

I N V E S T I G A T O R I N S I G H T

In this section, we highlight the human side of biomedical investigation, putting a few questions to a researcher at DMS-DHMC.

Allan Gulledge, Ph.D.
Assistant Professor of Physiology

Gulledge studies the cerebral cortex, the brain's outermost layer and the area most associated with cognition. He examines how chemical neurotransmitters, such as acetylcholine, influence the activity of cortical neurons. He joined the faculty in 2007.

What got you interested in science?

From a very young age I was fascinated with both biology and psychology. But I didn't appreciate the potential for a career in scientific research until several years after I completed my undergraduate education. It was serendipitous that I discovered the opportunity to pursue neuroscience as a graduate student.

How did you end up studying cortical activity?

I went to Australia as a National Science Foundation International Research Fellow to study the role of dopamine in modulating the activity of cortical neurons. While I was there I became increasingly interested in acetylcholine as a cortical transmitter and began a long-term project that I continue today. Part of this project, examining the role of acetylcholine in different classes of inhibitory cortical neurons, was carried out in Japan at their National Institute for Physiological Sciences.



What accomplishments have been most meaningful to you?

The births of my three children are at the top of the list. My most meaningful career accomplishments include conducting my first successful experiment as a graduate student, publishing my first paper, turning in my doctoral thesis, and attaining outside funding for my research.

What's your favorite nonwork activity?

I enjoy spending time with my family and the occasional bike ride along the Connecticut River. I also enjoy skiing in the winter and kayaking on local rivers and lakes during the summer and fall.

What are some of your favorite books and/or movies?

They're few and far between lately, but some of my favorites are Jared Diamond's books on human history (*Guns, Germs, and Steel*, for instance) and Steven Pinker's excellent book on the biological basis of human nature, *The Blank Slate*. As for fiction, I love Ayn Rand's *Atlas Shrugged* and anything by Douglas Adams. The last movie I saw in a theater was *Ratatouille*.

If you could travel anywhere you've never been, where would you go—and why?

South America, because it was the last continent inhabited by humans, or Antarctica, because it's had only limited human exploration.

If you invented a time machine, where would you go first?

I'd zoom ahead to the future to find out the answers to scientific questions that today seem intractable—the big questions that haunt every scientist. In neuroscience, it's how neuronal activity in the brain leads to the perception of conscious experience. Other fields have their own big questions, on issues such as the origin of life and the physical nature of the universe. It would be fun to peek at the answers to these questions in a grade-school textbook of the future.

What is a talent you wish you had?

I wish I had even an iota of musical ability.

What are the keys to success in science?

I'm still working on that, but I think key ingredients are honesty, objectivity, and a curiosity about the world around you.

Do you always have a working hypothesis in the lab?

Most of the time. But I always reserve a little time for exploratory science. Ultimately it is the exploratory experiments that develop into the best hypothesis-driven projects down the road.



Making an impact on the diagnosis of traumatic brain injury

What do battered women, athletes in contact sports such as football, and veterans of the Iraq and Afghanistan conflicts have in common? They are all at risk of suffering from acquired traumatic brain injury. Some such injuries are so severe they're immediately apparent, even to nonprofessionals. Other victims may have what's commonly called a concussion and is known to doctors as mild traumatic brain injury (mTBI)—a much more subtle and difficult problem to diagnose.

One of the confounding factors, especially in veterans, is that mTBI can be confused with post-traumatic stress disorder—or the two conditions may coexist in the same individual.

Symptoms: Sleep disturbances, fatigue, and irritability are symptoms common to both syndromes, while dizziness, blurred vision, impaired balance, and sensitivity to light and noise are characteristic of mTBI. Since the treatment for the two conditions is different, it is important to distinguish between them. Dartmouth is now helping the military set up a new way of doing so.

Elizabeth Pearson, M.S.W., of DMS's Department of Pediatrics has devoted most of her career to the study of mTBI in battered women. She was the first person to use a powerful software tool to assess the extent of their injuries. The tool, called ImPACT, was