

Research Scholar Investigates Molecular Approaches to Brain Tumor Imaging



When **Moritz F. Kircher, M.D., Ph.D.**, writes about his research, his enthusiasm is hard to contain. His work with MRI-Raman (MRI-R) nanoparticles is revealing new ways to visualize brain tumors.

Dr. Kircher credits a **Philips Healthcare/RSNA Research Resident Grant** that he received in 2008 with jumpstarting his career. During his residency, he continued down the research path working on novel methods for molecular imaging and cell tracking. As a busy clinical fellow in Magnetic Resonance Imaging (MRI) at Stanford University, he managed to simultaneously complete a postdoctoral fellowship with Sanjiv Sam Gambhir, M.D., Ph.D., at the Molecular Imaging Program at Stanford (MIPS), where Dr. Kircher

started working on surface-enhanced Raman scattering (SERS) imaging.

Then in 2011, with the support of a **Bayer HealthCare/RSNA Research Scholar Grant**, Dr. Kircher began work to develop a new molecular approach to brain tumor imaging that allows both preoperative staging and intraoperative high-resolution image-guided tumor resection using a single injectable contrast agent.

Dr. Kircher's team used a novel dual-modality MRI-R nanoparticle, which



Bayer HealthCare

"Bayer HealthCare Radiology & Interventional is committed to supporting radiology research and is proud to sponsor these talented RSNA researchers who are helping to advance science and patient care through their Research & Education Foundation grants."

Edio Zampaglione, Vice President US Medical Affairs, General Medicine and Diagnostic Imaging, Bayer HealthCare Pharmaceuticals.

they discovered could be detected by both MR imaging and surface-enhanced Raman scattering (SERS) imaging with very high sensitivity. Through this research, it was shown that this nanoparticle, which is stably retained by the brain tumor, allows three-dimensional visualization of brain tumors with

MR imaging, and high-resolution guidance of tumor resection with Raman imaging in a mouse glioblastoma model.

The research has already resulted

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- Volunteer Profile: Carol M. Rumack, M.D.
- New resources available at RSNA.org/Foundation

Successful Fun Run Raises Over \$20,000 for R&E Grants!

More than 500 runners joined the 5K Fun Run with a vital reason to run: The future of their profession. RSNA 2012 attendees and their colleagues braved the cold of a Chicago morning on the lakefront to participate in a race where proceeds benefited the R&E Foundation. Participants and donors contributed over \$20,000 that will fund R&E grants, pushing the specialty forward.

The R&E Foundation thanks Intelrad Medical Systems, Inc. for sponsoring the event.



Fun Run participants proudly display their medals

The top three finishers in each gender:

MALE:

- 1st Manuel Salvador, M.D., Ph.D.
Spain
- 2nd Romain Labas, France
- 3rd Vincent Magnotta, Ph.D.
U.S. (Iowa)

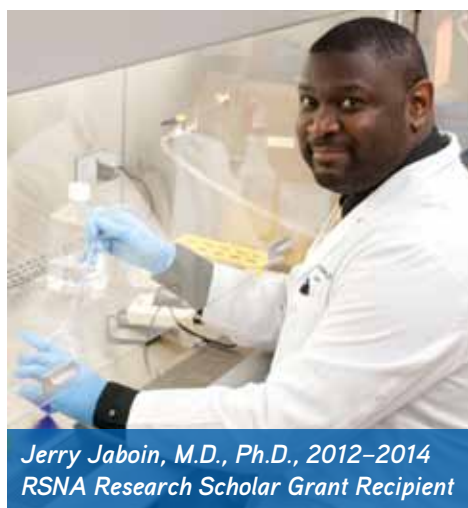
FEMALE:

- 1st Laura Paulsen, U.S. (Minnesota)
- 2nd Kara Waters, M.D. U.S.
(Virginia)
- 3rd Amanda Murphy, M.D., Ph.D.
Canada

Scholars Present their Progress at RSNA Annual Meeting

The Research Scholar Grant supports junior faculty members who have completed the conventional resident/fellow training programs, but have not yet been recognized as independent investigators. In addition to receiving mentorship at their home institution, each Scholar works with an off-site scientific advisor to help strengthen the research project and scientific approach.

During the RSNA annual meeting, second-year Scholars present an overview of their projects and the progress made to date. For the third consecutive year, the Scholar presentations were incorporated into the Introduction to Academic Radiology program at RSNA 2012. Scholars, advisors and other grant recipients had an opportunity to socialize and discuss their research projects during a luncheon after the presentations.



Jerry Jaboin, M.D., Ph.D., 2012-2014
RSNA Research Scholar Grant Recipient

"There is a proverb, '...better than a thousand days of diligent study is one day with a great teacher.' I'm not sure where that may be more true than in science.

The RSNA Research Scholar Grant has been invaluable to me, but just as valuable has been this focus on the role of mentorship, both external and university-based, in the development of my research program. The Scholar session at RSNA was a very good opportunity to learn about other Scholars, in particular their failures, as well as successes, in the development of their research programs."

Showing Our Appreciation



Representatives from the Vanguard Donor Program at the Corporate Donor Reception surrounding Theresa C. McCloud, M.D. (bottom row, center). Corporations have donated more than \$18 million to support research and education grants.



RSNA leaders, donors from academia and private practice, grant recipients, and corporate executives enjoy the Distinguished Donor Reception.

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in publications in prestigious journals such as *Nature Medicine*, *Nature Clinical Reviews Oncology*, *Clinical Cancer Research* and *Radiology*. In addition, Dr. Kircher was recently awarded \$893,000 for a 5-year NIH K08 Mentored Clinical Scientist Development Award (CA163961) from the National Cancer Institute, "A Combined Pre- and Intraoperative Brain Tumor Imaging Strategy using a Dual-Modality Raman-MRI Nanoparticle."

With an eye toward the future, Dr. Kircher and his colleagues have

filed three patent applications and are currently planning to create a company around their Raman nanoparticles.

"Both the 2008 Philips Healthcare/RSNA Research Resident Grant and the 2011 Bayer HealthCare/RSNA Research Scholar Grant have been absolutely essential for my career development," Dr. Kircher said. "These grants have provided me with the protected academic time needed to pursue my research endeavors. The RSNA Scholar Grant was my first extramural grant as a junior faculty member. It has resulted in ten additional successful grant applica-

tions in the first year after receiving the R&E grant, with a grant budget now totaling over \$2,700,000. This funding has allowed me to build up a lab with currently seven postdoctoral fellows and one graduate student." Dr. Kircher recently received the "Young Investigator Award" (1st place) at the 2012 World Molecular Imaging Conference for his work.

Dr. Kircher concluded, "I could not be more thankful to RSNA and the donors who support the Foundation for jumpstarting my career."

Grant Recipients Research the Benefits of Exercise on Parkinson's Disease

At RSNA 2012, press conferences were held to highlight research findings that might be particularly interesting to the public. Grant recipient, **Chintan Shah, B.S.**, was chosen to present the work he did with another R&E grantee, **Michael D. Phillips, M.D.**, about the benefits of exercise on Parkinson's disease.

The idea for this research originated with Jay L. Alberts, Ph.D., neuroscientist at the Cleveland Clinic Lerner Research Institute in Cleveland. In 2003, Dr. Alberts rode a tandem bicycle across Iowa alongside a cyclist with Parkinson's to raise awareness for the disease. The fellow cyclist experienced improvements in her symptoms after the ride.

"The finding was serendipitous," Dr. Alberts recalled. "I was pedaling faster than her, which forced her to pedal faster. She had improvements in her upper extremity function, so we started to look at the possible mechanism behind this improved function." As part of this inquiry, Dr. Alberts, together with principal investigator Dr. Phillips, researcher Mr. Shah, and their Cleveland Clinic colleagues, recently used functional connectivity MR imaging (fcMRI) to study the effect of exercise on 26 patients with Parkinson's disease.

"The results show that forced-rate bicycle exercise is an effective, low-cost therapy for Parkinson's disease."

"By measuring changes in blood oxygenation levels in the brain, fcMRI allows us to look at the functional connectivity between different brain regions," Shah said.

The patients participated in bicycle exercise sessions three times a week for eight weeks. Some patients exercised at a voluntary level and others underwent forced-rate exercise, pedaling at a speed above their voluntary rate. The research-



Michael D. Phillips, M.D., *Section Head of Imaging Sciences and Vice Chairman of Research and Academic Affairs, Imaging Institute at Cleveland Clinic and a 1996 RSNA Research Fellow Grant Recipient*

ers used a modified exercise bike to induce forced-rate activity.

"We developed an algorithm to control a motor on the bike and used a controller to sense the patient's rate of exertion and adjust the motor based on their input," Dr. Alberts said.

fcMRI was conducted before and after the eight weeks of exercise therapy and again as follow-up four weeks later. The research team calculated brain activation and connectivity levels from the fcMRI results and correlated the data with average pedaling rate. Results showed increases in task-related connectivity between the primary motor cortex and the posterior region of the brain's thalamus. Faster pedaling rate was the key factor related to these improvements, which were still evident at follow-up.

"The results show that forced-rate bicycle exercise is an effective, low-cost



Chintan Shah, B.S., *a 2009 Canon U.S.A./RSNA Research Medical Student Grant Recipient*

therapy for Parkinson's disease," Shah said.

Dr. Alberts noted that while faster pedaling led to more significant results, not all people with Parkinson's need to do forced-rate exercise to see improvement.

"We're now looking at this phenomenon in patients with exercise bikes in their home," he said, "and other exercises like swimming and rowing on tandem machines may provide similar benefits."

IN THE NEWS

409 print, broadcast, and online media outlets ran the story about this research, which ultimately exposed more than 146 million people worldwide to the work of R&E grant recipients.

Follow Your Money — from Gift to Grant Recipient

“Where does the money go?” asked a doctor considering a gift to the R&E Foundation.

The answer, “To more than 900 grant recipients.”

Now you can search for current and past grant and award recipients online at RSNA.org/Foundation.

Through this tool, you can:

- ① Find name, photo, institution, and grant title.
- ② Expand the results to include the abstract and other RSNA activities for each recipient.
- ③ Narrow the search by keyword.

For more information, contact Scott Walter, Assistant Director, Grant Administration, 630-571-7816, swalter@rsna.org.



RSNA Unveils New Video Resources for Grant Applicants

As part of its ongoing mission to help grant applicants prepare a competitive grant application for the RSNA R&E Foundation, RSNA has developed two training videos. **Gayle E. Woloschak, Ph.D.**, instructor for the RSNA Advanced Course in Grant Writing and former reviewer and Chair of the R&E radiation oncology study section, walks applicants through the application and review process offering helpful tips, from a reviewer's point of view, on how to approach the grant writing process and avoid common pitfalls that weaken applications. **Kitt Shaffer, M.D., Ph.D.**, reviewer and current Chair for the R&E education study section, addresses special issues and challenges with education grants. The videos were unveiled for the 2013 application cycle and are available on the grant application site, grants.rsna.org/grants.





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Foundation Welcomes New Chairman and New Trustees

On December 1, **James P. Borgstede, M.D.**, assumed the Chairmanship of the R&E Foundation Board of Trustees. Dr. Borgstede is a professor of radiology and vice-chair for professional services, clinical operations and quality at the University of Colorado, Denver. He has served on the R&E Board of Trustees since 2008 and on the R&E Corporate Giving and Public Relations committees. He also served on the RSNA Quality Improvement Committee.

New trustees of the R&E Board of

Trustees for 2013 are **Richard L. Morin, Ph.D.**, and **Richard D. White, M.D.**

Dr. Morin is consultant to the Department of Radiology at the Mayo Clinic, Jacksonville, FL, and a professor of medical physics and Brooks-Hollern Professor at Mayo Medical School in Rochester, MN.

Dr. White is Chairman and Chief of Service, Department of Radiology, The Ohio State University Medical Center, and Director, Imaging Signature Program, The Ohio State University

Medical Center. Dr. White also serves as Professor of Radiology and Professor of Medicine, Division of Cardiovascular Medicine, The Ohio State University College of Medicine.

The RSNA R&E Foundation is governed by a Board of Trustees, comprised of twelve individuals representing a variety of backgrounds, including radiology, radiation oncology, medical physics, corporate relations, and fund development.

Grant Recipient Takes Leadership Role

Mitchell D. Schnall, M.D., Ph.D., has been named chair of the Department of Radiology at the University of Pennsylvania in Philadelphia. Dr. Schnall previously served as Matthew J. Wilson Professor of Research Radiology and vice-chair of research in the department.

Dr. Schnall is a past recipient of a GE Healthcare/RSNA Research Scholar Grant and remains active in a variety of RSNA activities.



Former grant recipient and now chair, **Mitchell D. Schnall, M.D., Ph.D.**, (far right) speaking at a meeting about international trends.

Donor Profile

A pioneer in pediatric brain ultrasound and founding President of the American Association of Women Radiologists, Carol M. Rumack, M.D., began giving to the R&E Foundation with her first donation in 1990. The associate dean for graduate medical education at the University of Colorado School of Medicine, Dr. Rumack chose to give to the Foundation to support young investigators and help increase the number of excellent researchers in radiology. She has remained committed to the Foundation for more than a decade as a distinguished Presidents Circle donor.



"I haven't been the recipient of an R&E Foundation grant myself, but what a wonderful opportunity for young investigators to get a start," said Dr. Rumack. "All of radiology will benefit from their success."

"I encourage my residents to apply for R&E grants. They are a tremendous opportunity," explained Dr. Rumack.

Dr. Rumack has continued to give over the years because she sees the growing need for Foundation grants. "In a time when NIH funding may be less available, R&E Foundation grants become even more important," said Dr. Rumack.

Her dedication to RSNA extends beyond the R&E Foundation. Recently,

she recorded a segment for the RSNA 60-Second Checkup radio program on the use of fMRI in the diagnosis of dyslexia. "I like seeing RSNA focus on patient education with these radio programs and the online resources like *Radiologyinfo.org*."

As an RSNA volunteer for decades, Dr. Rumack says, "RSNA is a great place for radiologists to come together to support science and education."

Supporting the specialty with service

Dr. Rumack's contributions include leadership on a number of RSNA committees and programs including:

- Pediatric Radiology Subcommittee, Chair
- Professionalism Committee, Member
- *Daily Bulletin* Chair
- Refresher Course Committee Education Track, Director
- Public Information Advisory Board, Member
- Associated Sciences Consortium, Vice-Chair

Thank you, Dr. Rumack for your commitment to the R&E Foundation, RSNA and radiologic science!

RSNA Staff Celebrate International Day of Radiology with R&E Donations

On November 8, the staff of RSNA joined others from around the world to celebrate "International Day of Radiology." The day was a success in promoting the mission to build greater awareness of the value that radiology research, diagnosis and treatment contribute to safe patient care, and to build understanding of the vital role radiologists perform in healthcare delivery.

More than half of the staff at RSNA Headquarters showed their support of radiologic science by donating to the Foundation. In addition, staff shared personal stories of how imaging science has had a positive impact on them or their family and friends.



INTERNATIONAL
DAY OF
RADIOLOGY

AN INITIATIVE OF THE RSNA, ESR AND ACR



Donors' names were displayed at RSNA Headquarters.

The R&E Foundation is pleased to announce a new \$500,000 commitment from Agfa HealthCare.

At RSNA 2012, Michael Green, President and CEO of the Americas Region of Agfa HealthCare, made a new \$500,000 commitment in support of the RSNA R&E Foundation.

As a founding Vanguard donor company since 1989, Agfa HealthCare has supported 21 research grants to residents, fellows and scholars.

Agfa HealthCare delivers informatics solutions to healthcare providers worldwide to help advance improved

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clinical and IT efficiencies and the safety of care. Agfa HealthCare is committed to an open standards, integrated data approach, and offers a full range of

proven, workflow-centric departmental and enterprise imaging solutions, from classic X-ray film to Direct Radiography, advanced Imaging Informatics solutions, and Hospital/Clinical Information systems.

"Agfa HealthCare is pleased to continue our decades long commitment to the RSNA R&E Foundation. In supporting the research and education fostered by the RSNA, we are excited to help further so many impressive technology advancements in imaging and clinical practice. I look forward to seeing the research results of the next round of grants made possible by this commitment and their application to the improvement of patient care."

Michael Green, President and CEO of the Americas Region of Agfa HealthCare



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- ▶ Help launch the careers of young investigators.
- ▶ Contribute to the future of the radiologic sciences.

