Message from the Program Director

It has been a long time coming — the inaugural Purdue Medical Physics Newsletter! This biannual newsletter provides brief updates on new developments in the Medical Physics and imaging programs, and to highlight the accomplishments of our students, the faculty, and you, the Purdue alumni. We would very much appreciate any feedback on topics of interest or questions you may have, and if you are participating in Task Groups, Committees, or research, please let us know. I look forward to hearing from you; and seeing you all in San Antonio.

— Keith Stantz

Announcements

Purdue Alumni Dinner at AAPM 2019

Hello Purdue Alumni! This year we are planning an alumni event on Monday, July 15th at 7 AM at Las Ramblas (306 W Market Street in the Hotel Contessa). If you plan to attend AAPM, please join us. RSVP to me at alison.roth2020@gmail.com by Friday, July 5th. I look forward to meeting everyone! Boiler up!

— Alison Roth

Program Developments

Accreditation: The Purdue-Indiana University MP program successfully obtained CAMPEP reaccreditation through 2022. We want to thank the reviewers for their valuable time and feedback in helping improve the program.

Change in Leadership: Dr. Keith Stantz has taken on the role of the Director and Drs. Yi Le (IUSM) and Ulrike Dydak (Purdue) as Associate Directors. We would like to thank Dr. Gary Hutchins and Colleen DesRosiers, who stepped down in 2016, for their very important service to the MP program!

Graduates: This year, we have seven graduates, with six entering residency programs (see p.2).

Clinical Experience: Purdue campus now supports two new diagnostic clinical courses, a Radiological & Diagnostic Imaging Physics internship (3CR; Dr. Stantz) and an MRI QA Internship (3CR; Drs. Dydak). These courses provide hands-on QA measurements for x-ray, fluoroscopy, CT, US and MRI/MRS clinical scanners and imagers housed within Veterinary Radiology Clinic and Purdue MRI Facility. We would also like to thank Drs. Le/DesRosiers and Dr. Ringor in leading the Radiation Therapy physics Clinical Competency Part I and II internships at IUSM and Faith, Love and Hope Cancer Center.

Note: We would like to thank IUSM Radiology department for lending/donating phantom and dosimetric equipment in support of these internships. Any equipment you wish to donate to the MP program would be greatly appreciated; please

New Faculty

Dr. Perez-Torres joined us in 2015 as an Assistant Professor after finishing his postdoctoral training at Washington University in St. Louis. Here at Purdue, his research projects focus on using MRI on animal models to study side effects of radiation therapy with the hopes of improving treatment methods. Aside from research, he is also responsible for teaching Radiation Biology course and a new course on Oncology.

Dr. Emir joined us in 2017 as an Assistant Professor after serving as the Head of MR Spectroscopy group at the FMRIB Center in the University of Oxford. Here at Purdue, his research projects focus on developing novel MRS techniques to profile metabolites in brain cancer and psychiatric disorders. Aside from research, he is also responsible for teaching an undergraduate course on Medical Imaging and an advanced MRI course.
Research Highlights

Diagnosing and Treating Brain Cancer. The prognosis for patients diagnosed with brain and nervous system cancers remains very poor, 34-percent 5-year survival rate. New approaches are desperately needed. Purdue researchers Drs. Uzay Emir, Jason Parker (adjunct) and Carlos Perez-Torres are developing and applying advanced MRI to determine type and stage of brain cancers and monitor patient treatment response.

Dr. Uzay Emir’s lab develops MRI to detect IDH1/2 mutations, an established pathological biomarker that differentiates stage IV glioblastomas (GBM) from secondary GBMs and stage II/III gliomas. Implementing MRS, the proton’s chemical shift of cellular 2-HG, a metabolite under the control by IDH1/2 genes and linked to disease progression, can be determined. By optimizing the pulse sequence within a 7T field, a narrowed 2-HG linewidth with enhanced contrast sensitivity not only identifies patients with the IDH mutation but can differentiate IDH1 from 2 mutations (Cancer Res; 76(1):43,2016). Dr. Emir’s research provides a new non invasive diagnostic parameter capable of evaluating treatment response to a new class of IDH1 and/or IDH2 targeting drugs and to radiation therapy (IDH1 mutation confers radiation resistance).

Dr. Carlos Perez-Torres’ lab investigates early causes of radiation-induced brain injury. Advanced multifunctional MRI — T1w, T2w, FLAIR, DWI, Gd-enhancement — is being correlated to pathological progression of necrosis and neurodegeneration (figure). These early indicators of neuroinflammation provide new insights to improve treatment, and advances in models and pharmaceutical interventions mitigating normal tissue toxicity and cross hemispherical mechanisms in white matter. Through collaborations with the College of Veterinary Medicine and the Life Sciences MRI Facility, his models and techniques will possess high translatability to improve clinical outcomes in pediatric brain cancer patients, and GBM patients.

Graduate Students

Awards & Honors

Congratulations!

- Alumni News: Connor Holloway, Graham Owen, and Justin Ruiz passed ABR part 3 this year!
- Purdue University: David Edmonson was awarded the College of HHS Outstanding graduate student and School of HS Kessler award.
- AAPM 2018: Devin Miles abstract was featured in the Science Highlights; Devin Miles and Michael Klem were awarded the Compton Travel Award.
- ISMRM 2019: Pingyu Xia was awarded Magna Cum Laude on her oral presentation; Whitney Perez, Ahmad Alhulail and Pingyu Xia received an educational Stipend.
- ORVC AAPM 2019: Mychaela Coyne was the winner of the MedPhys Slam presentations.

Student Spotlight

Mychaela Coyne is the co-President of the student Medical Physics club. After completing her MS in Health Physics at Purdue, Mychaela joined the MP program to continue her studies as a PhD student, where she develops neutron activation instrumentation to measure in vivo tissue sodium concentration levels within Dr. Linda Nie’s laboratory. To achieve her career goal as an RSO of a research hospital, she is completing a mini-MBA program at Krannert, preparing for ABR part 1, and completing her clinical rotation at IUSM. While serving as MP Student Club Co-President, she attends and provides valuable student feedback to the MP Steering committee meeting, and this fall, leading a monthly journal club that investigates new research and current issues in MP. Any practicing MP that is interested in leading or joining the discussion in persons or via Skype can email her at coyne0@purdue.edu.

Graduate Students

Eric Cameron
Diagnostic Imaging Residency
Medical and Radiation Physics, San Antonio, TX (Dydak)

Zheng Gu
Radiation Therapy Residency
University of Arizona (Stantz and Le)

Michael Klem
Radiation Therapy Residency
Rush University (Stantz)

Kyle Ostrowski
Diagnostic Imaging Residency
Upstate Medical Physics, New York (Dydak)

Jessica Vadas
Radiation Therapy Residency
Beaumont, Detroit, MI (Klein)

Huan Yao
Radiation Therapy Residency
Northwell Health, New York (Klein)

Savanah Wang
TBD (Stantz)

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