

# Bulletin of the

## CONNECTICUT ACADEMY OF SCIENCE AND ENGINEERING



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## Hopes, Promises and Expectations for State's Stem Cell Research Program

On June 15, 2005, Connecticut became the third state in the nation to publicly fund human stem cell research when Governor M. Jodi Rell signed into law an act appropriating \$100 million to establish a Stem Cell Research Fund. The law provides for \$10 million per year through June 30, 2015 to go toward stem cell research grants in Connecticut. The first \$20 million came from the state's General Fund, with an additional \$80 million coming from the state's Tobacco Settlement Fund.

State-funded stem cell research grants are particularly critical for entities conducting human embryonic stem cells research, since federal law currently bars access to federal research dollars to underwrite research on embryonic stem cell lines not approved by the National Institutes of Health.

Connecticut's historic law established the Connecticut Stem Cell Research Advisory Committee (SCRAC). The SCRAC oversees the process of reviewing and granting applications. In addition, the law established the Connecticut Stem Cell Peer Review Committee, which is responsible for assuring the scientific and ethical merits of each application.

In May 2006, the SCRAC opened the initial round of proposal requests, resulting in 70 applications from eight Connecticut-based universities and nonprofit institutions, each competing for a share of \$20 million of available funding. The total requests came in at \$65 million. In November 2006, guided by the Peer Review Committee's ratings and with administrative support from Connecticut Innovations and the DPH, the SCRAC awarded the first grants of \$19.78 million to 21 projects at the University

(see Stem Cells, page 2)

## Update from the CT Science Center

Over 200 interactive exhibits have been designed for the new Science Center! The Center has selected two exhibit fabricators and two media producers who are currently in the process of manufacturing these exhibits. Fabrication will take approximately nine months to complete, and installation will begin three months prior to opening.

Some of the fascinating exhibits that will entice visitors to explore and wonder are the Video Ripple & Entry and Mag-Lev Test Track. Upon entering the Sight and Sound Experience gallery, visitors will create ripples as they walk across a virtual pool of water. As they pass, patterns and lights on the walls will appear to follow and respond to their movement. Inside the Forces in Motion gallery, visitors will discover the power of magnets as they construct a race car that will hover over its track and speed down the runway with the help of magnetic coils.

The Center's exhibits will fill ten unique gallery spaces; Forces in Motion, Planet Earth, Exploring Space, The Picture of Health, Smart Energy, Sight and Sound Experience, Sports Lab, Invention Dimension, A River of Life, and KidSpace. In addition, the Center will have 7,500 sq. ft. of space for traveling exhibits. Approximately three blockbuster traveling exhibits will visit the Center every year. The first one will be the Ends of the Earth.

## News from the National Academies

The following is excerpted from press releases of the National Academies and from Infocus Magazine ([www.infocusmagazine.org](http://www.infocusmagazine.org)), a new resource of the National Academies.

### ◆ Open Exchange of Research Critical to National Security

Noting that science and technology play a crucial role in maintaining national and economic security, a new report by the National Research Council urges the United States to "ensure the open exchange of unclassified research despite the small risk that it could be misused for harm by terrorists or rogue nations." US universities and research institutions must continue to welcome foreign-born science and engineering students, said the committee of former national security leaders and senior university researchers and administrators that wrote the report, adding that while concerns about certain types of research findings falling into the wrong hands are legitimate and safeguards are needed, the gains in science and technology that flow from the free exchange of information far outweigh the slight risks.

Although National Security Decision Directive 189 (NSDD 189) was enacted to assure that basic research remain open to publication and foreign participation, many government policies and practices have effectively reversed this in recent years, the report says. To protect both security and scientific interests, the federal government should establish a standing entity, preferably a Science and Security Commission, that would review policies regarding the exchange of information and the participation of foreign-born scientists and students in research. The report suggests that the commission be co-chaired by the national security adviser and the director of the White House Office of Science and Technology Policy, and include representatives from academic research institutions and national security agencies.

[[http://books.nap.edu/catalog.php?record\\_id=12013](http://books.nap.edu/catalog.php?record_id=12013)]

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of Connecticut, Wesleyan, and Yale—the largest amount of public support of embryonic stem cell research provided by any state in the country up to that time.

*Round Two ...*

Round two of Connecticut’s stem cell grants process is currently underway, with \$10 million in available grant monies. The Connecticut Stem Cell Peer Review Committee is currently considering the scientific and ethical merits of 87 grant applications totaling just over \$41 million.

Milton Wallack, a member of the Connecticut Stem Cell Research Advisory Committee and co-chair of the Connecticut Stem Cell Coalition, believes the increase in proposals is good news, reflecting a “process that has been opened more vigorously to the

biotech community, hospitals... making it better known to those groups” and contributing to the “transparency of process.”

“Transparency” has been a core guiding principle of the state’s stem cell research initiative from the beginning, according to DPH Commissioner J. Robert Galvin, who also serves as Chairman of the SCRAC.

“Transparency is one of the key areas where Connecticut is distinct from the stem cell programs in other states,” Dr. Galvin stated. “The meetings of both the Advisory Committee and the Peer Review Committee are open to the public, both in person and telephonically. That is unheard of in the world of scientific research. However, we are working with state taxpayer dollars, and we are accountable to those taxpayers as to how their money is spent.”

Another key element in to transparency has been the development of a “consumer-friendly” web site ([www.dph.state.ct.us/stemcell](http://www.dph.state.ct.us/stemcell)). In addition to basic information about stem cells and stem cell research, the site offers access to transcripts and minutes of all Advisory and Peer Review Committee meetings.

*Measuring Success*

Wallack praises the “enormous progress” made by the state’s stem cell research community in the two years since the 2005 legislation was enacted—progress that has placed the state, he firmly believes, “at the epicenter” of embryonic stem cell research.

One example of the state’s growing leadership role in the international stem cell research community is the formation of the Interstate Alliance on Stem Cell Research (IASCR). The IASCR was founded by Connecticut in March 2007 to advance stem cell research by fostering effective interstate collaboration. Warren Wollschlager, Chief of the Office of Research and Development at DPH, serves as the founding chair of the IASCR. “The IASCR provides a wonderful forum for information exchange and collaborative planning across state lines, and contributes to the efficient and effective use of public funds,” Wollschlager stated.

A recent two-day IASCR meeting in Cambridge, MA was hosted by the British Consulate and attended by representatives from the nine states that currently support stem cell research (California, Connecticut, Illinois, Maryland, Massachusetts, New Jersey, New York, Rhode Island and Wisconsin). Other attendees included the British and Canadian governments, the National Academy of Sciences, the International Society for Stem Cell Research, and members of the public. Additional information regarding the IASCR can be found at their website at [www.IASCR.org](http://www.IASCR.org).

In the laboratories, the state’s funding has been critical to attracting new talent to help develop programs here.

“The money is already working hard, supporting core facilities funding research that will ultimately provide stem cell-based therapies,” says CASE member Laura Grabel, Fisk Professor of Natural Sciences at Wesleyan University and a recipient of funding in the initial round.

Sherman Weissman, CASE member and professor of genetics at Yale and co-manager of the Genomics and Proteomics Core of the Yale Stem Cell Center, agrees: “Connecticut’s state-funded stem cell research program has essentially made possible the establishment of a stem cell research program at [Yale] and the recruitment of an outstanding young scientist (Haifan Lin) to head the Cen-

(see Stem Cells, page 7)

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# IN BRIEF

## Science and Engineering Notes from Around Connecticut



### Business & Industry

**SOUND PIPELINE COURT RULING TO BE APPEALED.** **Islander East**, a partnership of KeySpan Energy and Spectra Energy, has indicated it will appeal a federal court decision that set aside a decision of the US Secretary of Commerce overruling the **State of Connecticut's** environmental-based objections to the 45-mile long gas pipeline that would pass 22 miles beneath **Long Island Sound**.

**CII FUNDS CARA THERAPEUTICS.** **Cara Therapeutics, Inc.** has received \$4 million from **Connecticut Innovations** to build a 41,000-square-foot facility, including laboratories, in Shelton. The company makes pain-relieving drugs.

**NEW PRE-SEED FUNDING PROGRAM AIDS STARTUPS.** Cheshire-based **Helix Therapeutics, LLC** (Helix) is the second Connecticut company to receive funding from **Connecticut Innovations'** (CI) new Pre-Seed Support Services Program. The funding will be used to help Helix develop a business plan that will focus the company's start up and growth strategy, utilizing the most current regulatory information and financial and market research analysis. In August 2007, Equity Health Partners LLC (EHP) of Chester was named the first company to benefit from the program. CI's Pre-Seed Support Services Program helps innovative, high technology entrepreneurs develop companies in Connecticut. The CI team provides mentoring, coordination of services and funding for business assistance that will prepare the technology company for future investments. The types of services that an entrepreneur may access through this program include: intellectual property reviews, technology reviews, business plan development and reviews, market analyses, market entry strategy development and other related services, in addition to direct investment by CI and its network of allied investor organizations.

**NEW HAVEN STARTUP GETS \$37 MILLION.** **Ophtherthon Inc.** has established its headquarters in New Haven after securing \$37 million in start-up financing. The company, founded by **Yale University** and University of Iowa researchers in 2005, develops products to diagnose and treat macular degeneration.

**WOMEN'S HEALTH FIRM GETS \$30 MILLION.** **Ikonisys Inc.**, a maker of cell-based diagnostic products for women's health and oncology testing, has received \$30 million of venture capital. The company, in Science Park in New Haven, plans to unveil two new tests in 2008. The tests are based on the company's Ikoniscope digital microscopy, a fully automated system that allows scanning and preliminary analysis of samples to take place in real time. The company's 60 employees is expected to 75 or 100 over the next year.

**UI, NRG PARTNER FOR NEW POWER PLANTS.** The **United Illuminating Company** has announced a partnership with NRG Energy of New Jersey to spend as much as \$700 million to build power plants in Connecticut to generate electricity during peak summer and winter periods. Plans must be submitted to the **Department of Public Utility Control** by February 1, 2008. The companies hope to have the plants in operation by summer 2009.



### Communication

**911 SURGE.** On October 29, during a 44-minute period, 911 operators at the **New Haven** emergency center received 519 non-emergency calls, about 20 times the typical call volume, from around the country. Although no emergency calls were missed, the system automatically rolls excessive calls to other phones in the center and to the Hamden 911 center or the State Police. The cause of the problem is being investigated. AT&T halted the non-emergency traffic by turning off the incoming calls through their source network. Calls came from as far away as Illinois, Florida, Texas, and Puerto Rico.

**COURT RULES FOR AT&T.** A Hartford Superior Court judge has ruled that **AT&T** does not have to obtain a statewide cable franchise for its U-verse service. Instead, the company can apply for a competitive video franchise, a new type of license created by a law that took effect October 1. More than 7,000 residents in 42 communities subscribe to the service. It is currently available to 150,000 homes statewide. AT&T maintained that U-verse uses different technology than cable television, therefore the company should not have to seek a cable franchise.

**CT TAXPAYERS GO ONLINE.** The Internal Revenue Service reported that a record number of Connecticut taxpayers had filed tax returns online during 2007. As of the beginning of September, more than a million taxpayers had filed electronically, a 10% increase compared with the same period last year. More than 260,000 filed from their home computers, 12% more than last year. Professional preparers E-filed 9% more returns than they did last year.

**VOTING VIDEOS.** **Secretary of State Susan Bysiewicz** posted a 90-second instructional video to the internet about the optical scanning voting machines being used for the first time in elections this year. The videos—in English and Spanish—were also posted on YouTube, the online video sharing site.

**NEW CONTROLS IN WAKE OF THEFTS.** The theft of a computer tape in Ohio last June and a state-owned laptop computer on Long Island in August has prompted **Governor M. Jodi Rell** to order new security controls, including specifying what kinds of confidential data can be loaded onto state laptops, new encryption programs, tougher reporting requirements when state laptops are lost or stolen, and expanded use of remote data access by employees in the field. A worker for a consulting company working on computer systems in Connecticut and Ohio accidentally transferred Connecticut data into an Ohio computer; the data, including information on state government bank accounts and purchasing cards, ended up on a backup tape that was stolen from an Ohio state worker's car. In August, a state-owned laptop containing 106,000 Connecticut taxpayers' names and social security numbers was stolen from a Revenue Services Department employee's car.



### Education & Cognition

**TRUST ME, TRUST MY AVATAR.** **Christine Nowak** and **Christian Rauh** of the **Human-Computer Interaction Laboratory** at the **University of Connecticut** have found that avatars—images rep-

*Items that appear in the In Brief section are compiled from previously published sources including newspaper accounts and press releases. For more information about any In Brief item, please call the Academy at (860) 527-2161, write the editors at CASE Bulletin, 179 Allyn St., Suite 512, Hartford, CT 06103-1422, or email us at acad@ctcase.org*

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resenting humans in cyberspace—are perceived as more human-like and more trustworthy when they have clear male or female characteristics than their androgynous counterparts. In the study, reported in the *New Scientist*, participants were instructed to “get to know their partner” represented by an avatar. Avatar images tested included two male and two female human-like characters, a blond girl with pigtails and a ketchup bottle with a face. The researchers found that androgynous avatars are perceived as less humanlike than distinctly male or female avatars, and the perception of the avatar’s credibility is driving the perception of the person’s credibility.

**NEW NAME REFLECTS EVOLVING MISSION.** Governor **M. Jodi Rell** signed into law a bill changing the name of the **Department of Mental Retardation** to the **Department of Developmental Services** effective October 1. The name was changed to reflect the agency’s mission—including the planned expansion of an ongoing pilot program to serve patients with autism spectrum disorders—without suggesting its mission was changing or the services it provides would be altered.

**STATE GETS \$13 MILLION MATH, SCIENCE GRANT.** Connecticut is one of seven states awarded grants from the National Math and Science Initiative to bolster math and science education and promote interest in careers in the sciences and technology. The \$13.2 million grant was awarded to the **Connecticut Business and Industry Association’s (CBIA) Education Foundation** in partnership with the **Connecticut Academy for Education in Mathematics, Science, and Technology**, the **Connecticut Science Center**, and the state departments of education and higher education. CBIA said the association plans to work with high schools in **Ansonia, Coventry, Danbury, East Hartford, Hartford, New Britain, New London, Putnam, Stamford, and Waterbury**. The grant will help pay for teacher training and incentive programs to help students succeed in Advanced Placement and pre-Advanced Placement high school courses and exams that can lead to granting of college credits. The grant targets schools where students have had limited access to advanced courses or have not enrolled in significant numbers.

**COLLEGE ENROLLMENT CONTINUES TO RISE.** Enrollment in Connecticut colleges broke records for the sixth year in a row, according to the **Department of Higher Education**. At the top was the **University of Bridgeport** with an increase of 18.3%. **Asnuntuck Community College** in Enfield had a 9.4% gain. Overall, public schools grew by 1.6% to 112,495 students. Private colleges grew by 0.9%, with registrations of 65,395 students. **Higher Education Commissioner Valerie Lewis** said 58% of the high school graduating class last year chose to attend college in Connecticut, compared to 48% a decade ago. “Both public and private colleges have gained in quality and we have seen them all beginning to pay more attention to the state’s needs for business growth, such as engineering,” Lewis said. Asnuntuck, which led the community colleges in enrollment gain, offers courses to meet the needs of aerospace manufacturers in the region, which are seeking trained workers to replace their retiring employees.



## Environment

**2007 MOSQUITO TESTING RESULTS REPORTED.** During 2007, researchers at **The Connecticut Agricultural Experiment Station** in New Haven collected a total of 156,682 mosquitoes from 92 sites and tested them for viruses. They found West Nile virus 69 times, eastern equine encephalitis virus four times, and

Jamestown Canyon virus 42 times. Detailed results and a map showing virus activity in the state are available at the Experiment Station’s web site: [www.ct.gov/caes](http://www.ct.gov/caes).

**WATER DISCHARGE SOURCES FOUND NONCOMPLIANT.** **Environment Connecticut** released a report: “Troubled Waters: An Analysis of 2005 Clean Water Act Compliance” that showed 74% of discharge sources categorized as “major” were found to be out of compliance with the federal Clean Water Act. The study found that 80 of 108 sources, including industrial and municipal sewage facilities, had exceeded their discharge permits at least once during the year.

**USED TIRE SITE TO BE COVERED.** An agreement has been reached to use dredged materials from New York Harbor to cover a 29-acre site in **Hamden** and **North Haven** that contains millions of used tires. The agreement would extinguish “the danger of catastrophic fire that could severely contaminate the surrounding area,” according to **State Attorney General Richard Blumenthal**.

**CT YANKEE REMEDIATION COMPLETE.** The **Department of Environmental Protection** announced in late October that the long-term environmental remediation at the **Connecticut Yankee** nuclear power plant in Haddam has been completed subject to long-term ground water monitoring which began in June. The plant stopped operating in 1996. The containment structure was removed in 2006.



## Energy

**TOWANTIC POWER PLANT GETS OKAY.** A bankruptcy court in Manhattan has approved a settlement that will allow the General Electric Company to move ahead with the long-delayed **Towantic** power plant in Oxford. The 512 megawatt natural gas-fired plant has been in the works for eight years. The **Aircraft Services Corp.** unit of GE is taking over the project from Calpine Corp., which filed for bankruptcy protection in 2005. GE must commit to build the plant by April 30, 2008 and the **Connecticut Siting Council** will require the plant to be finished by the end of 2011.

**NEW NATURAL GAS STORAGE FACILITY.** Filling of a 1.2 billion cubic-foot liquefied natural gas storage facility in **Waterbury** was completed by **Yankee Gas Services** this fall. The \$108 million plant will allow Yankee Gas to purchase natural gas when demand and prices are low for storage in liquid form for use during the coldest days of winter when demand and prices usually are higher.

**NRG CHALLENGES DPUC DECISION.** NRG Energy, a New Jersey company, has filed an appeal of a **Department of Public Utility Control** decision to select Kleen Energy Systems to build a 620-megawatt plant in Middletown instead of NRG’s proposal to build a similar, 630-megawatt natural gas plant in Montville. NRG questions some of the market assumptions of the DPUC and contends in the suit filed in New Britain Superior Court that the Kleen Energy plan would cost \$32 million more than NRG’s proposed plant. The appeal focuses on the way the DPUC treated the fact that the NRG proposal combined construction of 630 megawatts of new power with shutting down more than 400 megawatts of older generation facilities.

**ENERGY REDUCTION A PRIORITY.** A **Connecticut Business and Industry Association** survey indicates that three out of four Connecticut businesses have taken steps to reduce energy costs

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this year. Out of a total of 967 respondents, 69% said they had replaced light fixtures, 49% had updated heating and air conditioning systems, 27% conducted energy audits, and 26% had installed energy-efficient non-lighting equipment.

**SUMMER SAVER PROGRAM A SUCCESS.** More than 309,000 customers of **United Illuminating** and **Connecticut Light & Power** who reduced their electricity consumption of 10% or more for the three months ending September 30 (compared to the same period in 2006) are receiving credits totaling nearly \$18 million from the utilities under the state's new **Summer Saver Rewards Program**. The Summer Saver program, which was enacted this year, was open to all electricity customers who lived or had a business operating in the same location in 2006.



### Food & Agriculture

**"V-NOTCH" LOBSTER PROGRAM OKAYED.** The American Lobster Management Board said the state's V-notch lobster program can substitute for a scheduled lobster size limit increase planned for 2008. Under the program, tails of mature female lobsters are notched with a "V" shape, returned to the Sound, and protected from capture for two years until the notch grows out. The hope is that the females will reproduce and help replenish the lobster population, depleted by a die-off in 1999. The Board said 60,000 mature females will have to be notched per year as a substitute for the abandoned 1/16th inch size increase. Lobstermen will be compensated for each lobster caught, notched, and returned to the water. The program will employ students from the **Bridgeport Regional Aquaculture School**, the **Sound School** in New Haven, and **Ella Grasso Southeastern Technical School** in Groton to do the notching and keep track of the number of female lobsters thrown back.

**LEARNING TO EAT HEALTHIER.** The state **Department of Education** has selected 25 schools and residential care institutions to participate in the USDA Fresh Fruit and Vegetable Program. The schools, selected by a competitive grant process, represent a cross section of rural, suburban and urban communities and include 13 schools where 50% of the enrolled students are eligible for free and reduced price meals. The program allows the schools to offer fresh fruits and vegetables, free of charge, to students throughout the school day. The goals of the program include providing healthier food choices, increasing fruit and vegetable consumption, and expanding the variety of fruits and vegetables the students experience. The grants to the schools range from \$8,292 to \$103,120.

**STATE FARMING RANKS HIGH.** Despite its high population density of about 1 inhabitant per acre for each of its 3 million acres, Connecticut was the number two agricultural state in New England in 2006, according to the **New England Office of the National Agricultural Statistics Service**. Connecticut had farm sales of \$503 million, close behind top-ranked Maine's \$593 million. The value from greenhouse and nursery totaled \$248 million. Milk sales at \$52 million were the next largest contributor.

**VERIFYING THE HIGH RANK OF CT FARMS.** To get directions, satellite views and links to websites for Connecticut farms open to the public, visit the state **Department of Agriculture's** new website at <http://www.ct.gov/doag/cwp/view.asp?a=1368&q=259128>. The website, designed to help users to find agricultural products and destinations, allows searches by product, county, or farm name.

**NEW FARMLAND PRESERVATION BOARD MEETS.** The new **Connecticut Farmland Preservation Advisory Board** held its first meeting in October. The Board was created in July when **Governor M. Jodi Rell** signed legislation that provides lump sum bonding of at least \$5 million twice a year for farmland preservation over the next two years. The 12-member Board's major mission is to help find ways to expedite the process of preserving active farmland throughout the state.

**DROUGHT ADVISORY ISSUED.** **Governor M. Jodi Rell** issued a drought advisory for the state on October 5, asking residents to reduce water use. Barely two inches of rain were recorded at **Bradley International Airport** during August and September. The average is 8 inches for the period. The **Housatonic** and **Naugatuck Rivers** were flowing at low levels and reservoirs in some towns had fallen to 70% of capacity. **Bristol, Manchester, Norwich, Sprague, Greenwich, and Sharon** enacted emergency water use restrictions.



### Health

**HEALTH 'ILLITERACY' COSTLY.** A **University of Connecticut** study shows that health illiteracy—failure to understand doctor's orders, prescription instructions, or other health information—costs between \$106 and \$238 billion per year. **John A. Vernon**, UCONN health economist and lead author of the study, said losses include costs of emergency room visits, delayed disease detection, unhealthy lifestyles, misunderstanding health care workers, and taking medicines incorrectly. The other costs, such as lost time for work and other secondary costs, are probably much higher, he said. He found that 36% of American adults have basic or below basic health literacy skills and only 10% are considered proficient. The study indicates that if health illiteracy could be eliminated, the savings would be enough to insure all of the 47 million people who lack insurance.

**STUDY SHOWS ETHNICITY, DENTAL HEALTH LINKED.** A **Connecticut Department of Public Health** report indicates that one out of every three children in preschool had at least one filling or untreated tooth decay. By third grade, 35% of white children, half of African-American children, and 63% of Hispanic children had fillings or untreated decay. Rampant decay, five or more teeth with decay, was found in 1 out of 10 white children and one out of five nonwhite children.

**SPLIT-LIVER TRANSPLANT PERFORMED.** The first split-liver transplant—transplantation of a portion of an adult liver into a child—has been performed at **Yale New-Haven Hospital**. The 7-month old patient received the new liver during eight-hours of surgery by **Sukru Emre**, the hospital's transplant director. The transplanted sections will not grow, but the remaining portion of liver can grow back to original size over about eight weeks. Emre plans a split liver transplant from a live person. Using split transplants should greatly reduce the mortality of children awaiting liver transplants.

**HEART DISEASE GENE IDENTIFIED.** Researchers at the **University of Connecticut Health Center's Pat and Jim Calhoun Cardiology Center** have identified a gene that they believe plays a significant role in the development of heart disease. Lead investigator **Lixia Yue** says the TRPM7 gene provides a conduit that allows calcium to get into fibroblasts, which are a type of heart cell. Abnormal calcium levels can lead to cardiac fibrosis, which can cause irregular heartbeat, enlarged heart, heart

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failure, and cardiac death. Control of the calcium level could control or stop fibrosis.

**YALE TO USE GRANT FOR STRESS CENTER.** The **Yale University School of Medicine** has received a \$23.4 million grant from the National Institutes of Health Roadmaps for Medical Research Initiative. The program will bring together multidisciplinary groups to study the link between stress and the loss of self-control that leads to drinking, overeating, and smoking. Yale will establish a Stress Center and create a consortium with scientists at the University of California and Florida State University. Research at Yale will likely involve large population-based studies of the relationship between stress and loss of control. The project will also involve 10 research projects that investigate mechanisms regarding use of tobacco, alcohol, and unhealthful foods.

**NO EVIDENCE OF 'CHRONIC' LYME DISEASE.** An article in the *New England Journal of Medicine* coauthored by **Henry M. Feder Jr.**, of the **University of Connecticut Health Center** and **Allen C. Steere** of the **Yale University School of Medicine** and others states that there is no evidence that Lyme disease can be chronic and recommends against long-term treatment with antibiotics. The authors concluded that "The assumption that chronic, subjective symptoms are caused by persistent infection with *B. burgdorferi* is not supported by carefully conducted laboratory studies or by controlled treatment trials. Chronic Lyme disease, which is equated with chronic *B. burgdorferi* infection, is a misnomer, and the use of prolonged, dangerous, and expensive antibiotic treatments for it is not warranted."

**JOB-RELATED ILLNESSES.** A study prepared for the **Connecticut Worker's Compensation Commission** by **Tim Morse** of the **University of Connecticut Health Center** found reports of 4,851 occupationally-related illnesses during 2005 based on the state **Labor Department/Bureau of Labor Statistics** (BLS) survey. More than half were caused by long-term repetitive motion, such as tendonitis and carpal tunnel syndrome. Other findings include an increase in reports of lung diseases such as acute respiratory conditions and asthma of 36%, and a 35% increase in elevated blood lead levels in adults based on lab reporting data filed with the state **Department of Public Health** (see <http://www.uchc.edu/ocomm/newsreleases07/aug07/occupationalillnesses.html>). The overall rate of occupationally-related illnesses in the state, according to Morse, is 20% higher than the national average.



### High Technology

**MATCHING GRANT WILL HELP FUEL CELL RESEARCH.** The **University of Connecticut** has received \$2 million in matching private funding to help underwrite the university's new fuel-cell research program. The money comes from the **Northeast Utilities Foundation**, **United Technologies Corp.**, and **FuelCell Energy of Danbury**. Last year, the General Assembly set up a \$2 million annual expenditure for alternative energy research, requiring a matching contribution from state companies. New faculty are being recruited to pioneer new energy technologies and train energy workers and entrepreneurs, to help meet the state goal of reducing fossil fuel consumption by 20% by 2020.

**MOLECULAR DISCOVERY KEY TO VISION LOSS.** A discovery at the **University of Connecticut Health Center** could help reduce the incidence of blindness. **Timothy Hla**, director of the **Center for Vascular Biology**, determined that a molecule found in blood plasma (sphingosine 1-phosphate) may hold one of the

keys to vision loss caused by diabetes or age-related macular degeneration. The researchers found a specific receptor that binds to the molecule is necessary for blood vessel abnormalities that often lead to blindness in people with these conditions. Drugs or therapies that inhibit the receptor could be useful in treatment.

**ELECTROCHEMICAL HYDROGEN SEPARATOR SHOWS PROMISE.** The **Connecticut Clean Energy Fund**, **FuelCell Energy** and the **University of Connecticut** have announced that an Electrochemical Hydrogen Separator (EHS) at the **Connecticut Global Fuel Cell Center** was successfully operated for over 6,000 hours with practically no change in its performance. Results have shown that significant operating cost savings of 30-60% are possible when compared to today's commercially available hydrogen separation systems.

**NANOTUBES MAY BE TOOL AGAINST COMMON BACTERIA.** **Yale** scientists have produced the first direct evidence that single-walled carbon nanotubes (SWCNTs) can kill common bacteria like *E. coli* by severely damaging their cell walls. CASE member **Menachem Elimelech**, senior author on the paper in the *American Chemical Society Journal Langmuir*, said that studies of the toxicity of multi-walled carbon nanotubes indicate that they are less toxic than SWCNTs. SWCNTs might eventually be used to create antimicrobial coatings with their toxicity controlled by embedding them to prevent leaching into the environment.



### Transportation

**MORE MONEY FOR I-95 BRIDGE PROJECT.** The **South Central Region Council of Governments** has approved an additional \$500 million in spending for the new **Pearl Harbor Memorial Bridge** over New Haven Harbor. The project total is now set at \$1.36 billion for the new bridge and to reconstruct the junction of I-95, I-91 and Route 34. The project, currently scheduled for completion in 2016, has been split into several parts because no bids were received for the entire project.

**AVON MOUNTAIN PLAN DRAFTED.** Prompted by a near-fatal truck accident on Route 44, the state **Department of Transportation** has drafted a preliminary plan to build a runaway truck ramp at the base of **Avon Mountain**. The design employs metal netting with four-and-a-half foot walls to enclose and slow down a runaway truck. The ramp would stop trucks of up to 40 tons going 90 mph.

**RUSH HOUR GETS LONGER.** A study by the Texas Transportation Institute estimates rush hour in southwestern Connecticut increased by two-tenths of an hour between 2004 and 2005 to 7.4 hours. The delays cost drivers and businesses \$280 million per year. Travelers in the **Bridgeport-Stamford** area experienced an average of 31 hours of delay per year. The national average is 38 hours.

**NEW UNIT AT CONNDOT.** A new unit, the **Office of Project Oversight and Quality Assurance**, has been created at the **Department of Transportation** to provide oversight of the department's capital projects. Duties of the new department will include reviewing design plans and documents for all projects costing over \$10 million, making sure that inspections are properly conducted, reviewing engineering estimates that increase by more than 10% during the design process, and maintaining a database of cost overruns.

— Compiled and edited by Paul Gough

### ◆ Sleep Deprivation and Emotion

Those who are sleep deprived may have more trouble controlling their emotions than those who get eight hours a night. A recent study concluded that people who have been deprived of sleep have greater reactions to negative visual stimuli than those who are well rested.

The study, conducted by researchers at the University of California, Berkeley, and Harvard Medical School, measured activity in the amygdala, the part of the brain that controls emotional reactions. Subjects were shown pictures that ranged from neutral to negative. An MRI scanner showed that the group who had been deprived of sleep had higher levels of activity in the amygdala, particularly when viewing negative images.

[[http://books.nap.edu/catalog.php?record\\_id=11617](http://books.nap.edu/catalog.php?record_id=11617)]

### ◆ MRSA More Common Than Thought

Infections caused by methicillin-resistant *Staphylococcus aureus* (MRSA) are becoming more common and deadly, and not just in hospitals where the incidence of MRSA has already been documented, according to a new study led by researchers at the Centers for Disease Control and Prevention.

Most drug-resistant staph infections are mild skin infections. But this study focused on the invasive infections that enter the bloodstream or destroy flesh. The researchers estimated that there were 94,360 cases of invasive MRSA in the United States in 2005, resulting in more than 18,000 deaths. Nearly 14% of the cases were not associated with health care facilities. Senior citizens were most vulnerable, and blacks were more likely than whites to be infected.

Published in the *Journal of the American Medical Association*, the study underscores the need to develop new antibiotics and curb the unnecessary use of those already available. Researchers note that patients should be treated with the few remaining effective drugs before they develop serious complications.

[<http://www.nationalacademies.org/headlines/20071025.html>]

### ◆ Competition from Abroad Threatens US Lead in Mechanical Engineering Basic Research

Although the United States is among the world's leaders in mechanical engineering basic research, international competition is shrinking that lead, according to a new report from the National Research Council. A decline in the number of US citizens seeking advanced mechanical engineering degrees, and questions about whether the nation can continue to attract foreign students, also threaten American dominance in this field.

The report highlights the main findings of a benchmarking exercise to rate the standing of US mechanical engineering basic research relative to other regions or countries, key factors that influence US performance in mechanical engineering research, and near- and longer-term projections of research leadership.

The United States now holds a position among the leaders in most areas of mechanical engineering basic research, the report finds, but because of the advance of mechanical engineering in other nations, competition is increasing and the US lead will shrink. The United States is particularly strong in areas at the interface with other disciplines. In these areas, which include bioengineering, design, and mechanics of materials, the United States will maintain the leadership position in spite of growing competition. In some core areas where the US position is currently not as strong, such as acoustics and dynamics, dynamics and controls, computational mechanics, and tribology, the US position may continue to fade.

[[http://books.nap.edu/catalog.php?record\\_id=12055](http://books.nap.edu/catalog.php?record_id=12055)]

ter." However, Weissman cautions that while stem cell research has "broad potential for the long term ... it will take years of development before it is ready to be tested in any clinical setting."

Dr. Lin was recruited from Duke University, where he founded and co-directed of that school's internationally renowned stem cell research program. Lin now heads the Yale Stem Cell Center at the Yale School of Medicine.

He sees the state grants as "an unprecedented opportunity to work together with the University of Connecticut, Wesleyan University, and industry to establish Connecticut as a world-class state for stem cell research." He notes that the funding Yale received "has generated a transforming impact on stem cell research at Yale—it for the first time allows Yale to launch a human embryonic stem cell research program." The funds have allowed Yale to build core facilities, "to make it possible for research labs at Yale to conduct human embryonic stem cell research."

In addition, Lin says, the state money has "stimulated Yale scientists to embark on stem cell research," noting that in the first year of funding, the number of human embryonic stem cell research labs at Yale has grown from one to nine; by the end of 2008, at least 14 Yale laboratories will be involved in this research. The funding also enhances the university's ability to recruit world-class faculty and research scientists, and helps the state's biotech industry by encouraging academic-industry partnerships.

Like Weissman, Lin cautions that "stem cell-based therapies cannot be achieved overnight" but he is excited about the prospects for Connecticut, and believes that only by maintaining the current "exciting momentum" can researchers "accelerate the translation of discoveries in research labs to clinical and industrial applications."

Grabel concurs.

"It may be years before any embryonic stem cell therapy makes it into the clinic... Many roadblocks still exist to the successful implementation of human embryonic stem cell therapies.... However, the argument that we should not fund the research because we have not yet seen a cure seems absurd to me. How will we ever produce new cures if we don't do the basic research to test their efficacy?"

#### *In the Laboratories: Hopes and Expectations*

For Weissman, state funding has allowed his laboratory to undertake what he calls "an ambitious program to analyze on a whole genome basis, which gene activities are needed for various early stages of nerve cell differentiation. This could provide a basis for understanding how various genes might affect the development of common psychiatric disorders, and perhaps provide the lines along which reagents might be developed to promote repair in the nervous system."

In the Grabel Laboratory at Wesleyan, the focus is on identifying the conditions that promote the transition of embryonic stem cells into neurons, with particular inter-

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est in the early stages of this event—the production of neural stem cells that can differentiate into all the cells of the nervous system.

Milton Wallack predicts the public will see three “plateaus” of success—and accompanying benefits—as researchers move toward their goal of developing new therapies for debilitating diseases. The earliest benefits, including “better and more timely testing of new drugs,” are likely to be realized in the very near term, he says. Since stem cells can be used to test drugs, researchers will no longer have to rely on longer-term animal and human models; this has the potential to reduce both the cost and the lead time for drug research and development, which could allow more effective drug therapies to reach patients sooner. Other benefits, such as successful regenerative therapies for spinal cord injuries, will take much longer—“10, 12, even 15 years down the road,” according to Wallack.

*At a ‘Critical Juncture’*

“We are at a critical juncture for this field,” says Grabel. “Due to the federal restrictions, we have not really launched the kind of all-out effort appropriate given the potential to design new, broadly-based approaches to treat a large number of diseases and injuries. State initiatives are helping to fill the funding gap left by [federal] restrictions.”

“We as scientists cannot ‘see around corners’ to be able to predict precisely what or when practical applications will come out of stem cell work,” cautions Yale’s Weissman. “However, it is in principle the most promising way to look for long-term solutions for repairing defects in various parts of the body... In the long term, there are any number of areas where this research could lead to newer and more effective treatment or even cures of common disorders.”—**Martha Sherman, Connecticut Academy of Science and Engineering**

*[Editor’s Note: In March of 2007, at the request of the Connecticut Stem Cell Research Advisory Committee and the Connecticut Department of Public Health, CASE was asked to provide guidance and advice in developing a strategic plan “to ensure the long-term viability and sustainability of Connecticut as an International Center for Excellence for Stem Cell Research.” That report, entitled Guidelines for Developing a Strategic Plan for Connecticut’s Stem Cell Research Program, was issued in May of 2007, and is available at the Academy’s website at [www.ctcase.org/reports/stemcells.pdf](http://www.ctcase.org/reports/stemcells.pdf).]*

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