For Jill McGaughy, UNH Associate Professor of Psychology, attention is at the heart of both her lab research and educational philosophy. McGaughy studies attention as it manifests itself in diseases from Attention Deficit Hyperactivity Disorder (ADHD) to Alzheimer’s disease, while staying laser focused on getting her undergraduate students to “click on in the classroom.” Focusing her own attention, however? Not a problem, McGaughy says: “I will never get tired of trying to figure out how the brain works.”

In 2010, McGaughy was awarded a two-year, $399,000 grant from the National Institutes of Health to research ADHD and how its treatments affect normal adolescent brains. Work was done in conjunction with Dr. Barry Waterhouse at Drexel University College of Medicine in Philadelphia. What has McGaughy learned? All drugs are not created equal, or as she puts it, “drugs that are supposed to be equivalent in treating ADHD are not equivalent.”

Using a rodent model, McGaughy found that the commonly prescribed drug Strattera (atomoxetine) tended to be best at treating cognitive rigidity, helping subjects to expand their attentional scope. Ritalin (methylphenidate), on the other hand, helped distractable animals. McGaughy and her fellow researchers noticed that animals often would not respond to both drugs—only to one or the other. She hopes that, in time, her research will enable treatment programs in which prescribing drugs is less of a frustrating, trial-and-error process, and doctors are equipped with a more targeted, effective blueprint for patients suffering from attention-related diseases.

McGaughy is reminded of her research’s significance in the classroom, where students openly discuss their own struggles with ADHD, the misuse of ADHD drugs, and the transition from childhood ADHD to adulthood ADHD. McGaughy sees this synergy between teaching and research as incredibly important: “I always try to talk about the relevance of the subject, whether it’s ADHD medication or how the brain works.”

McGaughy fosters this relevance by designing courses such as “Drugs and the News,” which examines the difference between TV coverage on a drug and actual research findings, and by making the classroom an interactive experience. For instance, when McGaughy teaches how the brain controls motor movement and describes how behavior can modify brain wiring, she tells students that people who play string instruments have a different brain wiring than those who do not. Then she takes an informal poll. “I ask, ‘How many of you
play string instruments? Okay, so your brains are wired slightly differently than those of us who do not.’ I always try to make those links for them…. I think the mythology is that students want to put in the least amount of effort possible, but I don’t think that’s accurate. Students don’t want to waste effort, like the rest of us don’t want to waste effort. But if they understand the value of an assignment, and where you’re trying to go, they will definitely exceed expectations.”

As McGaughy applies for another round of funding, she is excited by a new development in her field called optogenetics, a process in which light signals are used to switch genes on and off in behaving animals. McGaughy says, “We’re just beginning to understand how to utilize optogenetics and link it to behavior. So I think that’s one of those places where we’re going to see potentially major changes. I am winding down this grant and applying for another one, in which we plan to look for changes in genetic markers.”

When asked what she would do with unlimited funding to study any mental illness, McGaughy’s first response is “Yay!” (This question, for researchers, is the equivalent of asking what you would do with extravagant lottery winnings or what your dream mansion looks like.) After a thoughtful pause, McGaughy answers, “That’s a tough one. I guess I don’t see our research driven by a disease model—we study attention. There are so many diseases that have attentional impairments to them: schizophrenia, dementia, Parkinson’s disease, ADHD. I think I’m pretty wedded to prefrontal cortex and attention.”

For more about ADHD:
National Institutes of Health/Health Information: Attention Deficit Hyperactivity Disorder
http://health.nih.gov/topic/AttentionDeficitHyperactivityDisorder

To learn more about the promise of optogenetics:
Method of the Year 2010: Optogenetics – by Nature Video http://www.youtube.com/watch?v=l64X7vHSHOE
Optogenetics: Controlling the Brain with Light http://www.scientificamerican.com/article.cfm?id=optogenetics-controlling

Scientific publications reporting the results of Dr. McGaughy’s NIH grant-supported research:
Atomoxetine facilitates attentional set shifting in adolescent rats.

Attentional effects of lesions to the anterior cingulate cortex: how prior reinforcement influences distractibility.
PMID: 21480690

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