SOMnews

UNIVERSITY OF MARYLAND SCHOOL OF MEDICINE 1807 200 Years

DEAN'S MESSAGE: What's On My Mind

What's on my mind this month is the importance of information technology to our pursuit of excellence in research, education and patient care. These mission areas depend on a wide range of hardware, software and support to store, analyze and communicate an ever growing mountain of data. From our day-to-day email and text messages to the vast amount of raw data required to sequence the human genome, the School of Medicine is processing an enormous volume of information. With the amount of data doubling every 18 months, the task is daunting. To keep pace with this explosion of data, **we are continually working to improve the School of Medicine's information infrastructure, while implementing new and more efficient systems for managing data.**

The Office of Information Services (IS) maintains the School of Medicine's data network, which includes more than 2,400 computers and printers in 15 buildings, as well as hundreds of Blackberrys, smart phones and mobile devices. As the campus has grown, so has the network. Since 2001, the School of Medicine's network has tripled in size and the number of servers has increased from six to more than 150. For the BioPark alone, 600 new network connections were added. Health Sciences Facility III, when completed, will add hundreds more.
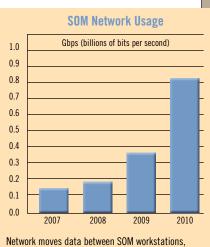
On the education front, the School of Medicine is using technology to help our students excel. **Student email accounts are being consolidated into the School of Medicine email system to facilitate communication with faculty instructors, to protect patient privacy, and provide additional features offered to faculty and senior staff.** The Office of Medical Education continues to improve Medscope, the student intranet that provides curriculum information and support. The Graduate Program in Life Sciences (GPILS) will provide its new students with iPad mobile computers. In addition, **students have been invited to participate in information technology focus groups so that we can hear their ideas and better serve their technology needs.**

The School of Medicine network is the foundation upon which our research enterprise will continue to grow and flourish. A case in point is the Institute for Genome Sciences (IGS), and its Informatics Resource Center (IRC). Using an array of high performance computers and storage systems, the IRC analyzes huge strings of genomic sequencing data for University of Maryland researchers and other scientists around the world. IGS is a global leader in the field of bioinformatics—the application of information technology to biological data. Owen White, PhD, professor of Epidemiology & Public Health, leads the IGS bioinformatics team, which is already fueling a revolution in healthcare—a revolution that includes translational and personalized medicine. **We will continue to make bioinformatics a priority as we move forward.**

A technological revolution is also underway in the realm of patient care. **In the near future, faculty physicians will be recording patient information in EPIC—a fully computerized medical record system.** EPIC is a collaborative initiative of the University of Maryland Medical System, the School of Medicine, and its clinical practice plan. The system is not only good for the environment, but it will reduce duplication of effort and provide for a more coordinated approach to care. Computers will also be used to interpret electronic patient information more quickly and more accurately. To that end, the School of Medicine is working with IBM to test the advanced analytics of the company's "Watson" computer for potential health care applications.

SOM Network Usage

Gbps (billions of bits per second)

2007	2008	2009	2010

Network moves data between SOM workstations, servers and the internet.

Average growth: 100% per year

To handle the growing bandwidth requirements of the school's research initiatives and patient care programs, the School of Medicine's network has been upgraded to handle ten times more internet traffic. Data storage capacity is also being expanded through the use of virtual servers. Because multiple virtual servers can reside on a single machine, virtual servers are faster, use a fraction of the space and consume less energy. In addition, Wi-Fi coverage will be improved as soon as possible by adding additional wireless access points in School of Medicine buildings.

It is clear that information technology is the bedrock for all that we do. While the scope of information technology services provided by the School of Medicine is already large, the demand for those services will continue to grow. **For these reasons, I am committed to making information technology a priority and expanding the school's information services in order to maintain our status as a world-class academic medical institution.**

In the relentless pursuit of excellence, I am
Sincerely yours,

E. Albert Reece, MD, PhD, MBA
Vice President for Medical Affairs, University of Maryland
John Z. and Akiko K. Bowers Distinguished Professor and
Dean, University of Maryland School of Medicine

Technology Corner

Virtual Servers: Doing More with Less

► BY CATHY BEVERAGE

Suppose you could buy a car that gets 100 miles per gallon, goes from zero to 60 in six seconds, and costs only $1,000. And if your new car ever crashed, you could easily undo the damage. And what's more, you could fit 12 of those faster and more efficient cars in a single garage! Would you be interested? Those are the kinds of benefits the Office of Information Services is getting from virtual servers.

Servers are vehicles for storing, processing and moving data. In the past, a server was on a single machine made for the heavy demands of network computing. As the demand for data soared and servers proliferated, servers began to take up more and more space. But thanks to software improvements, today dozens of virtual servers can co-exist on a single machine.

"Virtual servers need but a fraction of the space and consume 85 percent less energy than their physical counterparts," said Scott Stefan, Director of Technical Operations in the Office of Information Services. "Typically, only a fraction of a physical server's capabilities are actually needed—it might be as little as two to three percent—so underutilized servers are perfect candidates for virtualization," explained Stefan. "In addition, virtual servers are less vulnerable to hardware failure and recovery is faster should a problem arise."

Virtual servers are not only more cost effective, they are more efficient and smarter. "When a virtual server's work load increases, the physical server detects that and automatically moves the virtual server to another physical server that has enough resources to handle its higher demands," said Stefan. The School of Medicine website and many other online services are hosted on virtual servers.

"Virtual servers are faster to deploy and don't require physical maintenance," said James McNamee, PhD, Associate Dean of Information Services and CIO. "We can provide more applications, improve application performance and make them more reliable while using fewer resources." That's virtually doing more with less.

Harry June, PhD

Laure Aurelian, PhD

Genes Associated with
Binge Drinking

► BY KAREN ROBINSON

School of Medicine research scientists have identified two genes associated with binge drinking that may open doors to new, more effective treatments for excessive alcohol consumption. The scientists found that manipulating two receptors in the brain, GABA receptors and toll-like receptor 4 (TLR4), "caused profound reduction" of binge drinking for two weeks in rodents that had been bred and trained to drink excessively. The study was published in the journal the *Proceedings of the National Academy of Sciences*.

About 30 percent of Americans who drink do so excessively, and about 75,000 people die each year from the effects of excessive drinking. Current treatments for excessive alcohol drinking include prescription drugs Revia and Campral for controlling cravings. To ease withdrawal symptoms, doctors often prescribe medications such as Valium and Librium that carry their own risks of addiction. Valium and Librium reduce the anxiety alcoholics feel when they stop drinking but do not reduce cravings for alcohol.

The new study found that treatments that manipulate both the GABA receptor and toll-like receptor 4 have the potential to reduce anxiety and control cravings, with little to no risk for addiction, according to lead investigator Harry June, PhD, professor, Departments of Psychiatry and Pharmacology & Experimental Therapeutics. The study was funded in part by the National Institute on Alcohol Abuse and Alcoholism, part of the National Institutes of Health.

"Binge drinking—defined as achieving a blood-alcohol content of .08 g percent, the legal limit in many states, in a two-hour period—is a serious form of excessive drinking," said Dr. June. "This is the kind of drinking we see with college students on spring break, and even some adults. It doesn't meet the classic definition of alcoholism, characterized by dependence and a long period of drinking followed by withdrawal. But binge drinking carries the same serious health risks as other types of excessive drinking: cancer, heart disease and, most notably, the serious public health issue of vehicle accidents."

In the study, Dr. June and senior author Laure Aurelian, PhD, professor, Departments of Pharmacology & Experimental Therapeutics and Microbiology & Immunology, examined the effect of alcohol on the GABA receptor and TLR4. GABA receptors are a class of receptors in the brain that react to the neurotransmitter GABA and act as inhibitory receptors, calming down or inhibiting the activity of neurons in the brain. GABA receptors react to alcohol, giving drinkers a calm and euphoric feeling and reinforcing excessive drinking behavior. Dr. June has long been interested in the role GABA receptors play in alcoholic drinking. This is the first scientific study to document GABA receptors' key involvement in binge drinking specifically,

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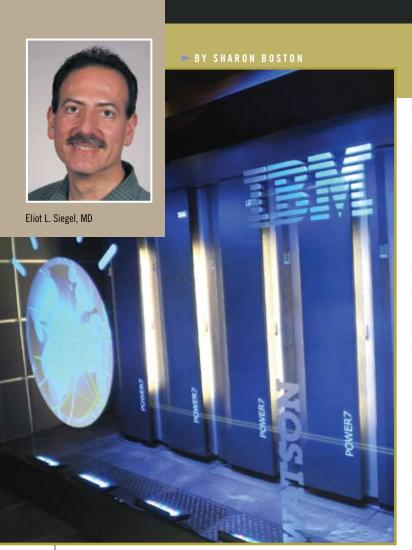
though scientists already believed that the receptors had a role in excessive drinking in general.

One of the study's most novel findings concerns TLR4's important role in binge drinking. Science has traditionally considered TLR4 to be an innate immunity receptor involved with neuroinflammation in the brain. Scientists associated TLR4 with microglia, cells that support inflammatory responses in the brain. "What makes this finding particularly important for the field of neuroscience is that we're showing that TLR4 plays a significant role in neurons, specifically, the neurons that are connected to the GABA receptor," said Dr. June.

To establish the connection between the GABA receptors, TLR4 and alcohol, the scientists manipulated this pathway in the binge drinking rodents. Dr. Aurelian was a pioneer in developing a method to inhibit gene expression, helping scientists to pinpoint the role of individual genes in the body. In this study, she used a herpes viral vector—a deactivated herpes virus—to deliver a gene-modifying agent directly to the neurons in the brain, to target TLR4 and GABA receptors. The scientists found that when they artificially stimulated the GABA receptors and TLR4 in order to simulate the good feelings binge drinkers feel when drinking alcohol, the rats lost interest in alcohol for two weeks after the procedure.

Compounds exist that would stimulate the receptors in the same way the scientists did in the study. "It's very likely that, down the road, these compounds could become new therapies for binge drinking," said Dr. June. "These compounds would act like a substitute for alcohol, much like methadone acts as a substitute for heroin. They would help alcoholics stop drinking, giving them relief from their cravings and from the anxiety that they try to alleviate with drinking."

The next step is to further investigate the newly discovered role that TLR4 plays in binge drinking. Future treatments could target both GABA receptors and TLR4, or just TLR4, depending on what scientists find, according to Dr. June. More study is needed, said Dr. Aurelian, "The discovery of this involvement of TLR4 in a pathway with GABA is most remarkable. This study provides basically a totally new understanding of what TLR4 and GABA are all about. That's exciting, but there is a lot more to learn about this pathway and where it goes beyond this point. This is a fascinating new paradigm we plan to explore further." 🏛

Eliot L. Siegel, MD

► BY SHARON BOSTON

"Watson" and Health Care?

Radiologists Collaborate with IBM to Bring "Watson" Computer's Brain Power to Health Care

The University of Maryland School of Medicine is one of only two universities working with IBM to test the advanced analytics of the company's "Watson" computer for potential health care applications.

The computer program, which may best known for besting two top champions on the TV show *Jeopardy!* in February 2011, has shown an amazing ability to comprehend human language, a barrier that has been a challenge for computer designers for many years. Watson can also absorb huge databases and then mine that information quickly.

Eliot L. Siegel, MD, professor, Department of Diagnostic Radiology & Nuclear Medicine, will be leading the project for the School of Medicine. He said, "The system also has the potential to ingest information from a single patient's electronic medical record in one facility or potentially multiple facilities and also to acquire information from multiple patients. It then has the ability to form multiple hypotheses in a manner similar to the way in which it understands the Jeopardy question and forms multiple hypotheses."

In the health care setting, the Watson technology may be a powerful tool, helping doctors diagnose patients. Dr. Siegel suggests the technology has the potential to result in a renaissance in the application of "artificial intelligence" in medical data mining, data analysis and decision support.

He added, "I see Watson's capabilities not as replacement for physicians but as an adjunct and tool to organize, highlight and prioritize information to make a physician more efficient and effective, and improve patient safety. In a manner similar to a physician who works with residents and fellows and medical students, our physician of the future might utilize this tool to provide improved patient care more cost effectively."

Dr. Siegel directs the Maryland Imaging Research Technologies Laboratory at the School of Medicine and also is head of imaging at the Baltimore VA Medical Center.

Columbia University is the other institution working on the health care applications for the Watson system. 🏛

► BY SHARON BOSTON

Gulf Oil Spill Psychological Impact

BP Oil Spill Caused Significant Psychological Impact Even to Nearby Communities Not Directly Touched by Oil

The explosion and fire on a BP-licensed oil platform in the Gulf of Mexico in April 2010 had huge environmental and economic effects, with millions of gallons of oil leaking into the water for more than five months. It also had significant psychological impact on people living in coastal communities, even in those areas that did not have direct oil exposure, according to researchers at the University of Maryland School of Medicine who worked in collaboration with the University of Florida, Gainesville. Study results were published in the February 17 online edition of *Environmental Health Perspectives*, a publication of the National Institutes of Health.

"We found that people living in communities with and without direct oil exposure had similar levels of psychological distress. People in both groups showed clinically significant levels of depression and anxiety. Also, where compared to people whose income was unaffected by the disaster, people with spill-related income loss in both groups had higher rates of depression, were less resilient and were more likely to cope using 'behavioral disengagement,' which involves just 'giving up' trying to deal with the problem," explained Lynn Grattan, PhD, associate professor, Department of Neurology.

The Maryland investigators, who traveled to the region soon after the spill, worked with Gulf Coast community leaders to get "real-time" assessments of the acute impacts of the spill. Their goal was to measure the acute psychological impact, coping resilience and perceived risk (concerns about the environmental impact and potential health consequences) of people living along the Gulf Coast. By doing this, they could help identify the potential mental health needs of the Northwest Gulf Coast communities. They examined the psychological impact in two fishing communities: Baldwin County, Alabama, and Franklin County, Florida. Baldwin County had direct oil exposure; Franklin County did not. The researchers defined indirect impact as a place where oil did not physically reach the coastline, but where anticipation of the oil spread significantly affected the community's recreation, tourism and fishing industries.

The people in Florida, where oil had not reached shore, showed similar elevated levels of anxiety and depression as those living in Alabama who had direct oil exposure. Both groups had similar high levels of worry about the impact of the spill on the environment, health and seafood safety.

However, the levels of psychological distress were higher in both communities among people who had suffered income loss because of the spill. They had significantly more tension, anger, fatigue and overall mood disturbance than those whose income was not adversely affected. These people also had lower scores on resilience and may have fewer psychological resources to bounce back from adversity.

"From a public health standpoint, we need to understand that when there is a significant environmental crisis, we need to extend public health outreach and education, psychological monitoring and mental health services beyond the immediately affected areas, paying particular attention to people at risk for income loss. There are things that can be done to help people manage their stress and anxiety, and cope in these situations, so these interventions need to be available immediately in the communities where the impacted individuals live," added Dr. Grattan.

The study on psychological impact built on a research program by University of Florida investigators who were already in the area to study the acute environmental and health impact of the spill. Through contacts with local community and religious leaders, trade associations, the University of Florida extension office and other agencies, the Maryland researchers recruited 71 residents in Florida and 23 from Alabama for the psychological assessment.

The team evaluated the participants through interviews and standardized assessments of psychological distress, resilience and coping. The team also looked at whether the participants had cognitive symptoms of neurotoxicity as a result of exposure to oil and chemical dispersants. These included assessments of attention, memory, and dexterity and speed (through a pegboard puzzle task). The researchers also asked the participants about what they were doing to cope with the situation, which could range from prayer and meditation to increased use of alcohol and other drugs.

The National Institute of Environmental Health Sciences provided partial funding for this study. 🏛

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Lynn Grattan, PhD

Match Day 2011

► BY CAELIE HAINES

Historic Davidge Hall was the site of Match Day festivities March 17, 2010, when the School of Medicine's graduating class discovered where they'll pursue the next step in their medical careers. Held at the same time in medical schools around the country, Match Day is when fourth-year medical students learn where they will continue their training as residents. The National Resident Matching Program (NRMP) conducts the Match nationwide, using a computer algorithm that aligns the preferences of applicants with the preferences of residency programs in order to fill thousands of training positions available at U.S. teaching hospitals.

The suspense-filled process takes more than an hour, with names called randomly as each envelope is pulled from a chest. Ethan Bassett relieved the tension by adding musical cues as each of his classmates made his or her way up to the podium. The theme from "Jaws" and the "Come on Down" music from "The Price is Right" were popular themes. Laura Park was the last one to receive an envelope. As a reward for her patience, she won a Maryland flag-themed piggy bank into which each student had put a monetary donation before accepting their Match letters. This money is traditionally used for a post-Match celebration.

This year, School of Medicine students matched to 85 different hospitals in 28 different states (up from 72 different hospitals in 24 states last year). Twenty-eight percent of the class will be staying in Maryland to train, many at the University of Maryland Medical Center, including the president of the Class of 2011, Chris Lemon. "I'm staying here for Em-Peds (Emergency Medicine-Pediactrics)," Chris discovered after opening his envelope.

Others, like Laura Caputo and Nancy Lentz, will be heading south. "I matched at Duke, internal medicine," said a still-stunned Laura. "We're going to North Carolina!" exclaimed Nancy, bouncing her two-year old daughter on her hip as she celebrated landing a residency at Duke as well.

Elizabeth Urban chose not to tear open her envelope at the ceremony. "I wanted something a little more personal," she explained. "I have a lot of family waiting for me to open it with them." 🏛

Here are the Match stats:

- 19% matched in Internal Medicine, up from 17% last year
- 9% matched in Pediatrics, up from 7% last year
- 7% matched in Family Medicine, down from 8% last year
- 10% matched in Emergency Medicine, up from 9% last year
- 5% matched in General Surgery, down from 7% last year
- 5% matched in OB/GYN, up from 3% last year
- 2% matched in Orthopaedic Surgery, down from 3% last year
- 3% matched in Radiology, down from 8% last year
- 1% matched in Psychiatry, down from 4% last year

Elizabeth Kenez and her parents were thrilled to find out she'll be staying here in Baltimore for a residency in Emergency Medicine at the University of Maryland Medical Center. Elizabeth, who attended the University of Maryland for her undergraduate degree, too, later referred to herself on Facebook as a "triple Terp."

HSMM Offers Insight into the Path to Medical School

Current medical students field questions from high school students during High School Mini-Med.
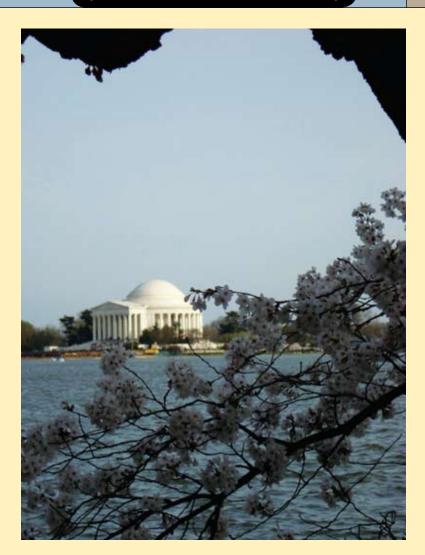
On February 25, 2011, the Office of Student Research presented High School Mini-Med (HSMM), a one-day program that welcomed students from Digital Harbor, Patterson, Western and Vivien T. Thomas high schools to the University of Maryland School of Medicine. The participating students are considering careers in medicine or science. High School Mini-Med gives these high school students a chance to see first-hand School of Medicine facilities, talk with actual medical students and discover potential medical or scientific opportunities.

It was clear from the questions asked during the Q&A session with medical students that many of the high school students are interested in learning how to pursue such a career. The teens were honest about the obstacles in their lives they feel might keep them from a bright future. They wanted to know if the University of Maryland medical students had overcome similar obstacles and, if so, how they had done it. The medical students were happy to share how they had succeeded in spite of poverty, language barriers, negative peer pressure and academic detours that threatened to derail their dreams.
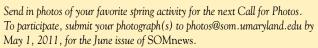
Never losing sight of their goal to get to medical school—no matter what life threw in their way—was the common theme in their tales of triumph. "You have to sacrifice for things you want," advised second-year student Andrew Wright. "You have to decide whether to go for the quick and easy payoff, or invest in a future that will pay out over a much-longer time." Added Beatrice Dijon, another second-year student, "There are no boundaries except the boundaries you put on yourself. There may be twists and turns, but you can get to your goal if you keep at it."

This is the fifth year for HSMM. Many students who were first introduced to the School of Medicine through the program have returned to campus to participate in the volunteer summer research program, which encourages students to consider careers in biomedical or clinical research and/or in academic medicine and offers them a realistic view of the demands of the field. "I can arrange for faculty mentors for any of you who are interested," offered Jordan Warnick, PhD, professor, Department of Pharmacology & Experimental Therapeutics, assistant dean for Student Education & Research, and the person who oversees the Office of Student Research. 🏛

Jefferson Memorial through Cherry Blossoms Photo by: **Terry Heron**, academic coordinator, Department of Physical Therapy & Rehabilitation Science

Call for Photos!

Send in photos of your favorite spring activity for the next Call for Photos. To participate, submit your photograph(s) to photos@som.umaryland.edu by May 1, 2011, for the June issue of SOMnews.

SOMnews

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