



AMERICAN ASSOCIATION
of PHYSICISTS IN MEDICINE

IMPROVING HEALTH
THROUGH MEDICAL PHYSICS

AAPM NEWSLETTER

September/October 2021 | Volume 46, No. 5



IN THIS ISSUE:

- ▶ President Elect's Report
- ▶ Education Council Report
- ▶ Professional Economics Committee Update
- ▶ MPLA Spotlight
- ▶ Research Spotlight
- ▶ Person in the News
- ▶ ...and more!

COVID-19 UPDATE

Notice as of Sunday, August 29, 2021, 9AM Eastern Time.

- [COVID-19 Information for Medical Physicists](#)
- Beginning August 1, AAPM will allow in-person meetings and AAPM-funded travel for those fully vaccinated, with the understanding that individuals may participate virtually if they do not feel comfortable traveling. Meetings at AAPM HQ must be pre-approved by EXCOM and follow guidelines established by EXCOM as appropriate to circumstances at the time of the meeting.

NEW Solution for Motion Synchronization QA



Delta⁴
by ScandiDos

We provide a realistic pre-treatment verification of the delivered treatment for Accuray Radixact® with Synchrony®.

In collaboration with Accuray, ScandiDos has developed a solution that improves the quality assurance (QA) of radiotherapy treatments of moving targets. The solution independently simulates the breathing motion of patients, therefore, adding an extra dimension of QA to the already existing product, the ScandiDos Delta4 HexaMotion motion platform.



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:
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PUBLISHING SCHEDULE

The AAPM Newsletter is produced bi-monthly.
Next issue: November/December 2021
Submission Deadline: October 8, 2021
Posted Online: Week of November 1, 2021

CONNECT WITH US!



Editor's Note

I welcome all readers to send me any suggestions 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 enhance the overall readership experience. Thank you.



MARK YOUR CALENDAR FOR THESE UPCOMING AAPM MEETINGS!

2021



Practical Big Data Workshop 2021

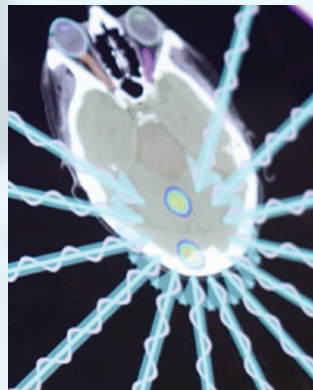
September 26–29, 2021
aapm.me/PBDW2021

This workshop series brings together global innovators in radiation therapy and diagnostic imaging who are leading in development and use of big data and artificial intelligence to improve care for cancer patients.

Patient Communication for Medical Physicists Workshop **SOLD OUT!**

September 23–24, 2021
aapm.me/2021PCMP

Learn how to use communication strategies to develop professional relationships with patients and implement those strategies in realistic clinical scenarios. Capacity is limited.



2022

AAPM Spring Clinical Meeting

March 26–29, 2022
New Orleans, LA

AAPM 64th Annual Meeting & Exhibition

July 10–14, 2022
Walter E. Washington
Convention Center,
Washington, DC

ANOTHER DAY, ANOTHER SURGE OF WHAT? ARPA-H!

PRESIDENT-ELECT'S REPORT J. Daniel Bourland, MSPH, PhD
Wake Forest School of Medicine



Greetings AAPM Colleagues:

It's a pleasure to write to you again, and I hope you are all doing well. The month of July went by quickly and featured another successful, albeit virtual, Annual Meeting. The exciting meeting with the theme **Creative Science. Advancing Medicine.** featured guest speaker Bruce J. Tromberg, PhD, Director since 2019 (right before COVID) of the National Institute of Biomedical Imaging and Bioengineering (NIBIB). Dr. Tromberg has substantial

accomplishments as a biomedical engineer working in biophotonics and was the keynote speaker in AAPM President **Jim Dobbins'** Symposium on "The Importance of Creativity in Science." After welcoming comments from Mary Mahoney, MD, President of RSNA, and Laura Dawson, MD, President of ASTRO, Dr. Dobbins gave "a brief history" of creativity in science, from basic science through medical physics. Dr. Tromberg's talk reviewed priorities and challenges for NIBIB and healthcare in the United States. Relevant to medical physics, technologies in health are projected to have a substantial impact in the coming years, representing a large portion of the NIH research portfolio going forward. The medical physics field has much to contribute, as we consider how to broaden our tent to other areas of physics in medicine, beyond our traditional roles in the radiological and radiation sciences. An astute panel of medical physicists provided panel discussion on scientific creativity, inventions to product, and optical imaging: **David Jaffray, PhD, Robert Jeraj, PhD, Rock Mackie, PhD, Maryellen Giger, PhD, Charles Mistretta, PhD,** and Nimmi Ramanujam, PhD. The Annual Meeting has substantial content in all areas of medical physics practice, education, science, and diversity and inclusion. I encourage you to [take advantage of the online content](#) for personal learning as well as continuing education credits available.

A Board of Director's Meeting is always associated with the Annual Meeting that includes a multitude of reports, including mine as President-Elect. A summary of my report includes:

- Serving on EXCOM, five Councils, and various Ad Hoc Committees. Notably, the Presidential chain of Board Chair **Saiful Huq**, President **Jim Dobbins**, President-Elect **Dan Bourland**, and now President-Elect-Designate **Ehsan Samei** are committed to providing continuity of leadership as we transition each year to the next office. Also, Board Chair Huq is providing leadership to the BOD for robust engagement and deliberations.
- Authoring on behalf of AAPM, an article published by the British Institute of Radiology in a brochure titled "Innovations in Imaging and Radiotherapy – A more connected world." This publication included the opinions of 20 international radiological societies and can be found [here](#).

Email: bourland@wakehealth.edu

What are our highest priorities? Please let me know if you have comments or suggestions about AAPM's mission, priorities, and committees or would like me to participate in your meeting or seminar — my email remains:
bourland@wakehealth.edu.

PRESIDENT-ELECT'S REPORT, Cont.

- Giving the talk “Medical Physics – Perspectives for the Future” for four AAPM chapters, three physics groups, and AAPM Headquarters staff. This talk provides the opportunity for dialogue and feedback, and I would be delighted to give this to your chapter or physics group.
- Topics and Themes (TTs) in consideration for next year's 2022 Annual Meeting, Washington, DC. These TTs include:
 - Celebration! – It's been a long time since gathering, time to celebrate!
 - In-vivo Molecular Imaging – Imagine, single-cell imaging, in people
 - Advocacy – Communicating and building on initiatives by Pres. Dobbins and the Board
 - The Interface of Imaging and Therapy Physics – We need to work together
 - Artificial Intelligence – This particular surge continues, with great future impact

I welcome your comments and suggestions on the featured aspects of next year's meeting

And in a fast-breaking event, AAPM presents at an ARPA-H Listening Session: Two days before the BOD meeting, AAPM received the invitation to present at an NIH Listening Session being held on Wednesday, August 11 ([Listening Session #9](#)) as one of three stakeholders for the NIBIB (AIMBE and ARPIR) on the rapidly progressing formation of the Advanced Research Projects Agency for Health, known as ARPA-H. Similar to DARPA and ARPA-E (energy), ARPA-H is a new, multi-billion-dollar proposal from President Biden to accelerate biomedical discovery and development — from benchtop to product — for rapid impact on prevention, diagnosis and treatment of

disease. AAPM's invitation was facilitated by President Jim Dobbins' invitation to Dr. Tromberg to take part in AAPM's Annual Meeting, as well as by **Cynthia McCollough, PhD**, Chair, AAPM Nominating Committee (and Past BOD Chair and President), who had invited Dr. Tromberg and other biomedical leaders to an AAPM-convened workshop at Headquarters (November 2018). These invitations helped to inform Dr. Tromberg of AAPM's mission and activities, and we were honored to have been invited as an NIBIB stakeholder.

A 4-minute talk for ARPA-H — fortunately, help arrived!

As President-Elect, I agreed to present at the NIH listening session, led by NIH Director Francis Collins. With a very short time to prepare, a small and dedicated team of AAPM members and staffers worked together to provide content and feedback on AAPM's rapidly produced document. I give great thanks to **Maryellen Giger, Jan Seuntjens, Paul Kinahan, Rex Ayers, John Hazle, Robert Jeraj, Jim Dobbins, Angela Keyser, and Richard Martin**. AAPM's response can be found on our [webpage](#), and we look forward to further participating in the formation and implementation of ARPA-H. There will be more to come on ARPA-H and AAPM.

Again, the richness of AAPM resides in our remarkable members, volunteers, headquarters staff, and other colleagues. Together, we bring a diverse mix of expertise, experiences, interests, and cultures to AAPM's mission of Improving Health. In the midst of a **pandemic, which looks to be surging again**, I commend all of you for your continuing contributions in medical physics and public health for the benefit of your workplaces, homes, and communities. I encourage all to “keep going” and take care of themselves to best take care of others. ■

AAPM 2021 MID-YEAR FINANCIAL REPORT

TREASURER'S REPORT Mahadevappa Mahesh, PhD | Johns Hopkins University



If this were a normal year, I would be talking about returning from our successful Annual Meeting held in Columbus Ohio. However, this is not a normal year. AAPM and the rest of the world is still dealing with the lingering effects of the global pandemic and now we are dealing with the spread of the Delta variant. As a result of the ongoing challenges with COVID-19, the 2021 Annual Meeting was held virtually. Since the meeting was virtual and all committee meetings were scheduled before and after the annual meeting, I was able to

attend many wonderful sessions and co-lead a session on personal finances for medical physicists. Regarding AAPM finances, despite the challenges bestowed upon us by the COVID-19 pandemic, AAPM remains strong.

Regarding FY 2020, however, the year 2020 ended less favorably for the Association as AAPM experienced a deficit from operations of approximately (\$429,000). (Figure 1). For the year 2020, AAPM had budgeted for a deficit of approximately (\$1,009,000), therefore this led to a favorable variance of \$580k for 2020. The largest single driver contributing to this favorable variance came as the result of net under-spending versus budget in Councils and Committees which contributed \$1,330,000 to the favorable variance. This was mainly travel-related costs due to travel restrictions imposed as a result of the pandemic. Additionally, underspending in Governance and Administrative Services contributed an additional \$303k to the favorable variance. Offsetting this positive variance were negative variances of \$937K. The largest negative variances for 2020 included Meetings (annual, spring clinical, summer school) \$612K, Overhead \$202K, Publications \$116K, Membership Dues \$69K, and Other Income and Expenses \$54K. As a result of the deficit from operations AAPM was not in compliance with the Debt Service Coverage (DSC) ratio of 1.2 to 1 covenant requirement as a part of AAPM's building financing with TD Bank. For the year ending December 31, 2020, AAPM's DSC ratio was 1.01 to 1. TD Bank waived the covenant violation.

AAPM's balance sheet remains strong as of the end of the year 2020 with total assets exceeding \$29.2M (Figure 2). This represents an increase of approximately \$2.9M over the prior year 2019. This increase was the result of very strong market performance during the year. For the year the investment reserves achieved unrealized gains of about \$1.87M. At year-end reserve balances stood at slightly over \$16.0M.

The FY 2021 budget has an approved deficit of approximately \$1.39M. This budget was prepared utilizing a statistical model, using historical budgets and operating results as a guide. However, the budgeted deficit is higher than the guide. In the budget it was anticipated that certain revenue streams would

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I would like to thank Robert McKoy for his help with the subject matter. Please feel free to reach out to me (email me, call me at 410-955-5115, or tweet me) if you have any questions concerning this report.

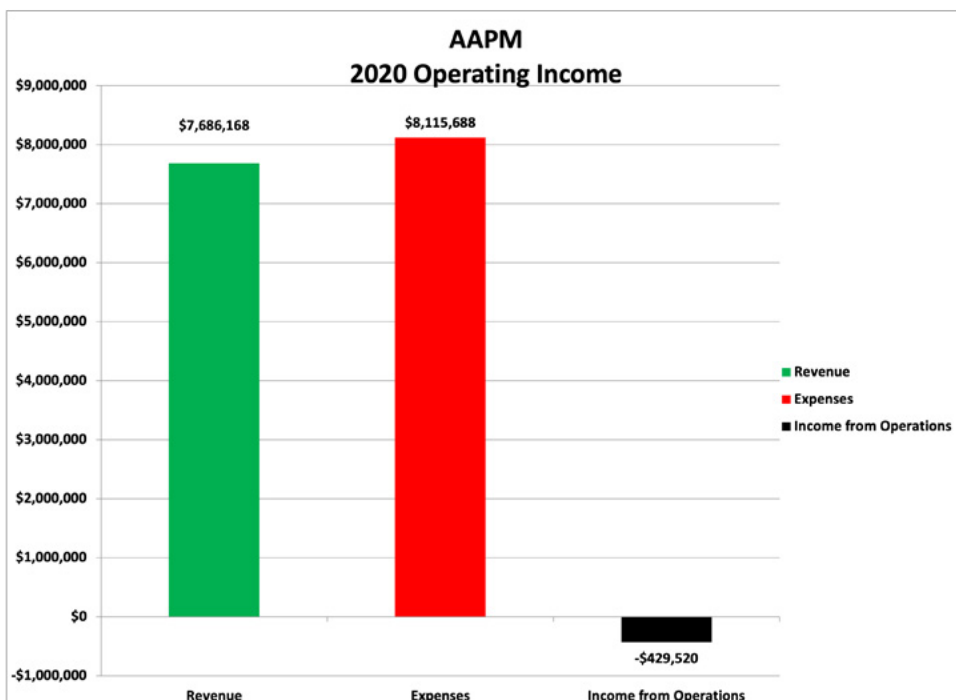
TREASURER'S REPORT, Cont.

decline as a result of the pandemic. It was determined that this was a short-term situation and therefore the decision was made not to cut programs which would hinder AAPM's ability to achieve its strategic goals. Given the association's strong reserves, if a deficit was realized in the short-term, the association could fund the deficit from its reserves. Based on the tremendous economic uncertainty facing the Association in 2020, AAPM applied for and received a Paycheck Protection Program (PPP) loan from the Small Business Association (SBA). The Association has fulfilled all the spending requirements under the program and is applying for forgiveness of this debt. It is anticipated that this will be approved during FY 2021.

Currently, the Association is working on the budget for 2022. All councils and committees are invited to prepare their respective budgets and will submit them by the end of August. At the present time, the plan is for FINCOM to meet face-to-face or virtually on October 20, 2021 to review and approve the 2022 budget to be submitted to the Board.

I have included a chart (Figure 3) which compares the Historical Reserves of the Association against the annual

Figure 1: AAPM Income and Expenses for year 2020



operating expenses (blue line in graph). As shown the unrestricted net assets of the Association exceed the annual operating expenses indicating the financial strength of AAPM.

I have also included for informational purposes a five-year trend of Operating Revenues and Expenses (Figure 4). This chart shows the operating income, Investment Income, Unrealized Gains (Losses) and Education and Research Fund, net activity for the past five years. Over the past five years the Association has generated an Operating Deficit of approximately (\$742,000) and total income (all sources) of approximately \$47.9M. AAPM remains fiscally strong, and the operating results continue to bear this out.

My term as Treasurer will end in December of this year and this is the last time that I will have the opportunity to address AAPM's finances with you. It has been my privilege to serve as your Treasurer. I want to leave you with one final graph (Figure 5). When I became Treasurer in 2016 AAPM's reserves were at approximately \$12.8M (Operating Reserves). While the year is not over, as of the end of July they were at approximately \$17.2M (Operating Reserves

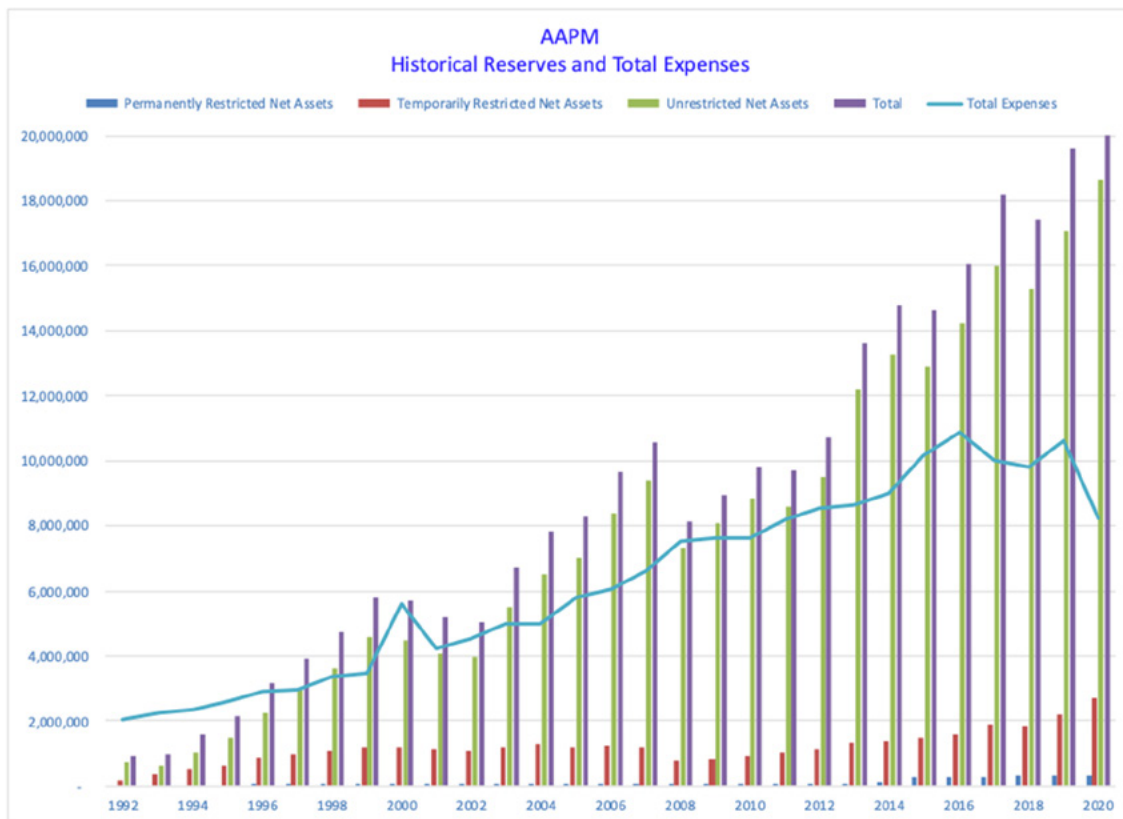
and EBIEP). This represents an increase of over \$4.4M or 34% during my tenure. We have experienced this growth despite having withdrawn nearly \$3.9M from reserves to cover costs associated with purchasing the building as well as the cost of the Association Management System (AMS) and Financial Management System (FMS). While I would love to take all the credit, AAPM is the beneficiary of a very strong market. Even the Education and Research Fund investments have grown from \$1.4M to \$2.6M during my tenure. All in all, AAPM is in a very strong position as I pass the baton to our next Treasurer **Dr. Samuel Armato** at the end of the year. ■

TREASURER'S REPORT, Cont.

Figure 2: AAPM Balance Sheet

	12/31/19	12/31/20	\$ Change	% Change
Assets				
Cash	1,932,905	2,651,168	718,263	37.2%
Other Current Assets	826,612	862,291	35,679	4.3%
Investment - Reserves	13,970,567	16,082,339	2,111,772	15.1%
Investments E&R Fund	2,124,072	2,453,215	329,143	15.5%
Building & Other Fixed Assets	7,381,148	7,161,955	(219,193)	-3.0%
Total Assets	\$ 26,235,304	\$ 29,210,968	\$ 2,975,664	11.3%
Liabilities				
Current Liabilities	3,028,172	4,115,229	1,087,057	35.9%
Bonds Payable	3,604,425	3,433,963	(170,462)	-4.7%
Total Liabilities	6,632,597	7,549,192	916,595	13.8%
Net Assets				
Net Assets without restrictions	17,072,945	18,622,010	1,549,065	9.1%
Net Assets with restrictions	2,529,762	3,039,766	510,004	20.2%
Total Net Assets	19,602,707	21,661,776	2,059,069	10.5%
Total Liabilities and Net Assets	\$ 26,235,304	\$ 29,210,968	\$ 2,975,664	11.3%

Figure 3: AAPM Historical Reserves (Restricted & Unrestricted funds)



TREASURER'S REPORT, Cont.

Figure 4 Five Year Trend Operating Revenues and Expenses

5 Year Trend Statement of Activities					
	2016	2017	2018	2019	2020
Operating Revenue	11,002,721	9,686,258	9,800,256	9,797,797	7,686,168
Operating Expenses	10,580,445	9,735,695	9,689,598	10,593,730	8,115,688
Net Income (Loss) from Operations	422,276	(49,437)	110,658	(795,933)	(429,520)
Investment Income	225,067	219,347	267,952	301,314	245,200
Unrealized Gains (Losses)	703,017	1,603,959	(1,016,205)	2,258,255	1,866,573
Education and Research Fund, Net	111,602	317,107	(79,255)	404,060	376,815
Net Income (Loss)	1,461,962	2,090,976	(716,850)	2,167,696	2,059,068

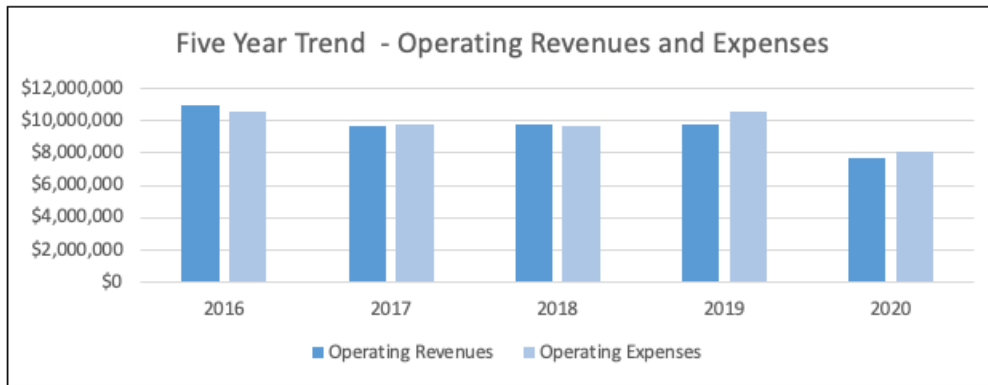
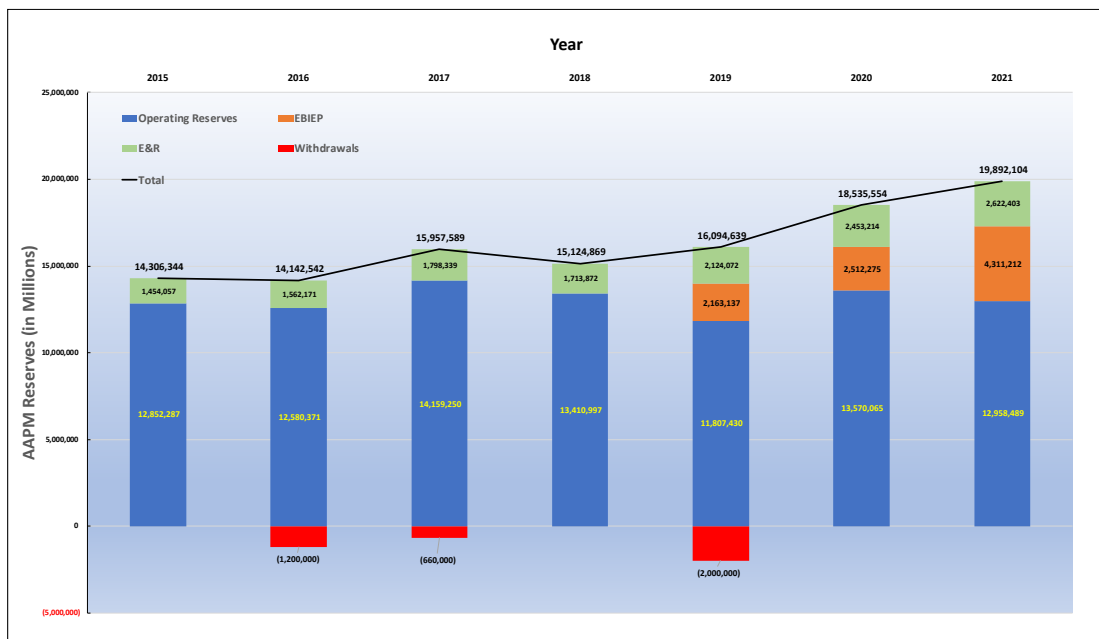
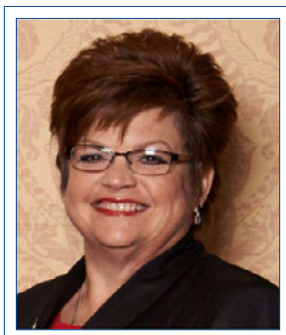


Figure 5 Investments



INFORMATION FROM HQ

EXECUTIVE DIRECTOR'S REPORT Angela R. Keyser | AAPM



New Publications

- Magnetic Resonance Biomarkers in Radiation Oncology: Report of AAPM Task Group 294
- MPPG 1.b: CT Protocol Management and Review Practice Guideline published in JACMP
- MPPG 3.b.: Levels of Supervision for Medical Physicists in Clinical Training published in JACMP
- Estimation of Patient Skin Dose in Fluoroscopy: Summary of a Joint Report by AAPM TG357 and EFOMP

International Day of Medical Physics on November 7

IOMP is once again promoting activities to raise awareness about the role of medical physicists through the International Day of Medical Physics (IDMP). Each year the IDMP is scheduled for November 7, the birthdate in 1867 of Marie Sklodowska-Curie. The theme of IDMP 2021 is "**Communicating the Role of Medical Physicists to the Public.**" This is an excellent opportunity to promote the role of medical physicists. Visit the [IOMP website](#) for more information and promotional resources.

RSNA 2021 — Redefining Radiology

[Register now](#) for the RSNA 107th Scientific Assembly and Annual Meeting, to be held November 28 – December 2, 2021. AAPM Members must register by October 1 to receive complimentary registration for the physical meeting. There is a charge for virtual access. For the most up-to-date information on RSNA 2021 health and safety precautions and requirements, continue to monitor [this page](#).



Have a Suggestion?

Use the "Suggestion Box" in the upper right corner of the website to reach the Executive Committee, Chairs of AAPM Councils or the Executive Director.

Twitter: @AngelaKeyser

Email: akeyser@aapm.org

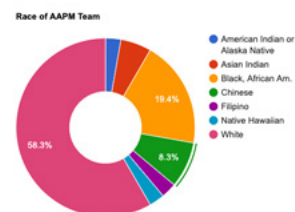
AAPM HQ Team at Your Service

Who does what on the AAPM HQ Team? See a list with contact information and brief descriptions of responsibilities online. An Organization Chart is also provided. We are now providing information about the diversity of our team as well.

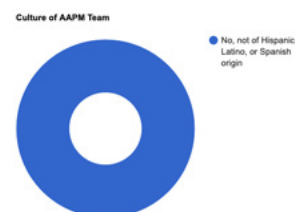
DIVERSITY OF AAPM TEAM

Race, Culture and Gender

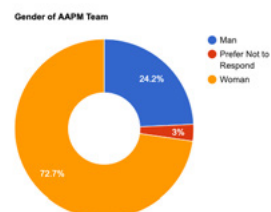
Primary race of team members reporting (32 of 33)



Culture of those reporting (33 of 33)



Gender of those reporting (33 of 33)



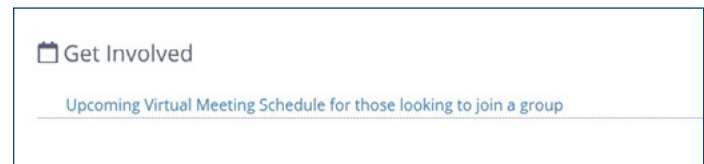
EXECUTIVE DIRECTOR'S REPORT, Cont.

Did You Know?

- If you would like to make the pronunciation of your name available on your AAPM Member Directory listing, you can create a profile at [NameCoach](#), record your name, then store a link to your NameCoach NameBadge in your [Primary Information page](#) so others can hear exactly how to pronounce your name.
- **AAPM tracks member orcidIDs**
Haven't heard of orcid? It's a unique, persistent identifier free of charge to researchers provided by [ORCID](#). If you have published in Medical Physics or JACMP, we have imported your orcid, but if you have not, feel free to sign up for one and enter it into your profile.
- **AAPM Reports Authored Included in Membership Directory Listing**
Ever want to find an AAPM Report, don't remember all the details, but remember the name of one of the authors? AAPM includes "AAPM Reports Authored" in the AAPM Membership Directory listing of each AAPM Member. Login and check it out!
- AAPM Members are eligible for joint membership in ESTRO for € 55.00, with access to most services ESTRO has to offer. Details available [online](#).
- If you find a page or section of the website that is not working as it should, please send an email to the [Help Desk](#) which will put the request into the Information Services Team queue. Someone will then respond to let you know when it has been resolved.

AAPM Groups Continuing to Do Good Work...Virtually

AAPM groups are meeting remotely, many of them on a regular basis. Historically, finding out when the virtual meetings were scheduled was not easy to do. HQ has created an [Upcoming Virtual Meeting Schedule](#) that is posted on the main webpage.



Interested in joining an AAPM Group? Review the schedule, find something that you are interested in, and then plan to attend the Group's meeting. It's also helpful to send an email to the Chair of the Group noting your interest and background. After the meeting, if you would like to know more, ask the Chair if you can be added as a guest. This will allow you to participate in online discussions and remote meetings.

The AAPM family continues to grow! Two more of our team members "tied the knot" in the last few months. (That is three in 2021!). Deputy Executive Director **Michael Woodward** married Klare Madelin Warfel on July 9 and AAPM Applications Developer **Rohan Tapiyawala** married Rima Kapadia on July 13. We wish Michael and Maddie and Rohan and Rima many years of wedded bliss! ■

The Working Group for Non-Clinical Professionals (WGNC) and the Working Group to Promote Non-Clinical Career Paths for Medical Physicists (WGNMCP) would like to invite you to attend our virtual Non-Clinical Careers Expo!

**Join us Tuesday, October 19, 2021
7:30–9:00 pm Eastern | 4:30–6:00 pm Pacific
on Zoom — stay for as long as you would like!**

This Expo is aimed at facilitating general discussions on non-clinical careers and roles that medical physicist fill outside of the clinic. We will have experts in multiple facets of non-clinical medical physics

— from medical physicists in Industry working in Sales, Product Development, and Support...to those in Regulatory with the FDA, NIST, and NRC...to Business, Entrepreneur, and Manager medical physicists. They'll share how they found their career, their career roles, and answer any questions about non-clinical careers you may have!

To participate in the Career Expo or for any questions, please e-mail [Alison Roth](#).

We hope to see you there!





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UPDATE TO AAPM ONLINE EDUCATION CREDITS PROGRAM



The move to a virtual meeting environment in 2020 and the expectation that future AAPM meetings will include a virtual component necessitate that AAPM rethink existing fee structures. Two changes have been made to the subscription program:

- Starting in 2021, non-members are now able to subscribe to the Online Education Credits Program to earn credits through the AAPM Website.
- The Online Education Credits Program subscription fees have not increased since 2013 — in 8 years. The Board approved an increase in fees beginning in 2022, as follows:

Membership/Affiliation Type	2022 Subscription Fee MEMBERS	NEW 2022 Subscription Fee NON-MEMBERS
Full Associate	\$150	\$300
Emeritus & Emeritus Associate Corresponding Professional Affiliate International Affiliate	\$100	
Resident Junior	\$20	\$150
Student	\$0	\$50



AMERICAN ASSOCIATION
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Call for Nominations

Nominations are Now Being Accepted for the following AAPM Awards:

William D. Coolidge Gold Medal Award • Marvin M.D. Williams Professional Achievement Award
Edith H. Quimby Lifetime Achievement Award
John S. Laughlin Young Scientist Award • AAPM Fellows • Honorary Membership

Recipients will be honored at the Awards and Honors Ceremony during the 2022 Annual Meeting in Washington, DC.

All nominations are due by **October 15, 2021**

awards.aapm.org

2020 & 2021 Award, Grant and Fellowship Recipients

AAPM/RSNA Fellowship for the Training of a Doctoral Candidate in the Field of Medical Physics: Skylar Gay — The University of Texas MD Anderson Cancer Center

ASTRO-AAPM Physics Resident/Post-Doctoral Fellow Seed Grant: Devin Miles, PhD — Johns Hopkins University School of Medicine

The AAPM Science Council Associates Mentorship Program: Rachel B. Ger • Haidy G. Nasief • Michelle E. Howard • Phillip D. H. Wall • Qihui Lyu • Stella (Shu) Xing • Arthur Lalonde • Afua A. Yorke

2021 Virtual DREAM — Diversity Recruitment through Education and Mentoring Program: Corrie Burroughs • Carlos G. Colon-Ortiz • Wilson Delmas • Beatriz Guevara • Joana Krasimirova Hadzhilazova • Erika Jank • Baylie Jensen • Kristiana Ramos • Paul Teng • Sara T. Zeida • Nahom Zewde

Research Seed Funding Grant: Yang Sheng — Duke University Medical Center • Oleksandra Ivashchenko — Leiden University Medical Center • Qihui Lyu — University of California, Los Angeles

AAPM/RSNA Imaging Physics Residency Program Grant: University of Pennsylvania/Penn Medicine
University of Texas/Southwestern

2021 Virtual Summer Undergraduate Fellowships: Edward Robert Criscuolo • Jade Fischer • Joshua H. Genender • Marissa Allison Iraca • Alaina C. Kelley • Caleb Yong Kwon • Jason Costa Lima • Corbin Gabriel Maciel • Henry Meyer • Karen Rex • Chase E. Ruff • Ethan Douglas Stolen • Caitlin Welch • Andrew J. White • Ye Wan Evan Wong

The AAPM Expanding Horizons Travel Grant: Nitish Chopra • Maduka M. Kaluarachchi

Summer School Tuition Scholarships: Tirthraj Adhikari • Daniel Hernandez • Borna Maraghechi • Patricia Oliver • Andrew Santoso • Shima Yaghoobpour Tari

Grand Challenges:

The Deep Learning for Inverse Problems (DL-sparse-view-CT) Grand Challenge Winners: Martin Genzel, PhD • Jan Macdonald, PhD • Maximilian März, PhD

The DAIR Digital Breast Tomosynthesis Lesion Detection Phase 2 (DBTex2) Grand Challenge Winners: Krzysztof J. Geras, PhD • Jan Witowski, MD, PhD • Jungkyu Park • Jakub Chłędowski

MedPhys Slam:

1st Place: Alexander Podgorsak

2nd Place and Popular Choice: Felix Mathew

Innovation in Medical Physics Education: Adam Riegel

Jack Fowler Early-Career Investigator Award: Tess Reynolds, PhD

Jack Krohmer Early-Career Investigator Award: Sang Ho Lee, PhD

The John R. Cameron Early-Career Investigators Competition:

1st Place: Yiqun Ma • **2nd Place:** Nolan Esplen

3rd Place: Evan Gates

Journal of Applied Clinical Medical Physics Paper Awards: George Starkschall Award of Excellence for an Outstanding Radiation Oncology Physics Article

Yunfeng Cui • Hao Gao • Jiahao Zhang • John P. Kirkpatrick • Fang-Fang Yin

Edwin C. McCullough Award of Excellence for and Outstanding Medical Imaging Physics Article

Jeffrey E. Snyder • Joel J. St-Aubin • Sridhar Yaddanapudi • Amanda Boczkowski • David A.P. Dunkerley • Stephen A. Graves • Daniel E. Hyer

Peter R. Almond Award of Excellence for an Outstanding Radiation Measurements Article

Owen J. Brace • Sultan F. Alhujailli • Jason R. Paino • Duncan J. Butler • Dean Wilkinson • Brad M. Oborn • Anatoly B. Rosenfeld • Michael L. F. Lerch • Marco Petasecca • Jeremy A. Davis

Michael D. Mills Editor In Chief Award of Excellence for an Outstanding General Medical Physics Article

Daniela Poppinga • Jana Kretschmer • Leonie Brodbek • Jutta Meyners • Bjoern Poppe • Hui Khee Looe

Medical Physics Journal Paper Awards:

Moses & Sylvia Greenfield Award for an Outstanding Paper on Imaging

Ran Zhang • Amy M. Fowler • Lee G. Wilke • Frederick Kelcz • John W. Garrett • Guang-Hong Chen • Ke Li

Farrington Daniels Award for an Outstanding Paper on Radiation Therapy, Dosimetry, Planning or Delivery

Conor H. McFadden • Shirin Rahmanian • David B. Flint • Scott J. Bright • David S. Yoon • Daniel J. O'Brien • Aroumougame Asaithamby • Amir Abdollahi • Steffen Greilich • Gabriel O. Sawakuchi

2020 Honorary Membership: John Buatti, MD • Donald Frush, MD

Fellows: Jenghwa Chang, PhD • Eri Chen, MS • Quan Chen, PhD • Jaydev Dave, PhD • Keyvan Farahani, PhD • Ryan Foster, PhD • Alonso Gutierrez, PhD • Scott Hadley, PhD • Michael Howard, PhD • Grace Gwe-Ya Kim, PhD • Eugene Lief, PhD • Liyong Lin, PhD • Holly Lincoln, MS • An Liu, PhD • Dale Michael Lovelock, PhD • Wei Luo, PhD • Alex Markovic, PhD • Rebecca (Marsh) Milman, PhD • Andrea Molineu, MS • Ke Nie, PhD • Jennifer O'Daniel, PhD • Stephanie Parker, MS • Marianne Plunkett, MS • Julianne Pollard-Larkin, PhD • Gregory Sharp, PhD • Koren Smith, MS • Stephen Thompson, MS • Neelam Tyagi, PhD • Michelle Wells, MS • Ning Wen, PhD • Xiaowei Zhu, MS

John S. Laughlin Early-Career Scientist Award:

Clemens Grassberger, PhD

2020 Marvin M.D. Williams Professional Achievement Award:

Priscilla Butler, MS • Christopher Serago, PhD

2020 Edith H. Quimby Lifetime Achievement Award:

Frederic Fahey, DSc • X. George Xu, PhD

2020 William D. Coolidge Gold Medal: Randall Ten Haken, PhD

HIGHLIGHTS OF EDUCATIONAL PRESENTATIONS AT THE 2021 ANNUAL MEETING

EDUCATION COUNCIL REPORT

Joann Prisciandaro, PhD | University of Michigan/Michigan Medicine



The 2021 Annual AAPM meeting was a great success thanks to our wonderful presenters and the hard work of our dedicated headquarters staff. This edition of the Education Council report will highlight several educational presentations and events from this year's meeting. I hope these summaries will pique your interest and encourage you to consider making innovative changes in your approach to education.

—Joann Prisciandaro, PhD, University of Michigan/

Michigan Medicine, Education Council Chair

Joint Council Symposium – Creativity in Medical Physics

Virtual Fellowships: A Novel Approach to Undergraduate Research Training and Mentorship

By: Parmindar Basran, PhD, Cornell University - College of Veterinary Medicine

Of the many challenges medical physicists continue to face because of the COVID-19 pandemic, cultivating and supporting pathways for undergraduate students into the profession are unique, demanding novel approaches in outreach and training. The AAPM-supported virtual studentships facilitated through the Summer Undergraduate Fellowship and Outreach Program in 2019 and 2020 not only maintained an important vehicle for student recruitment, but also provided new training and mentoring opportunities for students that face travel, financial, health, and other personal circumstances that prevent an in-person experience. A successful virtual fellowship requires a reassessment of:

1. How academic and personal mentorship is achieved, often requiring more frequent meetings for mentors and students;
2. How knowledge translation is achieved, often facilitated through virtual training, learning and teaching opportunities with other students, supervisors, and health professionals (e.g., clinical rounds, departmental meetings, lectures, journal clubs, etc.);
3. How knowledge is applied, with clear project goals and planning, access to journals/books and information, providing reports and virtual presentations;
4. Provisions for success, such as access to software, data, user-rights, and internet access; and
5. Ensuring a positive life experience, through a healthy work/life balance and access to personal growth, enrichment, and social activities.

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Virtual studentships are an intriguing pathway for both undergraduate students and AAPM mentors that could be adopted in the future, as well as extended to students and mentors outside our borders. While there is no replacement for in-person training and education, the pandemic has unnaturally thrust upon us new opportunities while demanding the administrative and technical readiness needed for modernized undergraduate training and education.

Education Council Symposium – Lessons learned during the COVID-19 pandemic, innovative approaches to didactic and clinical training

1. It only took a pandemic: Engaging online students with active learning strategies

By: Izabella Barreto, PhD, University of Florida

Shifting to the online learning environment introduced several new challenges — including the one to become better educators. Along with limited access to computers and internet access, the natural connection students once shared in the classroom diminished along with their motivation to engage with the course content. To overcome these challenges, I redesigned my Radiation Biology graduate course with active learning strategies and student-centered assignments. Active learning benefits from higher-order thinking, improved understanding, interaction to encourage motivation, collaboration to contextualize meaning as a group, and community to support collaborative learning. Rather than reproducing how I taught in a classroom setting, my synchronous video lectures became components of the class, but did not fully cover everything the students were expected to learn. Supplemental content such as readings and pre-recorded videos were included in the course's learning management system. I aimed to drive their learning by sparking intrinsic motivation with their interest of the material and recognition of its utility in their careers. I did so by exploiting their emotional curiosities with real-world scenario questions to challenge students to apply their new knowledge. Being reminded they'll someday have to resolve concerns using fact-based evidence helps capture their attention and maximize cognitive performance. I also incorporated several fun activities to humanize the course, build a learning community, and promote interaction in and out of class.

Students often engaged in collaborative activities by applying, analyzing, and summarizing their learnings. They presented their topic to their peers and engaged in discussion, identifying curiosities, concerns, agreement, enforcing their own understanding of the material from different perspectives. Since students can feel greater confidence from receiving formative feedback during the learning process, I offered several low stakes quizzes and extra credit opportunities through interactive games and teamwork to grasp whether key points were clear. Compared to prior semesters, the number of in-class assessments increased from 6 to 19, and the number of homework assignments increased from 12 to 18. The transition to the online environment forced many of us to consider student attention and introduce activities and collaboration to increase engagement. Over the past year, instructors became familiar with several new tools that enable interactive lessons and should consider using these to redesign activities to promote active learning in both online and classroom environments.

2. Using digital training tools to address resident training during a pandemic

By: Christopher Watchman, PhD, Memorial Sloan Kettering Cancer Center

The pandemic demonstrated the need for Digital tools in the training of medical physics residents. There are many online resources available to supplement didactic resident training. Each of the major professional societies provide significant digital resources ranging from traditional research journals and reports to video and eLearning training modules. The AAPM has their virtual library of lectures in addition to many webinars on varied topics. The RSNA has a series of training modules covering physics topics and professionalism and ethics curriculum. ASTRO also provides digital education tools through their ASTRO Academy, while the ACR has their Education Center and their Lifelong Learning portals. The IAEA also provides video content on their YouTube channel and eLearning training modules in their Human Health Campus website. In addition to society-based tools, there are several vendor-based products available, including [Educase.com](https://www.educase.com) that has contouring training tools. SIMAC ([Linax Technologies Ltd, Kelowna, BC Canada](https://www.linaxtechnologies.com)) and VERT ([Virtual, East Yorkshire, UK](https://www.virtuallifelearning.com)) are

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virtual linear accelerator tools that were developed to train medical physics trainees. VERT Physics, also from Vertual, is a virtual physics training tool providing different modules that simulate common measurements in medical physics. There are also training videos available on-line through both YouTube and Vimeo. One example of these is the Duke University Eclipse Treatment Planning [video course](#).

Video conferencing tools have become widely used and are a necessity in current medical physics training. Commercial options include Zoom (Zoom Video Communications, San Jose, CA), WebEx (Cisco Systems, San Jose, CA), and MS Teams (Microsoft, Redmond, WA). While each of these systems provide similar video conferencing capabilities, MS Teams also works as an integrated system with Microsoft's suite of applications. This system can provide a comprehensive location for storing residency documents and forms. It can also serve as a common workspace for projects and as a common platform for administrative functions in residency training. MS Teams has integrated their streaming video storage platform, MS Streams. Streams allows for storing and disseminating video-based training or reviews of previous lectures, conferences, and discussions. Using streams as a video storage portal can allow for the development of a library of lectures given through MS Teams, and used to supplement and reinforce resident education.

Creation of video-based eLearning content is also a valuable option for enhancing residency training. Video-based eLearning requires four main components: (1) video capture equipment (e.g., video cameras, software simulation capture tools, video conference recordings), (2) audio editing software, (3) eLearning authoring software, and (4) eLearning Management software. With the eLearning software you can often take slides and incorporate them into your training module. Effective video training should account for active learning strategies. Approximately, 30% of the information presented in a video is retained by the learner. This can be increased to 70%–90% if an interactive learning strategy is incorporated. Active eLearning training can be achieved by developing a module where the instructional component presented in the video is followed by an interactive quizzing, or replication of the process presented. In the future, we

may be able to improve the quality of virtual training by using AI and/or augmented reality to develop simulation training courses. This type of training could be used to supplement resident training by providing “virtual, hands-on” training for emergency situations that could be encountered, while reducing the risk of equipment damage or patient harm.

3. Silver Linings: Tools I will take with me when I leave virtual teaching behind

By: Victor Montemayor, PhD, Germantown Academy

All teachers have struggled during the past year trying to move their classes forward in the face of virtual teaching, distancing, and masking. To accomplish this, we were forced to try new things: new ways of organizing our classes and new tools to help us present our subjects and engage our students. In this presentation, I summarized the tools that I found particularly useful to the extent that I will continue using them after the pandemic has passed. This is simply a summary of tools that I found useful — it is neither an exhaustive overview nor an endorsement of the products listed.

I have found Microsoft® OneNote (Microsoft, Redmond, WA) to be particularly useful. In particular, creating a class notebook in Microsoft® Teams (that works with OneNote) and then exporting it to OneNote allows for the easy distribution of course materials to students in the class and for the grading of work that the students post in their notebooks, all done virtually so that no paper changes hands. Using a tablet and stylus makes it all very easy and convenient. Socrative is an online homework/quiz system that makes it easy to quiz the students during class, for example. It provides nice feedback for the instructor and the students. Screencastify (Screencastify, LLC, Chicago, IL) is a video recording and editing software package that is easy to use, particularly for editing videos. Finally, OBS Studio (Open Broadcaster Software®) is a free-download, open-source streaming and video recording software package that makes it easy (with a bit of a learning curve) to produce fancy videos. It's a very powerful and useful tool.

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4. Post-pandemic education and training: Will we do more than just endure?

By: Jay Burmeister, PhD, Wayne State University, Karmanos Cancer Center

While the COVID-19 pandemic has been unique in our lifetime in terms of its societal effects, it is not the first pandemic and won't be the last. However, its effect on the global educational infrastructure was unparalleled by any event in history, as approximately 1.6 billion learners in nearly 200 countries lost access to their place of education [1]. Prior to COVID-19, we had already seen widespread implementation of online education practices, but the pandemic stretched our ability to deliver remote education in every way — from training, to implementation, to technology, to speed of deployment. To help understand the effects of the pandemic on our students, to prepare for future disruptions in our educational infrastructure, and to prepare for future implementation and use of online education, we have an obligation to evaluate the data we have from pre- and post-COVID remote education efforts.

The uptake of results from studies of pre-COVID implementation of remote learning and new technology in education has been slow. In this sense, it mirrors the delay in departing from the traditional lecture format in favor of active learning techniques. While the latter represents a reluctance to change and the former represents a “newer must mean better” mindset, they both illustrate a failure to adapt to available data. This is an unfortunate statement about the way we pay attention to, and ultimately implement, education science.

There are many lessons to be learned from existing data on remote learning, and many more to come as we evaluate our data from the COVID-19 era. Here are a couple of examples:

(1) Pre-COVID data evaluating online vs. in-person undergraduate education shows an advantage for in-person coursework [2]. This advantage is not only substantial (about a half a GPA point), but also persistent (resulting in an additional half a GPA point advantage in future courses in that subject).

(2) Gains in mathematics within standardized testing were markedly lower for elementary and middle school students taught virtually during the COVID pandemic in 2020, than those taught in person in 2019 [3].

There is more data showing similar findings and these cumulatively suggest that virtual coursework is not equivalent to in-person education [4-7]. This appears to be true for learners of all ages, as well as both before and during the COVID era. However, a closer look reveals disparities in the magnitude of the detriment from virtual delivery. Undergraduate students with the lowest GPAs suffered much more from online education (nearly a full GPA point) than those with the highest GPAs (only about a tenth of a GPA point) [2]. Additionally, 3rd through 5th graders suffered more in math during COVID (about a 10% drop in gains from 2019 to 2020) than 6th through 8th grade students (only about a 5% drop from 2019 to 2020) [3].

Results like these suggest a cumulative observation regarding virtual education. That observation is that not every student necessarily suffers significantly from an interruption like that resulting from the COVID-19 pandemic and virtual education is not detrimental for everyone, but that the loss of the physical educational environment most profoundly affects our most vulnerable students. There are many reasons why one might anticipate this to be true, but of course, that doesn't make it true. It is up to us to dig deeply into the reservoir of new data we have now to determine where we should go from here in our application of virtual education (and all things virtual for that matter). While virtual may be more accessible and may even be more comfortable now, what is most comfortable is not necessarily best. That advice was crucial in our movement from the traditional lecture format to active learning techniques and may be just as crucial if it now feels more comfortable to deliver classes from behind a camera rather than in the classroom with our students.

COVID upset our educational apple cart. But adversity brings opportunity. One silver lining of the COVID pandemic in education is that we now get a chance to consider why we set up our apple cart the way we did in the first place, and how best to set it back up again this time. There are plenty of lessons to be learned

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here about educational equity, metacognition, and independent learning.

Our goal has always been and still is to engage students, and to encourage critical thinking and self-directed learning. We now have a chance to reconsider how we can most effectively engage with our students and to seek out and truly appreciate such opportunities. As we survey the aftermath of COVID-19, let's take a moment to stop and ask ourselves what teaching should look like as we move forward. Specifically, "What does it actually mean to 'teach students' - not 'subject matter', but 'students'?"

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The Student and Trainees Subcommittee Events

By: **Mallory Glenn, PhD, University of Washington**

Krystal Kirby, PhD, Mayo Clinic Rochester

Phillip Wall, PhD, University of California San Francisco

The 2021 Students and Trainees Subcommittee (SPASC) consists of 18 student and trainee voting members, three voting faculty advisors, one voting liaison from Professional Council, and seven non-voting members. With so many involved volunteers, we have been working diligently over the past year to coordinate and host a number of events at the AAPM Annual Meeting (and beyond) for students and trainees alike. For the 2021 Virtual AAPM Annual Meeting, we hosted three events geared towards our fellow students and trainees:

- Annual Student Meeting (Sunday, July 25): This year's Annual Student Meeting, titled "Beyond the Clinic — Medical Physics in Industry," discussed the role of medical physicists in the industrial workplace. STSC members Reed Kolany and Ahtesham Khan moderated an engaging session, where we were joined by a panel of industry physicists — **Paul Naine** of Elekta, **Maria Bellon** of ViewRay, and Christie Lin of OnLume — who shared their experiences in industry, advice for trainees looking into industry careers, and insights into the future of the medical physics industry. We generously thank the speakers for their time and valuable perspectives.
- Annual Student Night Out (Sunday, July 25): This continues to be one of our most consistently and heavily attended events even in a virtual environment, with over 80 students and trainees in attendance this year. Led by our friends at Majestic Circus, we had some group fun playing trivia and interactive games while competing to become trivia masters! Shout-out to Team Broccoli for coming out on top with the big win!
- MedPhys Slam (Tuesday, July 27): In our fourth annual event, we had 18 trainee contestants, representing 16 AAPM chapters and the Canadian Organization of Medical Physicists (COMP), with Mary Gronberg and Soleil Hernandez hosting the competition. These contestants won their local competitions and gave three-minute talks on their research judged by four non-medical physicists: Molly Garrity Adams, Senior Communications Specialist at MD Anderson; Max Crawford, Meteorologist for KBTX in Brazos Valley, TX;

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Edwin Greco, PhD, Senior Academic Professional at Georgia Institute of Technology; and Roger Parker, JD, Former Senior VP and General Counsel for Memorial Sloan-Kettering Cancer Center. This event is targeted at practicing the communication of science so that non-medical physicists can understand the impact funding our research has on the future of cancer therapy. A special thanks to all our participants, and congratulations to our winners: **Alexander Podgorsak** (1st) and **Felix Mathew** (2nd & People's Choice)!

Upcoming Student and Trainee Events:

- Residency Fair: Despite the challenges of navigating virtual environments, the Residency Fair continues! This year, we will be hosting Virtual Residency Fair Fridays throughout the month of September. We continue to hear positive feedback from students and trainees that this event helps them gain a sense of the personality of programs to help narrow down who they will apply for in the MedPhys Match. Additionally, the virtual environment ensures that more students, who may not otherwise attend a physical AAPM meeting, may have the same opportunity to engage with potential residency programs. Follow our social media and check the 2021 Residency Fair web page for updates!

Be sure to keep an eye out for a few of our other events coming up in the near future! To stay up to date on the latest on all things STSC, be sure to follow our social media accounts. Find us on Facebook, Twitter, or Instagram: @aapmstsc!

Innovation in Medical Physics Education

By: Lisa Genovese, DMP, Krueger-Gilbert Health Physics

The Innovation in Medical Physics Education session highlighted six researchers studying how medical physicists are educated and how we can add to and improve our education practices. Each year the Medical Physicists as Educators Committee (MPESC) reviews submitted abstracts and selects six finalists to present their work at the annual AAPM meeting. As pedagogy evolves and new learning tools and technologies emerge, it is important to continue to innovate and update our practices to advance our field as a whole and improve our methods. The Innovation in Medical Physics Education session encourages this research and highlights it for other AAPM members to educate,

inform, and hopefully spark new and creative ideas for teaching medical physicists.

The 2021 virtual session gave us insights into teaching professionalism and communication skills, the importance of robust rubrics for medical physics education, using Virtual Reality (VR) to interact with students, questions asked during oral examinations, co-ops as a course option for graduate students, and VR brachytherapy training. The presentations showcased outstanding research in the field and provided creative and unique viewpoints of medical physics education. Information about this year's presentations (as well as past presentations) can be accessed on the MPESC [Wiki page](#). Congratulations to the Innovation in Medical Physics Education winner **Adam Riegel** for his presentation, "Cooperative Education in a Medical Physics Masters Graduate Degree Program"!

Session in Memory of Edward "Ed" F. Jackson

Innovations in Medical Physics Education

By: Joann Prisciandaro, PhD, University of Michigan/ Michigan Medicine

Dr. Edward Jackson was a brilliant scientist, educator, and scholar. He was known for his many contributions to the field of medical physics, especially in the areas of MRI, quantitative imaging, and education. A one-hour session in memory of Dr. Jackson was held at this year's annual meeting. The presentation on innovations in medical physics education focused on how these innovations relate to the preparation of medical physics trainees for the future of our field, as well as pedagogical techniques to engage our trainees.

Recommended guidelines for the education and training of medical physics graduate students and residents have been published by the AAPM [1,2] and CAMPEP [3,4]. However, given that the field of medical physics is constantly evolving, we need to ensure training remains current to appropriately prepare graduate students and residents for the future of our profession. A challenge we encounter as educators is deciding when to modify didactic and training curricula to include new content, and when to stop covering older concepts that may be less relevant. Additionally, given the length of these programs, we need to make time in our curriculum for new content. Although we cannot predict the future of medical physics,

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we can provide our trainees with the tools to be prepared. To do so, we need to ensure our students have a strong, fundamental background and understanding of physics and medical physics. We need to prepare our students to be critical thinkers, to be engaged in their learning. Further, we should consider including course offerings in other disciplines such as immunotherapy, molecular biology, big data, and machine learning, as well as business courses in topics such as communication and management. In short, we need to prepare and position our trainees to be "scientific agents of precision, innovation, and value in the development and practice of medicine [5]."

In addition to routinely reviewing and updating our course content to reflect technological advancements and changes in clinical practice, we also need to periodically update our teaching style and approach. Many medical physics educators rely on traditional, instructor-centric teaching models, in which an instructor attempts to transfer information to their students and/or trainees through lectures, hands-on labs, or on-the-job training. However, there are a number of active, student-centric pedagogical models that may prove to be more effective and enhance the learning experience of our students and trainees. Examples of these innovative techniques include:

- Just in Time Learning [6,7] – An approach in which students are given short questions on at-home reading due prior to class and to make use of the students' answers to guide that day's lecture.
- Peer Instruction [7,8] – In this approach group problems based on specific concepts are incorporated within the lecture to engage students, enhance the learning experience, and to guide the subsequent class discussions.
- Flipped Classroom [9] – An approach that flips the traditional home and classroom activities (i.e., lectures are recorded and watched prior to class, allowing students to spend class time working in groups on conceptual questions and problem solving).
- Problem/Project-based learning [10] – In this technique, the learner is presented with an open-ended problem or project, and they are required to perform background research to determine what needs to be done to complete the task, and then to do it.

Although many of us have not had formal training in education, there are many wonderful resources available

in the AAPM virtual library and on the Committee on Medical Physicists as Educators wiki [11]. Additionally, the AAPM plans to host another workshop for educators in the near future. As educators, we need to educate ourselves on best practices and available tools for teaching. We owe it to our students and trainees to provide them with the best educational techniques to enhance their learning experience.

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UPDATE: AAPM Policy PP-15 “Conflict of Interest”

The Ad Hoc Committee to Develop Conflict-of-Interest Review and Management Policies and Procedures (AHCOI) has recommended that the Board update AAPM Policy PP-15 “Conflict of Interest” which they did during the November 2020 meeting.

This update and the changes to the conflict-of-interest form are an attempt to clarify what can sometimes be a confusing process of defining if a conflict exists and the best way to report it.

The new policy clearly defines conflict-of-interest, offering examples of various scenarios. It breaks down disclosable interests and relationships into three parts

1. Compensation, Remuneration, Funding, and Employment Relationships
2. Ownership or Investment Interests
3. Leadership Positions in Other Organizations

It defines the disclosure process at both AAPM's website and in AAPM reports and other publications and puts the responsibility for managing any conflicts on the Chair of the group writing the report.

Finally, it defines the process for managing potential or real conflicts for both chairs and editors/peer reviewers.

The COI form at aapm.org has detailed instructions for how to report any potential conflict or real conflict for Compensation, Remuneration, and Funding in accordance with the AAPM Code of Ethics. Members may view up to 24 months of previous COI submissions for themselves or any other member.



CMS ISSUES MEDICARE 2022 PROPOSED RULES

PROFESSIONAL ECONOMICS COMMITTEE UPDATE

Wendy Smith Fuss, MPH | AAPM Consultant | Health Policy Solutions



Radiation Oncology Alternative Payment Model

The Radiation Oncology Alternative Payment Model (RO Model) proposed rule was issued on July 19, 2021 in conjunction with the 2022 Hospital Outpatient Prospective Payment System (HOPPS) and Ambulatory Surgical Center (ASC) Payment System proposed rule.

The RO Model is designed to test whether prospective, site-neutral, modality agnostic, episode-based payments to physician group practices (PGPs), freestanding radiation therapy centers and hospital outpatient departments (HOPDs) for radiotherapy (RT) episodes of care reduces Medicare expenditures while preserving or enhancing the quality of care for Medicare beneficiaries.

The RO Model will include 30 percent of all eligible radiation oncology episodes of care. These occur in 204 randomly selected Core-Based Statistical Areas (CBSAs) in 48 states and the District of Columbia. The Centers for Medicare and Medicaid Services (CMS) estimates that 500 PGPs (of which 275 are freestanding radiation therapy centers) and 450 HOPDs will furnish RT services in the selected CBSAs.

Under the RO Model, Medicare would pay participating providers specified professional and technical RT services furnished during a 90-day episode of care to Medicare beneficiaries diagnosed with 15 cancer types.

The RO Model has a new proposed start date of January 1, 2022 and would run for five performance years ending December 31, 2026. Key proposed changes include:

- Adjusting the pricing methodology, including updating the baseline period from 2016-2018 to 2017-2019.
- Lowering the discount factors by 0.25 percent to 3.5 and 4.5 percent, for the professional component and technical component, respectively. The discount factor reserves savings for Medicare and reduces beneficiary cost-sharing.
- Removing liver cancer from the RO Model as it does not satisfy the RO Model's newly proposed cancer inclusion criteria.
- Removing brachytherapy from the list of included treatment modalities, which means that all brachytherapy services and supplies, including brachytherapy sources will continue to be paid fee-for-service (FFS).
- In light of the current COVID-19 Public Health Emergency and several recent natural disasters, adding an "Extreme and Uncontrollable

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For additional information including Medicare rule summaries, 2022 proposed payments and impacts visit the [AAPM website](#).

PROFESSIONAL ECONOMICS COMMITTEE UPDATE, Cont.

Circumstances" policy. This policy would give CMS the flexibility to reduce administrative burden of RO Model participation, including reporting requirements, and/or adjust the payment methodology as necessary.

CMS currently expects the RO Model will include approximately 282,000 episodes of care, 250,000 beneficiaries, and \$4.6 billion in total episode spending of allowed charges over the Model performance period. CMS estimates that on net the Medicare program would save \$160 million over the five-year period.

Based on the proposed modifications to the design of the RO Model, CMS believes that on average, Medicare payments to PGPs will increase by 5.5 percent and Medicare payments to HOPDs will be reduced by 9.6 percent over the life of the RO Model.

The concerns of the radiation oncology community have been largely ignored in this proposed rule. AAPM believes the proposed rule may seriously jeopardize access to radiation therapy for patients served by practices mandated to participate in the RO Model. AAPM is working closely with ASTRO and other stakeholders to ask the Biden Administration and Congress to intervene on the flawed RO Model. In addition, AAPM will submit comments to CMS by the September 17th deadline.

[For additional information visit the Center for Medicare and Medicaid Innovation \(CMMI\) RO Model website.](#)

Medicare Physician Fee Schedule

The CMS recently released the 2022 Medicare Physician Fee Schedule (MPFS) proposed rule. The finalized changes will appear in the November 1st final rule and are effective January 1, 2022. The MPFS specifies payment rates to physicians and other providers, including freestanding cancer centers. It does not apply to hospital-based facilities. Payments to hospital outpatient departments are described in a separate section below.

CMS is proposing to update the clinical labor pricing for 2022, in conjunction with the final year (year four of the transition period) of the medical equipment and supply pricing update. CMS believes it is important to update the clinical labor pricing to maintain relativity with the recent equipment and supply pricing updates.

Clinical labor rates were last updated for 2002 using Bureau of Labor Statistics (BLS) data and other supplementary sources where BLS data was not available. CMS is proposing to use the methodology outlined in the 2002 MPFS final rule, which draws primarily from BLS wage data, to calculate updated clinical labor pricing.

CMS used the most current 2019 BLS survey data as the main source of wage data for this proposal. CMS recognizes that the BLS survey of wage data does not cover all the staff types contained in the direct practice expense (PE) database, including Medical Physicists and Dosimetrists. Therefore, CMS crosswalked or extrapolated the wages for several staff types using supplementary data sources for verification whenever possible.

As in the 2002 clinical labor pricing update, the proposed cost per minute for each clinical staff type was derived by dividing the average hourly wage rate by 60 to arrive at the per minute cost. To account for the employers' cost of providing fringe benefits, such as sick leave, CMS used the same benefits multiplier of 1.366 as employed in 2002.

CMS is proposing to use the 75th percentile of the average wage data for the Medical Physicist clinical labor type because they believe this level would most closely fit with the historic wage data for this clinical labor type. A Medical Physicist is a specific type of physicist, and the available BLS wage data describes the more general category of physicist, which is paid at a lower rate. In this specific case, the 75th percentile more accurately describes the clinical labor type in question based on how it has historically been paid.

CMS isolated the anticipated effects of the clinical labor pricing update on specialty payment impacts by comparing the proposed 2022 MPFS rates with and without the clinical labor pricing updates in place. The estimated impacts for several specialties, including radiation oncology, reflect decreases in payments relative to payment to other physician specialties which are largely the result of the redistributive effects of the proposed clinical labor pricing update. The services furnished by these specialties involve practice expense (PE) costs that rely primarily on medical supply or medical equipment items and therefore are affected negatively by the proposed updates to clinical labor pricing. Since

PROFESSIONAL ECONOMICS COMMITTEE UPDATE, Cont.

Proposed Clinical Labor Pricing Update

Labor Code	Labor Description	Current Rate Per minute	Updated Rate Per Minute	Percentage Change
L152A	Medical Physicist*	1.52	1.80	18%
L107A	Medical Dosimetrist/ Medical Physicist	1.08	1.45	35%
L063A	Medical Dosimetrist*	0.63	1.07	70%
L050C	Radiation Therapist	0.50	1.00	100%

**Clinical labor type without a direct BLS labor category where CMS employed a proxy BLS wage.

PE is budget neutralized within itself, increased pricing for clinical labor holds a corresponding relative decrease for other components of PE such as supplies and equipment. The overall impact from this proposal is minus 4 percent for radiation oncology.

CMS notes that when updates to the payment methodology based on new data produce significant shifts in payment, they often consider whether it would be appropriate to implement the updates through a phased transition across several calendar years. For example, CMS utilized a 4-year transition for the market-based medical equipment and supply pricing update concluding in 2022. CMS is considering the use of a similar 4-year transition to implement the clinical labor pricing update. A multi-year transition could smooth out the increases and decreases in payment caused by the pricing update for affected stakeholders, which promotes payment stability. However, a phased transition would delay the full implementation of updated pricing and continue to rely in part on outdated data for clinical labor pricing.

The proposed 2022 conversion factor is \$33.58, a significant 3.75 percent decrease from the current conversion factor of \$34.89.

The reduction to the 2022 conversion factor, in conjunction with the clinical labor pricing and medical equipment & supply updates will result in significant payment reductions to all radiation oncology services in 2022. CMS estimates that total radiation oncology payment will be reduced by 5.0 percent in 2022 but analysis by ASTRO and the American Medical Association yield payment cuts of 8.3

to 8.75 percent, respectively. See below for examples of proposed payment reductions anticipated in 2022:

- Weekly Medical Physics Consult -10.2%
- Special Medical Physics Consult -8.9%
- Conventional Treatment Delivery -17.0 to -22.5%
- IMRT Delivery -12.7%
- SBRT Delivery -22.6%

AAPM will submit comments to CMS regarding the clinical labor pricing proposal, the reduced conversion factor and the significant payment cuts to radiation oncology by the September 13th deadline.

Hospital Outpatient Payment System

The CMS recently released the 2022 Medicare Hospital Outpatient Prospective Payment System (HOPPS) proposed rule, which provides facility payments to hospital outpatient departments. The finalized changes will appear in the November 1, 2021 final rule and are effective January 1, 2022. This rule does not impact payments to physicians or freestanding cancer centers.

CMS estimates an overall 2.3 percent increase in hospital outpatient facility payments in 2022. Radiation oncology related Ambulatory Payment Classifications (APCs) have proposed payment increases from 2.3 to 2.7 percent in 2022. Payment for medical physics consultation codes 77336 and 77370 have a proposed 2.6 percent payment increase.

CMS maintains the Comprehensive APC (C-APC) policy for stereotactic radiosurgery (SRS), intraoperative radiation therapy (IORT) and several brachytherapy needle/ catheter insertion procedures in 2022. CMS defines a C-APC as a classification for the provision of a primary service and all adjunctive services and supplies provided to support the delivery of the primary service. Under this policy, CMS calculates a single payment for the entire hospital stay, defined by a single claim, regardless of the date of service span.

AAPM remains concerned regarding the accuracy of claims data for radiation oncology-related C-APCs, as

there is a great deal of discrepancy around how hospitals submit these claims. The AAPM is also uncertain as to whether the rates associated with C-APCs adequately or accurately reflect all of the procedures and costs associated with those APCs.

Beginning in 2022, CMS proposes to designate standard clinical APCs, brachytherapy APCs, and New Technology APCs with fewer than 100 single claims that can be used

for ratesetting purposes as Low Volume APCs. Under the proposed Low Volume APC policy, the payment rates for these APCs would be set at the highest amount among the geometric mean, median, or arithmetic mean, calculated using up to four years of data, which for 2022 would be claims data from 2016 through 2019. This proposed policy designates five brachytherapy source Low Volume APCs under the HOPPS. ■

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GAO REPORTS ON STATE AND LOCAL GOVERNMENT FISCAL IMPACT OF COVID-19

LEGISLATIVE & REGULATORY AFFAIRS REPORT Richard J. Martin, JD | AAPM



In a report entitled, "State and Local Governments: Fiscal Conditions During the COVID-19 Pandemic in Selected States," (GAO-21-562), published July 15, 2021, the Government Accountability Office (GAO) examined changes in revenues and expenditures for state and local governments during the pandemic, and actions states took to address those changes. See the report [here](#). The GAO undertook its work on this issue under CARES Act provisions, which directed the GAO to report on COVID-19 pandemic oversight efforts.

The GAO found that state and local government revenues from individual, corporate, and sales taxes declined substantially in the second quarter of 2020 and rebounded in the third and fourth quarters. State and local government expenditures remained flat throughout 2020 as state and local governments increased expenditures in some areas but limited spending in other areas. Of note, states reported continuing economic impact from the pandemic. How that impact may influence state expenditures going forward, including a state's engagement in specific and/or non-essential regulatory activity, remains to be seen.

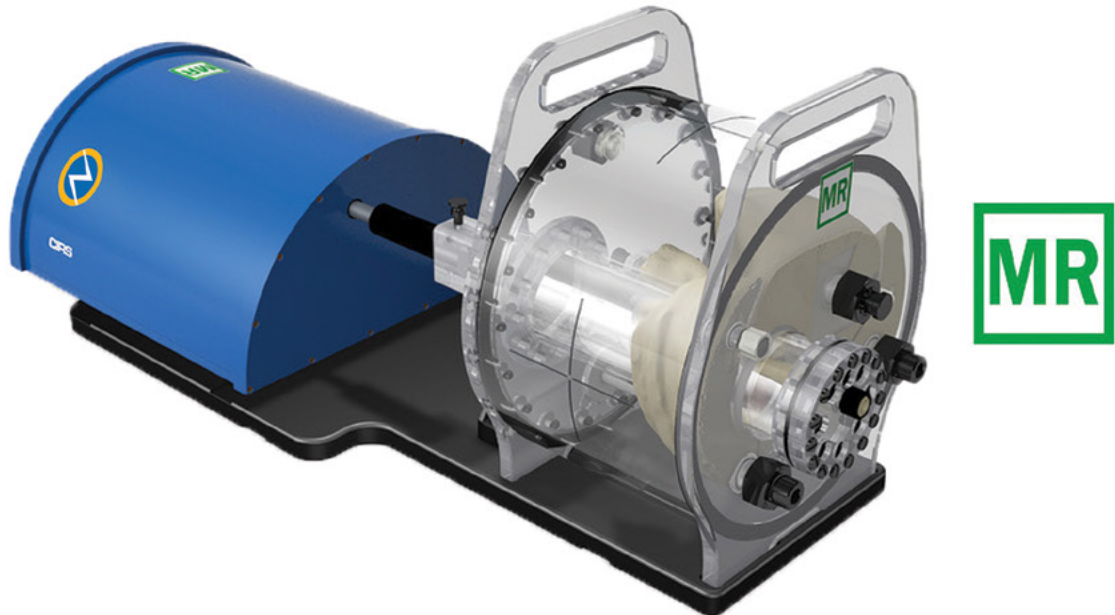
The GAO focused its review on eight states — Arizona, Florida, Michigan, Nevada, New Hampshire, North Carolina, North Dakota, and Pennsylvania — which collectively represent 20 percent of the US population. Looking at these eight states, the GAO advised that most states increased public health and safety spending during the pandemic for items including testing sites, personal protective equipment, and care for vulnerable populations. To compensate for these expenses as well as additional unemployment benefits, states used federal assistance, cut spending by implementing hiring freezes, and drew on reserve funds to help balance budgets. The GAO report acknowledged that states that are highly reliant on tax revenues from either energy production or tourism were particularly susceptible to adverse economic effects of the pandemic.

The report provides data and analysis about the economic impact of the pandemic on state and local government revenues and expenditures and will be a valuable reference for our state advocacy as we move beyond the pandemic. We will continue to monitor and update you on state and local developments that may impact regulatory activity. ■

If you have any questions or require additional information, please contact Richard Martin, JD, AAPM Government Relations Program Manager, at richard@aapm.org.

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INTRODUCING MPLA'S TAGLINE: EMPOWER. INSPIRE. LEAD.

MPLA SPOTLIGHT

Samantha Simiele, PhD | University of Texas MD Anderson Cancer Center



Written on behalf of the Medical Physics Leadership Academy Marketing and Publicity Subcommittee with contributions from **Jatinder Saini, PhD, Surendra Prajapati, PhD, Jennifer Johnson, PhD, and Ashley Celnar, PhD.**

The medical physics leadership academy introduced their new tagline "Empower. Inspire. Lead." just prior to the 2021 AAPM Annual Meeting.

The purpose for developing a tagline is to provide a quick phrase that helps to convey the value and mission of a group or organization. For MPLA, the goal was to create a compelling tagline that distilled the committee's mission in a few memorable and straightforward words, enabling medical physicists to relate their leadership potential and growth opportunities.

Physicists have a skill set that provides a unique perspective in solving a myriad of technical and non-technical problems that arise in advancing medicine in various settings. The goal of MPLA is to empower and inspire physicists to learn leadership, apply their technical skill set, and be proactive in taking leadership opportunities in their respective spheres.

The final tagline was the result of months of work by a subgroup of committee members that included Drs. Saini, Prajapati, and Johnson. Developing the tagline involved a disciplined and systematic workflow that merged the creative thinking of many individuals by seeking input and feedback from the MPLA community. The first survey involved asking MPLA members to provide relevant keywords associated with the purpose of MPLA. Participants were asked who the MPLA tagline should focus on: Leading self, leading others, or leading self and others. Members were asked to reflect on why MPLA was created and to consider the committee's purpose, value to physicists, and how it helps individuals realize their leadership potential. After obtaining a repository of keywords, the list was consolidated by removing variations and redundant words, as seen in the word cloud in **Figure 1**. A second survey was then distributed, and users were asked to rank their top 15 word choices. This process allowed the group to finalize the keyword selection. The second survey results were also presented in the form of a word cloud, as shown in **Figure 2**, to help MPLA members visualize the weighted ranks of each keyword.

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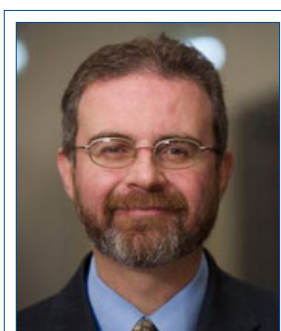


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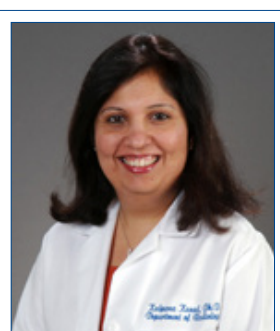
ABR MEDICAL PHYSICS PART 1 QUALIFYING (GENERAL AND CLINICAL) EXAMS — CHANGES TO THE ELIGIBILITY REQUIREMENTS AND ADMINISTRATION SCHEDULE

ABR NEWS

Matthew B. Podgorsak, PhD | Roswell Park Cancer Institute
Kalpana M. Kanal, PhD | University of Washington • Robert A. Pooley, PhD | Mayo Clinic
J. Anthony Seibert, PhD | University of California at Davis
Geoffrey S. Ibbott, PhD | ABR



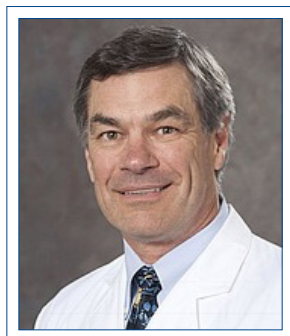
M. Podgorsak, ABR Trustee



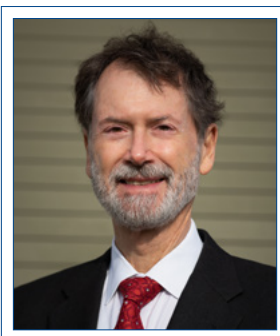
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R. Pooley, ABR Trustee



J. A. Seibert, ABR Governor



G. Ibbott, ABR Associate
Executive Director

Eligibility requirements for ABR exams undergo periodic review to ensure they remain aligned with contemporary professional and associated educational preparation practices. As a result of the most recent review undertaken by ABR medical physics leadership, the ABR Board of Trustees has approved a change to the eligibility requirements for the Part 1 qualifying (general and clinical) exams. A candidate's application must now include attestation from their program director (either graduate program or certificate program) that he/she has previously completed or is currently enrolled in classes that together with previous coursework covers the entire CAMPEP core graduate curriculum. This change was instituted so that eligible candidates will be optimally prepared by having completed courses covering the material upon which they will be tested.

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- **ABR now requires program director attestation that a Part 1 candidate has completed the CAMPEP core curriculum.**
- **The Part 1 exam will be administered in mid-January, beginning in 2022.**
- **The application window for candidates for Part 1 is now open.**

ABR NEWS, Cont.

This change in eligibility was first communicated to stakeholders (SDAMPP, CAMPEP, AAPM, ABR IC-AC) as a proposal in 2018. At that time, SDAMPP leadership noted that some graduate programs do not offer coursework covering all the CAMPEP core material in the first year of their curriculum. With the traditional August administration of the Part 1 qualifying exams, students in these graduate programs would not be eligible to take the exams under the new eligibility requirements until they had completed 2 full years of study. So that students in these programs would not need to wait until the end of their second year to sit for the Part 1 qualifying exams, the ABR Board of Trustees further approved a schedule change, moving administration of the exams to mid-January starting in 2022. With this schedule change, students in programs that require 3 semesters to cover the CAMPEP core material will be eligible for the Part 1 qualifying exams after their third semester.

A recent survey of program directors and graduate students, sponsored by SDAMPP and shared with ABR medical physics leadership, indicated concern among respondents about the January timing of the Part 1 qualifying exams. It was suggested that having the exams so close to traditional holidays was not ideal. Furthermore, scheduling the exams immediately prior to residency program interview season was viewed to be problematic. Some suggested that the usual August administration could remain open to those candidates who complete

the CAMPEP core material within their first year of study, and that a second administration, perhaps in January, could be made available to those candidates, admittedly a smaller cohort, who do not complete the CAMPEP core material until the end of their third semester. It was decided, however, based primarily on the additional volunteer effort required to put together a second exam, that it is not feasible to offer two different Part 1 exams every year. While we remain sensitive to the concerns voiced by our stakeholders, moving the exams to January was the best compromise enabling all candidates to be eligible for the exam prior to completing their second year of study. Finally, in response to the concern regarding the proximity of the Part 1 exams to residency program interviews, we have committed to expediting exam scoring and communication of results to examinees, so that those participating in the residency match will know as early as possible in the interview season whether or not they passed.

We are grateful to our stakeholders who provided valuable input over the past 2-3 years. We hope there is agreement that these most recent changes to the Part 1 eligibility requirements will result in candidates achieving the best possible academic preparation prior to taking the Part 1 exams. We pledge to actively monitor the impact of these changes on our candidates and stakeholders, and, when warranted, we will consider further modifications. ■

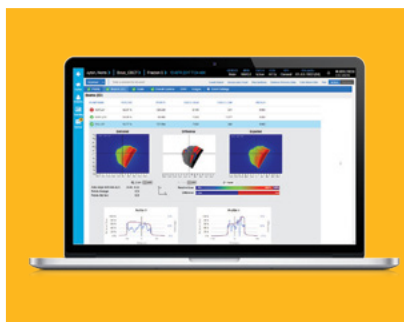
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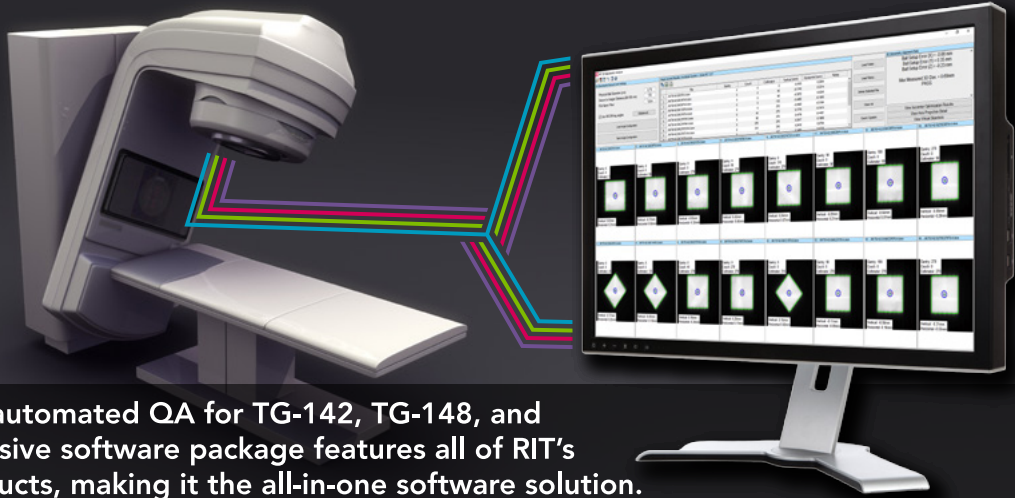
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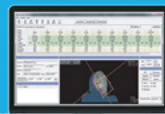
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ACR ACCREDITATION & MORE: UPDATES FOR MEDICAL PHYSICISTS

ACR UPDATES Dustin A. Gress, MS | Senior Advisor for Medical Physics



Investigating helical acquisition of CTDI measurements

Leon et al published in 2020 a paper demonstrating the feasibility of using a helical acquisition technique for measuring CTDI during medical physics annual surveys. I have partnered with those researchers and other interested colleagues to investigate the generalizability of their proposed measurement method. In other words, their results indicate that the helical measurement method can

work, and we are now investigating whether the helical method can reliably work for everyone.

We encourage all our colleagues who practice in CT to add a handful of extra measurements to their CT testing routine and contribute data to the study. The more data we can collect for analysis, the more we will all learn from the results! You can download the Excel template with instructions [here](#), and you can drag & drop your completed Excel templates at [the study landing page](#).

When you submit data, you'll need to attest that your dosimetry equipment has been calibrated within 24 months of your measurements, and that you are not submitting PHI, facility information, or CT device identifiers.

New search tool for ACR Practice Parameters and Technical Standards

In case you missed it, the ACR Guidance and web teams recently updated the landing page for accessing Practice Parameters and Technical Standards. The [new landing page includes filtered searching](#) by modality, organ, collaborative society, and more. I hope you like the new search tool as much as I do.

DIR Fluoro is Live!

If a site is already participating in DIR for CT or the General Radiology Improvement Database (GRID), no additional registration or fees are required.

If a site already has a National Radiology Data Registry (NRDR®) account, but not DIR, they only need to complete an addendum to their existing agreement to participate in the DIR. New sites wishing to participate should [complete the application process](#) and create corporate and facility accounts in the NRDR.

To establish the framework for ACR's DIR Fluoro module, a two-year pilot project was carried out at nine institutions beginning in early 2018 that included updating the [ACR Common lexicon](#), collecting clinical radiation dose indices from approximately 60,000 interventional radiology procedures, and comparing the dose index distributions collected to those reported in

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In each issue of this Newsletter, I will present information of particular importance or relevance for medical physicists. You may also check out the ACR's accreditation web site portal for more accreditation information and QC forms. A big THANK YOU to all of the other staff that keep ACR programs running and assist with creating the content in this column.

Changes to the ACRedIt website are imminent! Likely the most critical change in ACRedIt Plus for medical physicists is that sharing of login information will no longer be possible, because ACRedIt Plus will leverage multifactor authentication (MFA) through Okta. However, there will be upgraded permissions features to ensure that necessary personnel can participate in the various tasks required throughout the accreditation process. Facility personnel will be able to assign permissions to external personnel, such as a medical physicist, and the medical physicist will be able to remotely, securely, and legitimately log into ACRedIt Plus to conduct their pieces of the accreditation process. The permissions can then be assigned back to facility personnel. Each person will initially need to configure their login credentials and MFA, but this is unlikely to be your first time undertaking such a process for data security. We appreciate in advance your patience while everyone becomes familiar with the new process for accessing ACRedIt Plus.

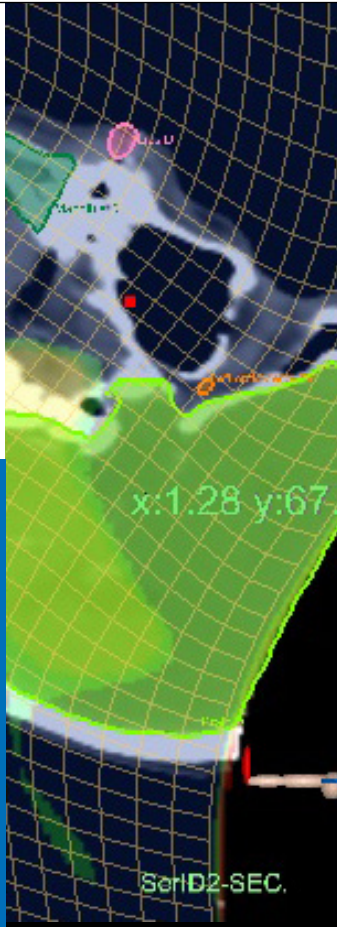
ACR UPDATES, Cont.


the Radiation Dose in Interventional Radiology (RAD-IR) study, which took place from April 1999 through January 2002. You can get some good foundational and technical information about the pilot group [in the paper they've published in JVIR](#).

DIR Fluoroscopy is now available for enrollment and data submission. You can read about the features of the new interactive fluoroscopy standardized DIR reports in the [Knowledge Base](#). The pilot participants recently worked with some ACR staff to publish [a paper in JACMP](#) giving

medical physicists a framework for providing leadership and value by facilitating participation in DIR Fluoro. DIR Fluoro is just getting off the ground and will be a very powerful tool for providing important information to the community regarding use of radiation dose in fluoroscopic procedures; I encourage my colleagues to seize this opportunity for leadership with their employers and/or clients.

More tips on getting started with DIR Fluoroscopy [here](#). ■



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TOTAL-BODY PET BRINGS ENORMOUS POTENTIAL TO BIOMEDICAL RESEARCH AND CLINICAL MEDICINE

RESEARCH SPOTLIGHT Richard S. Dargan | Contributing Writer, AAPM



Total-body positron emission tomography (PET) is set to expand PET's reach into new areas of medicine, experts say, by providing systemic views of metabolic processes with a much higher sensitivity and lower radiation dose than conventional scanners.

PET is a tomographic imaging technique in which a radiopharmaceutical — a positron emitting radioisotope attached to a drug — is injected into the body as a tracer. The positron emitted from the

radioisotope combines with an adjacent electron, leading to the annihilation of the corresponding positron-electron pair. The annihilation then produces gamma rays emitted in opposite directions. These gamma rays are detected by the PET scanner composed of a ring-shaped arrangement of detectors. The collected data are used to form, using computer algorithms, a 3D image of the distribution of the radiopharmaceutical.

In conventional PET, the detector ring's relatively small axial length means that it can image only limited areas of the body at a time. Radiation emitted from the patient that is outside of the ring is lost, resulting in unnecessary radiation doses, and patients must be moved through the ring for a more comprehensive view, resulting in long imaging times. These limitations can be solved if the ring's length is increased to cover the entire patient, creating a total-body PET.

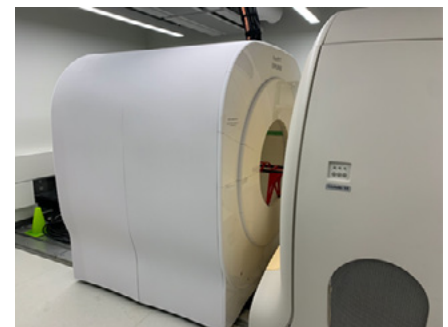
The idea of a total-body scanner has been around for decades, but costs and limitations in computing power and engineering slowed its progress. Psychological barriers also impeded the technology's development, according to **Simon R. Cherry, PhD**, professor and biomedical engineer at the University of California in Davis (UC Davis).

"Our biggest problem early on was getting anyone to believe in and support this," he said. "We had a terrible time getting even conceptual studies funded in the early days."

Despite the obstacles, researchers like Dr. Cherry and his UC Davis colleague **Ramsey Badawi, PhD**, helped advance total-body PET beyond the idea stage in the early 2000s. Computer simulations from Dr. Badawi showed that lengthening a scanner would not lead to scatter-related deterioration in the data. Studies on mice further supported the idea, and in 2005, the UC Davis team settled on plans to develop a 2-meter-long scanner, or a little more than 6 feet, 6 inches long.



United Imaging's total-body PET scanner at the University of California, Davis. (Courtesy: Ramsey Badawi, PhD, UC Davis)



PennPET Explorer PET/CT scanner at the University of Pennsylvania in Philadelphia. The system currently operates with five rings and an axial field-of-view (AFOV) of 112 centimeters, and will soon be expanded to six rings and an AFOV of 143 cm. (Courtesy: Joel Karp, PhD, University of Pennsylvania)

RESEARCH SPOTLIGHT, Cont.

"We decided, if we're going to do this, let's make a scanner that covers the whole body," Dr. Cherry said.

Through the EXPLORER consortium, and with substantial funding support from the National Institutes of Health (NIH), the UC Davis researchers collaborated with Joel Karp, PhD, a pioneer in PET at the University of Pennsylvania in Philadelphia, and other leaders in the field to tackle the significant engineering and science challenges behind a machine that was considerably more complicated than conventional PET scanners.

"When we first started this, we discussed whether we should make the least expensive type of scanner longer, which means you're increasing sensitivity but not necessarily improving the other characteristics of a PET scanner such as spatial resolution and timing resolution, or base it on the best technology that we currently had in commercial systems," said Dr. Karp. "The decision we made was to use better materials, even if it made the system more expensive."

The EXPLORER consortium bore fruit in 2018 with the completion of the first prototype by its industrial partners at Shanghai-based United Imaging Healthcare. The first human studies were done in September 2018, and U.S. Food and Drug Administration clearance followed three months later. The scanner was shipped to UC Davis in 2019 and is now housed in a full clinical suite at the university, where its use is evenly divided between clinical studies and research.

Across the country in Philadelphia, Dr. Karp built a total-body PET system with the combined support of the NIH, his Radiology department and the Cleveland-based Philips Healthcare. Siemens has also jumped into the market with its Biograph Vision Quadra PET/CT scanner.

"Having more vendors participating is a great aspect of where this project has gone," said Dr. Karp.

Total-body PET has a vast number of potential applications in the clinic. For cancer imaging, it provides finer detail and better quantifies the amount of radiotracer in each lesion, ultimately providing more accurate staging and estimations of response to therapy.

It can record movies of the radiotracer moving around the entire body, enabling the solution of a set of differential

equations that describe the reaction rates of the radiotracer moving into the cell.

"Now you'll be able to get absolute metabolic rates, not just relative ones," said Dr. Badawi. "This allows you to do parametric imaging and make images that reflect actual rate constants. It's a big deal for cancer and a wide range of diseases."

The higher sensitivity and shorter imaging times will likely reduce the need for anesthesia and its associated risks and expenses in pediatric patients. For teenagers and young adults who've been imaged since childhood, total-body PET could reduce their radiation burden while providing the same image quality as conventional PET.

Total-body PET can also boost the power of radiotracers. Its 40-fold higher sensitivity means that clinicians could push the imaging time back for 18F-FDG, the primary tracer used in clinical imaging, to many hours after radiotracer administration, allowing for more clearance from the background tissue and better lesion-to-background contrast.

The technology's high sensitivity provides an ideal match for novel radiotracers entering or nearing clinical use. For example, an antibody tracer developed at the University of California in San Francisco has the potential to visualize and characterize whole-body HIV burden, but its dose of about 20 mSv per millicurie injected means that only a minuscule amount can be injected. On a conventional PET scanner, the resultant image would be of poor quality.

"When we scan on EXPLORER with this kind of agent, we get images that are very high quality with only trace amounts of the antibody," said Dr. Badawi. "It's a huge step forward."

The strengths of total-body PET open up an entire range of applications not possible with conventional PET scanners. It makes imaging chronic processes like arthritis, obesity, and fatty liver disease feasible. By scanning all areas of the body simultaneously, it could be used to study the systemic effects of infectious diseases like COVID-19 or the pathways of opioid addiction. Researchers expect to learn more about the connections between related events such as heart attacks and inflammation in the brain and the role of the gut microbiome in systemic health.

RESEARCH SPOTLIGHT, Cont.

"The opportunity to do total-body kinetic imaging of a contrast agent or radiotracer means that we can look at the body as a system," added Dr. Cherry. "That meshes well with the trends in medicine, which is starting to appreciate that the body is a system and there's a lot of intercommunication going on between different organs and systems."

On the research side, total-body PET's higher sensitivity and lower radiation dose enable studies that could not be done with a conventional instrument. Promising areas for research include:

- Detecting and quantifying low-grade cancer, inflammation, or infection.
- Speeding the translation of new therapeutic agents by determining the pharmacokinetics of new drugs in all the organs and tissues of the body at low masses and radiation doses.
- Measuring and optimizing the efficiency of cell-based therapies, as well as providing information on the delivery and retention of nanoparticles elsewhere in the body over extended time scales.
- Maternal-fetal medicine.
- The impact of nutrition, exercise and stress-reduction therapy on various systems in the body.

"These are important areas that we wouldn't have dreamed of touching before because the radiation dose would be too high," said Dr. Badawi. ■

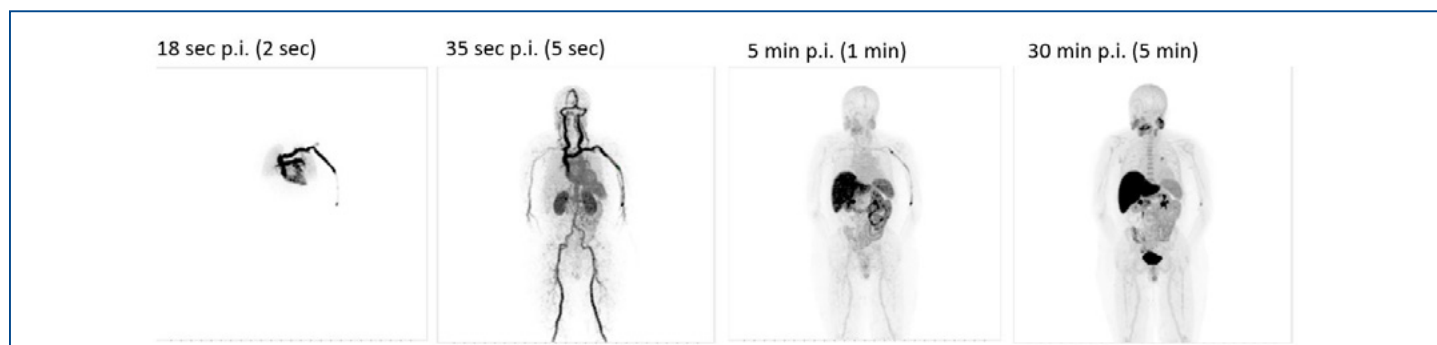
Prospective customers for the new scanners will measure the benefits of total-body PET against costs approaching \$10 million for the 2-meter model. Prices are expected to come down in the future through decreasing component costs, especially in the scintillation crystals.

Additional savings may be found in shorter scanners that offer most of the benefits of total-body PET at a lower cost. Dr. Karp believes that scanners in the 1-meter range, or a little more than 3 feet, would be sufficient for many institutions. He and his colleagues at Penn are studying whether the rings need to be fully populated with detectors. Their current implementation has gaps in it that reduce the cost by 40% compared to a scanner with all the detector slots filled contiguously.

"The reason why that works, I think, is that while we are giving up some sensitivity with fewer detectors to capture the gammas, we use state-of-the-art detectors that provide very precise time-of-flight information for image generation and compensates for the missing gammas," he said.

Whatever the configuration, the scientists and engineers who spent years developing total-body PET see a bright future for it in biomedical research and clinical care.

"It's very exciting and gratifying to see that this isn't the end of something, but the start of a whole new field," says Dr. Badawi. ■



Total-body PET scans from a patient with breast cancer imaged with ^{18}F -Fluoroglutamine radiotracer. The dynamic sequence shows the uptake of radiotracer at several post-injection (p.i.) times and scan durations (2 sec–5 min).

(Courtesy: Austin Pantel, MD, University of Pennsylvania)

EARLY CAREER INVESTIGATOR IN IMAGING TRAVEL AWARD

This is an exceptional opportunity for early-career researchers to:

- Meet NIH Institute and Center directors and staff
- Meet national radiology leadership, industry leaders, and department chairs
- Meet Capitol Hill representatives and staff
- Present your research ideas on radiology or biomedical imaging
- Learn how science and health-care policies are developed
- Meet patient advocacy leaders who help drive research priorities
- Meet other future leaders in radiology, imaging science, and the AAPM

The Science Council sponsors a travel award administered by the Research Committee to support the attendance of up to two early-career, research-oriented AAPM members to participate in the 12th Annual Coalition for Imaging and Bioengineering Research (CIBR) *Medical Imaging Technology Showcase*, which is sponsored by the Academy of Radiology & Biomedical Imaging Research (the Academy).

The Academy hosts the annual Medical Imaging Technology Showcase (MedTech) on Capitol Hill to educate members of Congress and their staff about the impact of imaging technology.

Funding will be provided for the awardee(s) to travel to Washington, DC for three days in the Spring of 2022 (exact dates TBD) to participate in meetings at NIH and to communicate the value of biomedical imaging to Capitol Hill representatives and staff.

Awardees become part of the Academy's Council of Early Career Investigators in Imaging (CECI²), and actively participate in the Academy's mission to advocate for federal investments in imaging research.

CECI² also serves as a networking and educational resource for its members.

EVENT SCHEDULE SPRING 2022 (Exact dates TBD)

Sunday:

- Informal dinner and Capitol Hill Day training session

Monday:

- Meetings with NIH Institute and Center directors and staff.
- Evening reception with academic chairs, industry partners, patient advocacy leaders, and other event attendees

Tuesday:

- Audit the Academy's Research Roundtable discussion including leading academic researchers, industry, and government agencies
- Meet with Congressional office staff and Members of Congress
- Participate in the Medical Imaging Technology Showcase by displaying your area of imaging-related research. Your presentation may include an interactive hand-held technology, an iPad demonstration, or a simple and easy to understand educational poster (a template will be provided). *Simplicity in your presentation is vital, so that your research can be easily explained to and understood by a general non-scientific audience, including Members of Congress, Congressional staff, and the general public. Academy staff and CECI leadership will contact you and guide you through the requirements of your materials and the presentation process.*

ELIGIBILITY CRITERIA

- Post-doctoral fellow, diagnostic or nuclear medicine medical physics resident or fellow, or junior faculty member (i.e., no more than 10 years

APPLICATION DEADLINE:
October 15, 2021

<https://gaf.aapm.org/#ECIII>

All materials are due by application deadline
Documents should be combined as one PDF
Questions: [Emily Townley](#)
Recipients notified by: November 15, 2021

after post-graduate training and no prior substantial independent grant funding as PI).

- Research focus must be in radiology or biomedical imaging.
- Must be a member of AAPM at the time of application (any membership category) and maintain membership for the duration of the award period. Pending membership status is not acceptable.

REQUIRED SUPPORTING MATERIAL

1. Cover letter outlining why you wish to attend this event, including information on how it fits into your professional goals.
2. Abbreviated CV (5 pages max).
3. For residents and fellows, a letter from supervisor confirming ability to attend, if selected.
4. Two letters of support, maximum of two pages each.
5. A short description of your research in layman terms (1-page maximum). Some of the MedTech target audience is non-scientific, so please keep that in mind when explaining your area(s) of research focus. You will be discussing these topics in your Congressional meetings and with attendees at the Medical Imaging Technology Showcase on Capitol Hill.
6. Awardees will meet with representatives from NIH Institutes and Centers. Please indicate which Institutes and Centers you would be interested in visiting and why.

Sponsored by the [AAPM Science Council](#) through the [AAPM Education & Research Fund](#).

THE INSTITUTE OF PHYSICS AND ENGINEERING IN MEDICINE AWARDS THE IPEM ACADEMIC GOLD MEDAL TO INDRA J. DAS, PhD

PERSON IN THE NEWS



The Academic Gold Medal is awarded to IPEM members who have made outstanding contributions in academia, innovation, and healthcare.

Professor **Indra Das** is Vice Chair, Professor and Director of Medical Physics at Northwestern University Feinberg School of Medicine in Chicago.

An IPEM Fellow, Professor Das is an internationally known medical physicist with a track record of sustained presence in clinical areas, teaching, service and research. He has contributed to every area of radiation oncology physics, including electron, photon, proton and MR-Linacs.

His areas of expertise are in nanoparticles, radiation dosimetry, treatment planning, outcome and medical physics technology. He has served in most societies as a board member, including the American Association of Physicists in Medicine (AAPM), the Medical Dosimetrist Certification Board, and the American Society for Radiation Oncology.

Professor Das has been member of IPEM since 1979 and served as a member of the Fellowship panel. He has taught courses in local universities and hospitals as well as for many organizations, including the International Atomic Energy Agency, the Union for International Cancer Control and AAPM.

Research

His research expertise has been acknowledged by almost 240 peer reviewed publications and more than 440 abstracts. He has written 24 books and chapters, including the recent intensity modulated radiation therapy (IMRT) book by IOP Publishing and Physics of Radiation Therapy and Biology by Springer-Nature.

Professor Das is the current Associate Editor of the British Journal of Radiology, Medical Physics, Journal of Radiation Research and journal of Medical Physics, and is the current chair of the Editorial Advisory Board of the IPEM/IOP Publishing e-books programme.

Humble beginnings

Professor Das said: 'I was born in a tiny village on the India/Nepal border to illiterate parents who really cared and loved me. I developed a great passion for learning and dreaming big from my grandfather, who instilled an aspiration for education, striving and perseverance in me.

"I am honoured to receive this award and I am thankful to everyone who made it possible, and I am thankful to my wife and children for their love and support."

Professor Stephen O'Connor, IPEM's President, said: "The Academic Gold Medal represents excellence in academia, generally over a considerable period of time, and collaboration with IPEM. Indra has had a stellar academic career and found time to collaborate with IPEM most recently as a member of the Fellowship Panel."

Taken from: [IPEM Latest News](#)

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