

## In the Footsteps of Nathan Smith: DMS Welcomes Class of 2006

When Nathan Smith founded DMS in 1797 he could not have imagined how medical education, and medical students, would change in two centuries. Indeed, one medical student writing in his journal in 1808 said of his classmates,

*Such a motley collection, I am sure I never set my eyes on before. I perceived that much of my disgust arose from the total want of uniformity among them.*



The Class of 2006 gathers for orientation.

The 2002 entering class is far from being a “motley collection,” yet its undeniable diversity and accomplishments are the strength of the medical school. DMS welcomed this new cadre of students—the 206<sup>th</sup> medical class—to Hanover with greetings from Acting Dean Ethan Dmitrovsky, MD, Dartmouth College President James Wright, PhD, and others at the orientation session August 14.

Dmitrovsky, professor and chair of pharmacology and toxicology and professor of medicine, promised that DMS would, “do all that we can for you to become the kind of physicians you aspire to be,” and reminded the students that their core mission was service to the community, their patients and the nation. He also encouraged



Director of Admissions Andy Welch welcomes Christy Paiva and Sai Li to DMS.

them to embrace the enduring Dartmouth traditions of excellence, leadership and service.

Wright, urging the new students to follow Dmitrovsky’s example, pointed out a long legacy of enterprise and energy dating back to the DMS founder. He lent the historical perspective of Smith’s herculean efforts and personal sacrifice in building the much-needed medical school, noting that these qualities typify the essence of a good doctor.

Introducing the class of 2006, Director of Admissions Andrew Welch extolled the talents the 82 medical students bring to the community. Drawn from nearly 5,000 applicants, this is arguably the most academically gifted group in the institution’s history, Welch noted, with a Fulbright scholar and six graduate degree holders among them.



New students and faculty mingle at the Dean's picnic.

He continued that class members have published in a dozen respected medical journals, captained intercollegiate varsity teams and participated in health care and biomedical research. Others include a test pilot, a musician, a professional dancer and Peace Corps and VISTA volunteers.

The medical student orientation will culminate with the white coat ceremony September 20 and a special lecture, *Finding Meaning in Medicine: Achieving and Maintaining Wellness*, September 23.



Assistant Dean for Student Affairs Sue Ann Hennessy keeps things cool at the “get acquainted lunch.”

### 2002 Entering Class

- 4,947 applicants
- 82 students
- 62 Dartmouth students
- 15 Brown/Dartmouth students
- 5 MD/PhD candidates
- 53% men, 47% women
- 25% people of color and international students
- 11% racial or ethnic groups underrepresented in American medicine
- 10 students born outside the United States
- 29 states and 55 undergraduate institutions represented

Steve Snyder - top photos

Beth Hindmarsh

## Dean's Column

It is an honor to serve Dartmouth as Acting Dean of our Medical School. I see many opportunities to build on strengths evident in our size and core values of excellence in research, clinical care, teaching and, importantly, service.



Mark Austin-Washburn

Our research surges ahead with nationally visible discoveries and impressive gains in funding. This past year, Dartmouth Medical School was awarded more than \$110 million in grants and contracts. Our clinical enterprise remains ambitious with plans underway to expand academic programs and facilities. We attract outstanding students, postgraduate trainees and staff. Likewise, we recruit preeminent faculty scholars who are committed to the pursuit of excellence and our interdependent missions.

My goal is to sustain and build upon the positive trajectory of Dartmouth Medical School and Dartmouth-Hitchcock Medical Center. We have a unity of purpose for progress in our shared visions. Our collegial and collaborative values enhance these efforts. We should set our sights high and capitalize on creative interactions between Dartmouth's Medical School and Medical Center and with the College community.

Now is the time to celebrate how far we have come. I am inaugurating a Distinguished Lecture Series to invite to Dartmouth internationally distinguished scientists and physicians. We will not only learn about their work, but also have them become ambassadors to convey to others the excitement evident in our growth. The College and Medical Center will co-host this series, open to the entire Dartmouth community.

I am grateful to so many for making my transition to Acting Dean smooth. This reflects what makes our community special. I will work hard to keep the path smooth for our next Dean. I take seriously the responsibility to promote the national stature of our institution and plan to accomplish this by emphasizing our assets and values. With your help and support, we shall achieve our high aspirations for Dartmouth Medical School.

*Ethan Dmitrovsky*

Ethan Dmitrovsky, MD  
Andrew G. Wallace Professor  
Acting Dean, Dartmouth Medical School

## Genetics in Clinical Practice: A Revolutionary Approach

A Dartmouth Medical School professor is leading the way in using computer technology for medical education with a pioneering virtual clinic unlike any existing models to teach "Genetics in Clinical Practice." Joseph V. Henderson, MD, a professor of community and family medicine who heads the Interactive Media Lab (IML), created a "virtual practicum in genetics," combining state-of-the-art interactive multimedia and world leaders in genetics research to foster more effective medical education.

Henderson's core goal is to help non-geneticists (primarily third-year medical students and residents) use genetic testing and services appropriately by improving their understanding of the process. Another mission is to help generalists, specialists and laboratory professionals form an integrated patient care team. "This virtual course shows how the testing is done, how to counsel patients, how to understand the test results," Henderson explains.

The result of a three-year project, funded through an educational grant from the Centers for Disease Control and Prevention (CDC), the program takes place in a virtual genetics clinic, where the learner participates in a "virtual mini fellowship" with a master clinician/master teacher. Addressing three central topics, genetics in clinical practice, working with genetics laboratories and personnel, and working with genetic counselors, Henderson's group provides users access to genetics experts and patient simulations that form the backbone of training.

Henderson assembled a team representing the world's best in genetics and says, "You have real experts—some of the most prominent clinical geneticists out there." Case discussions and counseling demonstrations are led by Edward McCabe, MD, a UCLA School of Medicine geneticist, and by physicians from the CDC, the National Cancer Institute, the National Human Genome Research Institute and the National Institutes of Health.

"For the generalist physician or the medical resident, ordering a genetics test for

a patient is not like ordering a standard test, such as for cholesterol. There is not only the science, but the associated psychosocial aspects. It's one thing to know about the genetics, for example of cystic fibrosis, but it's another thing to counsel a couple who are pregnant with a child who may be affected by CF," says Henderson. This program offers that real-world aspect by virtual interaction and exposure to patients.

The program's flow and content center on three simulated patients who have or are at risk of developing diseases for which knowledge of clinical genetics can affect outcomes. In some instances, patient outcomes will depend on the decisions of the learner. The highly detailed, computer-based environment is intuitive and easy to use any time, any place via a broadband



A bird's-eye view of the virtual genetics clinic featured in the IML's "Genetics in Clinical Practice: A Team Approach."

Courtesy Susan K. Johnson, Interactive Media Lab

Internet connection or CD-ROM. The CD is available at little or no cost to the Dartmouth community and to outside users through such professional organizations as the American College of Medical Genetics.

The program, based on Henderson's pre-existing "virtual practicum" model, may also be helpful in training students, genetic counselors, medical laboratory professionals, public health practitioners and others interested in genetic testing.

IML specializes in combining emerging technology with innovative instructional design and develops distance learning systems for delivering multimedia over the Internet. The genetics virtual clinic can be accessed on the web at <http://iml.dartmouth.edu/education/cme/Genetics>.

## Professor Finds No Scientific Evidence for Watery Urban Myth

It is accepted wisdom: “Drink at least eight glasses of water a day!” Not necessarily, says DMS physician Heinz Valtin, MD. The universal advice that made guzzling water a national pastime appears to lack scientific proof, he found.

In an invited review published online by the *American Journal of Physiology* August 8, Valtin, Vail and Hampers professor emeritus of physiology, reports no supporting evidence to back this popular counsel, commonly known as “8x8” (for eight, 8-ounce glasses of water).

Valtin, a kidney specialist and author of two textbooks on the kidney and water balance, sought to find the origin of this dictum and to examine the scientific evidence. We see the exhortation everywhere: from health writers, nutritionists, even physicians, but Valtin doubts its validity. Indeed, he finds it, “difficult to believe that evolution left us with a chronic water deficit that needs to be compensated by forcing a high fluid intake.”

Though perhaps more urban myth than medical dogma, the 8x8 rule is slavishly followed. It is acceptable to drink water anywhere, anytime. How did the obsession start? Is there any supporting scientific evidence? Does the habit promote good health? Might it be harmful? Valtin thinks the notion may have started when the Food and Nutrition Board of the National Research Council recommended approximately “one milliliter of water for each calorie of food,” which would amount to roughly two to two-and-a-half quarts (64

to 80 ounces per day). Although in its next sentence the Board stated, “most of this quantity is contained in prepared foods,” that sentence may have been missed, so the recommendation was erroneously interpreted as how much water one should drink each day.

Valtin and DMS biomedical librarian Sheila Gorman found no scientific studies to support 8x8. Rather, peer-reviewed surveys of fluid intake on healthy adults of



Heinz Valtin, MD

both genders strongly suggest that such large amounts are not needed. Moreover, a quantity of published experiments attest to the capability of the human body for maintaining proper water balance.

Valtin emphasizes that his conclusion is limited to *healthy* adults in a *temperate* climate leading a largely *sedentary* existence—precisely, he points out, the population and conditions that the “at least” in 8x8 refers to. He stresses that large intakes of fluid, equal to and greater than 8x8, are advisable for the treatment or prevention of some diseases, such as kidney stones, as well as under special circumstances, such as strenuous physical activity or hot weather. But barring those exceptions, he concludes that we are currently drinking enough and possibly even more than enough.

Despite the dearth of compelling evidence, then, what’s the harm? “The fact is

that, potentially, there is harm even in water,” explains Valtin. Modest increases in fluid intake can result in “water intoxication” if one’s kidneys are unable to excrete enough urine. Such instances have led to mental confusion and even death in certain circumstances.

Valtin lists other disadvantages of a high water intake: possible exposure to pollutants, especially if sustained over many years; frequent urination, which can be both inconvenient and embarrassing; expense, for those who satisfy the 8x8 notion with bottled water; and feelings of guilt for not achieving 8x8.

The burden of proof that everyone needs 8x8, Valtin argues, should fall on those who persist in advocating the high fluid intake. Finally, strong evidence now indicates that not all of the prescribed fluid need be in the form of water. Careful peer-reviewed experiments have shown that caffeinated drinks should indeed count toward the daily fluid intake in most people. Additionally, published studies show that most coffee, tea and soft drinks may be counted toward the daily total.

“Thus, I have found no scientific proof that absolutely every person must drink at least eight glasses of water a day,” says Valtin. While there is some evidence that the risk of certain diseases can be lowered by high water intake, the quantities needed for this beneficial effect may be less than 8x8, and the recommendation can be limited to those particularly susceptible to the diseases in question.

## Journal Highlights Strong DMS Education in Patient Care

Dartmouth Medical School projects that address how to meet the challenges of teaching aspiring doctors in the outpatient setting were featured in a series of five special-themed articles in the July *Academic Medicine*, the journal of the American Association of Medical Colleges.

About 90 percent of medical care takes place in an ambulatory setting, and the average physician appointment is about 15 minutes, according to Patricia Carney, PhD, associate professor of community and family medicine, author of three studies. Teaching and learning in the ambulatory care setting have been described as inefficient, variable

and unpredictable. Inserting medical student teaching into that environment is different than having a captive audience at the patient’s bedside and medical educators are continually evaluating ways to assure that doctors-to-be have the kind of experiences they need.

“DMS has significant and long experience with the challenges of teaching in the ambulatory setting,” notes Martha Regan-Smith, MD, professor of medicine, lead author of one article. “It was the first medical school to implement a clinical curriculum in which more than 40 percent of its required clerkship was in the ambulatory

setting. Prior to 1989, the clerkship curriculum was like others in that most all of the required clerkships were taught in hospitals using inpatients—only community and family medicine was taught in an outpatient setting.”

Other Dartmouth authors include: William Young, MD, Adam Keller, MPH, Catherine Pipas, MD, M. Scottie Eliassen, MS, Sarah C. Mengshol, MD, Leslie Fall, MD, Karen E. Schifferdecker, PhD, Ardis Olson, MD, Deborah Peltier, MD, David Nierenberg, MD, Margaret Russell, MS, Daniel Poor, MEd, W. Blair Brooks, MD, Gregory Ogrinc, MD.

## New Way to See Light Found

Dartmouth Medical School geneticists have discovered a new class of proteins that see light, revealing a previously unknown system for how light works. The novel photoreceptors are part of the gears that drive biological clocks, the cellular timekeepers of circadian rhythm, which paces life's daily ebb and flow in a 24-hour light-dark cycle. Their identification opens a window for genetically engineered drug delivery systems that exploit the properties of these new-found molecules.



The findings are reported in the August 2 *Science* by

Jay Dunlap, PhD

professor and chair of genetics, Jennifer Loros, PhD, professor of biochemistry and of genetics, graduate student Allan Froeh-

lich and former postdoctoral fellow Yi Liu. Dunlap and Loros were the first to delineate circadian clockwork in *Neurospora*, the bread mold fungus and a genetic model system. They pieced together how the circadian cycle works and demonstrated how light resets it through a complex of interwoven molecular messages.

"That left open the question then of what actually absorbed the light. What we found is a new paradigm within clocks," Dunlap says. "Light is absorbed by a molecule that is actually within the clock and is an activating element in the clock cycle. This is a new molecular mechanism to see light and a new way for light to have an effect."

Eventually researchers may be able to harness the proteins against fungal disease. "Virtually nothing is known about how pathogenic fungi respond to light or whether [our findings] can be exploited for a noninvasive therapy," Dunlap says. It may

be a long shot, but drug therapies start with properties people lack. "If you want to do therapy—antifungal, antibacterial or anything—you start looking for biochemical activities that the host does not have that can be targeted on the pathogen."

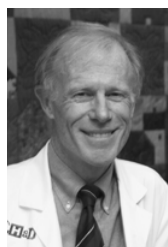
Froelich built on the Dunlap and Loros discovery that the gene frequency (*frq*) encodes a central cog of the clock cycle and that light resets the clock through *frq*. He determined that the clock proteins White Collar-1 and White Collar-2 (WC-1 and WC-2) bind to *frq* and that under appropriate biochemical conditions, they can also detect light. He then showed that WC-1 is the photoreceptor protein.

WC-1 is also a transcription factor—a protein whose role is to bind to DNA and regulate gene expression, Dunlap explains. "This is the first case of a transcription factor that is itself a photo pigment and a transcription factor that contains both ability to turn on gene expression and ability to do that in response to light within the same protein."

## Physician Heads Panel on Smallpox Vaccine Proposal

There's a certain irony that smallpox, whose eradication was one of the last century's stunning success stories, could come back to haunt us. In the wake of September 11, a national panel headed by Dartmouth Medical School infectious disease expert John Modlin, MD, has grappled with the possibility of an outbreak.

The Centers for Disease Control and Prevention (CDC) Advisory Committee on Immunization Practices, which Modlin has headed since 1997, recommended expanding smallpox vaccination for members of designated teams that would respond to a smallpox release, and to certain healthcare workers at hospitals identified in advance to receive smallpox patients, but rejected mass immunization for the country. The strategy,



John Modlin, MD

revised June 20 following a series of consultations with experts in the field and public forums, is reviewed by the CDC and the Department of Health and Human Services to adopt a national smallpox policy.

Although there has not been a case of smallpox worldwide for almost 25 years, heightened bioterrorism fears prompted the update, said Modlin, professor and chair of pediatrics. The smallpox vaccine is a milder live virus that can cause serious, perhaps lethal complications, so the challenge is to balance the risk of an outbreak and the potential for problems.

The question, he said, is, "Does the small threat of a smallpox attack justify a couple of hundred deaths and a larger number of other serious adverse reactions in otherwise healthy people living in this country?"

The committee also supported the CDC policy of containment and ring vaccination, the approach used to eradicate smallpox by isolating those infected and vaccinating close contacts to provide a ring of containment. After weighing many factors, including the low risk of an attack, how smallpox spreads and sophisticated disease modeling of potential scenarios, Modlin says the committee felt the strategy could be implemented appropriately for effective smallpox protection and control.

DARTMOUTH  
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DMS Communications  
1 Rope Ferry Road (HB 7065)  
Hanover, NH 03755-1404  
Tel: (603) 650-1492 Fax: (603) 650-1730  
Email: [dms.communications@dartmouth.edu](mailto:dms.communications@dartmouth.edu)  
[www.dartmouth.edu/dms/news/publications/digest.shtml](http://www.dartmouth.edu/dms/news/publications/digest.shtml)

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