

LSU/MBPCC Medical Physics News

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Newsletter of the LSU/MBPCC Medical Physics and Health Physics Graduate Education Program

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Notables

Announcements

In 2015, 100 percent placement of graduates continues, with all graduates entering residencies.

Five new students join our program in August.

Faculty and students set new program record in 2014 for the number of research publications.

We had four new faculty appointments in 2015.

100% Placement Rate Despite National Residency Shortage

Once again, 100 percent of our graduates were placed in residency programs. This year, for the first time, students participated in the new American Association of Physicists in Medicine Medical Physics Match Program. Out of approximately 300 applicants for 110 positions nationwide, all five of our upcoming summer 2015 graduating LSU students placed for a residency position with a July 1 start date. Please join us in congratulating Hatim, Garrett, Nick, Ryan, and Colie!

Tony Mazza and Wayne Newhauser at the graduation ceremony in May 2015

Hatim Chafi - Mary Bird Perkins Cancer Center - Baton Rouge, LA
Nick Petersen - Christiana Care Health System - Newark, Delaware
Garrett Pitcher - UFHealth Cancer Center - Orlando, FL
Ryan Schurr - Baylor Scott & White Health - Temple, TX
Runyon "Colie" Woods -

Joe Steiner, recipient of the Outstanding Teaching Assistant Award

Dr. Kip Matthews, recipient of the Outstanding Faculty Award

The excitement of unwrapping gifts on Christmas Day was overshadowed for Trey Bowman and his family in 2010, after realizing there was something wrong with their seven-year-old daughter, Bella.

After rushing to the emergency room where doctors ran tests, Bella was diagnosed with an ependymoma brain tumor on New Year's Day.

The doctors immediately removed the tumor, and the Bowmans travelled to St. Jude's Children's Research Hospital in Memphis, Tennessee, to begin Bella's radiation therapy.

"Children with this type of cancer usually receive this course of treatment — radiation after the surgery," Trey said. "So we went to St. Jude's and ultimately to Jacksonville, Florida, where Bella received proton radiation. She did quite well through the treatment, and even shortly after the treatment, everything was great."

Bella and her family returned to their Baton Rouge home in summer 2011.

For the first few months, Bella stayed healthy, but an unexpected side effect took her back to St. Jude's.

"[The doctors] found tissue necrosis inside her brain stem, which is inoperable," Trey said. "Basically the radiation was working, but it was working too well. It was killing the healthy tissue that it shouldn't have been."

After 60 rounds of hyperbaric oxygen treatment — intended to stop and hopefully revert the necrosis — as well as two chemotherapy treatments, the Bowmans decided to drive home for the holidays on Dec. 15, 2011.

Bella showed symptoms during the drive back to Baton Rouge and was taken to Our Lady of the Lake Children's Hospital. She died on Dec. 23, 2011, at the age of eight.

From the moment Bella was diagnosed, Trey said he and his wife, Kim, were inspired by the support they saw from members of their community. A few weeks after Bella died, they decided to turn that inspiration into action by starting the Bella Bowman Foundation.

The foundation's commitment to research led to a collaboration with Wayne Newhauser, LSU medical physics professor and director of medical physics and health physics, who, in partnership with the Mary Bird Perkins Cancer Center, was given a \$75,000 research grant to look at the risks of radiation therapy for cancer patients in fall 2014.

"This is actually the second grant the Bella Bowman Foundation has awarded to us. The first was a seed grant to commence preliminary research on the several possible causes of radiation necrosis in 2012," Newhauser said. "That study, which was completed last year, yielded results that helped set the direction of the current study, which will continue through 2017."

Newhauser enlisted medical physics PhD students Christopher Schneider, Lydia Wilson, and William Donahue, as well as physics graduate student Andrew Halloran, to contribute to the research with projects for their degrees.

"We're simultaneously pushing the frontier of knowledge in several different areas. We have very bright young minds who are making a difference through the research they perform as part of their graduate training," Newhauser said. "It's our long-term goal to find ways to prevent radiation necrosis from taking another life."

Schneider works on testing, developing and refining the radiation dose calculation algorithms — looking at how much radiation treatment is administered by the machine — in both X-

New Publications in 2015

Thanks to the dedication and teamwork of our faculty and their trainees, 2015 is shaping up to be another record year for publications. Below you will find a list of some of the papers published to date.

Eley JG, Newhauser WD, Richter D, Lüchtenborg R, Saito N, Bert C. Robustness of target dose coverage to motion uncertainties for scanned carbon ion beam tracking therapy of moving tumors. *Phys. Med. Biol.* 60:1717-40, 2015.
<http://stacks.iop.org/0031-9155/60/1717>

Taddei PJ, Khater N, Zhang R, Geara FB, Mahajan A, Jalbout W, Pérez-Andújar A, Youssef B, Newhauser WD. Inter-institutional comparison of personalized risk assessments for second malignant neoplasms for a 13-year-old girl receiving proton versus photon craniospinal irradiation. *Cancers* 7, 407-426 (2015)
doi:10.3390/cancers7010407.

Eley J, Newhauser W, Homann K, Howell R, Durante M, Bert C. Implementation of an analytical model for neutron equivalent dose in a proton radiotherapy treatment planning system. *Cancers* 7, 427-438 (2015);
doi:10.3390/cancers7010427.

Newhauser and Zhang, The physics of proton therapy. *Phys. Med Biol.* 60 R155.

Freund D, Zhang R, Sanders M, and Newhauser W. Predictive Risk of Radiation Induced Cerebral Necrosis in Pediatric Brain Cancer Patients after VMAT Versus Proton Therapy. *Cancers* 2015, 7, 617-630; doi:10.3390/cancers7020617.

Newhauser, Jones, Giebeler, Zhang, Taddei, Stewart, Vassiliev, and Lee. Reducing the Cost of Proton Therapy: The feasibility of a streamlined treatment technique for prostate cancer. *Cancers*, 2015, 7, 688-705;
doi:10.3390/cancers7020688.

Rechner L, Zhang R, Eley J, Howell R, Mirkovic D, Newhauser WD. Minimization of the incidence of radiogenic second cancers with risk-optimized proton therapy, *Phys Med Biol*, at press.

Wilson, L. and Newhauser, WD, A simple and fast analytical method to calculate dose to the whole body from megavoltage external beam x-ray therapy. Submitted in Oct. to *PMB*, at press.

Zhang R., Mirkovic, D., and Newhauser, WD. Radiogenic second cancer risk calculation and visualization. *Radiat Oncol* 10 107 2015

Schneider C. Newhauser WD, Farah J. An analytical model of leakage neutron equivalent dose for passively-scattered proton therapy and validation with measurements. *Cancers*. *Cancers* 7, 795-810 (2015)

