For more than 20 years, Medical College of Wisconsin biophysicists have been global leaders in the discovery and development of functional Magnetic Resonance Imaging for measuring brain function. Today, faculty and students are leveraging this expertise to pursue new discoveries.

Graduate student aims at brain research

Using technology and tools that the Medical College of Wisconsin (MCW) was a world leader in developing, PhD candidate Alicia Thomas Barr in the Graduate School of Biomedical Sciences, and her mentor Alan Bloom, PhD, are pursuing brain research with potential to benefit cancer patients.

Thousands of patients with breast cancer receive chemotherapy every year and many suffer effects on brain function, a condition commonly known as "chemobrain." As patients become long-term survivors, it is important to understand potential chronic effects and what can be done to mitigate them.

The research of Alicia and Dr. Bloom is using functional Magnetic Resonance Imaging (fMRI) to determine the changes in brain function associated with chemotherapy, which chemotherapy regimens are most likely to cause them and how recovery occurs. Their findings will help inform what can be done during chemotherapy to minimize cognitive decline.

Working with volunteer breast cancer patients, the fMRI study examines memory, multi-tasking and attention tasks before, during and after their course of chemotherapy treatment. "fMRI is uniquely suited for these studies," said Alicia. "It's non-invasive and has no radiation, making it completely safe for use with patients. It views the brain at work in real time and provides much better spatial resolution than other imaging modalities."

Their work draws on MCW’s legacy as a global leader for fMRI development and expertise. More than 20 years ago, biophysics faculty and graduate students were among the first three groups in the world to discover and develop fMRI for measuring brain function. Ever since, MCW has been at the international forefront of advancing the field. The biophysics group was the first to develop another application of MRI technology, functional connectivity MRI, and demonstrate that networks in the brain are connecting with each other even in resting state, ushering in a new area of brain research.

Today, faculty and students like Dr. Bloom and Alicia are using these technologies to pursue new discoveries that will benefit clinical care. "The depth of infrastructure and expertise in fMRI and other fields across the academic medical center makes our research possible," said Dr. Bloom. "We draw on biophysics, radiology, neurology, neuropsychology, hematology and oncology, pharmacology and toxicology, and the Froedtert & the Medical College of Wisconsin Clinical Cancer Center, among others."

Following bachelor's and master's degrees in biomedical engineering, Alicia holds a prestigious graduate research fellowship from the United Negro College Fund/Merck Science Initiative, which supports a pipeline of minority students in science careers. Her target PhD completion date is spring of 2014. And then, "My true passion is in academia. I want to continue to pursue research and teach."

*Dr. Bloom is Professor of Pharmacology and Toxicology. Alicia is a PhD student in the Department of Pharmacology and Toxicology and the Neuroscience Doctoral Program of the MCW Graduate School of Biomedical Sciences.*
Alicia Thomas Barr and Dr. Bloom use a Magnetic Resonance Imaging unit dedicated to research. Functional magnetic resonance imaging (fMRI) is a specialized application of MRI technology that allows the study of functional activity in the brain.

Read more about the programs and students in the Medical College of Wisconsin’s Graduate School of Biomedical Sciences at mcw.edu/gradschool