PARTNERSHIP FOR *Life*

LSU AND MARY BIRD PERKINS CANCER CENTER TEAM UP TO BEAT CANCER

BY BRENDA MACON | PHOTOS BY LARRY HUBBARD

LSU AND MARY BIRD PERKINS CANCER CENTER (MBPCC) have an ongoing partnership that benefits not only both institutions, their students, and their staff but also the citizens of Louisiana – particularly those in the south and central parts of the state. This partnership is providing students with unique training opportunities, researchers with facilities and resources that are hard to find, and most important, patients with the latest innovations and techniques for improved outcomes in their cancer treatment.

The design of the collaboration is to leverage the strengths of both institutions. The partnership gives MBPCC access to graduate students, multidisciplinary faculty, advanced computer technology, and all of the other advantages of University resources. LSU benefits by having access to clinical training for its students and clinical facilities for its faculty research. Both benefit by empowering faculty and students and providing them with opportunities to contribute to advancing patient treatment options. These advantages are fueling interest in maximizing collaboration.

The partnership has expanded and improved both programs and has allowed levels of treatment and research that otherwise would not be possible. This collaboration began years ago, first with the establishment of the medical physics program in the 1980s, and then with the hiring of two visionaries from Texas who saw the potential for building something great when they put their heads together.

Chief of Physics Dr. Jonas Fontenot.

Mary Bird Perkins Cancer Center CEO and President Todd Stevens.

A LITTLE BIT OF HISTORY

Things really started cooking when MBPCC CEO and President Todd Stevens (1988 BACH BUS) arrived at the cancer center in 1999 from the University of Texas M.D. Anderson Cancer Center in Houston and previously U.S. Oncology from 1997 to 1999. Once he had the lay of the land, he began recruiting Dr. Kenneth Hogstrom, who was considering retirement from M.D. Anderson. Hogstrom had been with M.D. Anderson for close to twenty-five years and had reached what he thought was the pinnacle of his career. After having served for sixteen years as chair of the medical physics department there, he was ready for a new challenge. Stevens gave him reasons to build something great in Baton Rouge. The two of them put their heads together to develop a plan for the future of MBPCC even before Hogstrom officially had joined the staff.

Those early meetings were primarily for planning Stevens' strategy at MBPCC. Stevens valued and respected both Hogstrom's business acumen and his knowledge of medical physics. During the course of the meetings, Stevens planted the idea of Hogstrom making a second career in Baton Rouge into their strategy. At the time, LSU had a medical physics program that had been around for a while, but it was small and not accredited. On the flip side, MBPCC had the resources for new technology but limited medical physics staff to expand its treatment program. Hogstrom knew how to bring the two programs into sync to create a partnership that would make both institutions stronger.

Then, in 2003, the medical physics program director at LSU retired, so the physics department needed someone to fill that vacancy. Moreover, Hogstrom's wife, a Louisiana native and an LSU alumna, was ready to move back closer to her alma mater. Hogstrom, who is originally from Houston, felt that Baton Rouge was close enough to his hometown that it would be like home. As if by fate, everything played perfectly into the plan to bring Hogstrom to Baton Rouge.

Having been hired into two positions – serving as the chief of physics at MBPCC and as professor and director of the medical physics program in the Department of Physics & Astronomy – Hogstrom began to help Stevens implement their plans. At MBPCC, they increased and improved radiation therapy technology, equipment, and medical physics staffing to bring the center to the forefront of radiation therapy. Hogstrom knew and had worked with Stevens and many of the MBPCC radiation oncologists previously at M.D. Anderson, so he was a natural fit on the team, and the work went well, adding several state-of-the-art treatment options and new machines.

That is where LSU's medical physics program came into play. In his newly appointed director's position, Hogstrom was charged to build the small program into a stronger, larger, and fully accredited field of graduate education at LSU. He, himself, had an even bigger goal: to have one of the best medical physics programs in the U.S. and in the world. Attaining accreditation for the graduate degree programs was critical to that goal, so he worked from his arrival in 2004 to make that happen. In 2006, the master's degree program was accredited by the Commission on Accreditation of Medical Physics Education Programs, Inc. (CAMPEP), and in 2011, the Ph.D. program was added and was accredited the same year. Also, Hogstrom negotiated that LSU and MBPCC jointly create an endowed chair for the program director, and in 2006, he became the inaugural holder of the Dr. Charles M. Smith Chair of Medical Physics.

THE PROGRAM TODAY

Hogstrom pointed out that what was once experimental is now the standard of care. To keep pace with the rapidly changing and progressing field of cancer treatment, both LSU and MBPCC must have adequate funding. For example, part of the plan that

One of the latest advances in equipment is the Versa HD Elekta that delivers a full dose of radiation in one or two arcs around the patient. Photo provided by Mary Bird Perkins Cancer Center

he and Stevens discussed was to bring helical tomotherapy, an effective and relatively recent type of treatment, to MBPCC. Stevens was able to find funding for this relatively new technology, which gives students an edge because they are training on the latest equipment. In addition to funding for new technology, having money for student support and faculty research is critical to the program. "The challenge is to maintain our fiscal resources so that we continue to move forward," Hogstrom commented.

"Our [M.S.] program is tougher than any other of its kind in the U. S.," Hogstrom explained. "Ours is three years instead of the usual two years and requires a research thesis. We also require more courses. For example, we offer three radiation therapy physics classes where most programs only have one. All of this makes the program the best in the U. S., which is to say, in the world. Our graduates are so good that they get offers when many from other programs struggle."

Hogstrom officially retired from LSU in 2011, but he remains active as an emeritus professor and still maintains strong ties with both institutions, as he continues in a part-time capacity at MBPCC. The program and the partnership have grown remarkably since 2003, and two new leaders are continuing the progress and successes for which both LSU and MBPCC have become known. Dr. Jonas Fontenot is the current chief of physics at MBPCC, and Dr. Wayne Newhauser is professor and director of the medical physics program and holder of the Dr. Charles M. Smith Chair of Medical Physics. Both bring experience, gravitas, and strong leadership to the partnership. Both are sold on the benefits of working together to make great things happen.

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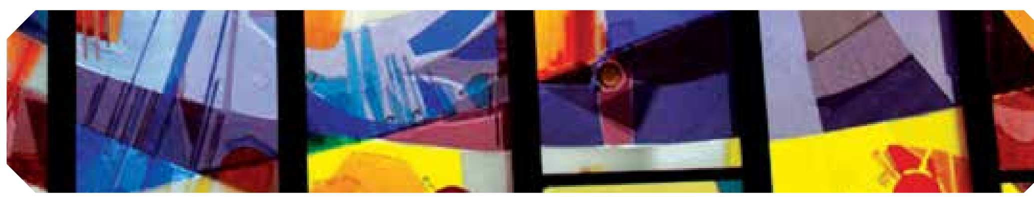
"This partnership is a win-win-win," Newhauser commented. "We benefit from the clinical expertise at MBPCC; they benefit from our research resources; and patients benefit from cutting edge treatment programs that arise from new knowledge derived from the research. This partnership has gained a reputation nationally and internationally because of the work we are able to do together. Some of the best students in the world are applying to our program because of the collaboration. Without this partnership, we could not provide our students with this high quality of education."

Under their leadership, the medical physics program has continued to address the needs of a field that is expanding as new technologies and treatments are introduced. The program now includes a CAMPEP-accredited radiation oncology physics residency component at MBPCC, which is a great benefit for graduating M.S. and Ph.D. students. Medical physics is one of only two (the other is genetics) non-physician medical disciplines certified under the American Board of Medical Specialties (ABMS), which requires completion of a residency program to sit for the board certification exam. The exam is administered by The American Board of Radiology, and board certification qualifies medical physicists for clinical practice. Currently, about 300 medical physics M.S. and Ph.D. degrees are awarded each year in the U.S.; only about 125 medical residency positions are available, which means that competition for admission to those slots is



Top left: Art adds beauty and warmth to the building; Top right: Dr. Kenneth Hogstrom, right, was instrumental in creating the partnership between LSU and the Mary Bird Perkins Cancer Center, serving in leadership positions at both institutions. Dr. Wayne Newhauser, left, is the current director of the medical physics program at LSU, continuing the leadership that makes the program one of the best in the world.

intense. Students who receive their graduate training in the LSU program are given priority in the residency program at MBPCC through a matching service very similar to that used by physician residency programs.

The MBPCC residency program is a consortium that includes programs at MBPCC in Baton Rouge, Willis Knighton Cancer Center in Shreveport, and the University of Mississippi Medical Center in Jackson, Mississippi. "The program is organized in a 'hub-and-spokes' model," residency program director Fontenot explained. "Each year, our partners admit one resident in each facility, and we admit two. Currently, we have nine residents. The program is in high demand: 100 M.S. and Ph.D. graduates applied for the four residency slots in 2016."

Newhauser added, "The talented students who receive this high quality education graduate from the program are able to save lives wherever they go. The quality of these graduates is well known in the field, and major cancer treatment centers, like the Mayo Clinic, have eagerly hired LSU graduates. However, many, close to fifty percent, elect to stay in the Gulf region, and about twenty-five percent have remained in Louisiana.

MBPCC plans to become The First in the world to develop technology for intensity modulated bolus ECT.

BOTTOM LINE: PATIENT CARE

The quality of the students in the graduate program allows for this advantage and also gives faculty researchers young mentees who often come up with new ideas for existing concepts. "Our students always have a fresh outlook," Fontenot explained recently. "Student research projects are determined by a number of factors, including ongoing research, clinical needs, funding, and student interest."

Wayne Newhauser concurred, commenting, "Students are cross-pollinators. They talk with each other, with other faculty, and with others outside the program. They bring new ideas and perspectives that make the research better." Both Newhauser and Fontenot agree that medical physics students are very creative in devising their projects, both M.S. theses and Ph.D. dissertations, often finding new uses for existing equipment and techniques.

Fontenot added, "Graduate students have contributed significantly to MBPCC research, which has advanced radiation therapy technology for its patients, as well as those throughout the United States and world."

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and around the world

Examples of how student research is benefitting survivors are numerous and include work in several areas. Radiation oncologists can better spare normal tissues in treating cancers in and adjacent to the brain. The medical physics team developed and applied methods that measure the accuracy of targeting disease in the head using image-guided radiation therapy (IGRT). This research enabled MBPCC medical physicists to use one of the machines in the MBPCC oncology unit called Brainlab to treat trigeminal neuralgia, a debilitating and painful condition.

Also, patients receiving postmastectomy radiation therapy (PMRT) now have better outcomes thanks to a technique developed by MBPCC medical physicists that uses rotational intensity modulated radiotherapy (IMRT) to treat the chest wall. Research in this area is ongoing, with emphasis on breath-hold techniques to further improve treatments and examination of long-term side effects.

Treating cancer in the thorax and abdomen is also often impacted by the patient's breathing, which means that the irradiated area becomes a moving target. MBPCC medical physicists have an ongoing research program in respiratory management to develop techniques for minimizing this problem. Recently, a deep-inspiration, breath-hold procedure that can reduce heart dose, and hence toxicity, was developed for use in radiating intact breast and postmastectomy breast cancers.

Radiation oncologists can now use electron beams to irradiate superficial cancers of the nose, scalp, chest wall, and extremities with improved sparing of adjacent normal tissues and organs like salivary glands, eye, spinal cord, and lung. MBPCC medical physicists and LSU students have researched and translated bolus electron conformal therapy (ECT) technology through .decimal LLC (Sanford, Fla.) to approximately 300 radiotherapy centers in the United States. This research continues as MBPCC plans to become the first in the world to develop technology for intensity modulated bolus ECT.

Another area of research at LSU that has gained national attention is the use of 3-D printing technology to identify and define tumors and isolate them from healthy tissue. This technology will initially be used in developing plans of treatment to target cancerous cells more efficiently, which will make treatment more tolerable for patients and can prevent potentially fatal side effects. The models developed in 3-D are personalized for each patient and provide detailed information about the location and other aspects of the tumors, which is especially important with tumors that require specialized reconstruction.

To minimize the risk of treatment complications, especially those caused by the radiation treatment itself, verifying the radiation calculations with measurements is of utmost importance. Medical physicists have been aware that, while the greatest percentage of the radiation used in treatment targets the cancerous tissue, a certain amount "leaks" to areas around the cancer. Until recently, scientists had no way of calculating how much or how great that leakage is. Lydia Wilson Jagetic, a Fulbright Scholar who recently developed an algorithm to calculate that leakage all the way to its outer edge, is currently pursuing her Ph.D. degree at LSU.

Training students in medical physics is, after all, to provide patients with the best care for the best possible outcomes. Through this partnership, the program's research is helping define the standard of care, which translates to better patient care.

WORKING TOGETHER, MAKING DECISIONS FOR THE FUTURE

Additionally, the center employs some of the most up-to-date equipment, such as linear accelerators that contain CT scanners and rotational treatment delivery methods that reduce the amount of time required for treatment. One of the latest advances in equipment is the Versa HD Elekta that delivers a full dose of radiation in one or two arcs around the patient. These machines replace what Stevens termed "the four-field box" treatment that used to be standard and that was far less accurate and more invasive than today's machines.

"We're practicing precision medicine," Stevens commented, "and adhering to the spirit of the Hippocratic Oath to 'do no harm.' We're working to treat only what needs to be treated without affecting surrounding healthy tissue."

Stevens referred to an article by Intel's Andy Grove that appeared in the May 13, 1996, issue of Fortune. As Groves points out in the article, cancer research was often reported in a highly biased atmosphere that favored whatever the pet approach of the researcher was. That insular environment is giving way to one that allows researchers to share information in real time. "We're seeing those walls break down," Stevens explained. "A good research idea should be shared as easily as a review of a play. People want to solve the problem of improving patient care." Collaborative research and cross-pollination of ideas will make that happen.

Stevens encourages anyone who wants to support the LSU/MBPCC partnership specifically and cancer research in general to advocate for STEM (Science, Technology, Engineering, and Math) education at all levels, from kindergarten through college; support university research; invest in collaborative efforts like this one that include education and research; and encourage students to become researchers. "At MBPCC and LSU, your gift will go directly to benefit medical physics research and training."

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