## **VOL 19** Summer 2019

# INSIDE VIEW



UNIVERSITY OF WISCONSIN SCHOOL OF MEDICINE AND PUBLIC HEALTH • DEPARTMENT OF RADIOLOGY

# FROM THE CHAIR



The pace of change in the Department of Radiology has been outgained only by the accomplishments we have realized

in recent months. Numerous faculty members have received honors or have been appointed to influential national positions in the field, including former Department Chair Dr. Patrick Turski, who received the Lifetime Achievement Award with the Wisconsin Radiological Society. Our research continues to thrive, with numerous new grants awarded to faculty in the Department. Artificial Intelligence (AI) is a hot topic throughout the science world, and the field of radiology is no exception. It is very exciting to learn how the department is embracing this new technology, using it to potentially transform the way we practice medicine. Also see how the Radiology team joined forces with other UW Health clinicians to break down barriers and help patients get treatment when a new drug became available to fight neuroendocrine tumors, a slow-growing, but usually incurable cancer. We have added several new doctors to our faculty, and continue to thrive as a group. As fast as change is happening, we are excited to be leading it!

> - Thomas M. Grist, MD, FACR Chair, UWSMPH Department of Radiology

# **ARTIFICIAL INTELLIGENCE HELPING RADIOLOGY RESEARCHERS DISCOVER NEW FRONTIERS TO ENHANCE** THE FUTURE OF HEALTH CARE

Scientists and researchers around the world are reaching an entirely new level of discovery with Artificial Intelligence (AI), using data to solve problems and enabling decisions in innovative new ways. AI remains a dominant conversation at scientific symposia across the globe and once again received top billing at RSNA and ISMRM annual meetings. One need not travel far to see how AI is creating new frontiers – it is also a big part of the research being conducted at the University of Wisconsin Department of Radiology.

The term AI dates back to the 1950s, but its present state is possible through the development of supercomputers. Advances in computer hardware over the past decade have paved the way for very complex algorithms to run quickly and easily, producing data faster than we could ever have imagined before. The Department has made the commitment to create a robust technical infrastructure to support innovation and encourage the expansion of AI in Radiology here at UW. Our Director of Informatics, John Garrett, PhD, is currently focusing on developing the infrastructure to support faculty and provide access to the type of equipment needed to process the large amounts of data necessary for Deep Learning (DL), a subset of AI.

The department invested in a GPU supercomputer, a networked group of computers whose processing power far surpasses the capabilities of even the most powerful CPU. "These are the same computers used in gaming applications," Garrett said. "The power of the GPU processing is equivalent to a whole server farm – this is the type of

computer we want to get people used to using to be able to do things they simply can't on other computers," he said.

Dr. Garrett noted that there are challenges to incorporating AI into a traditional hospital network, and to be able to integrate it into

the clinical workflow. That is where many of the department faculty are closing the gap.

Vivek Prabhakaran, MD, PhD, is Department of Radiology faculty member who is new discoveries. He has led the efforts to train an AI model using MRI

Vivek Prabhakaran, PhD, is using Artificial Intelligence to create synthetic FDG PET images (right column) from MRI images (left column) that using AI to make replicate regular FDG PET images (center column) in Alzheimer patients, without the need to inject a radioactive tracer. Images shown are from a healthy patient.

input to create synthetic FDG PET images. Traditional FDG PET scans are currently the standard for understanding brain metabolism and diagnosing Alzheimer's disease. They involve the injection of a radioactive tracer, fluorodeoxyglucose, or FDG, into the patient before the PET scan, to show the differences between the healthy and diseased tissue in the brain. Dr. Prabhakaran's synthetic version using MRI involves no radiation and had a 97 percent correlation rate with the test that used radiation. "Not only is this new method non-invasive, without the injection of radioactive tracers, but it can be done at a

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**DR. BURNSIDE USING ADVANCED METHODS** TO IMPROVE BREAST CANCER SCREENING (p.2) **DR. WEICHERT RECEIVES EXCITING** NEW GRANT (p.2)

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# **NEWS BRIEFS**

MRI/MBA Fellow Liisa Bergmann, MD was selected to receive a AC-GME Back to Bedside grant. This first-time initiative is intended to directly support residents and fellows as they lead projects that inform patient engagement and shape learning environments in a meaningful manner.

Donna Blankenbaker, MD, was named a Fellow of the American College of Radiology. Dr. Blankenbaker is a Professor of Radiology, the medical director of outpatient radiology, and co-director of medical student radiology education. She has been a musculoskeletal radiologist at UWSMPH Department of Radiology since 2001. She currently has over 70 peer reviewed articles, over 60 book chapters, edited 2 books, as well as hundreds of presentations. Dr. Blankenbaker has received multiple award including Outstanding teacher of the year in the UW Department of Radiology, and outstanding medical student teaching awards. She is also the secretary for the society of skeletal radiology and serves on various hospital, national, and international committees.

Over the past several months, David Bluemke, MD, PhD, has had a very busy calendar. He gave a presentation at the Korean Congress of Radiology, entitled "Advances in Photon Counting CT," which also included contemporary issues in scientific journal publishing. As editor of the flagship RSNA publication Radiology, Dr. Bluemke's bi-monthly podcasts have now reached 12,000 downloads per issue, and 18,000 downloads a month. He also gave advice to Radiologists at RSNA on techniques to help better the quality of their submission. Dr. Bluemke also presented a lecture at Mallinckrodt Institute of Radiology at Washington University, for the 47th Annual Wendell G. Scott Memorial Lecture titled "Creativity. Coattails and Collaborations: Building Your Academic Career." Great

BURNSIDE TEAM USING ADVANCED METHODS TO IMPROVE BREAST CANCER SCREENING PROCESS



Elizabeth Burnside, MD, MPH, MS, FACR, Professor of Radiology and Associate Dean of Team Science and Interdisciplinary Research in the UW School of Medicine and Public Health, is lead in-

vestigator of a Breast Cancer Screening Project within the UW Madison Center for Predictive Computational Phenotyping (CPCP). Along with her transdisciplinary team members, David Page, Niko Escanilla, Shara Feld, Ming Yuan, Jun Fan, Jennifer Cox, Eric Mischo, and Terry Little, Dr. Burnside is committed to improving the breast cancer screening process for both patients and physicians.

Advanced research methods are allowing researchers to make important strides in battling breast cancer. Statistics show that approximately one in eight women will get breast cancer in their lifetime, and approximately 40,300 women die from breast cancer in the United States each year. However, the recommendations for breast cancer screening differ in terms of the age at which one should begin screening and how frequently one should be screened. Technological advancements have created a new world of possibilities for cancer screening research which can be advantageous to help physicians and patients determine a more accurate screening plan that is tailored to each individual. To better customize an individual screening plan requires that researchers develop tools and methods to select necessary information from large biomedical datasets which contain genetic information, molecular profiles of cells, clinical diagnostic tests, and electronic health records. This, in turn, provides researchers with crucial information that can be used to better understand a woman's individual susceptibility of developing breast cancer.

Having a large amount of "big data" available at different levels (from cellular information unique to an individual to population-level information) is beneficial in many ways, but it can also make it difficult to discern which factors meaningfully contribute to the risk of breast cancer and which do not. Dr. Burnside's CPCP team has discovered that combining genetic data, mammogram and other imaging data, along with electronic health record information serves as a substantially better evaluation of a woman's risk for breast cancer. Better ways to predict breast cancer risk will help patients, physicians and policy-makers improve screening recommendations as well as each individual woman's screening plan. "Solving important problems in precision medicine, like tailoring screening to individuals based on predictive data," Dr. Burnside said, "will require transdisciplinary teams with expertise in imaging, informatics, engineering, population health, and other diverse disciplines working collaboratively. This CPCP project has provided exactly that opportunity."

# DR. WEICHERT RECEIVES GRANT TO INITIATE A NEW CANCER IMAGING AND IMMUNOTHERAPY CONCEPT



Jamey Weichert, PhD, Associate Professor, Department of Radiology and Director of the UW Carbone Cancer Center's Small Animal Imaging and Radiotherapy Facility, and his Co-PI, Zachary Mor-

ris, Assistant Professor in the Department of Human Oncology, recently received a \$3.8 million, a five year National Cancer Institute Biden Moonshot UO1 grant for their research. Drs. Weichert's and Morris' work focuses on combining molecular targeted radionuclide therapy (MTRT), developed by Dr. Weichert, and immunotherapy being developed by Dr. Morris and Dr. Paul Sondel. The grant, which is the direct product of an interdisciplinary UW2020 award to this group, began last September and includes the Weichert Lab (Radiology), Morris Lab (Human Oncology), Sondel Lab (Pediatric Oncology), and Bednarz Lab (Medical Physics).

A huge challenge in treating cancers is their ability to avoid immune surveillance and control. Recent research has focused on enhancing the detection of cancer cells by the immune system and recent clinical results have afforded increased survival for many

# RADIOLOGY DEPARTMENT PAVES WAY FOR REVOLUTIONARY NEUROENDOCRINE TUMOR TREATMENT



When Wisconsin's first patient was treated last year with a newly introduced drug therapy for a neuroendocrine tumor (NET), it truly took a village to make the treatment become a reality. UW Hospital clinicians and

Dr. Perlman

staff from the Nuclear Medicine and Molecular Imaging Section of the Department of Radiology and the Department of Medicine's Division of Hematology, Medical Oncology and Palliative Care, plus hospital safety experts and pharmacists, all worked together to be able to make the radioactive, tumor-specific drug treatment available to treat patients in record time.

Steve Cho, MD, Nuclear Medicine and Molecular Imaging Faculty member, Director of the UW Radiopharmaceutical Production Facility and Associate Director of the UW PET Imaging Center, remembers the great effort behind the orchestration. "Our clinicians and techs played a critical role in getting the proper treatment to the patient very quickly," he said. "At that time, there was a lot of public interest in this new drug treatment available in the United States, as it was previously only available in Europe."

NETs of the gastrointestinal tract arise from specialized cells called neuroendocrine cells. They represent only about a half of one percent of newly diagnosed cancers. "There is a very low incidence for these types of cancer," Cho said, "they are also very slow-growing, and people can live with them for a long time so there is actually a high prevalence or number of patients with this cancer. They can be widely metastatic," he said. After a while, the current treatment used becomes less effective, and the majority of patients do not survive the disease.

The new drug, Lutetium-177 dotatate (marketed as Lutathera®), showed in clinical trials that it stopped the growth of 65 percent of patient's tumors after treatment, as compared with 11 percent whose tumors stopped growing that instead received a higher dose of common NET therapy. With those who received the revolutionary Lutathera treatment, 18 percent of the patient's tumors actually shrank. "Lutathera treatment showed markedly longer survival rates for NET patients," Cho said. "It was a game-changer, and showed much more dramatic results than people anticipated."



Dr. Cho

Lutathera was approved by the FDA for use in the US on January 28, 2018, and calls to UW Hospital from NET patients started flowing in right away. Physicians and staff in both Nuclear Medicine and Oncology acted immediately. Dr. Cho and Scott Perlman, MD, MS, Director of the UW PET Imaging Center, and Section Chief of UW Nuclear Medicine and Molecular Imaging, and Scott Knishka, RPh, BCNP, Nuclear Pharmacy Manager, orchestrated the Nuclear Medicine effort. "Collaborating closely with the Carbone Cancer Center, including the patient's oncologist, Noelle LoConte, and medical oncologists Sam Lubner and Dan Mulkerin, we began the process of developing the treatment protocol," Cho said. According to Dr. Perlman, one of the first obstacles we faced was where to administer the intravenous treatment. "This led to our team searching around the hospital complex for an adequate space to administer the therapy. This is where we were fortunate to meet Kendra O'Connell, RN, the Carbone Cancer Center clinic manager who was willing to allow us to use a room a few days a week along with nursing support, even though their clinic was already very busy. This was a huge help and really allowed us to move forward rapidly," said Dr. Perlman.

"We had to immediately focus on the many different elements that needed to be completed," Dr. Perlman continued. "We had to complete all the paperwork – protocol consent form, written directives, get P & T and Human Radiation Use Committees approvals, engage radiation safety – everything, as it was a brand-new drug," he said. Much of this was coordinated by Mr. Knishka, who coordinated the development of the protocols, written directives, the consent form, and other paperwork required to get the drug approved within Radiology and UW Hospital.

# NEWS BRIEFS (FROM P. 2)

work, Dr. Bluemke!

The UW School of Medicine and Public Health's Quarterly magazine recently featured faculty member Elizabeth Burnside, MD, MPH, MS, FACR, As ICTR's Co-Deputy Executive Director, Dr. Burnside's extensive breast cancer research and bioinformatics expertise was recognized and her "resolve to bring IC-TR's crucially important resources to investigators in women's health and gender differences." Dr. Burnside also was also featured in the Faculty Proile section of SMPH Quarterly, focusing on her notable abilities to orchestrate team collaborations in her informatics and research work.



Weibo Cai, PhD, was recently named a recipient of the UW H.I. Romnes Faculty Fellowship. This fellowship recognizes faculty for their contributions up to six years past their first promotion to a tenured position. The award is named in recognition of the late WARF trustee president H.I. Romnes, and comes with \$60,000 that may be spent over five years Dr. Cai wasalso recently noted for his collaborations. This research findings could potentially lead to major breakthroughs both in facilitating weight loss research and promoting faster wound healing. Both devices have been

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# **NEWS BRIEFS**

successfully tested in animal models, and is a great example of what interdisciplinary collaboration can accomplish..

**Carolyn Haerr, MD**, was named a Fellow of the American College of Radiology. Dr. Haerr has been a Clinical Associate Professor at the UWSMPH Department of Radiology since 2002. She is also the Lead Interpreting Radiologist for Mammography at the UnityPoint Health-Meriter Monona Clinic since 2013. Dr. Haerr has been the

UW's Donna Blankenbaker, MD, (left) and Carolyn Haerr, MD,(right) along with Peter Hanson, MD, from Eau Claire (center)



were Wisconsin's three candidates named Fellows of the American College of Radiology this year.

Chief of MSK radiology at the UW Madison for five years, and she has presented numerous lectures and presentations. She has also been profoundly involved in quality and patient care initiatives.

Mark Kliewer, MD, Lori Mankowski-Gettle, MD, MBA, and Katie Yang, MS were awarded a \$165,077 RSNA Education Development Grant, running from 2019-2021. Their application was among the top-ranked and approved by the RSNA R&E Board of Trustees.

Vivek Prabhakaran, MD, PhD, was also featured in the SMPH *Quarterly* for his work on poststroke brain plasticity received a NIH KL2 award and a pilot award from the UW Institute for Clinical and Translational Research (ICTR). According to the publication "A vision to support researchers like Prabhakaran – with the goal of turning discoveries into health improvements – was behind the creation of ICTR in 2006."

# **ARTIFICIAL INTELLIGENCE** (FROM P. 1)

much lower cost," Dr. Prabhakaran said. The AI algorithm used by Prabhakaran has great potential to be expanded to other uses, for example to help diagnose cancer, epilepsy and myocardial viability.

Alan McMillan, PhD, director of the Molecular Imaging / Magnetic Resonance Technology Lab (MIMRTL) is one of "superusers" of the NVIDIA® DGX<sup>TM</sup> supercomputer system, seeking ways to advance MRI, PET/ MR and PET/CT imaging techniques. "There is no aspect of our research that doesn't incorporate AI," McMillan said. In fact, he sees the rapid growth of AI as a boon to all future research, allowing machines to focus on the algorithms and enabling people to focus on the more physical aspects of human health. Some of McMillan's recent efforts have centered on finding a way to create CTlike imaging from MRI images. Using Deep Learning, Dr. McMillan's team has been able to reconstruct robust CT images directly from clinical MR images. When these images are used to perform attenuation correction, they enable more quantitatively accurate PET images for simultaneous PET/MR and reduce error from 10-25% (in conventional techniques) to less than 5%.

Another researcher and clinician who is tapping into AI to discover new information is Perry Pickhardt, MD. Dr. Pickhardt recently found a new way to obtain additional "opportunistic" diagnostic information about the structures seen in the abdomen during abdominal Computed Tomography (CT) imagery performed during CT colonography. "CT sees many things," Dr. Pickhardt said. "We wanted to take the extra biomarkers in the CT scans and try to do something more with them. A CT scan also has information about patients' bone, muscle, fat, calcium, and more," Pickhardt continued. "With this, we can get a read on many other important health connotations, for example, we can quantify the aortic calcium levels of a patient and make a prediction about his or her likelihood of a cardiac event." Dr. Pickhardt's paper, "Fully-Automated Analysis of Abdominal CT Scans for Opportunistic Prediction of Cardiometabolic Events: Initial Results in a Large Asymptomatic Adult Cohort," received the Roscoe E. Miller Best Paper Award at the recent Society of Abdominal Radiology (SAR) conference.

Vivek Prabhakaran, MD, PhD, is another Department of Radiology faculty member who is using AI to make new discoveries. He has led the efforts to train an AI model using MRI input to create synthetic FDG PET images. Traditional FDG PET scans are currently the standard for understanding brain metabolism and diagnosing Alzheimer's disease. They involve the injection of a radioactive tracer, fluorodeoxyglucose, or FDG, into the patient before the PET scan, to show the differences between the healthy and diseased tissue in the brain. Dr. Prabhakaran's synthetic version using MRI involves no radiation and had a 97 percent correlation rate with the test that used radiation. "Not only is this new method non-invasive, without the injection of radioactive tracers, but it can be done at a much lower cost," Dr. Prabhakaran said. The AI algorithm used by Prabhakaran has great potential to be expanded to other uses, for example to help diagnose cancer, epilepsy and myocardial viability.

Innovations made possible by AI are occurring in practically every area of the imaging world. Department of Radiology researchers Richard Kijowski, MD, and Fang Liu, PhD, have developed a fully automated deep-learning system that uses two deep convolutional neural networks to detect anterior cruciate ligament ears (ACL) tears on knee MRI exams. The result of their research showed that a fully automated deep learning network could determine the presence or absence of ACL tears with similar diagnostic performance as experienced musculoskeletal radiologists. Similar deep learning algorithm have been developed by Drs. Kijowski and Liu to detect other musculoskeletal pathology, including cartilage lesions on MRI and hip fractures on pelvic radiographs. The use of deep learning methods to detect musculoskeletal pathology could provide immediate preliminary interpretations of imaging studies, maximize diagnostic performance, and reduce errors due to distraction and fatigue. "However, future work is needed for further technical development and validation before this could be implemented into clinical practice," said Dr. Kijowski. "I look forward to the future of this research."

The evolution of AI is currently thriving across UW campus, and is especially evident

# PATRICK TURSKI, MD, RECEIVES FLAHERTY LIFETIME ACHIEVEMENT AWARD FROM WRS

Patrick Turski, MD, FACR, a Professor Emeritus in the Neuroradiology Section and former Chair of the University of Wisconsin SMPH Department of Radiology, was recently named the annual recipient of the Wisconsin Radiological Society (WRS) Flaherty Lifetime Achievement Award. The Flaherty Award is the highest honor bestowed by the organization. Dr. Turski was selected for his demonstrated contributions to the



Dr. Patrick Turski demonstrated his skills with the guitar presented to him for his retirement last year. Also pictured is Neuroradiology Section Chief Dr. Aaron Field.

advancement of medical practice and lengthy volunteer service in leadership roles, which reflect with distinction on his practice of radiology in Wisconsin.

Dr. Turski, who retired from the Department of Radiology faculty last year, had a storied career as a neuroradiologist. In medical school at Rush Medical College in Chicago, he initially decided to practice general medicine, but during his internship and residency at UW–Madison, he met Dr. Joe Sackett, the Department of Radiology Chairman, who introduced Dr. Turski to the field and convinced him to pursue it as a career. He subsequently completed his neuroradiology fellowship at the University of California - San Francisco, where he was also awarded a Research Fellow Grant at the Centre International des Etudiants Medecins in Paris, France.

Dr. Turski joined the UWS-MPH Department of Radiology faculty in 1981. By 1986, he had been named Chief of MRI, and became the neuroradiology Section Chief in 1993. From 1995 to 2005, Dr. Turski was the John H. Juhl Professor and Chair of the Department of Radiology. During his career he wrote 150 peer-reviewed articles, 25 book chapters, one mono-

graph and book on MRA, and has been an invited lecturer at meetings across the globe. Dr. Turski has also been very active in the American College of Radiology, Wisconsin Radiological Society and the American Society of Neuroradiology organizations, serving in numerous leadership roles.

The Flaherty Award was named after the first recipient, Timothy Flaherty, MD, FACR, who is an inspiration to the field of Radiology with many accomplishments including being the past president of both the WRS and Wisconsin State Medical Society, throughout his 50-year career.

Congratulations to Dr. Turski on this momentous honor!

# ERICA TIMM, BSN, RN, WINS A TOP UW HEALTH AWARD



Erica Timm, BSN, RN, a nurse in the Musculoskelatal Section, (pictured top right corner) won a UW Health Clinical Nursing Excellence award. This award is given to nurses that provide patient care all year long. Erica was selected for her high level of commitment, clinical practice, and leadership in the delivery of patient and family centered care.

# NEWS BRIEFS (FROM P. 4)

Howard Rowley, MD, was recently re-appointed as the UWS-MPH Department of Radiology's Sackett Professor, a position he has held since 1999.

Congratulations to **Andrew Ross**, **MD**, **MPH**, who was voted to have contributed the single best review of manuscripts to the European Journal of Radiology in 2018. He was selected based on the quality and detail of the reviews he posted throughout the year.

Congratulations to **Dr. Alexey Samsonov, PhD**, who received ~\$1,900,000 award for his work as PI on a publication in National Institute of Biomedical Imaging and Bioengineering titled "Macromolecular Imaging of Gray and White Matter Pathology in Multiple Sclerosis." Dr. Samsonov had multiple co-investigators in three different areas of study, radiology, medical physics, and neurology. Radiology co-investigators included Drs. Aaron Field and Vivek Prabhakaran.

Elizabeth Sadowski, MD, was named the Dr. Morton Bosniak Lecturer for the 2018 New York University Head to Toe Abdominal Course. Dr. Sadowski lectured on the topics of US and MR imaging of adnexal masses and MR and PET imaging of endometrial and cervical cancer. These are topics which Dr. Sadowski has spent the past 18 years helping radiologists around the world understand how to provide clinicians with accurate imaging assessment information so they can tailor treatments appropriately for their patients.

**Tim Szczykutowicz, PhD**, was named the recipient of the 2018 Editor's Recognition Award for reviewing with Distinction. He received this award based on the quality and consistency of the time he takes to review Radiology publications. He was also invited by the the editors of Medical Physics to serve as a member of the Board of Associate Editors.

# DEPARTMENT WELCOMES NEW FACULTY MEMBERS



Aaron Eifler, MD, is an Assistant Professor of Radiology in the Vascular Interventional Radiology section.

He graduated from Northwestern University, Chicago, IL, cum laude, in Biomedical Engineering. He attended Northwestern medical school, where he was inducted into the Alpha Omega Alpha Honor Medical Society. While in medical school, Dr. Eifler completed a research fellowship through the Howard Hughes Medical Institute, Chevy Chase, MD. He completed his internship in general surgery at Northwestern Memorial Hospital, radiology residency at Stanford University Medical Center, and fellowship training in Vascular and Interventional Radiology at Northwestern Memorial Hospital.

### Laura Eisenmenger,

**MD**, is an Assistant Professor of Radiology (tenure track) in the Neuroradiology Section. Dr.



Eisenmenger graduated summa cum laude from Illinois Wesleyan University, Bloomington, IL. She earned her MD at Ohio State University College of Medicine, Columbus, graduating magna cum laude. She completed an internship at Riverside Methodist Hospital, Columbus, and a Diagnostic Radiology residency at University of Utah, Salt Lake City. Dr. Eisenmenger was President of the Utah Medical Association Resident Executive Committee in 2016-2017. She has received multiple research grants including the Radiological Society of North America (RSNA) Resident Research Grant in 2017, the Roentgen Resident Research Award in 2017, and the **RSNA** Fellow Research Grant in 2018. Dr. Eisenmenger completed her Neuroradiology fellowship at the University of California-San Francisco in the Department of Radiology and Biomedical Imaging, where she was a Chief Fellow in 2017-2018.

# **NEUROENDOCRINE TUMOR TREATMENT** (FROM P. 3)

The Nuclear Medicine team learned that the commercial FDA approved amino acid solutions used as a radioprotectant induced acute nausea. The Nuclear Medicine physician now prescribes a custom compounded amino solution that reduces this side effect. This has lead to a better patient experience. The procurement of the radiopharmaceutical and the radioproctectant is coordinated by Angel Kubly, RPh, in the nuclear pharmacy.

As a result of the UW Department of Radiology's Nuclear Medicine and Molecular Imaging excellent work, the UW Hospital became the first facility in the state and the 20th in the nation to administer this specific cancer therapy. "During the treatment, nuclear medicine physicians and techs were there the whole time, and oversaw everything," Dr. Perlman said. "We have successfully managed the side effects and are now treating one or two patients per week with Lutathera. People are still calling to schedule treatment, and those we are treating rave about being able to receive the Lutathera right here in Wisconsin," he said. According to Dr. Perlman, the demand has been so high there is currently about a five month wait for patients to be treated.

"Treating and imaging using the same target therapy is known as 'theranostics,' combining molecular imaging and targeted radionuclide therapy (TRT)," Dr. Cho said. "We expect this treatment to be the first of many new theranostic therapies to become available. It is the ideal example of personalized and precision medicine," Cho said. "Theranostics is the future of nuclear medicine."

The Nuclear Medicine Section would like to also recognize the expert assistance of the Nuclear Medicine Manager Derek Fuerbringer, CNMT, nuclear medicine technologists Rosalie Hovey-Andersen and Dani Brunk, and the radiation safety team headed by Jason Timm, Radiation Safety Officer, to make this feat become a reality. Lutathera is manufactured by Advanced Accelerator Applications. Due to the high cost of the drug, prior insurance authorization is necessary.

# 43<sup>RD</sup> BIG SKY RADIOLOGY CONFERENCE WRAPS UP

The 43rd Big Sky Radiology Conference in Big Sky, Montana recently concluded. The event is held annually by the UW Department of Radiology. Guest speakers included Dr. Laura Avery from Massachusetts General Hospital who presented a series of highly educational and entertaining lectures including foreign body ingestions encompassing children with magnets through adults trafficking illegal drugs. The difference between body packing and body stuffing was also discussed. Attendees learned the imaging to order for suspected fish bone ingestion depending on whether one ate at Legal's or Chinatown why this is significant, one must think Atlantic versus Pacific to figure it out. And, while Wisconsin has deer hunting season - Massachusetts has Nantucket gutter cleaning season in mid-October with its own range of injuries.

Dr. Mary Newell from Emory University in Atlanta discussed all things breast from pregnancy associated breast cancer to breast cancer screening which raised a lively discussion from the audience.

Department faculty members also presented various topics. Dr. Jason Stephenson talked about bone marrow and calcific tendinitis treatments and his talks almost brought down the house (ceiling rather, be sure to ask him.) Dr. Mark Kliewer presented an outstanding series of OB US lectures that were highly educational and



interesting even for those who don't practice that specialty. Dr. Anthony Kuner presented a wide range of Neuroradiology topics including a thorough discussion of acute stroke management. Dr. Scott Perlman covered the hot topics of theranostics and Lutathera for the treatment of neuroendocrine tumors and dementia imaging as well as the mundane but vital topic of BMD. Dr. Pamela Propeck finished up with challenging breast cases including systemic etiologies.

Attendees enjoyed favorable weather, including plenty of sunshine and temperatures in the 30's, making for beautiful days on the slopes. The speaker dinner was in the Blue Room at Adiano Italian Grill in Mountain Mall and included other UW faculty and trainees who attended the meeting. Tentative dates for next year are Jan. 12-15, 2020. Please consider attending! Those interested should contact meeting coordinator Karen Knipschild for further information.

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# AMY FOWLER, MD, PhD, DETERMINES IMAGING TECHNIQUE THAT COULD IMROVE THE OUTCOMES OF SOME BREAST CANCER PATIENTS



Amy Fowler, MD, PhD, Assistant Professor in the UW Department of Radiology Breast Imaging Section, had a manuscript published in the February 2019 issue of the Journal of Nuclear

Medicine. The featured basic science article was titled "Sensitivity and Isoform Specificity of 18F-Fluorofuranylnorprogesterone for Measuring Progesterone Receptor Protein Response to Estradiol Challenge in Breast Cancer."

Dr. Fowler's research focuses on the clinical need to improve ways to detect and predict therapy response in patients with estrogen receptor positive cancer (ER-positive), which accounts for around 70% of breast cancer patients. The current treatment can be ineffective in some cases because it is not always sensitive to anti-estrogen treatment. Dr. Fowler has discovered that non-invasive detection of changes in PR expression using 18F-Fluorofuranylnorprogesterone (18F-FF-NP) during an estradiol challenge could be an early indicator of the effectiveness of a specific hormone therapy. Previous studies were completed on ER-positive mouse models of breast cancer, which showed that measuring early decreases in progesterone receptor expression with the use of 18F-FF-

NP, and PET imaging after starting anti-estrogen therapy, could differentiate between endocrine sensitive and endocrine-resistant breast cancers.

Dr. Fowler and her colleagues used human breast cancer cells and tumor xenografts in order to test the ability of 18F-FFNP to detect any increases in progesterone receptor protein expression after estrogen treatment as a measure of functional endocrine sensitivity. The results indicated that 18F-FFNP uptake in tumors increased as early as 48 hours following estrogen treatment and correlates with an increase in progesterone receptor protein expression. They also found that 18F-FFNP could detect both the A and B isoforms of progesterone receptor proteins, which is expressed at variable levels in breast cancer.

"Validation of PR imaging as a biomarker of endocrine sensitivity in patients before and after estradiol challenge could provide new opportunities in the field of molecular imaging and nuclear medicine for breast cancer imaging," Dr. Fowler said. "Improved methods for testing endocrine sensitivity in patients could better inform decisions for optimal individualized ER-positive breast cancer therapy, potentially reducing morbidity and mortality."

# DR. WEICHERT RECEIVES GRANT (FROM P. 2)

patients with advanced melanoma and lung cancers for example. Although immunotherapy results are encouraging in several advanced cancers, only a fraction of patients respond and some eventually develop resistance to the treatment. In preclinical studies, Weichert and Morris discovered that delivering low-dose radiation to all disease sites with tumor targeted radioactive molecules modifies the tumor microenvironment in a way that significantly enhances systemic immune recognition and destruction of tumors anywhere in the body. Moreover, in initial animal studies with melanoma, breast, and lymphoma cancers, not only do a majority of animals become disease free, an immune

memory is produced which rejects subsequently injected cancer cells.

This grant will enable Weichert, Morris, and their colleagues to improve the delivery of immunomodulatory radiation to all tumors in a less invasive manner. MTRT is unique due to its ability to deliver radiation to all tumor sites, even those that are hidden or undetected. Administered intravenously, it allows selective delivery of radiation to tumor cells and subsequently enhances immunologic detection and destruction of the cancer cells with the potential of developing memory for that cancer type. The grant will also help to decipher the biologic mechanisms of this new approach.

# NEW FACULTY (FROM P. 6)



Michael Hartung, MD, is an Assistant Professor within the section of Abdominal Imaging and Intervention. He graduat-

ed from Marquette University, Milwaukee, WI, and earned his medical degree from UW–Madison. Dr. Hartung completed his internship at Wheaton Franciscan - St. Joseph Hospital, Milwaukee, WI, followed by a residency at Medical College of Wisconsin Affiliated Hospitals, Milwaukee, WI. He obtained his fellowship at the University of Wisconsin-Madison prior to joining the UW Department of Radiology faculty in 2018.

### Joanna Kusmirek, MD,

is an Assistant Professor of Radiology. She earned her MD at the University of Lublin, Poland, and



was board certified in Internal Medicine. She moved to Wisconsin and attended the University of Wisconsin–Madison where she completed two residencies in Nuclear Medicine and Radiology, followed by an mini fellowship in Cardiothoracic imaging. Her professional interests include cardiothoracic imaging, and nuclear medicine/PET.



Alan McMillan, PhD, is an Associate Professor of Clinical Health Sciences within the Department of Radiology and Medical

Physics. He obtained his Bachelor of Science, Master of Science, and PhD all in Biomedical Engineering at UW-Madison. He is currently Lab Director of the Molecular Imaging/Magnetic Resonance Technology Lab (MIMRTL), where the team's focus is to integrate advanced modeling, data science, and physics-based approaches to improve MRI and PET imaging techniques. He was recently awarded an R01 grant from the National Institutes of Health for his study of "Improved Techniques for Substitute CT Generation from MRI Datasets" using deep learning to improve simultaneous PET/MR and MR-based radiation treatment planning.



Department of Radiology UNIVERSITY OF WISCONSIN SCHOOL OF MEDICINE AND PUBLIC HEALTH

E3/366 Clinical Science Center 600 Highland Avenue Madison, WI 53792-3252

# MEMORABLE IMAGES



Dr. Alan Kaplan, UW Health CEO, Dr. Robert Dempsey, Chair of the Department of Neurological Surgery, Neuroradiologist Dr. Beverly Aagaard-Kienitz, and Dr. Thomas Grist, Chair of the Department of Radiology, (pictured left to right) attend the ribbon-cutting ceremony of UW Health's new biplane hybrid operating room, a huge step forward in the treatment of cerebrovascular disease and neurosurgical procedures allowing neurosurgery and radiology to complete their respective work in the same environment.

# **ARTIFICIAL INTELLIGENCE** (FROM P. 4)

in the Department of Radiology. But many are wondering, what should we expect from the future of AI? "My hope for AI is that it will create a better use for people's intelligence," Dr. McMillan said. "We can decide what problems are most important, and use AI to solve problems in faster and better ways. For many scientists, AI need not be the focus of their research, rather it can be leveraged as a tool that enables us to solve problems that couldn't easily be solved in any other way," he said. "The hope for the future is that we will keep finding more hard problems for AI to solve more quickly and efficiently. It is truly humbling and exciting work."

# **COMINGS & GOINGS**

### Welcome

Christian Jensen, Associate Information Processing Consultant

Monica Langeland, Associate Research Specialist Florian Braun, Associate Information Processing Consultant

Mark Connolly, Senior Administrative Program Specialist

Melissa Kuester, Program Assistant Confidential Laura Eisenmenger, Assistant Professor Aditya Rungta, Student Help Ryan Legler, Senior Instrumentation Technologist

Ian Herfel, Financial Specialist, Senior Jack Gage, Student Help Jamie Gribb, Research Nurse Coordinator, Medical Imaging Erin MacDonald, Research Associate Dylan Mooney, Sr. Financial Specialist

### Goodbye

Kelsey Doyle, Instrumentation Technologist Todd Forsythe, Administrative Program Specialist Kayo Kern, Administrative Program Specialist Sarah Kohn, Instrumentation Technologist Katie Randall, Administrative Assistant, Abdominal Imaging Marie Ruetten, Financial Manager

Help us GO GREEN!

Keven Stonewall, Associate Research Specialist Averie Theiste, Student Hourly Sam Zander, Student Hourly WIMR Pamela Ziemlewicz, Senior Instrumentation Technologist

### **Department Moves**

Kate Bednarke, Student Hourly to Associate Research Specialist Kim Gudex, MSN, RN, FNP-BC, Nurse Practitioner at Meriter to Nurse Practitioner with Interventional Radiology

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