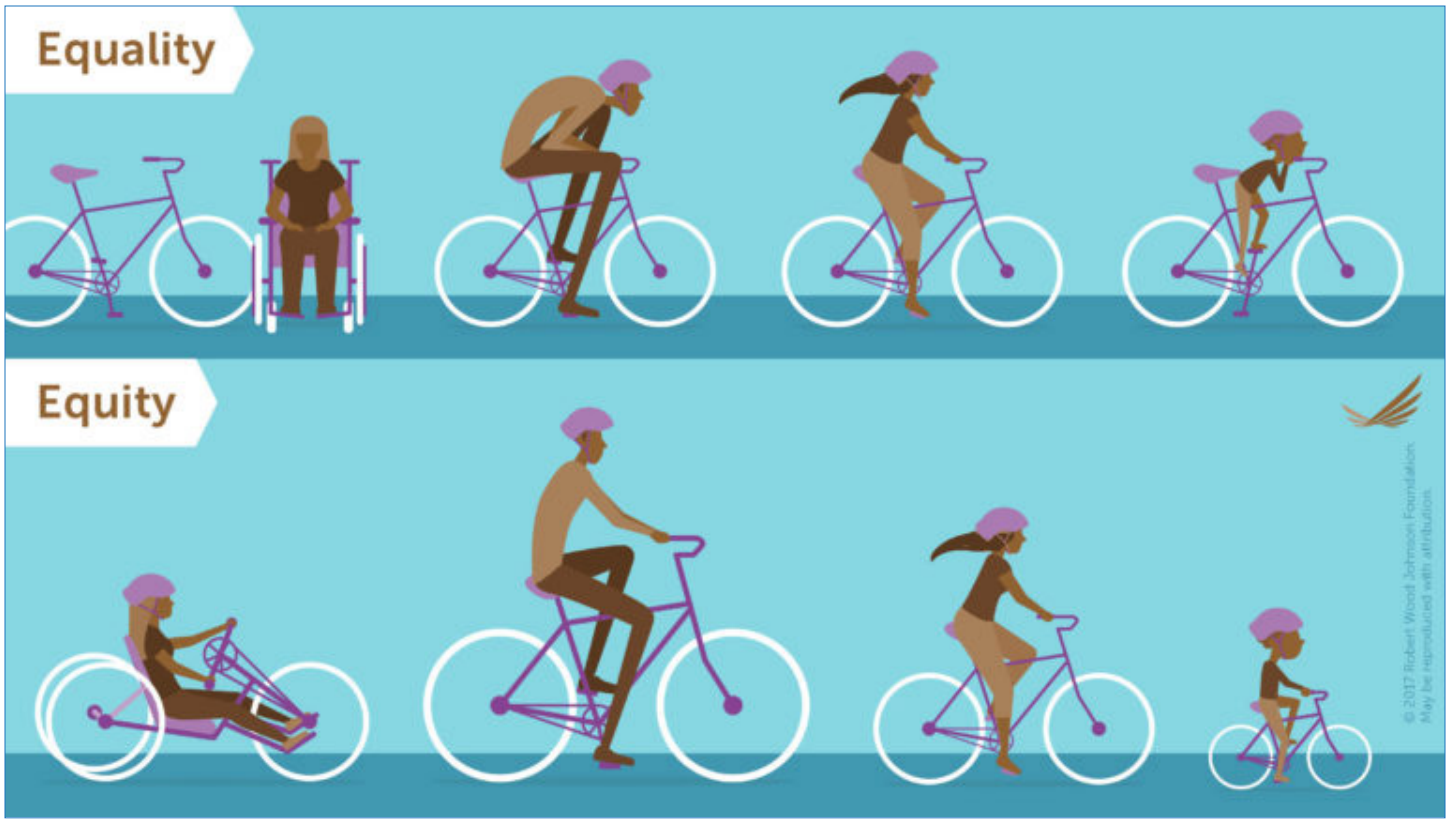
Another concept from the session which struck me is that Equality ≠ Equity. Equality is giving everyone the same treatment, while equity is giving everyone the same access to opportunities. A group of diverse individuals may not necessarily be inclusive, but some members of our society have the misunderstanding that gender and racial disparities do not exist because there is more diversity than there used to be. It is true that disparities are reducing, and Drs. Cerviño and Pollard-Larkin cited some of the very promising statistics from the American Institute of Physics.[1] The percent of women physicists has risen from under 10% in the 1950's to over 45% in 2016, and approximately 50% of high school physics students today are female. We have also seen an increase in women physicians over recent years with the number of female physicians overtaking male physicians in 2017.[2]

However, looking a little closer to our field, the increase in female radiation oncologists is only 0.3% per year. Fewer than 20 African-Americans earn a PhD in physics in each year in the US. The number of Hispanic-American PhD graduates is slowly increasing, with just under 40 graduates in 2016/2017.[3] A climate survey indicates around 21% of medical physicists are female in US vs 47% in Europe.[4] Our own AAPM Professional Survey indicates that the average certified female PhD physicist makes less than the average certified male masters physicist.

In AAPM, we are ahead of other physics fields with the percent of female student members at 35% and non-Caucasian members at 34% in 2019, but we are furthering the initiative with continuous feedback and outreach programs. Committees within AAPM organize programs such as the Diversity Recruitment through Education and Mentoring (DREAM), Science Council Associates Mentorship for Undergraduates, and the Med Phyz Wiz Kidz outreach event at the Annual Meeting. We collect information via the EDI climate survey and disseminate information in forms such as the WPSC Newsletter, the annual luncheon and social hour, as well as participate in the Annual Biomedical Research Conference for Minority Students (ABRCMS).

We concluded the session with vibrant discussion and brainstorming within our unfamiliar groups on the concepts of EDI. I could sense that some individuals were more vocal on these topics than others. This slight discomfort to discuss EDI could be a combination of one's general comfort in speaking up and also that the concepts of EDI can be unfamiliar or sensitive. Sessions such as this one teach us how to incorporate EDI concepts in our daily vocabulary, reinforce the necessity of supporting women and minorities at our work, and encourage us to participate in the many initiatives aimed at improving equity.

Some suggestions for how to get involved in promoting EDI within



AAPM are to participate in any of the programs mentioned here! Apply to be a mentor for DREAM or encourage undergraduates to apply for the program; participate in WPSC events and D&I events at the Annual Meeting and contribute topics for the WPSC newsletter; mentor students and junior faculty and encourage them to increase their network of mentors (mentorship can double faculty productivity!); or, at least stay aware of AAPM's ongoing EDI efforts and participate in their climate surveys. There are many efforts outside of AAPM as well, such as ASTRO's Pipeline Protégé Program or various leadership diversity awards through hospital and university systems. And there are many conferences aimed at underrepresented minority students which medical physicists could participate in to raise awareness of our field; in addition to the ABRCMS, there is the Society for Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS) or the Conference for Undergraduate Women in Physics (CUWiP). ■

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FEATURED PHYSICIST: DR. CARRIE HRUSKA

Ashley Tao, PhD | La Crosse, WI

I have been very fortunate to work with several women physicists in my short career. Each one has inspired me and contributed to who I am today. As a new member of the WPSC and recent residency graduate, I wanted to take this opportunity to highlight one of my many mentors: ***Carrie Hruska*****, PhD***, a medical physicist at the Mayo Clinic in Rochester, MN specializing in nuclear medicine with a special interest in breast imaging. She is an internationally recognized leader in developing molecular breast imaging (MBI) to improve cancer detection among women with mammographically dense breasts. I was excited to work on a research project with Dr. Hruska when I started the imaging medical physics residency program at Mayo Clinic. She was very enthusiastic about having me work with her group and the experience I gained during this time was invaluable.*

Dr. Hruska is an Associate Professor of Medical Physics and is ABR-certified in both diagnostic and nuclear medical physics. In addition to clinical work and research, she is an educator and mentor to residents and students at Mayo Clinic. She has an active role in several AAPM task groups and is Co-director of the Imaging Scientific Program for the 2020 AAPM Annual Meeting.

I would like to thank Dr. Hruska for taking the time to answer a few questions and the WPSC for allowing me to feature one of the many amazing women physicists in AAPM.

You studied electrical and biomedical engineering prior to becoming a physicist, what made you decide to go into medical physics and how did you transition to it?

I would love to say that I had a master career plan, but I have taken a meandering route to my current position. I have mostly just tried to follow my interests, work hard, and jump at opportunities as I saw them. I initially was set on studying something like art or photography, and also thought about creative writing or journalism- all interests I still have today. After a chance meeting with the Department Chair of EE at South Dakota State University (go Jackrabbits!) he convinced me that you can't go wrong with a solid foundation in engineering and that the career possibilities are endless. I do think that has been true. In college I was lucky to work in the SDSU Image Processing Lab and also was a summer student in MRI research at Mayo Clinic. These lab jobs, spent mostly with graduate students, showed me that grad school might be a good fit for me, so I came to Mayo to study biomedical engineering and specifically medical imaging. Here I met physicist **Dr. Michael O'Connor** and internist **Dr. Deb Rhodes**, who were starting a new research project in breast imaging (which eventually became molecular breast imaging), and were kind enough to take on a grad student to help with the work. Now 17 years later I joke that I just never left Mayo because my grad school project isn't done yet.

In that time I mostly worked on the technical side of research, making improvements to our gamma camera and optimizing the MBI test for patients, but I found that I really wanted to do imaging trials so I sought out several workshops on this and ended up pursuing a master's degree in Clinical Research. I also branched out into studying breast cancer epidemiology and imaging biomarkers with mentor **Dr. Celine Vachon**, who is known for her work in characterizing breast density as a cancer risk factor. Through this work I realized that I mostly want to do highly translational research that has a direct impact in clinical practice. When a clinical role as a medical physics was available at Mayo, I was ready, having gone through the ABR process for certification in diagnostic medical physics, and later getting an additional certification in nuclear medicine physics. Now I am fortunate to have a mix of both clinical physics

and research work in my job. Medical physics is a perfect area for learning and growth because there is always a new technology coming along that could be studied, improved, or used in a new way to help patients.

What advice do you have for women interested in pursuing a career in medical physics? Is there is anything you wish someone would have told you before entering this field?

The best advice I can give to young people starting their careers is to keep an open mind and take as many opportunities as you can manage to gain experience across a wide range of areas. You never know what talk or committee assignment will lead to a new opportunity that can help advance your career. Women in particular tend to underestimate our abilities and suffer from "imposter syndrome," which I know very well. It's important to understand that no one has it all together in their career.

The other thing I wish I had known was that there will be great successes and great disappointments throughout your career and this is just the natural course of work life.

In the past week alone, I had a manuscript published that was a source of great pride for me and the next day had a grant application I had worked on for months flat out rejected. Although my work is personal to me, I can't take these setbacks personally or I would be a wreck. I try to learn something from the feedback and then move on.

Have you come across challenges associated with being a female physicist that you would be willing to share? How did you overcome them?

I've certainly had some challenges that I hope weren't particular to being female, but more because of inexperience and dealing with a transition from the role of a student to staff member at the same institution, where I had to distinguish myself as someone with an independent career. In any challenge, I've found the best approach is to show your value by being reliable and producing high-quality work, to not be afraid to seek out additional training or advice from experts, and to always choose to be inclusive and collaborative. When I haven't done these things, I've regretted it and work has suffered. I'm grateful to interact with many fantastic women at Mayo who set a high bar for productivity and collegiality.

Everyone has a different story to tell in terms of how to balance their career versus family life. Can you share with us your story? What advice do you have for balancing family and work?

It's funny to me how I always thought I was so busy before I had kids. Now, life seems to move at light speed, but we are all happy and healthy and I'm extremely grateful for that. My husband, Tim, and I both have busy careers so we just try to be understanding and help each other out. I try to be really productive when I'm at work so I don't feel guilty leaving at a reasonable time at the end of the day. I also try not to let work creep into home time very much, because I have better ideas and more energy at work if I give myself downtime.

What is the most rewarding moment in your career?

In 2018, our MBI team, led by Drs. Rhodes and O'Connor, received the Mayo Clinic Team Science Award, which "recognizes the unique and valuable contributions of different insights, skill sets, and complementary expertise, without which the effort could not succeed." This recognition from our own institution and colleagues was really gratifying and also so accurately described the story of MBI. We started out as just a few people with a research question, but quickly added to the team several radiologists, technologists, study coordinators, statisticians, patients advocates and numerous others who worked together to bring this technology to patients. I was extremely proud to reflect on our years of successful collaboration and to remember the many women who have been helped by this technology.

What are some of your interests when you're not busy being a medical physicist?

I am deep in family life right now so have little time for interests of my own. I do enjoy raising our kids and going to their many activities. We like to travel, especially to national parks or to a beautiful lake in Minnesota. But I mostly enjoy being at home, fixing up things around the house, walking the dog, cooking, playing piano, or enjoying some silly TV show or movie with my kids. ■

HORMESIS, THE MEDICAL PHYSICS PODCAST

Irena Dragojevic, PhD | San Diego, CA

A few months ago, a medical physics podcast, Hormesis, was created by medical physicists **Alison Roth, Sean Tanny, Nicholas Sperling**, and **Andrea Herrick**. Sean, who spearheaded this idea, met Nicholas and Andrea while in graduate school. He later met Alison while serving on the AAPM Working Group to Promote Non-Clinical Career Paths for Medical Physicists. The team started brainstorming about the idea in 2017, and the first episode was launched in June this year. So far, there have been five episodes discussing a variety of medical physics topics.

Some topics have been very practical, like the discussion of TG-218 and IMRT QA, and some historical, like the story about the Radium Girls. Besides just discussing various topics, the podcast provides references to relevant publications and encourages further reading and more in-depth look into the topics discussed. One particularly interesting episode is "Radiomics: How to (maybe) classify your future," where the benefits, drawbacks, and potential of radiomics are discussed.

One of the episodes provides a glimpse into the creators' experience at the last AAPM meeting, and contains useful tips about navigating the meeting, joining workgroups, networking, etc., which could be very helpful for new AAPM members.

When asked about the inspiration behind the idea, the creators of the podcast said: "Our motivation to start the podcast was that we thought that there wasn't a great venue to discuss random topics in medical physics in depth. We aim to produce casual conversations about interesting topics (at least to the podcasters) related to medical physics. So far we are having fun and we hope you are too!"

While still in its early stages, this podcast has great potential to be a very valuable medium for discussing issues that affect medical physics as a field. Anyone is encouraged to submit topic ideas for future episodes, giving voice to medical physicists who may not feel represented through more traditional means. A Reddit page was started for the podcast by the creators, and listeners have a chance to discuss the episodes, share their opinions, and provide feedback. As social media is becoming more prevalent for professional use (see also in this issue the article from J**ulianne Pollard-Larkin** on using Twitter to promote your career successes), this podcast provides a fresh and less formal platform for discussing important topics in our field. ■

"Podcasts are becoming mainstream and are soon going to be content-searchable by Google, so medical physics podcasts like Hormesis will be more and more important for education and news, not just for industry professionals, but the general public."

—Jeremy Hoisak

"Really enjoying the podcast. I like the format. I think everyone has insightful and interesting contributions while being down to earth and diplomatic. As a solo physicist, I lack the ability to discuss medical physics topics with fellow physicists on a regular basis. Also, as someone with a lengthy commute, good listens are always needed."

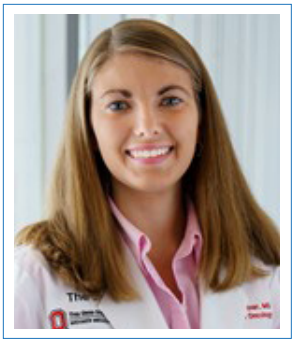
—Reddit commenter

"Great podcast! It's amazing to hear a conversation about a field I want to enter by experts in the field! I'm entering my last year of a bachelor's degree in biomedical engineering and I have really been enjoying your podcast!"

—Anonymous

MEMBER PERSPECTIVE

Ashley Cetnar, MS | Columbus, OH



How did you get involved in AAPM?

In my experience, involvement as a volunteer in AAPM has been a combination of having dedicated mentors to help me navigate the organization and perseverance. I was fortunate to be introduced to AAPM for the first time through a summer REU program while I was an undergraduate. My mentor was very enthusiastic about service and provided a unique opportunity for me to be a "student co-adviser" to give a student's perspective within a committee. This was a wonderful introduction to see what AAPM was like and work with medical physicists as an undergraduate.

While this was an excellent opportunity to observe, I was interested in making a difference by doing something instead of only observing. When I became a resident, I had a strong desire to get involved helping and serving in AAPM, but the problem was trying to get plugged into a group of people willing to take on someone new to the field. I applied to countless ads, but this was a frustrating process of rejection. So, I reached out to several chairs of groups that were working on things that I was truly passionate about and was able to join as a guest to learn more. Some of these were cold emails to chairs that I did not know. While not all responded, there were a few willing to give me a chance to make a contribution. I also attended as a guest to committee meetings during the annual meeting, and this was a great first-hand experience of the teams in action to understand more about committee work.

After I started my first job, I started getting involved in my local chapter. I expressed interest to the officers at the time to find out what would be a good fit, and I started by serving as secretary/treasurer of the chapter. By serving as an officer, I learned about the history of the region, how to organize meetings, how to communicate with vendors, and how to work with physicists throughout the region. This was the first time I felt that I was making a meaningful contribution with my volunteer time within the organization.

After gaining this experience, I was elected president of the chapter, and I am currently serving in this role. Being involved in the chapter helped introduce me to many incredible local members of AAPM. It made me realize the humanity of those that lead our organization, write TG reports, and conduct cutting-edge research which has helped me aspire to become a better leader for our region. If you are new to AAPM or have been around for a while but want to be more involved, I strongly advise talking with your chapter officers to see how you can get involved.

How do you balance having a family with chapter leadership?

While I had always heard about work-life balance as a challenge, I never realized the tangible complications until I brought my 5-month-old son to our chapter meeting. The expectation for the chapter president is to oversee the social event and the educational symposium. Our night-out events typically involve food, drinks, and a venue for networking and socialization. We were fortunate to have friends in town to watch our baby for the evening, but it would have been more difficult to attend without friends or family to help. The hotel did not provide refrigerators in the hotel rooms for guests or a mother's room to use after checkout, which was challenging during the symposium on Saturday.

While spouses have always been welcome at our social events, this can then make it challenging to arrange for childcare while the new parents are attending the social event. Some changes for our fall meeting include piloting a family-friendly night out event hosted at the zoo where parents can bring their children with them to enjoy the evening. The goal is to create an opportunity for families to meet one another so that they can develop networks as we continue to develop relationships within the region and at national meetings. The venue for the symposium is close to other attractions in the city that would be interesting for families to come and visit for the weekend to help justify taking a weekend away from home. There will also be several provided breaks in the schedule and a wellness room available for moms.

What are some new things happening within the Women's Professional Subcommittee?

The Women's Professional Subcommittee has been actively pursuing ways to be more inclusive including providing childcare opportunities at the annual meeting, venues for networking such as the Women's Luncheon, and advocating for the AAPM anti-harassment policy. Another effort is a specialty meeting which is currently under review to be hosted in Columbus, OH before the 2021 Annual Meeting entitled "Accelerating Women and Underrepresented Mid-Career Physicists in Leadership." If approved, this two-day conference will be a great opportunity for providing networking opportunities and resources to help encourage diverse leaders in medical physics. These are just a few of the initiatives currently underway within the group, and we look forward to sharing more updates soon. ■

TWITTER MAY BE THE MEDICAL PHYSICIST'S SECRET TO CAREER SUCCESS

Julianne Pollard-Larkin, PhD | Houston, TX

A large cohort of my not-quite millennial friends is anti-Twitter and social media in general. Given the publicity of some famous Twitter-happy celebs, I totally understand the misgivings, but Twitter is not just for B-list celebrities. Twitter just may help transform your career and improve your chances of moving up the academic/professional ladder.

As medical physicists, we are firmly aware of how small our field is. In fact, my favorite joke is that our specialty is like six degrees of Kevin Bacon in the sense that if you ask any medical physicist enough questions, chances are, you have one medical physics friend in common. Due to our size, it behooves us to do what it takes to make professional and social connections with each other. Most of us work in centers with a handful of physicist colleagues, but there are several organizations with lone physicists in need of the comradery and intellectual discourse that you can only get from interactions with each other. And that's where Twitter comes in; within seconds, your question or observation can be seen world-wide by physicist experts with perhaps more experience than you. It's almost better than a phone call, because a succinct tweet gets to the heart of your issue quicker than a lengthy audio conversation.

Despite being hard core scientists, our field is a social one. We spend a great deal of time reaching out to each other for help with technical issues and trying to establish collaborations. Generally, this will be done at conferences, via email or some other in-person venue. Twitter allows you to keep the conversation going long after the conference has ended and stay relevant in-between meetings. If you have a grant idea or see some puzzling data, a tweet about it just may spare you some time trying to figure out your issue on your own.

Perhaps you and your team have published some new findings. Instead of just hoping the scientific community reads your article, tweet the link to your work and watch your H-index grow! It's the modern-day academic equivalent of your parents putting your drawing on the fridge. Twitter also gives you a chance at truly developing your SAT skills of identifying the salient points of a scientific finding in as few as 280 characters. Explain to people in shorter text than your abstract why your findings are novel and quickly you will be able to connect with other scientists interested in the same space. In fact, many people use their professional Twitter account as a platform to display their academic success and to provide context to their CV. Many women have been told to be more open about their success, and Twitter gives you yet one more opportunity to show your impact.

Is there a highly-sought after physicist whom you would like to ask a question? Follow them on Twitter and tweet your question! This platform gives you back-stage like access to people you otherwise would not have any way of meeting in person. As I prepare for talks or panel discussions, tweeting at experts helps me get a quicker, no-frills response than a lengthy email. Twitter opens doors that you rarely get access to in real world interactions.

One of my favorite aspects of Twitter is the ability to quickly and sustainably create a true sense of community for people who otherwise feel disenfranchised by distance and circumstances. Are you part of an underrepresented group? Are there only a few people at your center from your background/country, and you would like to connect with them more? Twitter allows you to reach out to others around the world from similar backgrounds and create a virtual community of support and mentorship. Several studies have shown that the difference between success and failure is mentorship and a sense of connection. Twitter can help introduce you to your next best mentor and allow for you to check in on each other throughout whatever time frame you choose. This is essential for underrepresented talented junior scientists who lack real life role models who mirror their background. And this is critical for helping some who deal with the daily grind of thoughts filled with Impostor Syndrome. Academia is rough on the psyche and outside of a trained professional, having words of affirmation from a community of followers can be the difference from continuing on with your progress or wallowing in your feelings.

The best part of Twitter is that you choose what you see; you will see posts from those you follow and from accounts connected to those you follow, and those people will see your posts as well. You can keep your account completely professional, and it's the easiest way to expand your network and your influence in the field. By being decisive about what you see and follow, you can avoid the common social media pitfalls of creating a time sink inadvertently as you tweet with abandon.

Finally, I love Twitter because it gives results and fast! Most large entities and leaders of campuses have an active Twitter account. Twitter gives you a direct way to speak with them and give suggestions that may truly lead to policy changes. Case in point, my insurance company mailed out our new membership cards with a horribly placed sticker rendering everyone's card virtually useless. A stream of us tweeted at the company's site, and within a week new sticker-less cards were issued along with an apology. I have never complained and gotten help so quickly before, this almost changed my world-view!

For these reasons, albeit I am biased, I totally find Twitter to be a useful and unexpectedly powerful tool when used wisely, enjoy! ■

Tweet-up (Twitter user meet-up) at this year's AAPM Annual Meeting in San Antonio, TX.

DIVERSE PANEL OF WOMEN PHYSICISTS OFFER ADVICE, ANSWER QUESTIONS AT 2019 AAPM WOMEN'S LUNCHEON

Megan Lipford, PhD | Madison, WI

The very popular Women's Luncheon at the AAPM Annual Meeting was once again a sell-out in 2019, with 238 tickets sold. Despite expanding the seating capacity of the event, there was a waiting list again this year. This event gives women of all career levels and all subfields within the field of medical physics the opportunity to come together to network, make friends, and seek advice.

The event opened with a welcome from the Women's Professional Subcommittee (WPSC) Chair **Dr. Laura Cervino**. Dr. Cervino thanked the industry sponsors of the event and acknowledged the founding chair of the WPSC, **Nicole Ranger**, and the incoming chair, **Kristi Hendrickson**. Dr. Cervino also mentioned the happy hour later that day jointly hosted by the WPSC and the Diversity and Inclusion Subcommittee, and the Med Phys Wiz Kids outreach event which took place the preceding day. Dr. Cervino also asked all the women who are awardees, leaders and volunteers in AAPM including Fellows, chairs of committees, task groups, and working groups, to stand up and be recognized. She encouraged those not yet involved to talk to those who are.

AAPM President **Dr. Cynthia McCollough** then made some remarks. She expanded on her President's Symposium topic of ensuring diversity on all our teams. Dr. McCollough, reflecting on when she was named an AAPM Fellow and the sacrifices she made leading up to that point, encouraged those women who are mothers of young children that it is ok to slow down a little at work in order to be present at home during that season of life.

For the main event this year, **Julianne Pollard-Larkin, PhD** of MD Anderson Cancer Center, hosted a panel discussion in a talk show style. The panel represented imaging and therapy physicists as well as industry, academia, and clinical practice. The panelists were (from left to right in the photo): **Jennifer Lynn Johnson, PhD, FAAPM** from Kelsey-Seybold Clinic (therapy); **Titania Juang, PhD** from UC San Diego (therapy); **Carri K. Glide-Hurst, PhD, FAAPM**, from Henry Ford Cancer Institute (therapy); **Laura I. Cervino, PhD**, from Memorial Sloan Kettering Cancer Center (therapy); and **Erin Angel, PhD**, from Canon Medical Systems USA, Inc. (imaging).

Some questions asked of the panel were submitted in advance by registered attendees via the Social Q&A app, while others were open questions and comments from the audience. Topics included how to find women mentors when you are the only woman in your department, how to balance building a family and career, sponsorship in the workplace from women and men, and the use of social media to advance your career. The panel discussed how to encourage your institution to hire candidates that are more diverse, how to make men aware of their unconscious bias, and recognized

Panelists were ready to discuss every question.

Attendees at the luncheon lined up to ask questions of the panelists.

that illegal recruiting practices are still taking place, such as asking about marital status and family plans. It was encouraging to hear personal stories that outreach to young women and girls is effective and the reason that some in the room are in this field.

Next year's event will be held at the 2020 Joint AAPM/COMP Meeting in Vancouver, BC, and will maintain this year's expanded capacity to accommodate as many attendees as possible. While this year's event featured a panel of women physicists, next year's event will likely have an invited speaker. Based on feedback from luncheon attendees, the luncheon format may alternate between an invited speaker and a panel discussion.

For this first time this year, a mechanism for attendees to donate to the luncheon beyond the ticket price was available in the registration process. This yielded 21 donations totaling $420, helping to cover the increased cost of a larger capacity event. Still, a vast majority of the cost is covered by industry sponsors. The WPSC wants to make this event available to as many people as possible, and is investigating additional mechanisms for funding, such as a senior member covering the cost for a junior member.

I think everyone in the room wished this event could have been longer. There were more questions to be asked and more networking to take place at the end of the event. This is a rare opportunity to have such a large group of women physicists all in the same room. If you have not attended a Women's Luncheon, I highly encourage you to consider it. It is a highlight of my AAPM experience each year. ■

Special thanks to **Jaclyn Marcel**, chair of the Luncheon Working Group, and the rest of the WPSC Luncheon Working Group for organizing this popular event. Thank you also to the sponsors that made this event possible. At the Platinum level, **Imalogix**; at the Silver level, **Accuray, Canon, Elekta, LAP, Northwest Medical Physics Center, Radcal, Radiological Imaging Technology**, and **MD Anderson Cancer Center**; at the Bronze level, the **American Board of Medical Physics**, the **American College of Radiology, CivaTech Oncology, Modus QA, Radformation, Sun Nuclear Corporation**, and **The Phantom Laboratory + Image Owl.**

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YALE SCHOOL OF MEDICINE HOSTS RECORD NUMBER OF DREAM FELLOWS

DREAM UPDATE Jun Deng, PhD | Farmington, CT

Three DREAM fellows spent 10 weeks this summer at Yale School of Medicine, the first time YSM hosted that many DREAM fellows at the same time. The AAPM Diversity Recruitment through Education and Mentoring (DREAM) Program is designed to increase the number of underrepresented groups in medical physics. **Jun Deng, PhD**, Professor of Therapeutic Radiology, hosted **Ayobami Ayodele** #UTArlington, while **MingDe Lin**, Assistant Professor Adjunct of Radiology & Biomedical Imaging hosted **Neha Bhatt**, Yale '20 as the 2019 Fellow, and **Vijay Chockalingam**, #UofMichigan, the returning 2018 Fellow. @neha.s.bhatt. ■

From left: Jun Deng, PhD, Ayobami Ayodele, Neha Bhatt, Vijay Chockalingam and MingDe Lin, PhD

For over 20 years, the AAPM Education & Research Fund has been a catalyst in raising awareness and obtaining support within our proud profession in the form of funding strategic education and research programs, such as seed grants for early-career researchers, matching support for clinical residency programs, and fellowships for PhD students. The Education & Research Fund is also used to attract undergraduates to the field of medical physics and to promote diversity.

Without the generous contributions from AAPM members, we could not have funded over 100 grants, fellowships, and residencies.

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focus on our **future**

AAPM URGES DECISIVE ACTION TO END ADMINISTRATION'S TRAVEL BAN

LEGISLATIVE AND REGULATORY AFFAIRS REPORT Richard Martin, JD | Alexandria, VA

AAPM requests the House Judiciary Committee's Subcommittee on Immigration and Citizenship to take decisive action to end the administration's travel ban citing the ban's negative impact on the scientific community.

On September 24 the Subcommittee held a hearing to examine the impact of the travel ban. Witnesses at the hearing included government representatives, the director of Muslim Advocates, and an assistant professor at Morgan State University, who remains separated from his wife, an Iranian national, because she has been denied a US visa.

In follow-up to the hearing, AAPM submitted a letter to the Subcommittee expressing concern that the travel ban is placing the United States' preeminent scientific standing in the world in jeopardy. We talk about the importance of scientists attending educational meetings, such as the AAPM Annual Meeting, stating, "The AAPM Annual Meeting gives researchers an opportunity to present their work to others in the field and to defend their findings. These scientific meetings are also opportunities for medical physicists to network and foster the relationships that lead to new collaborative research opportunities. This networking is essential for young researchers, who rely on mentorship from established researchers to advance in their field."

We note that many scientific research projects are collaborations among multiple researchers at different institutions, often across national boundaries. We express the view that the travel ban, which impedes communication that is essential to bringing scientists from diverse backgrounds and viewpoints together, is damaging this collaborative process. In conclusion, we ask the Subcommittee to pressure the administration to end the travel ban that is negatively impacting international scientists and science as a whole.

AAPM's letter has been added to the Subcommittee's hearing website which provides more information about the hearing, including witness testimony.

We will update you on developments on this issue. If you have questions or would like additional information, please contact **Richard J. Martin, JD, Government Relations Program Manager**, at richard@aapm.org. ■

"The AAPM Annual Meeting gives researchers an opportunity to present their work to others in the field and to defend their findings. These scientific meetings are also opportunities for medical physicists to network and foster the relationships that lead to new collaborative research opportunities. This networking is essential for young researchers, who rely on mentorship from established researchers to advance in their field."

— Excerpt from AAPM's letter to the House Judiciary Committee's Subcommittee on Immigration and Citizenship

AAPM SUBMITS COMMENTS ON MEDICARE RADIATION ONCOLOGY BUNDLED PAYMENT PROPOSAL

HEALTH POLICY & ECONOMIC ISSUES Wendy Smith Fuss, MPH | Delray Beach, FL

The AAPM recently submitted two comment letters to the Centers for Medicare and Medicaid Services (CMS) regarding the Radiation Oncology (RO) Model proposed rule. CMS proposes the creation and testing of a new payment model for radiation oncology. The intent of the proposed RO Model is to promote quality and financial accountability for episodes of care centered on radiation therapy services.

The first letter submitted in August emphasizes our concerns regarding the impact of the proposed RO Model on quality and safety in radiation oncology, and includes recommendations to help ensure Medicare beneficiaries continue to receive high-quality care. The AAPM advised CMS that as the complexity of radiation therapy treatments has grown, the work of ensuring treatment accuracy and patient safety throughout a prescribed course of treatment has also become more demanding in expertise and attention. The inherent danger posed by the use of therapeutic levels of radiation dose is managed and minimized by the medical physicist. AAPM expressed concerns that the bundling of historical codes with embedded medical physics services will lead to a loss of direct financial accountability of facilities for providing adequate technical supervision that is provided by the medical physicist to each patient, and could significantly reduce medical physics resources around the country. This would inevitably drive a loss of medical physics support, and thus would pose an immediate and direct threat to patient safety and treatment quality. To ensure that medical physics support for the technical elements of care is maintained under the RO Model, the AAPM urges CMS to require accreditation of all RO Participants as part of model compliance. To allow for RO Participants who do not currently hold practice accreditation to prepare and complete the RO Model review process, the AAPM recommends that CMS allow for a 3-year transition period such that the accreditation requirement would take effect in 2023. Lastly, to help ensure safe and high-quality care during the transition period, for those participants that are not yet accredited, the AAPM recommends that CMS add 3 clinical data reporting requirements specific to medical physics beginning in 2020 and in subsequent years until national accreditation is obtained. Although the proposed clinical data measures do not reflect the full and dynamic nature of the medical physicist's role in patient care and represent just a portion of the ongoing physics oversight, we feel that they represent a reasonable surrogate during the transition to an accreditation requirement that will ensure radiation oncology patients receive safe and high-quality care.

HEALTH POLICY & ECONOMIC ISSUES, Cont.

The second CMS comment letter submitted in September addresses concerns and recommendations related to the design and implementation of the RO Model. The AAPM noted our grave concerns regarding mandatory participation and the number of practices required to participate, timing of model implementation, inclusion of certain radiation therapy (RT) services, the payment and pricing methodology, undue administrative and financial burden, and the potential negative impact on Medicare beneficiary access to safe and high-quality cancer care.

The AAPM advised that reducing payment will not improve quality but jeopardize access to safe and effective radiation treatments by putting too much financial strain on radiation oncology practices that have no choice but to participate. With virtually no positive incentives and significant payment cuts, requiring RO Participation is unjustified. The currently proposed RO Model does not meet the intent of the MACRA legislation nor move toward value-based payments.

The AAPM advised that the proposed RO Model is complicated and requires changes to coding, claims generation, claims processing, participant-specific modifiers and adjustments, withhold calculations, payment programming, and software updates for electronic health records (EHRs). Operationalizing the RO Model on both the Medicare contractor side and mandatory RO Participant side will be extremely challenging.

The RO Model as currently proposed is not only mandatory for a significant number of randomly selected providers but is 100 percent risk based with no hardship exemptions and no opportunity for other providers to opt-in to the model. Mandatory participation of such a large cohort of practices presents a systemic risk to the specialty and its patients should there be difficulties with implementation. There is a significant risk of unintended consequences associated with more than one-third of radiation oncology providers generating all of the savings associated with this proposed RO Model given that the model has never been tested. Specifically, AAPM recommends that CMS modify participation on a voluntary-basis for the first two of five performance years while the RO Model is tested and refined. CMS could then phase-in mandatory participation over an additional three-year period. Under a mandatory model, the AAPM recommends that CMS scale back the sample size to 10 percent of all eligible RO episodes nationwide by its selection of reduced Core-based Statistical Areas.

In regard to included and excluded radiation therapy services, AAPM recommended that brachytherapy sources and surgical procedures related to brachytherapy catheter/applicator insertion be excluded from the RO Model list of bundled services. The AAPM recommends that CMS exclude proton beam therapy from the RO Model whenever a RO beneficiary is participating in any clinical trial registered on clinical trials.gov or data registries structured in compliance with AHRQ guidance.

The AAPM discussed flaws in the development of the proposed National Base Rates that would result in a significant payment penalty for RO Participants. The AAPM is concerned that the proposed pricing methodology fails to account for a range of complex scenarios and treatment costs for many practices, including RT multi-modality or combination therapy. Multi-modality or combination therapy for cervical, uterine or advanced prostate cancer should be subject to an alternative payment methodology that reimburses for planning and preparation for two separate RT services provided during the same episode of care. Regardless if the combination therapy is provided by one or two physicians, CMS should provide adequate and fair reimbursement by providing a PC and TC payment for EBRT and a second PC and TC payment for Brachytherapy. Alternatively, CMS should consider paying for the second RT modality (often the brachytherapy boost) under Medicare fee-for-service (FFS), regardless if both modalities are furnished by the same physician.

CMS proposes to create a set of National Base Rates for the professional component (PC) and technical component (TC) of the included cancer types, yielding 34 different rates. Each of the National Base Rates represents the historical average cost for an episode of care for each of the included cancer types. The calculation of these rates would be based on Medicare FFS claims paid during calendar year 2015-2017. AAPM supports the proposal of a site neutral payment and appreciates the Agency's commitment to providing RO Participants with stable rates. However, we are concerned with the CMS decision to establish the site neutral test based on hospital outpatient

claims data alone. Approximately one-third of cancer care is provided in a freestanding radiation therapy center and the cost of this cancer care is not accounted for in the proposed National Base Rates. We believe that more accurate National Base Rates can be achieved through a blend of both the Physician Fee Schedule and Hospital Outpatient Prospective Payment System rates, especially for the Professional Component.

In addition, the AAPM recommends that CMS eliminate the historical-adjustment, which includes an efficiency factor and reduces the discount factors that determine provider-specific payment rates. **This factor rewards inefficiency and adds to implementation complexity.**

CMS proposes to monitor participants for compliance with many metrics that are historically understood as standards of practice accreditation. The AAPM recommends that CMS require accreditation of all RO Participants as part of model compliance. The accreditation requirement should be accompanied by a reduction or elimination of CMS' proposed monitoring requirements.

CMS proposes to implement the RO Model on January 1, 2020 or alternatively April 1, 2020. At a minimum, the AAPM recommends that CMS delay implementation of the RO Model until July 1, 2020. However, given the complexity of the alternative payment model and the undue administrative and financial burden, the AAPM recommends that CMS delay RO Model implementation for one year with a more realistic start date of January 1, 2021.

CMS is proposing that each Technical and Dual Participant annually attest to active participation in a radiation oncology-specific AHRQ-listed patient safety organization (PSO). The AAPM is pleased that CMS recognizes the importance of reporting and learning from patient safety data to AHRQ-listed PSOs. The AAPM recommends that the PSO participation requirement not go into effect until the second performance year as it is unlikely that all RO Model participants are currently participating in a PSO that collects radiation oncology-specific data, like RO-ILS.

The final rules will be published on or after November 1, 2019. Providers that are mandated to participate in the RO Model will be published in the final rule and the implementation date is not yet known.

For additional detail, both comment letters are available here. ■

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ORAL EXAMS — NEW CATEGORIES FOR THERAPY MEDICAL PHYSICS

ABR NEWS Kalpana M. Kanal, PhD ■ Matthew B. Podgorsak, PhD ■ Robert A. Pooley, PhD, ABR Trustees | J. Anthony Seibert, PhD, ABR Governor

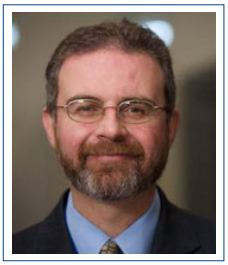
Oral Exams – New Categories for Therapy Medical Physics

The oral exams in all medical physics specialties are based on five categories. Passing the exam requires passing all five categories while passing four of the five leads to a conditioned status. From time to time the categories are adjusted to make the exam better fit current practice patterns. Starting with the 2020 oral exam, candidates taking the Therapy Medical Physics exam will be tested using questions derived from the new categories shown below, also found on the ABR website.

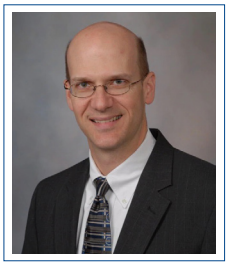
The new TMP Categories are:

TMP	Category Description
Reference and relative dosimetry	• Reference dosimetry: Absolute calibration for photons, electrons, protons, and low-energy x-rays • Ion chamber and electrometer design, characteristics, application, and QA • Other dosimeters design, characteristics, application, and QA • Survey detectors design and application • Film design, characteristics, application, and QA
Treatment machines	• Photon and electron medical accelerators • Proton units • Specialized machines (design and function) • Therapy imaging (including physics, equipment design, application, image reconstruction, acceptance testing, and commissioning) • Shielding and radiation safety
External beam treatment planning, uncertainty management, and treatment planning system QA	• Photon treatment planning • Electron treatment planning • Management of uncertainties • Treatment planning for specialized machines • Treatment planning system QA
Brachytherapy, radiation protection, radiation biology	• Brachytherapy • Treatment room shielding • Brachytherapy treatment planning • Radiation protection • Radiation biology
Patient safety, data transfer and integrity, professionalism, and ethics	• Patient-specific treatment delivery QA • Quality control and error prevention • Incident learning systems and medical event reporting • Computing & IT • Professionalism and ethics

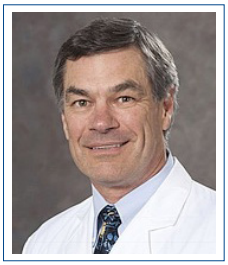
K. Kanal



M. Podgorsak



R. Pooley



J.A. Seibert

New Requirements for Part 1 Eligibility

The ABR Board of Governors has established new requirements for eligibility to sit for the Part 1 exam:

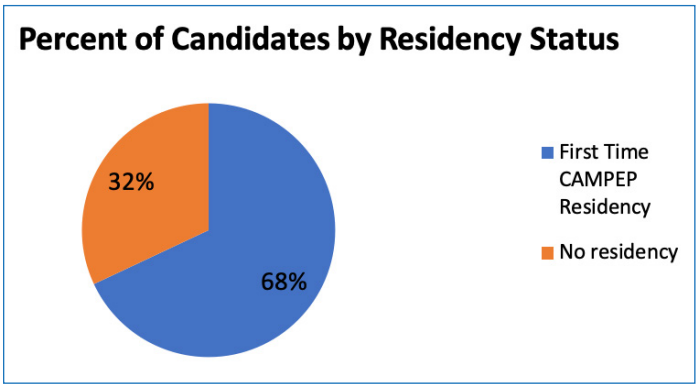
- The exam itself will not change.
- Beginning in 2022 the Part 1 exams will be given in January. In 2021 there will be an exam in August followed by one in January 2022. The registration period will be adjusted because of the date change.
- Beginning with the 2022 exam the eligibility requirements will change.
  - If eligibility is from a graduate program or DMP program, the program director must attest that the candidate will have completed the courses covering the core topics as described by CAMPEP by the time of the exam.
  - If eligibility is from a certificate program, the candidate must have completed the certificate program and have attained a suitable PhD at the time of registration.
  - If eligibility is from a CAMPEP approved residency or a structured mentorship the requirements will remain the same. A candidate enrolled in the program may register for Part 1.

Candidates who previously conditioned on their exam will continue to be tested using the categories in which they conditioned that were previously used.

Oral (Part 3) Exam

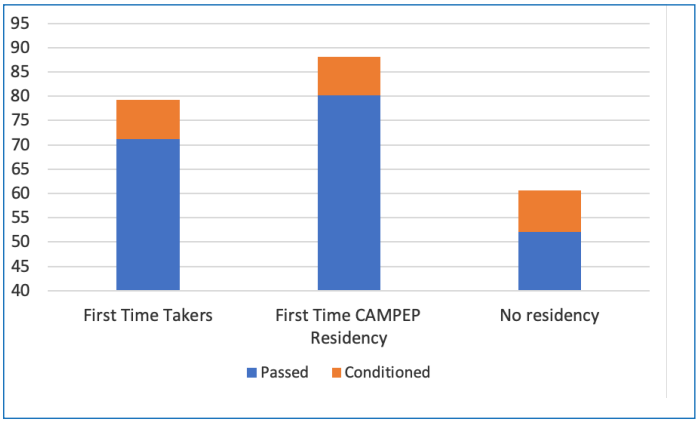
After many decades in Louisville, KY, the oral exam has moved to Tucson. The exam in 2019 received excellent survey scores from both the candidates and the examiners. The ABR is considering construction of an oral exam center, however, for the next few years the exam will remain in a hotel.

The percent of first-time takers having completed a CAMPEP residency continues to increase.



Beginning with the exam given in 2024 all new candidates will have had to complete a CAMPEP accredited residency.

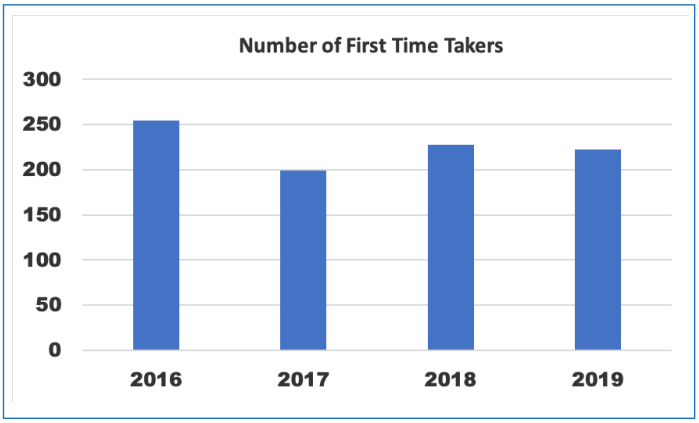
The pass and conditioned outcomes for the 2019 exam were:

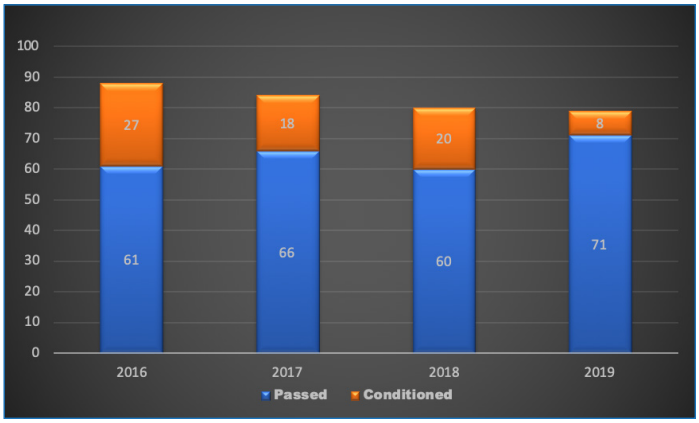


This follows the recent pattern of candidates that have graduated from a CAMPEP residency performing better than those without a residency.

Over the last few years the number of first-time takers has remained approximately the same. There was a bump in 2016 which was widely attributed to the 2014 requirement change.

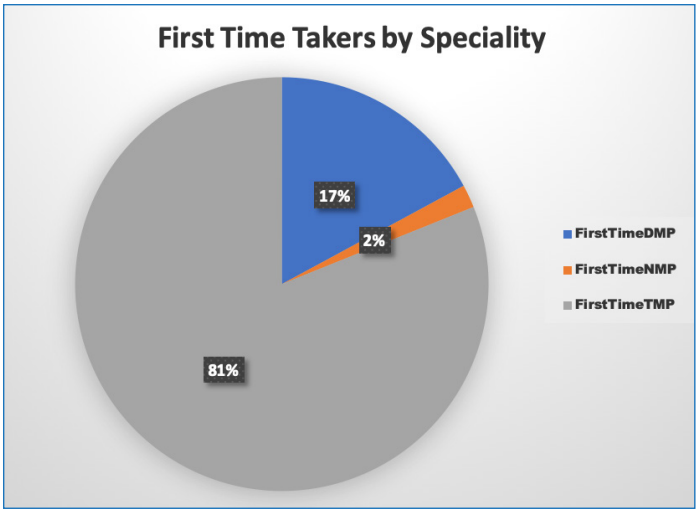
The overall performance over that period has shown little change, but a slow increase in the pass rates for CAMPEP First Time Takers.





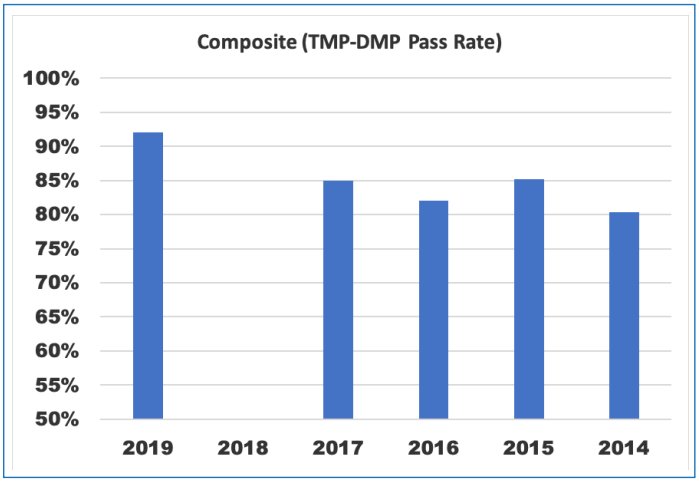
It is also notable that the number of individuals in the DMP specialty remains strong. The number of NMP candidates fluctuates from year to year.

ABR NEWS, Cont.



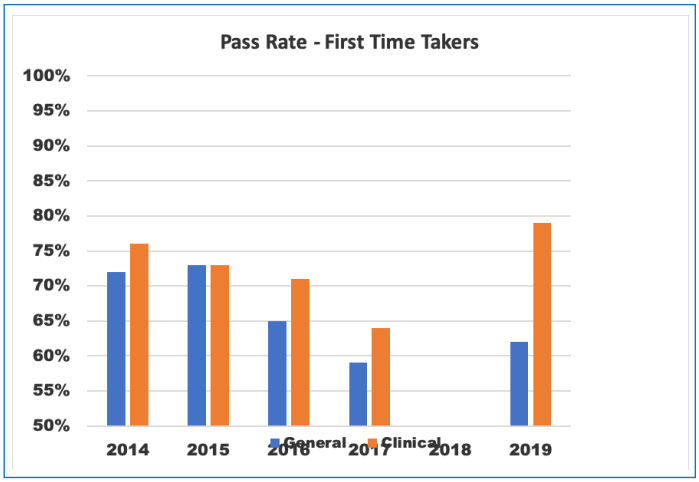
The Part 2 Exam

The Part 2 exam is designed to measure the competence of an individual who has completed a residency in their medical physics specialty. The Part 2 exam results are shown in the bar chart. These are a composite of the TMP and DMP results. Because of administrative problems in 2018 no result is shown. The pass rate increased somewhat this year.



The Part 1 Exam

The Part 1 exam is designed to test the competency of a medical physicist who has completed their core graduate education. The Part 1 exam is given in two parts, called the General Exam and the Clinical exam. Because of administrative problems in 2018 no result is shown.



The ABR has investigated the lower scores for the Part 1 General exam and has concluded that the exam has remained similar in content and difficulty over these years.

Please remember that if you have questions always contact the ABR first. ■

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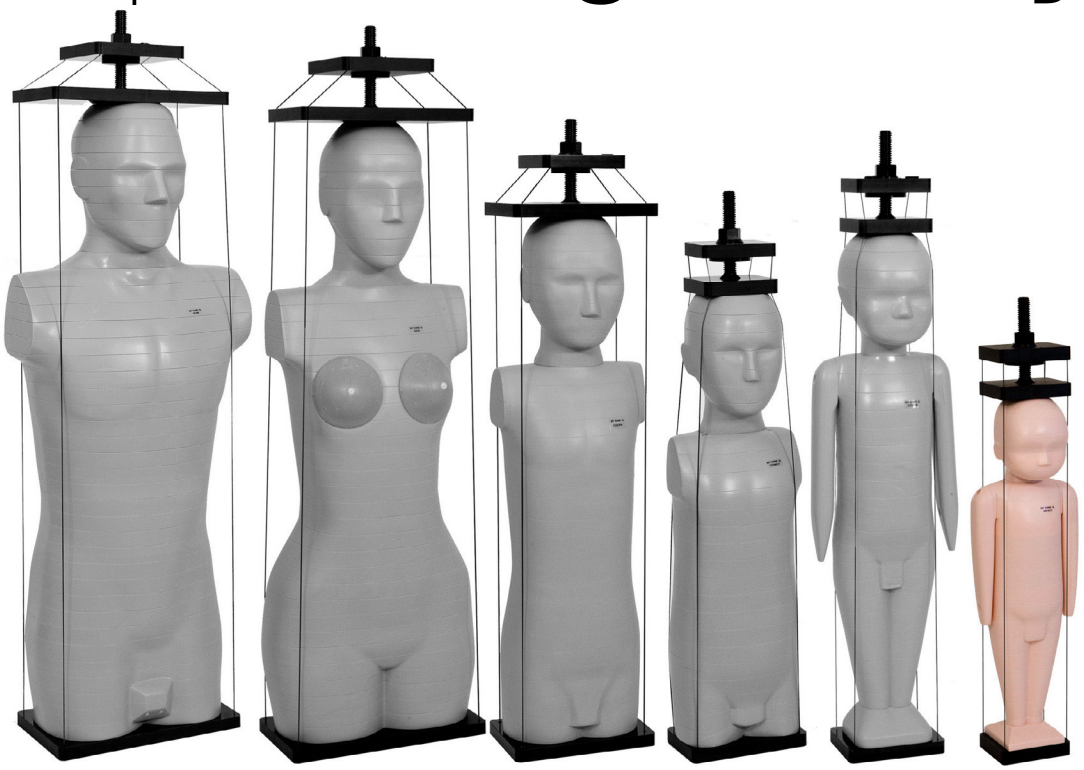

ATOM

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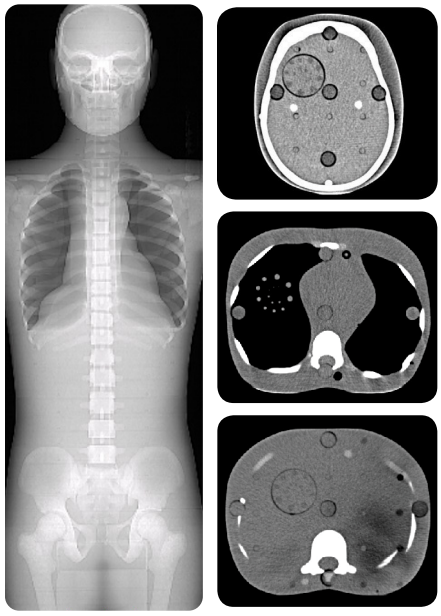

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ACR ACCREDITATION: FREQUENTLY ASKED QUESTIONS FOR MEDICAL PHYSICISTS

ACR UPDATES Dustin A. Gress, MS, Senior Advisor for Medical Physics ACR Quality and Safety | Reston, VA

Last November, the ACR released its 2018 Digital Mammography QC Manual with 2D and Digital Breast Tomosynthesis. ACR members may access the manual (and all of ACR's other QC manuals) from the Medical Physics Resources page on acr.org (ACR member login required). As always, our current and FDA-approved FAQs can be found on the ACR 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 at 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.

Q. When performing the Phantom Image Quality test, what settings should be used to acquire the phantom image?

A. Some manufacturers have historically included in their QC manual phantom image quality test procedure a step to fix the AEC "sensor" position, or to fix automatic segmentation features, or fix kVp settings, in order to ensure the phantom image quality acquisitions are consistently performed. With ACR's QC manual and the new, larger phantom, this accommodation is unnecessary. For facilities using the ACR manual, the phantom image quality test must be performed using the same image acquisition settings that are used in routine patient screening mammography exams.

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 for more FAQs, accreditation application information, and QC forms.

Q. I am performing the annual survey for my facility and need clarification on Collimation Assessment. Am I required to perform the test annually on all available anode tracks and field sizes, or is this only required at MEE?

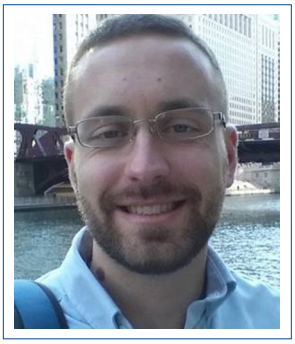
A. For 2D-only units, you only need to perform the ***full*** 2D collimation test (with all anode tracks and both small and large FOV) at MEE or after relevant service or component replacement. There is no requirement in the manual for annual Collimation Assessment for 2D-only units. For units that are 2D and DBT or DBT-only, you need to perform the ***full*** 2D collimation test at MEE and after relevant service or component replacement. Additionally, for units that are 2D and DBT or DBT-only, you must perform the Collimation Assessment annually, for only the largest FOV and the most clinically used anode track. This annual test for collimation must be done in 2D mode, not in DBT mode.

Q. For the quarterly Facility QC Review, the manual states, "The lead mammography radiologist lead interpreting physician), along with the facility manager, must review the QC test results…" and, "QC data/notebooks must be reviewed by both the lead interpreting radiologist and facility manager." What if we have a facility that does not have a manager?

A. The QC technologist must have supervision and support from a leader who is or serves as management with oversight at the facility. In some smaller practices, there may not be a dedicated manager for the mammography clinic; in cases like this it is appropriate for the lead mammography radiologist (LIP) to function as the facility manager for mammography QC. ■

AN AAPM MEMBER'S CROSS COMPARISON OF TG-142 AND MPPG LINAC QA RECOMMENDATIONS: WHAT'S CHANGED?

AAPM MEMBER REPORT Ryan Underwood, MS | Atlanta, GA



The earlier radiation therapy QA reports (TG-25, TG-40) were updated and expanded with the AAPM TG-142 report in 2009. The AAPM Medical Physics Practice Guidelines (MPPG) report series began in 2013 and, as the AAPM website states, are intended to: "provide the medical community with a clear description of the minimum level of medical physics support that AAPM would consider to be prudent in all clinical practice settings." MPPG report 8, released in 2017, outlines a list of recommended tests and tolerances for linac QA. Additionally, an FMEA analysis was included to prioritize each task, as well as demonstrate how a QA program can be customized to the needs of a clinic. MPPG report 2 provides QA recommendations for IGRT systems. The goal of this work was to cross compare the linac QA recommendations between TG-142 and the more recent MPPG reports.

It is important to note that the MPPG reports are not designed to *replace* TG-142, or any other task group report or article. As their website states, it is a recommended minimum level of physics support. Ultimately, it is up to the QMP, accreditation and regulatory requirements, to determine the QA program for an individual clinic. In that same vein, this review is not intended to be biased towards any particular report or QA test.

The following tables outline the differences in the linac QA recommendations between TG-142 and MPPG 8 and 2. They are broken down into three chronological categories: additions (Table 1 MPPG QA Test Additions), as in new tests within MPPG reports that did not exist in some form in TG-142; removals (Table 2 MPPG QA Test Removals); and finally: revisions (Table 3 MPPG QA Test Revisions), as in a change in the frequency a test is performed or the passing criteria. Rather than have separate tables for each testing category (e.g. IGRT, wedge, MLC, etc.), these categories are combined for brevity. Additional guidance about a specific test can be found in the relevant MPPG report and will not be discussed in detail here. MPPG report 9 discusses SRS/SBRT—however this will be considered separate and not included here.

As can be seen from the tables, the motivation for some of the changes seems to stem from the general progression of technology. This can manifest in a test being less clinically relevant, or in an increase in confidence of equipment that has become a more trusted standard. The light versus radiation field test is less useful now that IGRT is prevalent for patient setup. We do not use tissue compensators or hard wedges much anymore. Many of the MLC tests were consolidated into the dynamic delivery control test, now that sliding window and VMAT IMRT have become more standard. (If step-and-shoot IMRT is the technique used in your clinic, perhaps some of the TG-142 MLC tests would be more prudent.) Imaging dose tolerances have been quantified, to better understand their contribution in accordance with TG-180. One section within TG-142 that was not included in MPPG 8 was gating—it thus does not appear in the tables presented here.

Another large group of the changes for QA tests centers around the pass/fail tolerance, as well as providing more specifics. or certain tests the passing criteria was relaxed, while others were stricter. Photon and electron flatness/symmetry need to be within 2% of baseline, not 1%. And furthermore, they need to be compared to the flatness/symmetry values found within the clinic's treatment planning system (TPS) on a phantom, not compared to the commissioning water tank scans. EDW profiles need to also be compared to the TPS generated values. Output constancy on central axis (as well as off-axis), for different gantry angles needs to not differ by more than 2%, instead of 1%. Radiation isocentricity tests need to be within a 2mm diameter total, not compared to a baseline. The "Non-IMRT" tolerance column of the TG-142 tables was not kept.

Hopefully this review will be useful in analyzing the differences between the recommendations in these reports. Please refer to the relevant MPPG report for additional details regarding a particular test.

Table 1 MPPG QA Test Additions

Test	Note	Tolerance
Daily		
X-ray/Electron profiles	For energies to be used that day	3%
Anti-collision test		Functional
Electronic wedge check	Output, not just functionality	Internal: functional; Collimator shaped: 3%, for steepest angle
Monthly		
Dynamic delivery control	VMAT and sliding window IMRT only	3% of open field dose
All collision interlocks		
Physical wedge placement accuracy	Draw mark on wedge/tray slot	1mm
Annual		
Accessory latches/interface (all slots)		
Comprehensive review of machine settings	Linac controller definitions	Same as acceptance/expected
Safety procedures	Frequency determined by QMP	Functional

Table 2 MPPG QA Test Removals

Test	Note
Daily (& Weekly)	
MLC Weekly qualitative test	
IGRT Collision interlocks	
Monthly	
Backup monitor chamber constancy	
Typical dose rate output constancy	Within dynamic delivery control test
Light vs. radiation field	Asymmetric
Compensator placement accuracy	
MLC Setting vs. radiation field	For two patterns
MLC Travel speed	Within dynamic delivery control test
IGRT Uniformity and noise	All IGRT modalities
Annual	
SRS arc rotation mode	
Physical wedge transmission factor	Check positioning accuracy monthly, 1mm
Coincidence of radiation and mechanical isocenter	If spoke shots indicate problem, mechanical isocenter can be measured and utilized
Table top sag	
Table top angle	Checked monthly, absolute and relative
Table travel max range	
MLC transmission	
Leaf position repeatability	
MLC Coincidence of light vs rad field	
MLC Segmental IMRT (step and shoot)	
MLC Moving window IMRT	Within dynamic delivery control test
IGRT HU constancy	For CBCT (kV and MV)
IGRT Geometric distortion	For CBCT (kV and MV)
IGRT Full range of travel SSD	Planer MV imaging
IGRT Beam quality/energy	Planar kV imaging

Table 3 MPPG QA Test Revisions

Test	Note	Tolerance
Daily (& Weekly)		
Door closing safely	**Only after service**	Functional
Collimator size indicator		2mm **(per jaw, single field)**
X-ray and electron output constancy	**For energies to be used that day, per QMP**	3%
IGRT Imaging-treatment coordinate coincidence	**Weekly (not daily, or monthly), for non-SRS/SBRT machines. (Daily for SRS/SBRT)**	**1mm for SRS, 2mm otherwise (including SBRT)**
Monthly		
Flatness/symmetry	Electrons and photons, **review daily measurements or** measure with secondary device	**2%**
Light vs. radiation field	**Symmetric or asymmetric, only after service**	
ODI		**2mm, over clinical range**
Jaw position indicators		2mm, **over clinical range**
Wedge placement accuracy	Physical wedges	**1mm**
Treatment couch positions	Check all degrees of freedom, translational and rotational	**Absolute: 2mm, 1 degree Relative: 1mm over 10cm, 0.5 degree over 3 degrees**
Localizing lasers		**1mm, even if no IMRT**
Wedge factor	For EDW, **review daily readings**	
Leaf positional accuracy	**Multiple gantry angles, not necessarily four cardinal angles. Hancock test for Elekta machine can be done in lieu of picket fence**	
IGRT Scaling	**Every 6 months,** kV and MV planar	**2mm**
IGRT Spatial resolution & contrast	**Annually**, all imaging modalities	
Annual		
Output/Cone factors	**Only for nonstandard gantry angles and dose rates, single cone/field size acceptable**	
Flatness/symmetry	Electrons and photons	**2%; compared to TPS, not commissioning water scans**
Electron beam quality		**2mm**
Output constancy vs gantry angle	Electrons and photons	**2%, from 0 degree value**
OAF vs gantry angle	Electrons and photons	**2%, from 0 degree value**
Arc mode	Expected MU, degrees	**2%, 2 degrees**
TBI/TSET	Output/energy/profile	**Same as regular beam**
Radiation isocentricity	Collimator/gantry/couch rotation, MLC and jaw defined fields	**2mm diameter total, not from baseline. Mechanical isocenter can be measured if rad iso indicated problem**
MLC Spokeshot	Included in radiation isocentricity test	**For collimator, gantry, and couch rotation**
Wedge factor	For EDW	**All angles, 2% of TPS dose**
Wedge profile	For EDW, 60 degree	**All energies, 2% of TPS OAF**
IGRT Imaging dose	kV and MV CBCT	**+/- 1cGy from baseline for 2D MV and CBCT, +/- 3mGy for 2D kV (static), +/- 1cGy/min for 2D kV (fluoro)**

Note: **Bolding** signifies the specific revision

AAPM / RSNA IMAGING PHYSICS RESIDENCY GRANT

The AAPM Board of Directors has approved $420,000 in support over 6-years ($70,000/year starting in 2019) to fund six spots in existing or new imaging residency programs. The RSNA Board of Directors approved $210,000 in funding for 3 additional slots in existing or new imaging residency programs.

Sponsored by the AAPM Education and Research Fund.

A list of Award Recipients can be found here.

Applicant Eligibility:

The purpose of the AAPM funding is to provide 50% support of a resident's salary for two imaging physics residents. The awardee institution(s) will provide the other 50% support. After the period of the award is over, the intent is that the awardee institution(s) will continue to fully support this new imaging physics residency position. Demonstration of this intent should be included in the application materials.

- CAMPEP accreditation is expected within the first year of the funding period, if a program is not currently accredited.
- Open to existing or new imaging residency programs.
- 1st priority – New programs (hence new slots), no previous funding from any AAPM program. A new program is defined as one that has applied for CAMPEP accreditation after January 1, 2019, or has not yet applied for CAMPEP accreditation.
- 2nd priority – Existing program but with new slots, no previous funding from any AAPM program. A new slot is defined as one that has been created or filled after January 1, 2019.
- 3rd priority - Existing program but with new slots, has had previous funding from any AAPM program. A new slot is defined as one that has been created or filled after January 1, 2019.

Award Duration: July 1, 2021 – July 1, 2023

Application Deadline: May 4, 2020

Recipients Notified by: June 4, 2020

FOR MORE DETAILS, VISIT: http://gaf.aapm.org/index.php#IPRWG

NATIONAL CONFERENCE ON RADIATION CONTROL TO HONOR THE MEMORY OF RADIOLOGICAL HEALTH PIONEER JOHN VILLFORTH

CRCPD CHAIR REPORT Ruth McBurney, Executive Director of CRCPD | Frankfurt, KY

Dear Members and Colleagues,

John Villforth, one of the founding fathers of CRCPD and a pioneer in Radiological Health in the Public Health Service, passed away on September 14, 2019 and in honor of his service, will be buried in Arlington National Cemetery. The primary lecture at the National Conference on Radiation Control each year is named in his honor and has been awarded to numerous AAPM luminaries. CRCPD has developed a bio for John, with a link to his obituary. ■

A Legacy of Leadership

John C. Villforth

John C. Villforth attended Pennsylvania State University, where he received B.S. and M.S. degrees in sanitary engineering in 1952 and 1954, respectively. Immediately upon graduation, he was commissioned a 2nd Lieutenant in the U.S. Air Force, Medical Service Corps.

He served as the sanitary and industrial hygiene engineer at Loring Air Force Base in Maine. In 1956, he was assigned to the Atomic Energy Commission fellowship program at Vanderbilt University and Oak Ridge National Laboratory.

Upon completion of his graduate training and receipt of his M.S. in physics, Mr. Villforth was assigned to the Office of the Surgeon Headquarters, Air Force Logistics Command at Wright-Patterson Air Force Base, Ohio. He served as Secretary of the USAF Radioisotopes Committee, which was the Air Force contact with the Atomic Energy Commission on matters relating to licensing and use of radioisotopes.

In May 1961, Mr. Villforth entered on duty with the commissioned corps of the U.S. Public Health Service and was assigned to the radiological health facility of the then-Division of Radiological Health at Rockville, Maryland, with the responsibility for the Radiation Surveillance Network (RSN). The RSN was invaluable in alerting the states of increased levels of fallout during the resumption of weapons testing.

In January 1963, Mr. Villforth was assigned as Chief, Radioactive Materials Section, Division of Radiological Health. Mr. Villforth, through the efforts of this Section and in cooperation with the AEC, encouraged the State health agencies to develop a control program for radium and other non-AEC licensed materials, emphasizing the need to control the use, or more appropriately, misuse of radium. One very valuable program for radium control implemented by Mr. Villforth was the convenient disposal of obsolete and damaged sources.

Following the reorganization of the Public Health Service, Mr. Villforth was appointed Chief of the Medical and Occupational Radiation Program. In addition to the continuation of the radioactive materials activities, the Program, under Mr. Villforth's guidance, developed recommendations for the safe operation of particle accelerators; initiated the only nationwide survey of the use of radionuclides in medicine; and produced a survey manual for dental and medical x-ray equipment.

Congress in the late 1960's enacted landmark legislation — the Radiation Control for Health and Safety Act—authorizing the federal government to set and enforce safety controls for medical, consumer and industrial electronic products that emit various forms of radiation. Shortly afterwards, Mr. Villforth was promoted to the PHS rank of Director (equivalent to Navy Captain) and named Director of the Bureau of Radiological Health, the PHS (and later FDA) component responsible for implementing the new law. In a relatively short time, Mr. Villforth built a national program from the ground up and did so despite the loss of a substantial portion of the cadre of PHS radiological health experts who were reassigned to the newly-created Environmental Protection Agency.

He successfully put into force an interdisciplinary, science-based program that effectively balanced product regulation with training and other voluntary initiatives to reduce population exposure to ionizing and non-ionizing radiation. He did so at a time when, in FDA, reliance on non-regulatory means, such as cooperative programs with states, health provider organizations and consumers to achieve a public health result, was a somewhat novel philosophical approach.

2020 AAPM GRADUATE FELLOWSHIP

The fellowship is awarded for the first two years of graduate study leading to a doctoral degree in Medical Physics (PhD or DMP). Both BSc and MS holders are eligible to apply. Applicants must be a member of AAPM at the time of application, (any membership category). Pending membership status not eligible. A stipend of $13,000 per year, plus tuition support not exceeding $5,000 per year is assigned to the recipient. The amount of tuition support granted will be at the discretion of AAPM. The award will be paid to the recipient's institution and distributed in accordance with the institution's disbursement procedures. It is AAPM's policy that none of the funds may be diverted to the institution's "facilities," "administrative," or other overhead categories and the full $13,000 stipend must be provided to the recipient.

Sponsored by the AAPM Education and Research Fund.

A list of Award Recipients can be found here.

Each applicant must be a graduate of an undergraduate program in physics or equivalent majors (e.g., engineering-physics, math-physics, or nuclear engineering or applied physics) from an accredited university or college in North America. The undergraduate grade point average must be greater than 3.5 (based on a 4.0). Each applicant must have submitted an application for graduate study to one of the accredited programs with subsequent acceptance.

Required Supporting Documentation:

- All post-secondary study transcripts (official transcripts only)
- Copy of Graduate Record Exam results (If applicable)
- Recommendation Form
- TWO reference letters (optional)
- Acceptance letter from intended CAMPEP Accredited Program
- CV including GPAs and publications (use CV Template)

Merge all files into one PDF and upload the complete application (PDF).

Send supporting documentation *only* to:

American Association of Physicists in Medicine
1631 Prince Street
Alexandria, VA 22314
ATTN: Jacqueline Ogburn
jackie@aapm.org

Award Duration: September 2, 2020 - September 2, 2022

Application Deadline: May 18, 2020
(All supporting documents are due by the application deadline.)

Recipient Notified on: June 15, 2020

SIX TIPS FOR BEING A CLINICAL TRIAL SUPERHERO

AAPM WORKING GROUP ON CLINICAL TRIALS UPDATE

It has been five years since the National Cancer Institute (NCI) reorganized the National Clinical Trial Network (NCTN). Since these changes took effect, clinical trial participation has been streamlined, as have the credentialing steps required to participate in an NCTN protocol. Despite these improvements, and the fascinating and important clinical questions posed by trial protocols, we still see some clinical trials struggle to accrue. Some examples of these are:

- RTOG 1308 (a non-small cell lung cancer trial comparing photon therapy vs. proton therapy),
- RTOG 1112 (a hepatocellular carcinoma trial comparing Sorafenib vs. SBRT),
- NRG GI003 (a hepatocellular carcinoma trial comparing photon therapy vs. proton therapy),
- NRG HN001 (nasopharyngeal carcinoma),
- NRG BN001 (a low grade glioma trial comparing photon therapy vs. proton therapy),
- EAF151 (a GBM trial using contrast enhanced perfusion MRI),
- EA8171 (a prostate cancer trial looking at multiparametric MRI for preoperative staging and treatment planning), and
- EA1151 (a breast cancer trial comparing standard digital mammography with digital breast tomosynthesis).

There are so many benefits to participating in clinical trials. Trials run through the NCTN typically provide funding to participating institutions per patient and per activity in the trial (e.g. for patient screening, clinical intervention, and biospecimen collection). These funds can be used to support other clinical and research activities. Trials offer great motivation to introduce new technologies in your clinic, and provide a prescriptive method of how to do so. The Center for Innovation in Radiation Oncology (CIRO) website provides tools for clinical trial participants, including contouring atlases and DVH tools. Trials often require credentialing, which can provide an independent assessment of your image quality, dosimetry, treatment techniques, etc. Clinical trial participation can also increase your institution's status. At each clinical trial meeting, top accruing institutions are acknowledged, and clinical trial participation can be used as a promotional tool with patients.

So what can you, as a physicist, do to help these clinical trials?

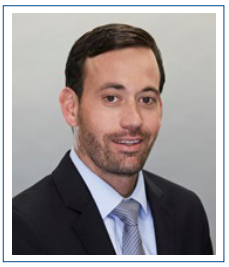
If you have other general questions about tips and tricks for clinical trial participation, you can reach out to the Working Group on Clinical Trials at 2019.WGCT@aapm.org**.**

AAPM WORKING GROUP ON CLINICAL TRIALS, Cont.

1. Speak to your physician colleagues and clinical trial coordinator (may be known as Clinical Research Associate, Clinical Research Specialist, Research Nurse, or Clinical Trial Nurse) at your institution about trials that might be a good fit for your patient population.
2. Visit the CTSU website for a list of possible protocols. You may need to register with your institution to get a CTSU login.
3. Spearhead credentialing efforts for a trial. These credentialing requirements can be found on the IROC Houston credentialing webpage, and most can be completed by a physicist. These credentialing steps might include updating your IROC facility questionnaire, irradiating various disease-site phantoms, completing IGRT credentialing, PET scanner credentialing, etc. These credentialing activities have the added benefit of meeting ABR MOC requirements for a Participatory Quality Improvement Activity (PQI).
4. Check out the Credentialing Status Inquiry to see if your site is already eligible to participate in a clinical trial. IROC will check what credentialing steps you have already completed and let you know if anything is outstanding.
5. Don't despair if you're at a photon clinic with no proton therapy available. Many of the randomized proton vs. photon trials allow for partnerships between institutions. If you need help connecting to a proton center, contact IROC at IROCHouston@mdanderson.org or by phone: 713-745-8989.
6. Volunteer with the clinical trial groups to add physics expertise to protocol development. NRG Oncology has a Medical Physics Subcommittee chaired by . We encourage imaging and therapy physicists to get involved. ■

NEW MEDICAL IMAGING WHITE PAPER PUBLISHED ON DETECTOR DOSE MEASUREMENT

THE MEDICAL IMAGING & TECHNOLOGY ALLIANCE UPDATE
Andrew Kuhls-Gilcrist, Chair of the MITA Interventional Fluoroscopy Workgroup
Philip Malca, Vice-chair of the MITA Interventional Fluoroscopy Workgroup



A. Kuhls-Gilcrist

P. Malca

The Medical Imaging & Technology Alliance (MITA) recently released "NEMA/ MITA DD P1-2019 Detector Dose Whitepaper: Understanding the Limited Usefulness of Detector Dose Measurements in Modern Medical X-ray Imaging Equipment," a medical imaging whitepaper that discusses the origins of detector dose, its historic relevance, and the usefulness of the detector dose metric in modern imaging equipment.

The development of this whitepaper benefited from the input and support provided by reviewers from the American Association of Physicists in Medicine (AAPM) and manufacturers. This group of reviewers provided valuable insights and served as indispensable experts, significantly improving the content through feedback, discussions, and additional background information. While this whitepaper has benefited greatly from their involvement, the views are solely those of the authors, and may not necessarily reflect the views of the reviewers.

For the purposes of the white paper, detector dose is defined as *the air kerma at the input surface of the image receptor.*

The white paper focuses on specific examples from radiography and fluoroscopy. However, the fundamental principles and points of discussion are generally applicable to all medical x-ray imaging modalities.

The following summary highlights the key takeaways from the paper. The full paper can be found here.

***

Detector dose originated in an era when image receptor technology was based on film. Film requires an appropriate exposure in order to produce clinically useful images, and at the time it was not possible to regulate dose other than at the entrance of this image receptor. Film has largely disappeared over the past decades, having been replaced by digital solid-state x-ray image receptors. These newer technologies produce clinically useful images over a much larger dynamic range, thereby enabling dose regulation at the entrance to the patient. In parallel, clinical focus has shifted to obtaining adequate image quality at the lowest possible dose to the

"Given the wide variety of x-ray detector technologies used across an equally wide variety of medical imaging applications, it is not practical to define detector dose levels (in terms of reference levels, statistical values, and/or limits) that would be sufficiently encompassing."

THE MEDICAL IMAGING & TECHNOLOGY ALLIANCE UPDATE, Cont.

patient. On modern imaging equipment, detector dose cannot well represent either goal. Within this context the white paper aims to:

a. Establish that detector dose is only one of a multitude of contributing variables that could be considered by a manufacturer in the design rules of any particular system configuration and does not provide complete insight into patient dose risk and image quality benefit;
b. Describe the usefulness of the detector dose metric as primarily limited to constancy testing as part of a Quality Control (QC) program and,
c. Provide a historical perspective and examples of various regulations pertaining to image receptor entrance dose that continue to persist.

X-ray detectors used for medical imaging have made major advancements over recent decades with a sustained effort to improve radiation dose efficiency in providing improved signal to noise ratio at equivalent or lower exposure levels. Given the wide variety of x-ray detector technologies used across an equally wide variety of medical imaging applications, it is not practical to define detector dose levels (in terms of reference levels, statistical values, and/or limits) that would be sufficiently encompassing.

Different detector technologies have different response characteristics that depend upon their physical composition. There are a multitude of technical parameters that must be taken into consideration by design engineers that can have substantial influence. Examples include X-ray absorption layer, pixel size, detector noise, characterization of detector response, x-ray spectrum, patient body habitus, subject contrast and size, and image processing.

Radiation dose delivered to the patient depends on multiple confounding variables. These include characteristics of the anti-scatter grid (when utilized), number of image frames per second, duration of imaging, x-ray energy defined by the target kV and added beam filter, tube current (mA), pulse width (ms), Field of View (FOV) size, imaging geometry including the Source to Image Distance (SID), focal spot size, and many other factors. The overall patient dose is dependent upon the equipment design and how it is utilized clinically.

The detector dose measured during the lifecycle of the equipment is to be differentiated from the target detector dose when this latter has a meaning in the equipment considered. The detector dose measured is generally performed at the installation of the equipment and aims to initiate the Quality Control process in recording the value measured in defined conditions. The *target detector dose* may be a characteristic of the equipment that enables the operation of the Automatic Dose Rate Control (ADRC).

Indeed, the nature of the signal enabling the operation of the ADRC — depending of the design choices — is not necessarily a dose such as a detector dose referred here. It may be a signal such as: digital image level representative of the Region of Interest (ROI) from a flat panel detector, exposure level from an ionization chamber in front of image receptor, etc. Several of these sensor signals may also coexist in a single piece of equipment.

Moreover, there is no direct correlation between the *detector dose measured* by a physicist and the *target detector dose* in the particular case when the design has implemented *the target detector dose* to make the ADRC operating. In addition, even in staying in this particular case, this target is not a constant and the manufacturers modulate this target according but not limited to: the field of view, the detail (dose rate level) and the mode of operation selected.

In state-of-the-art interventional fluoroscopy systems Automatic Exposure Controls (AEC) are designed to provide an optimized balance between adequate image quality for the particular clinical task and patient dose imposed. Clinical protocols provide further refinements to various technical settings (e.g. AEC response characteristics, kV, mA, framerate, and x-ray pulse width) depending upon the specific clinical application. Detector dose targets may also be part of the technical settings in the AEC feedback loop.

At stated above, dose control at the image receptor has been introduced historically when image receptors were on film technology (film changer) and image intensifier. The choice of the film was made by the user and it was therefore not possible to regulate the dose other than at the entrance of this image receptor. All these devices have disappeared or become the minority (image intensifiers),

THE MEDICAL IMAGING & TECHNOLOGY ALLIANCE UPDATE, Cont.

and the manufacturers of radiographic imaging devices are responsible for the whole (integrated image receptors).

Different national sources regulating the dose level at the input of the image receptor in different countries should be understood in taking into account the elements mentioned above, and should not be used as a scientific justification to perpetuate the control of the dose at the image receptors entrance on technologies that do not make it necessary. Some other countries may have also implemented similar requirements without necessarily being driven or adopting a consensus that does not exist in the scientific community.

Absolute values of detector dose are meaningless. The analysis of the national regulations showed that there is no consensus on the maximum values to be enforced among the countries enforcing such related regulations. For the equipment including an image receptor with an image intensifier technology losing luminosity when aging, user facilities may want to implement a procedure to measure the initial value(s) of the dose at the image intensifier, thus avoiding responsible organizations to compensate the aging by an increase of the dose that would affect the As Low as Reasonably Achievable (ALARA) principle. Detector dose has no technological justification when employed in flat panel detector systems other than measuring system constancy. ■

AMERICAN ASSOCIATION *of* PHYSICISTS IN MEDICINE

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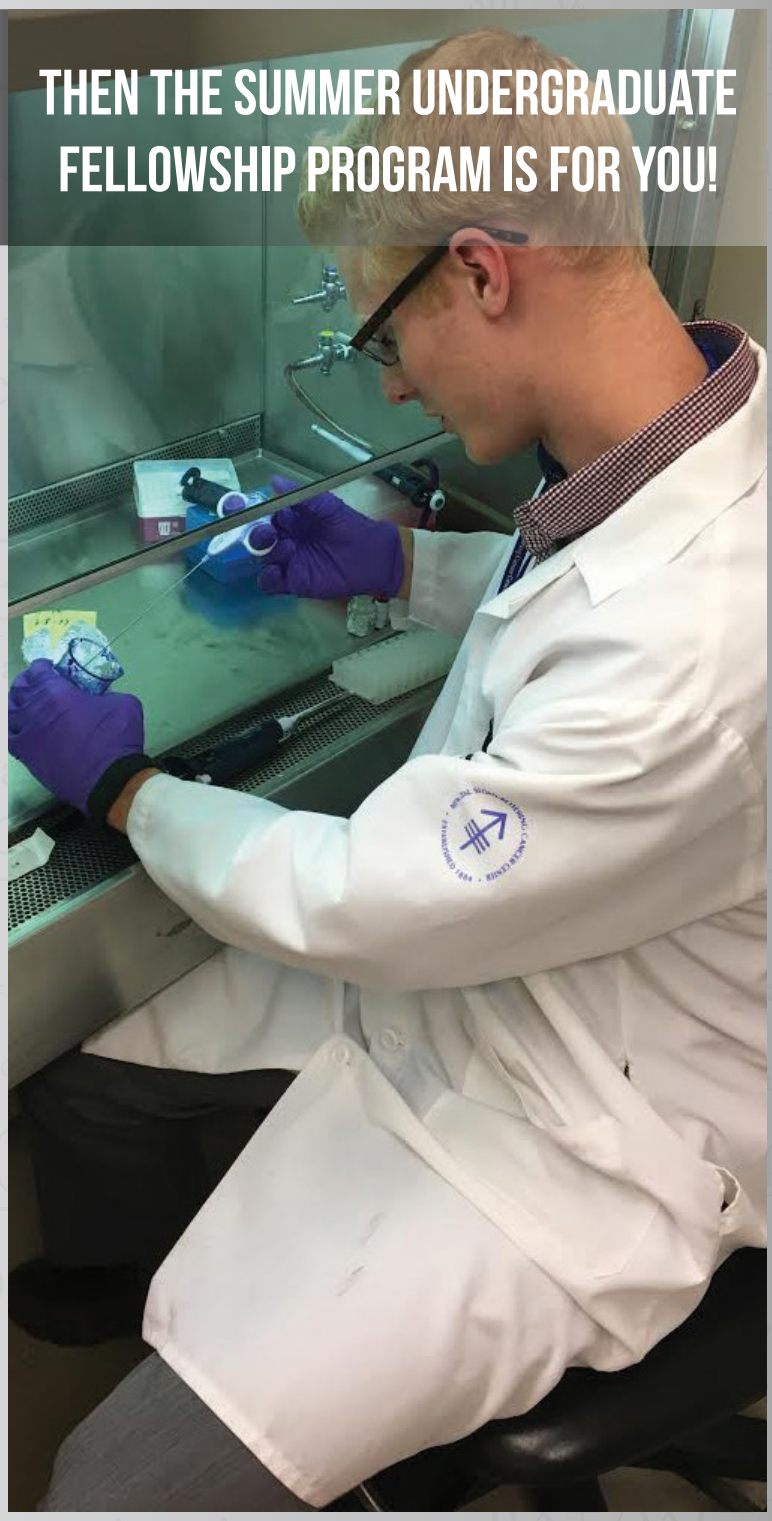

We provide opportunities for excellent undergraduates to gain experience in medical physics at leading clinical and research institutions. A large menu of mentor-defined projects is available and Fellows select their mentor according to their mutual interests.

Fellowships are offered for 10 weeks during the summer (May through September) and available to undergraduate students who are entering their junior or senior years.

Application Deadline:
February 3, 2020

For more details, visit:
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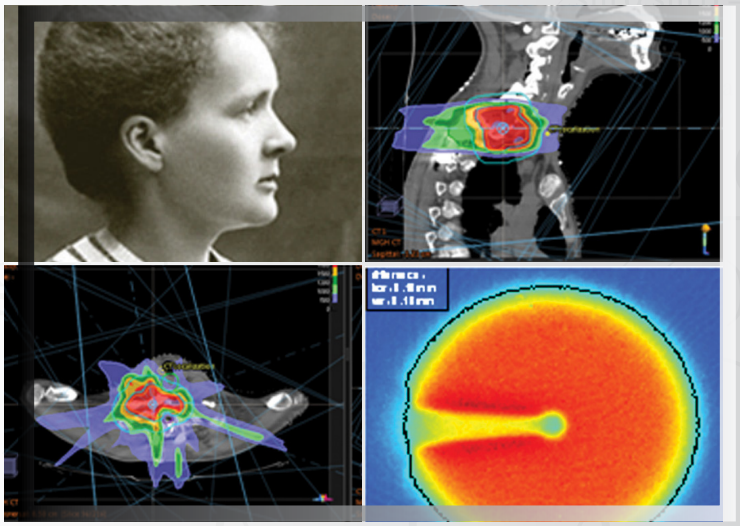
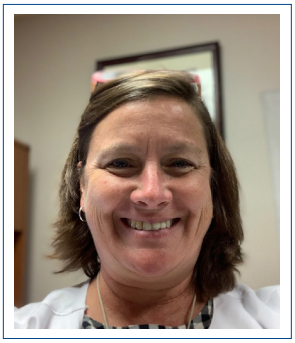


Sponsored by the AAPM Educational Council through the AAPM Education and Research Fund

PROGRAM CONTACT: Jacqueline Ogburn, jackie@aapm.org or 571-298-1228

IROC SURVEY REGARDING TG-100 ADOPTION

WORKING GROUP ON TG-100 IMPLEMENTATION REPORT Noël Christian, MS | Dothan , AL



Over the past several years IROC has distributed a survey regarding TG-100 to physicians and physicists. The survey has now been closed and the Working Group on TG-100 Implementation has summarized the results.

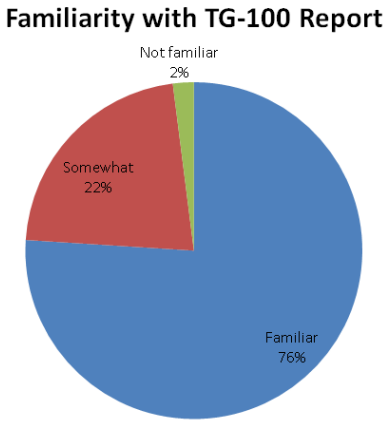
The survey was distributed for several years to the same institutions. Duplicate responses were eliminated with only the most recent survey per institution included in the analysis. There were approximately 900 respondents. 76% of respondents reported reading the TG-100 report and/or attending a workshop on TG-100. 22% had heard of TG-100, but weren't familiar with many details. The remaining 2% had not heard of the task group.

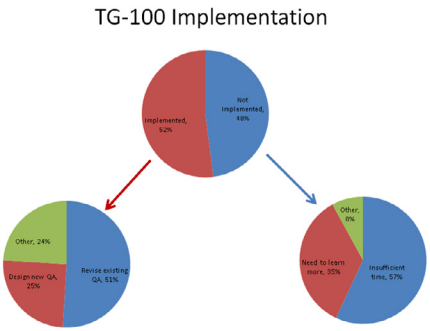
Respondents were asked whether they had used the principles in the TG-100 report in their practice. 48% percent reported that they had not implemented TG-100. Of those, 57% said that their available time was spent on other tasks, and 35% said that they needed to learn more about how to implement it.

Of the 52% who have implemented the principles of TG-100, 51% did so to revise their existing QA program while 25% used it to design a QA program for a new procedure or equipment.

The survey asked respondents what they would find most helpful in incorporating the principles of TG-100 into their practices. They were asked to score each item with a 1 for very helpful, 2 -helpful, 3- neutral, 4-unhelpful, 5-very unhelpful, and 6-don't know. Combining positive responses (those items that were thought to be helpful to very helpful), the idea of creating a repository to share risk based analysis tools was ranked highest with 80% of survey takers responding 1 or 2. Providing webinars on how to use risk based tools scored 75%. Promoting existing presentations on the AAPM virtual library scored 72%. Lower-ranked responses included promotion of risk based assessments to non-physicists (administrators, physicians, dosimetrists, therapists) and providing virtual office hours with an expert in risk-based analysis.

The survey included a place for respondents to write in how AAPM could help facilitate use of TG-100 in their clinics. Many suggested that implementation is costly in time and resources. To reduce some of that burden, suggestions were made to provide templates, software, relevant examples, collaboration with colleagues, and more education. In addition, physicists need to be able to justify the investment of time and resources to administrators. Toward that end, it would be helpful if practice accreditation programs encourage the implementation of TG-100 principles. ■





AMERICAN ASSOCIATION of PHYSICISTS IN MEDICINE

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AAPM Tuesday Evening Reception at RSNA during the 2019 AAPM / RSNA Meeting

Tuesday, December 3, 2019 | 6:00 – 8:00 pm

Crystal Ballroom BC, Hyatt Regency Chicago

151 E. Wacker Drive, Chicago, IL

light hors d'oeuvres

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IROC RADIATION THERAPY QA CENTERS: 5 YEARS OF SUPPORT OF THE NCI'S NCTN CLINICAL TRIALS

IROC HOUSTON REPORT David Followill, PhD | Houston, TX

The Imaging and Radiation Oncology Core (IROC) Group was quite active for the first 5 years supporting the National Clinical Trial Network (NCTN), Division of Cancer Prevention (DCP) and Experimental Therapeutic Clinical Trial Network (ETCTN) clinical trials. IROC was made up of six QA centers (Houston, Ohio, Philadelphia-RT, Philadelphia-DI, Rhode Island, St Louis) that provided an integrated RT and DI quality control program supporting NCI's clinical trials as shown in Figure 1.

IROC's efforts were focused on assuring high quality data for clinical trials designed to improve clinical outcomes for cancer patients worldwide. This program was administered through five core services: site qualification, trial design support, credentialing, data management, and case review. Each QA center had specific responsibilities that minimized redundancy and took advantage of existing infrastructure, past trial group relations, and efficient work processes. IROC QA Centers provided support to the legacy trials and new NCTN trials from the four adult and one pediatric trial groups. IROC continually interacted with the trial groups and the NCI.

IROC provided core support for 198 NCTN, DCP and ETCTN trials with RT, DI and RT/DI components. All 5 NCTN Groups incorporated the use of TRIAD in at least one protocol. After five years, 123 trials used TRIAD for data submission of DICOM and DICOM RT datasets. As a part of its RT site qualification service, IROC monitored 1840 RT photon and 28 proton institutions in 32 different countries as seen in Figure 2.

IROC has completed a large number of tasks over these five years. Twenty six of the 28 proton centers were approved to participate in NCTN clinical trials. Over 74,000 megavoltage beams outputs were monitored with ~8% of the sites requiring repeat audits due to one or more beams being outside of the ±5% criterion. As a part of IROC's RT credentialing core services, 2,985 end-to-end QA phantoms were irradiated, 1,600 benchmark cases were reviewed, 897 IGRT processes were assessed and 12,943 credentialing letters were issued. In addition, IROC RT QA Centers managed and reviewed 19,881 RT cases for quality and interpretation. It was IROC's responsibility to prepare the data and ensure its completeness/quality while it was each NCTN Group's responsibility to interpret the cases as per protocol or deviation.

The RT QA core services provided by IROC were numerous, are continually being evaluated for effectiveness, harmonized across all NCTN Groups and administered in an efficient/timely manner to enhance accurate and per protocol trial data submission. Through these efforts, clinical trial data uncertainty is minimized so as to not obscure actual trial outcomes. All of these efforts were supported by PHS Grant CA180803 (NCI, DHHS). ■

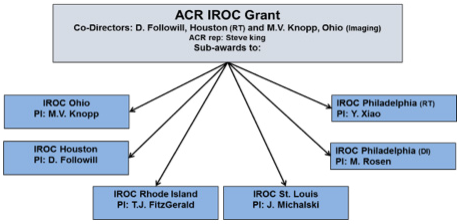


Figure 1. IROC QA Centers and their PIs.

Figure 2. Countries with ≥1 RT centers monitored by IROC.

2020 RESEARCH SEED FUNDING GRANT

Three $25,000 grants will be awarded to provide funds to develop exciting investigator-initiated concepts, which will hopefully lead to successful longer term project funding from the NIH or equivalent funding sources. Funding for grant recipients will begin on July 1 of the award year. Research results will be submitted for presentation at future AAPM meetings. The award is not intended to provide salary support for the applicant, however any other research-related expenses, including travel to scientific meetings, will be supported. Travel expense should be included in the submitted budget. At the end of the 12-month period a report must be forwarded to the AAPM, along with itemized expenses. The award will not support indirect costs. Any unspent funds should be returned to the AAPM.

Sponsored by the AAPM Science Council through the AAPM Education and Research Fund.

A list of Award Recipients can be found here.

Eligibility:

- 5 years or less since awarding of PhD.
- Must be a member of the AAPM at the time of application. (any membership category) Pending membership status not eligible.
- No previous grants >$50,000 as principle investigator.
- Previously funded projects are ineligible.
- Prior Seed Grant recipients are ineligible.

Application Requirements:

a. Five-page description of research project (including figures and tables), separated as follows:
b. specific aims
c. background and significance
d. preliminary results
e. research plan
f. literature cited
g. budget
h. Letter of support from division/ department chair demonstrating support for the project and authorization of time and resources to complete the proposed research.
i. CV (no more than 4 pages).

Note that sections (e) and (f) do not count towards the five-page limit.

As the competition for the seed grant is high, eligible applicants are encouraged to also submit their applications for other awards, e.g. www.cancer.gov/researchandfunding/training/.

Review Criteria

- 50% Scientific merit of proposal (significance, innovation, environment, and soundness of approach)
- 25% Potential for project to develop into a major project fundable by NIH, DOE, DOD, etc.
- 25% Background of investigator

Application Deadline: May 4, 2020

(All supporting documents are due by the application deadline.) **You must log onto the AAPM website to view the apply button.**

Award duration:
July 1, 2020 – August 31, 2021

Recipients notified by:
June 10, 2020

FOR MORE DETAILS, VISIT:

http://gaf.aapm.org/index.php#SEED

WINNER REPORTS Henry Chen, Ph | Houston, TX ■ Jennie Crosby, BS | Chicago, IL ■ Daniel Huff | Madison, WI ■ Qihui Lyu | Los Angeles, CA ■ Dan Mulrow, BS | St. Louis, MO ■ Alison Roth, MS | Madision, WI ■ Suman Shrestha, MS, MSc | Houston, TX

Name: Henry Chen

Institution: The University of Texas MD Anderson Cancer Center

Conference Selected: 2019 Organization for Human Brain Mapping (OHBM) Annual Meeting

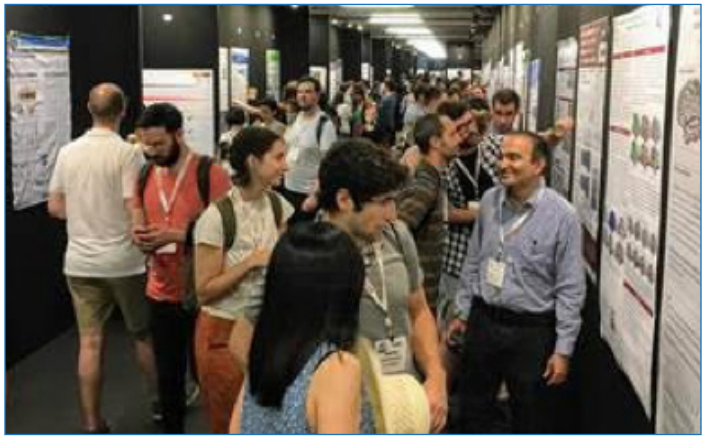
Location: Auditorium Parco Della Musica,. Rome, Italy

Dates: June 9–13, 2019

Research/Thesis Topic: My current research focuses on the relationships between resting-state functional MRI derived whole brain connectomic measures and neurocognitive function in glioma patients.

Favorite/Highlight Session from conference: The surprise highlight for me was when I attended the session on Recent Advances in Neuroanatomy — a topic that I thought I would be hopelessly lost in — which turned out to be both fascinating and relatable as an imaging scientist.

Impact: Being a relative newcomer to human brain mapping, this conference presented me with a huge learning opportunity. It helped me affirm my research direction, provided many new insights, and allowed me to gather invaluable feedback on my preliminary work.



Name: Jennie Crosby

Institution: University of Chicago

Location: Neural Information Processing Systems (NeurIPS) 2018, Montreal, Quebec, Canada

Dates: December 5–8, 2018

Research/Thesis Topic: My research involves the application of machine learning methods to medical images for the detection and localization of diseases/conditions.

Favorite/Highlight Session from conference: My favorite session was AI's Impact on Art, Music, and Culture since Yo-Yo Ma, world-famous cellist, was an invited guest. A piece of AI-generated cello music was played for him and he shared his impressions of the music.

Impact: The conference was unique in its wide breadth of topics, covering everything from the mathematics behind deep learning to the socioeconomic impacts of machine learning. I attended the "Medical Imaging Meets NeurIPS" workshop, which was a full day of talks and posters solely about machine learning applied to medical imaging where I learned many different techniques to apply to my own research.

AAPM EXPANDING HORIZONS TRAVEL GRANT, Cont.

Name: Daniel Huff

Institution: University of Wisconsin-Madison

Location: CMIMI 2019 – Austin, TX

Dates: September 22–23, 2019

Research/Thesis Topic: Development of a PET/CT-based image analysis framework for immunotherapy response assessment.

Favorite/Highlight Session from conference: The keynote session titled "Simplifying Machine Learning to enable Citizen Scientists" given by Dr. Shez Partovi of Amazon Web Services was one of many highlights from the conference. While the presentation was given at a high level, it was interesting to get an insight into how a large company in industry such as Amazon sees opportunity in an evolving technology like machine learning.

Impact: The primary impact of attending CMIMI for me was to see wider perspectives outside of academic or clinical medical physics research interact in one meeting. CMIMI attendees ranged from clinical radiologists, to healthcare AI startup founders, to scientists at large industry companies. This diversity of perspectives expanded how I think about my training in medical physics.

Name: Qihui Lyu

Institution: University of California, Los Angeles

Location: San Diego

Dates: February 16–21, 2019

Research/Thesis Topic: Dual-Energy CT guided Radiation therapy

Favorite/Highlight Session from conference: 'World's deepest-penetration and fastest optical cameras: photoacoustic tomography and compressed ultrafast photography'

Impact: Photoacoustic tomography (PAT) effectively differentiates healthy and diseased tissues from the optical absorption coefficient, producing either deeper penetration or higher resolution image than other modalities. PAT has huge potential in both diagnostic imaging and image-guided radiation therapy.

Name: Dan Mulrow

Institution: Washington University in St. Louis

Conference Selected: SPIE Photonics West

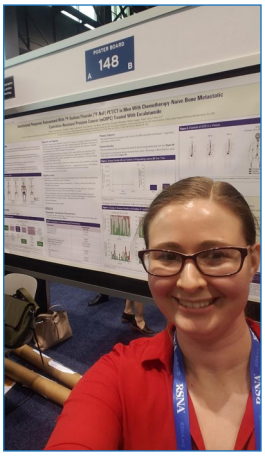
Location: San Fransisco

Dates: Feb 2–7

Research/Thesis Topic: The characterization of radioluminescent signals produced from proton irradiated materials.

Favorite/Highlight Session from conference: I attended the "Enhanced Imaging and Spectroscopy" which was particularly interesting and relevant to my own research projects.

Impact: I gained experience presenting medical physics research and terms to a broad audience and was able to expand my own knowledge of optical and spectroscopic techniques for my own research.



Name: Alison Roth

Institution: University of Wisconsin-Madison

Conference Selected: American Society of Clinical Oncology

Location: Chicago, IL

Dates: 5/31–6/3 2019

Research/Thesis Topic: My thesis research relates NaF PET/CT based imaging biomarkers to response to therapy in metastatic prostate cancer patients.

Favorite/Highlight Session from conference: One of my favorite sessions discussed clinical use of PSMA PET/CT from the perspective of a urologist, nuclear medicine physician, medical oncologist, and researcher. Not only did they do a great job of summarizing the strengths, benefits, and general state of the field, but their clinical experience and unique training brought a new perspective beyond the physics characteristics I was most familiar with.

Impact: At ASCO I hoped to gain clinical insight into my project directing biopsies using response information from NaF PET/CT. So far, a precision medicine approach has not been taken for metastatic prostate cancer, but the clinical interest is there and my project could help advance precision medicine research.

AAPM EXPANDING HORIZONS TRAVEL GRANT, Cont.

When Reality Exceeds Expectation: Expanding Horizon Grant Awardee's Perspective

Suman Shrestha, MS, MSc, Houston, TX

In fall of 2018, I was awarded the "Childhood Cancer Survivor Study (CCSS) Career Development Grant" for the project titled "Enhancing Heart Model of Current CCSS Age-Specific Computational Phantoms by Defining Cardiac Substructures and Dose Reconstructions." This is a collaborative effort with the MD Anderson Late Effects Research Group, which has collaborated on numerous national and international cohort and case-control radiation epidemiology studies for over thirty years. This work includes detailed abstraction of thousands of historic radiation therapy records to determine individual survivors' organ doses. These data along with patient outcomes are used to establish organ specific radiation dose response models for various late effects. The results of such studies are used to establish surveillance guidelines for cancer survivors and to establish dosimetric constraints for contemporary radiotherapy treatment planning. In particular, the purpose of this study is to establish a dose response relationship for individual substructures in the heart. This will be an improvement over existing models, which only consider whole heart doses.

As a physicist, I had very limited experience with survivorship research and had few interactions with epidemiologists, clinicians, and other researchers working in this field. This is where the AAPM Expanding Horizons Grant truly lived up to its name. In early 2019, I received this grant from AAPM to attend "The North American Symposium on Late Complications after Childhood Cancer (NASLCCC)." This was an ideal learning and networking opportunity for me. The biannual symposium provided a venue for the multidisciplinary exchange of innovative ideas among clinicians and researchers engaged in pediatric cancer survivorship clinical care and/or research. In addition, two other survivorship meetings that I attended preceded this Symposium: (i) Childhood Cancer Survivorship Study Investigator Meeting, (ii) International Late Effects of Childhood Cancer Guideline Harmonization Group (IGHG). At these meetings, I participated in in-person meetings with collaborators on the CCSS cardiac investigation and was exposed to the broader community of survivorship investigators.

The CCSS Investigator Meeting started with updates from leaders from all the centers and committees within CCSS, where they introduced their team and presented updates regarding ongoing activities and relevant publications since the last meeting two years ago. This was an excellent introduction to the team of potential collaborators and investigators. The second day began very early with the session "CCSS 101: A Primer on the Successful Use of CCSS Resources" which was presented by Eric Chow, MD, MPH. It was an opportunity for new survivorship researchers like me to learn about all the available resources and where to find them and how to use them. The venue was packed with scientists (at different stages of career) from all over the globe. This primer session then led to a period where six working-group chairs provided reports focused on membership, progress and future priorities. What followed was a breakout session where the auditorium full of investigators were divided into multiple sections based on working group and disease/research interests. This was a crucial session for me as I was able to meet scientists/physicians who were working on cardiac toxicity projects [Figure 1].

Figure 1. Gregory Armstrong, MD, MSCE (left) during the Working Group breakout discussion session.

During this session Dr. Gregory Armstrong, Dr. Daniel Mulrooney, Dr. Louis Constantine, Dr. Rebecca Howell and many others led a focused discussion on late cardiac toxicity. There was a specific interest on how my research will affect future research and practice. Another major highlight of the meeting was the discussions I had with Drs. Hudson and Armstrong (principal investigators of the CCSS and the St. Jude Lifetime Study, respectively) on the direction of the field and impact of new researchers like

AAPM EXPANDING HORIZONS TRAVEL GRANT, Cont.

me on survivorship studies. As a novice in the field this was an exciting opportunity for me to understand the vision of the leadership.

Immediately following the CCSS Investigators Meeting, I attended the IGHG Meeting. It is a worldwide endeavor initiated by several national guideline groups to collaborate on guideline development with the goal to establish a common vision and integrated strategy for the surveillance of chronic health issues and subsequent cancers in childhood, adolescent and young adult cancer survivors. During this session, I learned about how individual efforts from different parts of the world can be utilized to come up with best practice recommendations for the whole world.

Then the major NASLCCC symposium began on the afternoon of June 20. My experience only got better after this. Each day of the conference included exceptional keynote speeches by professors/scientists from around the globe. Saro Armenian, DO, MPH talked about intervening to mitigate health complication in cancer survivors. Claire Wakefield, PhD, MPH presented on early intervention to remediate psychosocial and behavioral late effects. Eric Chow, MD, MPH introduced emerging late effects of novel therapies. The symposium was filled with numerous scientific presentations on recent breakthroughs with scientists

from Europe, Asia, Oceania, South America, Canada, the United States, etc. These individuals are world leaders in their respective fields, may it be oncology, psychology, psychiatry, radiation oncology, social work or survivorship. These presentations were fascinating, but the main benefit for me was that it clarified the big picture of late effects and survivorship research. At the end of the meeting, I had a better idea about where my research fits in and also the impact of my research on a global level. Among other talks, Dr. Mulrooneys' presentation on recent reduction in cardiac events for survivors of childhood cancers in more recent eras was motivating, fascinating and pertinent to my current research goal.

Above all, the biggest asset of attending this meeting was the time I spent with investigators. I had the privilege of having multiple one-on-one sessions with many senior scientists (e.g., Dr. Hudson, Dr. Yasui, Dr. Leisenring, and Dr. Chow). I was truly humbled by how welcoming and helpful they were. Their interest in my research and my progress made me even more excited about the research prospects.

Since returning from the NASLCCC, I have had the pleasure of working with senior investigators in the field of cancer epidemiology and genetics from the National Cancer Institute, and senior physicians from the epidemiology/cancer control department at St. Jude Children's Research Hospital who work on cancer survivorship and outcomes research. Since this event was a venue for the multidisciplinary exchange of groundbreaking ideas mainly focused on pediatric cancer survivorship, clinical care and research, it was an ideal meeting to attend before I finalized the direction of my doctoral dissertation research. We (Dr. Howell and I) are currently in the process of designing and defining the full scope of my doctoral research. Attending the North American Symposium on Late Complications after Childhood Cancer was thus a critical step in my training towards becoming an integral part of the late effects research community. The AAPM Expanding Horizons Travel Grant gave me this opportunity to become acquainted with future collaborators and mentors in the field of survivorship and epidemiological research, and truly lived up to its name. This award was a pivotal moment in my career thus far. I thank the AAPM for this award and the opportunity to expand my horizons! ■

PERSONS IN THE NEWS

AMERICAN BOARD OF RADIOLOGY APPOINTS NEW TRUSTEE FOR MEDICAL PHYSICS

Jessica Fagerstrom, PhD | Lynnwood, WA

Contact:

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Northwest Medical Physics Center's Jessica Fagerstrom Selected as AAAS IF/THEN® Ambassador

Lynnwood, WA – September 9, 2019 – Northwest Medical Physics Center (NMPC) is proud to announce that Medical Physicist Jessica Fagerstrom, Ph.D. has been selected as one of the 125 AAAS (American Association for the Advancement of Science) IF/THEN® Ambassadors. IF/THEN®, a national initiative of Lyda Hill Philanthropies, seeks to further women in science, technology, engineering and math (STEM) by empowering current innovators and inspiring the next generation of pioneers.

"We firmly believe that IF we support a woman in STEM, THEN she can change the world," said Lyda Hill, founder of Lyda Hill Philanthropies. "The goal of IF/THEN® is to shift the way our country—and the world—think about women in STEM and this requires changing the narratives about women STEM professionals and improving their visibility."

To achieve this goal, AAAS IF/THEN® Ambassadors will connect with students in person and through various media platforms, including popular YouTube channels and network television shows. The Ambassadors are contemporary role models who represent a diversity of STEM-related professions in the United States, from entertainment, fashion, sports, business and academia.

"AAAS is deeply committed to advancing education and opportunities for girls and women in STEM," said Margaret Hamburg, chair of the AAAS Board of Directors. "This partnership enables us to reach more deeply into STEM education and help advance STEM careers for women and girls. It will help us to elevate the voices of women working in STEM fields and to inspire the next generation of girls and women in science."

PERSONS IN THE NEWS, Cont.

Dr. M. Miron Zaini, President and CEO of NMPC, stated, "NMPC is pleased to share that Dr. Jessica Fagerstrom has been chosen as an AAAS IF/THEN® Ambassador. Jessica' work in clinical medical physics makes a critical impact on patient care. Throughout her tenure at Northwest Medical Physics Center (NMPC), Dr. Fagerstrom has been a leader in our field, and she helps NMPC achieve its clinical service, educational, and research missions. We are very proud of her impressive work and community outreach involvements. Recognition of Dr. Fagerstrom as an AAAS IF/THEN® Ambassador is truly remarkable."

Jessica Fagerstrom majored in physics at Claremont McKenna College, and received her Ph.D. in medical physics from the University of Wisconsin. She has worked in clinics in Hawaii and Washington and is a staff physicist with the Northwest Medical Physics Center. She is board certified in therapeutic medical physics through the American Board of Radiology and is an active member of the American Association

AAAS IF/THEN® Ambassadors were selected through a rigorous selection process. Candidates were evaluated for overall excellence with a focus on the following:

- contributions to their STEM-related field, commensurate with their career stage;
- demonstrated experience and abilities in STEM communication and public engagement via media, classroom, and public programs; and
- commitment to inspiring middle-school girls to be the next generation of STEM pioneers.

The IF/THEN Girls Advisory Council, comprised of more than 150 10-18 year-old girls from around the country, also participated in the Ambassador selection process.

For a complete list of Ambassadors, go to www.ifthenshecan.org/ambassadors.

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ABOUT NORTHWEST MEDICAL PHYSICS CENTER

Northwest Medical Physics Center (NMPC), a non-profit, tax-exempt organization, originated in 1969 as a Regional Medical Physics Center funded by the Regional Medical Program at the University of Washington. Since 1972, it has been an independent organization providing Medical Physicist Consultation to many different radiation oncology departments.

Northwest Medical Physics Center strives to provide excellent care to patients; reliable, innovative and collegial service to clients; and education, professional development, and support to staff. NMPC is committed to advancing the science and practice of radiation oncology through research, education and training.

PERSONS IN THE NEWS, Cont.

ABOUT IF/THEN

IF/THEN® is part of Lyda Hill Philanthropies' commitment to fund game-changing advancements in science and nature. IF/THEN® seeks to further advance women in STEM by empowering current innovators and inspiring the next generation of pioneers. Rooted in a firm belief that there is no better time to highlight positive and successful female professional role models, IF/THEN® is designed to activate a culture shift among young girls to open their eyes to STEM careers by: (1) funding and elevating women in STEM as role models, (2) convening cross-sector partners in entertainment, fashion, sports, business and academia to illuminate the importance of STEM everywhere, and (3) inspiring girls with better portrayals of women in STEM through media and learning experiences to pique their interest in STEM careers. To learn more, visit www.ifthenshecan.org or follow IF/THEN® on Facebook, Twitter, Instagram and LinkedIn.

ABOUT LYDA HILL PHILANTHROPIES

Lyda Hill Philanthropies encompasses the charitable giving of founder Lyda Hill who believes that "science is the answer" to life's most challenging issues and is committed to funding transformational advances in science and nature. To learn more, visit www.lydahillphilanthropies.org.

ABOUT AAAS

The American Association for the Advancement of Science (AAAS) is the world's largest general scientific society and publisher of the journal *Science*, as well as *Science Translational Medicine*; *Science Signaling*; a digital, open-access journal, *Science Advances*; *Science Immunology*; and *Science Robotics*. AAAS was founded in 1848 and includes more than 250 affiliated societies and academies of science, serving 10 million individuals. *Science* has the largest paid circulation of any peer-reviewed general science journal in the world. The nonprofit AAAS is open to all and fulfills its mission to "advance science and serve society" through initiatives in science policy, international programs, science education, public engagement and more.

ABR APPOINTS ROBERT POOLEY, PhD

The American Board of Radiology (ABR) has appointed **Robert Pooley, PhD**, to its Board of Trustees. Dr. Pooley will replace Jerry Allison, PhD. Dr. Pooley is chair of the division of medical physics and an assistant professor of radiology at the Mayo Clinic in Jacksonville. He earned his bachelor's degree in physics, master's degree in medical physics, and PhD in medical physics from the University of Wisconsin. He did his medical physics residency at the University of Minnesota Department of Radiology. Robert Pooley is an oral board examiner for the ABR.

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