

Rob Strong



# BALANCING ACT

**W**HEN IT COMES TO RESEARCH, DEAN MADDEN, PHD, finds beauty in small things. A professor of biochemistry and cell biology, Madden's interests lie in understanding the fundamental characteristics of ion channels in terms of their molecular structures and their interactions with protein partners.

Essential physiological processes such as respiration, muscle contraction, and nerve signaling are driven by ions moving across the cell membrane and creating an electrochemical gradient, Madden explains. Special ion transporters establish and maintain the gradients, while ion channels exploit them. These ion channels are proteins found in a cell's membrane which create tiny holes that allow specific molecules or atoms to pass through. Madden and his lab group of nine scientists—seven graduate students and two post-doctoral fellows—are specifically interested in two of these channels: the cystic fibrosis transmembrane conductance regulator (CFTR) and the glutamate receptor ion channel.

The absence of these ion channels can have serious consequences, says Madden. For example, those suffering from cystic fibrosis (CF) lack CFTR, and as a result, among other things, their bodies can't regulate salt or digest food, because the pancreas can't effectively secrete the enzymes needed to break down nutrients properly. "In the Middle Ages, people knew that a baby with extremely salty sweat had a serious health problem, although they didn't know what that problem was," he says. "Today doctors can treat the nutritional issues associated with CF pretty effectively, but we are still working to address the problem of patients' lung lining drying out—currently the major cause of mortality in those with CF—because the lack of CFTR leads to chronic infections and airway damage.

"In our lab, we're not working directly on CFTR," Madden continues, "but rather trying to understand the molecular handshakes that take place when CFTR operates in a cell—the regulatory interactions that control its behavior." If researchers could ascertain a way to keep CFTR functional for longer, Madden says, it

could prove beneficial to patients with cystic fibrosis.

Although Madden relishes his time in the lab, research is but one aspect of his responsibilities at Dartmouth. He also teaches biochemistry and cell biology at Dartmouth and at Geisel, directs the Dartmouth COBRE Institute for Biomolecular Targeting and the Dartmouth CF Research Center, and serves as Dartmouth's vice provost for research. When queried as to how he manages to balance this generous complement of responsibilities, Madden begins to laugh. "Balance?" he quips, then quickly grows serious. "My lab team, faculty colleagues, and the vice provost's support team are really experienced and operate independently at a very high level without needing micro-management from me," he says.

Though Madden concedes that the demands of teaching, researching, and administering the work of the provost's office can be challenging at times, he also believes that this working model is sound. "It was a conscious decision to have someone wearing academic hats take on the administrative role, because it helps administrators stay abreast of what's going on in labs and classrooms as well as understand the ramifications of their decisions on both teachers and researchers."

The ability to manage his trio of jobs effectively requires strong support on the administrative side, Madden reiterates, as well as a sense of community within his lab group, where a great deal of co-mentoring takes place. As the 2012 recipient of the Faculty Mentor Award, Madden is keenly aware of the value of sharing ideas and experiences. "The people in my lab tend to co-mentor one another, and as a result, I believe that everyone gains valuable insights into diverse perspectives." Some of the students in his lab are focused on

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traditional academic careers, Madden explains, while others are interested in industry research and yet others are intent on pursuing policy or consulting roles.

Madden says he has also regularly witnessed the benefits of cross-disciplinary interests while instructing students in BIOC110, the Geisel first-term biochemistry course. "There's increasing diversity in medical students' undergraduate experiences and I believe it's quite valuable. The fundamental ability to dissect a problem and interrogate data can be learned in a variety of disciplines—it's not just students with degrees in more traditional fields such as biology and chemistry who succeed in the course. Students from non-traditional medical school majors such as history or economics oftentimes bring new insights and a fresh perspective to the problem at hand, too. These perspectives can be particularly valuable in understanding the whole patient, which really needs to be the focus of the whole medical enterprise."

On those rare occasions when Madden isn't working, he likes to go downtown and catch a film at the campus film series, read—history in particular—and travel. And in the warmer months, he tries to grab a swim in the Connecticut River every evening when he gets home. "That's one of the nicest things about Hanover—it's so easy to do extra-curricular activities. This is a wonderful place to live."

LORI FERGUSON