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## MacArthur Fellow Mary Tinetti's Research Challenges Assumptions about Elderly Falls

Mary Tinetti, CASE member and Gladys Phillips Crofoot Professor of Medicine and Epidemiology and Public Health in the Division of Geriatrics at Yale School of Medicine has been named a 2009 MacArthur Foundation Fellow. She received the award in recognition of her research "challenging prevailing notions of falls as unavoidable accidents associated with advanced age and identifying risk factors that contribute to morbidity due to falls." ([www.macfound.org](http://www.macfound.org))

The MacArthur Fellows Program awards unrestricted fellowships to talented individuals who have shown extraordinary originality and dedication in their creative pursuits and a marked capacity for self-direction. The three criteria for selection include exceptional creativity, promise for important future advances and the potential for the fellowship to facilitate subsequent creative work. The MacArthur Fellowship provides a \$500,000 "no strings attached" award and is intended to enable recipients to exercise their own creative instincts for the benefit of human society. CASE sat down with Dr. Tinetti recently.

### *CASE: What led you to focus your work on falls and their impact on the elderly?*

When I was first doing my training in geriatrics in at the University of Rochester and Monroe Hospital in Rochester, New York, Dr. Frank Williams identified falling as a health problem that was common, but largely neglected. Everyone knew that falling happened, but considered it an inevitable part of the aging process. It was not considered a problem that physicians could do anything about. Dr. Williams didn't believe this. He considered it a health problem like heart disease or strokes. His belief was that if we could understand it, then we could address it. Like many aspects of science and medicine, it was a mentor who spurred my interest.

(Tinetti, page 2)

## CT Medal of Technology Awarded to Rothberg

CASE member Jonathan M. Rothberg, chairman, CEO and founder of Guilford-based Ion Torrent™, was recognized for his development of innovative genomic technology. He is the founder of four genomics companies in his home state of Connecticut and has brought jobs, opportunity and innovation to the state.

In 1991, Rothberg founded New Haven-based CuraGen, one of the first companies to develop drugs based on genomics. In 2004, he founded 454 Life Sciences, based in Branford, which pioneered an entirely new way to sequence genomes. Rothberg founded the Guilford-based Ion Torrent in 2007 and is also founder of the Rothberg Center for Childhood diseases and RainDance Technologies, a provider of innovative microdroplet-based solutions that accelerate human health and disease research.



Jonathan Rothberg with the Ion Personal Genome Machine™ (PGM) Sequencer

[Photo courtesy of Jonathan Rothberg]

Ion Torrent has pioneered an entirely new approach to genetic sequencing that enables a direct connection between chemical and digital

(Rothberg, page 7)

## News from the National Academies

The following is excerpted from press releases and other news reports from the National Academies ([www.national-academies.org](http://www.national-academies.org)).

### ◆ Strong Evidence on Climate Change Underscores Need for National Strategy, Action Now

As part of its most comprehensive study of climate change to date, the National Research Council has issued three reports emphasizing why the United States should act now to reduce greenhouse gas emissions and develop a national strategy to adapt to the inevitable impacts of climate change. The reports by the Research Council are part of a suite of five studies, requested by Congress, known as *America's Climate Choices*.

The compelling case that climate change is occurring and is caused in large part by human activities is based on a strong, credible body of evidence, says *Advancing the Science of Climate Change*, one of the new reports. The report emphasizes that multiple lines of evidence support scientific understanding of climate change, and concludes that the core phenomenon, scientific questions, and hypotheses have been examined thoroughly through serious debate and the careful evaluation of alternative explanations.

"Climate change is occurring, is caused largely by human activities, and poses significant risks for—and in many cases is already affecting—a broad range of human and natural systems," the report concludes. It calls for a new era of climate change science where an emphasis is placed on "fundamental, use-inspired" research, which not only improves understanding of the causes and consequences of climate change but also is useful to decision makers at the local, regional, national, and international levels acting to limit and adapt to climate change. Seven cross-cutting research themes are identified to support this more comprehensive and integrative scientific enterprise.

(National Academies, page 7)

**CASE: Do you have any figures on how many older adults die each year from injuries sustained in a fall that could otherwise have been prevented?**

There are two answers to this question, one is the simple answer, and the other is more complex.

The Center for Disease Control (CDC) monitors this quite carefully. Each year between 10,000 and 12,000 older people die from falls. Falls are between the sixth and seventh most frequent cause of death for older adults. However, older people don't usually die of just one thing. Older people die because of the cumulative effect of assorted conditions—hip fracture, heart or lung disease, cancer—so falls may be one of the contributing factors.

**CASE: We speak of older adults as being more susceptible to falls. Is there a particular age when you would consider an individual to be more vulnerable to falls and their deleterious impact?**

There is no one age when we can say below this you're not at risk or above this age, you are. The falls that we study are the ones

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that happen under usual daily activities, not under extraordinary circumstances such as skiing. Falling during usual activities begins to increase in frequency around age 70 to 75.

**CASE: What are some of the specific risk factors that predispose older adults to falls?**

We have done very careful studies. There have been dozens of studies and we found that no one factor is more important than others. These are some of the primary risk factors contributing to falls:

- Gait is important. If someone looks unsteady when they walk—that's a risk factor.
- Blood pressure that drops too much when people stand up.
- Medication is a very common factor. The more medications one takes, the greater the risk. Blood pressure drugs, anti-depressants, and sleep aids all contribute to a greater risk.
- Decreased muscle strength is a factor.
- Vision is important, particularly in terms of depth perception. Cataracts that interfere with depth perception contribute to this risk.
- A disease such as Diabetes increases risk through several mechanisms. Diabetes affects vision obviously and can also result in decreased proximal muscle strength, making it difficult to transfer from bed or chairs. Also, peripheral neuropathy decreases proprioception [the sensory input and feedback that tells us about movement and body position-Ed.] Finally, diabetes medications may cause falls if glucose gets too low.
- The environment is a risk factor in terms of things that can be tripped over.

The more these factors are present, the greater the risk of a fall.

**CASE: Is there an inter-relationship between falls and social factors including income, gender and home versus institutional living?**

I have not seen any data that income level alone has an impact on falls outside of those aspects of income that effect nutrition and proper health care. Rich people and poor people alike are vulnerable to falls.

In terms of gender, the evidence is mixed. Men and women are probably equally likely to experience falls beyond the age of 80 years but some studies indicate women may be more likely to fall than men. However, if a fall occurs, women are more likely to experience a fracture as their injury, whereas men are more likely to experience a head injury. Women have more fragile bones due to osteoporosis.

The rate of falling is much higher for people living in nursing homes when compared to older people living in the community. This is generally because those adults living in nursing homes are more frail than those living on their own.

**CASE: What specific measures are most useful in preventing falls?**

The most effective prevention is a multi-factorial prevention. When looking at the strategies that are most effective we first identify factors that are the greatest risk and intervene on those factors to reduce risk. For example, we look at balance and gait, and then suggest physical therapy to show people how to walk more safely. The PT also instructs on progressive balance exercises and muscle strengthening exercises.

In some cases we recommend a walker or a cane. It is true that sometimes care providers think walkers are good for everyone, but they can cause as much trouble as they can help. There are specific indications—specific reasons or manifestations—for walkers as well as right and wrong ways to use them. Sometimes walkers are over-used and sometimes under-used. A physical therapist is best

(Tinetti, page 8)

# IN BRIEF

## Science and Engineering Notes from Around Connecticut



### Biomedical Research

**CURE HONORS CT BIOMEDICAL RESEARCH.** Pfizer received the **Connecticut United for Research Excellence (CURE)** Award for Excellence for several Alzheimer's clinical projects underway and others in early development at its Groton research site. **Jon Soderstrom**, who manages **Yale University's** technology and other intellectual property, received CURE's Atlas Award for Venture Capital Achievement. Soderstrom has led Yale's participation in over 25 bioscience and biotechnology ventures worth more than \$350 million in venture capital. The New Operations Award went to **MannKind Corp.**, for the custom processes at its Danbury plant in the manufacture and packaging of its Afrezza brand of insulin therapy, a drug/device combination. German pharmaceutical company **Boehringer Ingelheim**, with US headquarters in Ridgefield, received the Education Award. Boehringer funds Science Quest, designed for elementary school children, which includes a state-of-the-art mobile laboratory.

**CARBON NANOTUBES BOOST CANCER-FIGHTING CELLS.** Yale engineers have found that the defects in carbon nanotubes cause T cell antigens to cluster in the blood and stimulate the body's natural immune response (*Langmuir*, April 20). The findings could improve current adoptive immunotherapy. Adoptive immunotherapy is used to fight cancer and involves extracting a patient's blood so that T cells (a type of white blood cell that is often suppressed by tumors) can reproduce more effectively in the laboratory. Scientists boost the production of T cells outside the body using different substances that encourage T cell antigens to cluster in high concentrations. The Yale team, led by **Tarek Fahmy**, associate professor of chemical engineering and biomedical engineering at Yale and senior author of the paper, had previously reported the unexpected effect that carbon nanotubes had on T cell production. Now they have discovered that the increased stimulation is the result of antigens clustering in high concentrations around the tiny defects found in the carbon nanotubes.

**UCONN OPENING NEW RESEARCH FACILITY.** The **University of Connecticut** is set to open its new **Cell and Genomic Sciences Building** in July. A former research and testing facility, the building is located in Farmington near **UConn's Health Center (UHC)** campus. With open labs that flow into each other, the facility is designed to promote interdisciplinary research among academic and industry chemists, geneticists, physicists, mathematicians, cell biologists, and computer scientists. "Our goal is to maximize the state's investment in stem cell research by establishing an infrastructure to support scientists in their quest of turning discoveries at the bench into therapies for diseases such as autism and cancer and to advance the field of regenerative medicine," says CASE member **Marc Lalonde**, senior associate dean for research planning and coordination at UHC, director of UConn's Stem Cell Institute, and professor and chairman of genetics and developmental biology.

**HISTORX RECEIVES CI LOAN.** New Haven-based bioscience company **HistoRx Inc.** secured a \$1.5 million loan from **Connecticut Innovations**, the state's quasi-public authority responsible for technology investing. HistoRx will use the money to build out laboratory space and purchase new equipment. The five-year-old company has developed a technology that quantifies specific

protein expression within different parts of the cells in cancerous tissue samples. The information allows researchers and clinicians to determine which drugs may be best suited to fight a particular patient's cancer, while more accurately predicting a patient's response to treatment, the company said.



### Business & Industry

**CBIA PLEASSED WITH REGULATORY REFORM.** The **Connecticut Business and Industry Association (CBIA)** announced that it was pleased with the passage of Public Act 10-158, *An Act Concerning the Permit and Regulatory Authority of the Department of Environmental Protection*. The law calls for the establishment of an Office of the Permit Ombudsman within the **Department of Economic and Community Development**. The regulatory reforms are designed to make it easier for Connecticut companies to do business with the state **Department of Environmental Protection**, thus sparking greater economic development. The legislation includes establishment of time frames for completing review of permit applications and a program for expediting permits for projects of economic significance.

**UTC'S RESEARCH ARM EXPANDING TO EUROPE.** **United Technologies Corp.** announced in April that it will open **United Technologies Research Centre Ireland** to collaborate with European partners in technology for energy efficiency and sustainability. UTRC Ireland will open with 10 to 15 scientists and engineers within a year, and will eventually employ about 40 people.

**KAMAN BUYS CA DISTRIBUTOR.** **Kaman Corp.** in Bloomfield has moved into distribution of motion control and automation gear with its **Kaman Industrial Technologies Corp.** unit's \$39 million purchase of Minarik Corp, a California high-technology distributor. The deal closed April 30. Founded in 1952, Minarik also carries leading brands of sensors, drives, motors and automation control products sold to US manufacturers. It has 200 employees in 16 branch locations. Sales in 2009 were about \$84 million.

**GREENSKIES OPENS HQ IN MIDDLETOWN.** **Greenskies Renewable Energy LLC**, a Connecticut designer-installer of commercial and residential solar-power systems, opened its headquarters in mid-May in the Landmark Square office-retail complex in downtown Middletown. The year-old company designs, finances, installs, and maintains photo-voltaic solar systems throughout the Northeast and Mid-Atlantic states.

**EB GETS MORE NAVY WORK.** Groton-based **Electric Boat**—a division of **General Dynamics**—was awarded a \$6.4 million US Navy contract modification to make special tooling for submarines for the British and US navies. The change is to a \$76 million contract announced in December 2008 for a missile compartment on the new submarine being developed for the two navies.



### Communication

**NEW AT&T-CT CEO, WIRELESS NETWORK EXPANSION.** In March, AT&T announced that **Rodney A. Smith** was named presi-

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

# IN BRIEF

## Science and Engineering Notes from Around Connecticut

dent of **AT&T Connecticut**, succeeding **Ramona Carlow**, who was named AT&T's vice president of public policy and strategy. Smith is a former Congressional deputy chief of staff, corporate communications officer and a Washington newspaper editor, reporter and columnist. He is charged with expanding AT&T wireless and U-verse video service to more Connecticut consumers. Earlier in February, AT&T announced the addition of 20 new cellular sites for Connecticut in 2010. The company said wireless data traffic on its network has grown more than 5,000% over the past three years, largely attributed to more people using advanced smartphones.

**NATIONAL CYBERSECURITY INITIATIVE.** The Obama administration recently released a national plan to secure public and private sector networks. The Comprehensive National Cybersecurity Initiative consists of 12 priority areas, including improved coordination of cybersecurity research, commercialization assistance for strategic technologies and expanded cyber education. The complete plan is accessible at [www.whitehouse.gov/cybersecurity/](http://www.whitehouse.gov/cybersecurity/).

**ONE-THIRD OF AMERICANS NOT USING BROADBAND AT HOME.** A survey released in March by the Federal Communications Commission (FCC) found that 78% of US adults are regular Internet users, but only 65% use broadband connections at home. Affordability, lack of knowledge of computers and the Internet and lack of interest were cited as reasons by those who said that they do not use home high-speed Internet. The FCC will use the results in crafting a strategy to increase broadband adoption rates and improve the cost and quality of high-speed services. Conducted in November 2009, the FCC survey showed Internet use and adoption rate divisions along socioeconomic lines.

**NEW HEALTH-RELATED APPS.** In March, Hartford-based **Aetna Inc.** began offering wireless access to its health-data network via mobile Web and smartphone applications for members to find a doctor, check a claim or appointments, or prescriptions prices. Aetna's research showed that the most appealing health-related applications ("apps") help users save money and easily access information, so the company is providing the app for free. Earlier this year, the **Hospital of Central Connecticut** in New Britain unveiled a free iPhone app that lets users check emergency room wait times. In May, **Yale** announced a Lyme Disease app, developed by the **Yale School of Public Health**, which allows users to track the abundance of infected ticks at the location of the user (within the United States) as determined by GPS. The app includes a list of precautions to avoid tick-bites; a tick identification chart and instructions on how to properly remove a tick, along with a narrated video.



### Education & Cognition

**UConn ENGINEERING LANDS 2.7M FOR INNOVATIVE PROGRAM.** The **University of Connecticut School of Engineering** garnered a \$2.7 million competitive grant from the National Science Foundation (NSF) for a novel program that will enroll UConn graduate and undergraduate students, and technical high school students and their teachers in cross-cutting sustainable engineering research. CASE member and UConn professor **Doug Cooper** is principal investigator of the faculty team involved with the project. The program supports projects in which graduate students in STEM (science, technology, engineering and mathematics) disciplines engage with teachers and students in a K-12 setting to engender greater interest in, and preparedness for, STEM careers.

**CT TO RECEIVE \$25.7M FOR STRUGGLING SCHOOLS.** Connecticut is getting \$25.7 million from US Dept. of Education

to boost student achievement among more than 200 of the state's weakest schools. Connecticut must distribute the funds first to "persistently lowest achieving," or Tier III, schools. According to the **Connecticut State Department of Education's** application, most of the 220 listed Tier III elementary and secondary schools are in the **Hartford, Bridgeport and New Haven** areas. In applying for the funds, school districts must indicate how they will improve, either by replacing principals, teachers and staff; closing or converting schools; or altering curricula and expanding learning periods, among other strategies.



### Energy

**CCEF TECH INVESTMENT STRATEGY STUDY.** In April the **Connecticut Clean Energy Fund (CCEF)** released the executive summary of a report *CCEF, Technology Investment Strategy Study*. The report was prepared for CCEF to provide guidance and recommendations to CCEF for investing in emerging renewable energy, energy efficiency and electric infrastructure technologies. The full executive summary is available at [www.ctcleanenergy.com/navigant](http://www.ctcleanenergy.com/navigant). Key recommendations include using the state's fuel cell industry as a model to build additional industry clusters around the renewable, efficiency and infrastructure investment themes identified in the report; focusing on supporting the front end (e.g., research, product development and design for manufacturing) and back end (e.g., sales, marketing, installation, servicing and financing) of the value chain and invest in manufacturing activities that align with core capabilities in the state; and focusing incentives on developing technologies that presently have limited support.

**MILLSTONE LAYOFFS.** Virginia-based Dominion, the company that owns and operates the **Millstone** nuclear power complex in Waterford, announced in March that it had laid off 50 to 75 workers. Dominion officials said that there were more workers than needed to safely operate the complex, which they said can be run with 1,060 to 1,085 employees. The chairman of the Nuclear Energy Advisory Council says it remains to be seen whether Dominion can safely operate Millstone at the new staffing level.

**GE TO STUDY PUTTING SOLAR ON GRID.** With the help of a \$3.3 million US Department of Energy grant, **General Electric Co.** is teaming with Arizona's biggest electric utility to figure out how to incorporate large amounts of solar power into the power grid. A research team from GE and Arizona Public Service will conduct the first-of-its-kind study. They will identify methods and technologies to optimize grid reliability and efficiency with the high concentration of distributed solar generation.



### Environment

**OUTLOOK FOR CT BATS BLEAK.** White Nose Syndrome (WNS), which affects hibernating bats, continues to kill them at alarming rates both in Connecticut and in expanding areas, according to the **Department of Environmental Protection (DEP)**. The effects of WNS will lead to a dramatic reduction in the size of the state's bat population this summer, according to **Jenny Dickson**, DEP Supervising Wildlife Biologist. "Just three short years ago, one of Connecticut's largest hibernacula had over 3,300 wintering bats. This year fewer than a dozen remain—all but one showed active signs of WNS. The outlook for their survival is grim," said Dickson.

**RESTORING THE MILL RIVER.** The **Department of Environmental Protection (DEP)**, the **City of Stamford**, the **US EPA Long Island**

# IN BRIEF

## Science and Engineering Notes from Around Connecticut

**Sound Study** and the **Mill River Collaborative** are working to restore the **Rippowam River** (popularly known as the **Mill River**) in Stamford. In 2009, two dams were removed by the City of Stamford, with support from the US Army Corps of Engineers and the Mill River Collaborative, beginning a comprehensive restoration which has opened up 4.5 river miles to increase fish runs. Project funding includes \$5 million in Army Corps Section 206 Habitat Restoration funding and \$2.9 million from the City of Stamford.

**BPA EXPOSURE MAY CAUSE FERTILITY DEFECTS.** Researchers at the **Yale School of Medicine** discovered that a fetus' exposure during pregnancy to Bisphenol A (BPA), a common component of plastics, causes permanent abnormalities in the uterus of offspring, including alteration in their DNA. The findings were reported in the March issue of the *Journal of the Federation of American Societies for Experimental Biology* (FASEB J.). Led by **Hugh S. Taylor**, professor in the **Department of Obstetrics, Gynecology & Reproductive Sciences** at Yale, the study is the first to show that BPA exposure permanently affects sensitivity to estrogen.

**\$3.1M FOR CT BROWNFIELDS.** Connecticut will receive more than \$3.1 million in federal funding to help assess, clean up and re-use "brownfields"—contaminated and often long-abandoned properties that can be remediated and turned into productive sites for economic development or other public uses. The grants from the US Environmental Protection Agency will go to nine projects in eight Connecticut cities and towns, as part of more than \$16 million in brownfields grants distributed to New England communities. Grants for community-wide assessments will go to **East Hampton** and the **Waterbury Development Corp.** Others to receive the grants include **Griswold**, for cleanup at former **Triangle Plastic Wire and Cable Co.**; **Hartford** for cleanup at **Ramon Qurios Park**; **Middletown** for cleanup at **Remington Rand Complex**; **New Haven** for cleanup at **10 Wall Street** and another grant for a community-wide revolving loan fund; **Preston Redevelopment Agency**, with three cleanup grants for work at the former **Norwich State Hospital** property; and **Shelton** for cleanup at the former **Cellastik Parcel**.

**CLIMATE CHANGE IMPACTS ON CT.** The **Adaptation Subcommittee** of the **Governor's Steering Committee on Climate Change** released a report in April entitled, *The Impacts of Climate Change on Connecticut Agriculture, Infrastructure, Natural Resources, and Public Health*. Developed in accordance with the *CT Global Warming Solutions Act*, CGS Section 22a-201e, the report identifies aspects under each topic area that are/will be most impacted by climate change. For example, the report notes that the top five most imperiled agricultural planning areas in Connecticut were maple syrup, dairy, warm weather produce, shellfish, and apple and pear production. Similarly, other areas are identified under infrastructure, natural resources and public health. Recommendations call for additional research and monitoring programs to determine more precise risk. The full report is available at [www.ctclimatechange.com](http://www.ctclimatechange.com). The Subcommittee is currently developing recommended adaptation strategies for the most impacted features of each area, with a report due out in mid 2010.

### Food & Agriculture

**RUDD CENTER LAUNCHES POLICY DATABASE.** The **Rudd Center for Food Policy and Obesity** at **Yale University** launched a database this spring that gives policy makers, journalists, advocates, researchers and concerned citizens a single online destination for current information on government legislation pertaining to food policy and obesity issues, including access to healthy food, school

initiatives, menu labeling, sugar-sweetened beverage taxes, and more. The database can sort bills by topic and by state or federal filing status. Key features include a list of bills that have been recently acted upon, bills that have been enacted into law, and contact information for bill sponsors. The Legislative Updates database may be accessed at [www.yaleruddcenter.org/legislation/](http://www.yaleruddcenter.org/legislation/)

**USDA GRANTS & OTHER FUNDS FOR QUIET CORNERS.** In March, the US Department of Agriculture announced \$207,000 in grants meant to spur economic development and protect natural resources in the **Quinebaug** and **Shetucket River Valley**. They comprise what the National Park Service calls the "last green valley" in the Boston-Washington corridor—695,000 acres of fields, forests and rugged hills in Connecticut's northeast corner. The **Last Green Valley Inc.**, a non-profit organization, is getting a pair of \$28,000 grants to craft a website for farmers to locate educational information, business assistance and marketing opportunities and to create a "mastering the business of agriculture" educational program. Other grants will go to the **Northeast Connecticut Economic Alliance** (\$40,000) to help firms unable to secure credit and to the **Eastern Connecticut Resource Conservation and Development Area Inc.** (\$81,000) to help a **Stafford Springs** slaughterhouse conduct an environmental quality analysis, and to provide outreach and technical assistance to applicants for USDA Rural Development's Rural Energy for America program. In addition, the **Northwest Connecticut Chamber Education Foundation** will receive \$30,000 to renovate a historic **Torrington** diner to serve as a tourism and business center for the Chamber; an additional \$308,000 will be leveraged from other sources for the renovation project.

**BIOLOGICAL CONTROL OF NEMATODES.** Farmers often have to fumigate to control the microscopic roundworms in soil that parasitize plants. Scientists at **The Connecticut Agricultural Experiment Station** in New Haven and Windsor are testing the alternative of naturally occurring chemicals in Brassicas like mustard, radish, broccoli, and cabbage. Rapeseed grown for biodiesel is also a Brassica. Biochemist **Neil McHale** characterized the predominant type of glucosinolate in seeds and seed meals of several species and varieties of Brassica. By experiments, plant pathologist **James Lamondia** determined that the type of glucosinolate is more important than the amount to fight different nematodes. He also found that glucosinolates remaining in meals after biodiesel extraction may biologically control soilborne pathogens like nematodes.



### Health

**UCHC FUNDING.** Connecticut lawmakers passed legislation authorizing an overhaul of the **University of Connecticut Health Center** in Farmington, as well as the development of a regional health network. The legislation includes renovating the 35-year-old **John Dempsey Hospital**, building a new patient tower, and increasing classroom and lab space for UConn's medical and dentistry schools. The cost is estimated at \$362 million. The bill authorizes \$237 million in borrowing, including about \$25 million that will be shifted from bonds originally earmarked for other UConn projects. The legislation requires that an additional \$100 million be provided in federal funding or from other sources. Detractors say the state cannot afford the project but proponents argue that it will become an economic generator for the state. The plan also calls for a partnership between UConn and area hospitals.

**PREDICTING INVASIVE BREAST CANCER.** **Yale** scientists have discovered a way to predict whether women with the most common form of non-invasive breast cancer—ductal carcinoma in situ (DCIS)

# IN BRIEF

## Science and Engineering Notes from Around Connecticut

—are at risk of developing more invasive tumors in later life (*Journal of the National Cancer Institute* online). The finding will allow women with DCIS to be more selective about their course of treatment and, potentially, avoid aggressive forms of treatment such as mastectomy or radiation. Researchers found that two factors were predictors of risk of developing invasive cancer within eight years after being diagnosed with DCIS: the method by which it was detected and the expression of several biomarkers. The findings showed that a breast lump that is diagnosed as DCIS was more predictive of a high risk of subsequent invasive cancer than DCIS diagnosis by mammography.

**EHEALTH RECEIVES GRANT.** Rocky Hill nonprofit **EHealth Connecticut**, contracted by the state to create a health information exchange, is to receive \$5.7 million in federal stimulus funds to establish an electronic medical records center, authorities say. The grant comes from the US Department of Health and Human Services and is part of a \$2 billion federal effort to achieve widespread use of health information technology and provide use of an electronic health record for every person by the year 2014.



### High Technology

**UConn PHYSICISTS TO TEST THEORY AT LHC.** **University of Connecticut** theoretical physicist **Munir Islam** has worked on a proton model for more than 30 years and will get to see if his theory is corroborated by experiments this fall at the Large Hadron Collider (LHC) at the European Center for Nuclear Research (CERN) in Switzerland. Islam, UConn research physicist **Richard Luddy** and two European colleagues reported the model, which shows a proton with three layers. Confined in its core are three quarks, or point-like subatomic particles, surrounded by two rings of clouds. The ring closest to the core has what the physicists describe as a "baryonic charge." The outer cloud ring is composed of quarks and anti-quarks in a condensed state. While the theorists have tested this model at smaller particle colliders, the upcoming experiment will provide enough detail to demonstrate if their theory is consistent.

**NEW AMPLIFIER PUSHES BOUNDARY OF QUANTUM PHYSICS.** For quantum computers to reach their enormous potential, they need amplifiers capable of transmitting signals consisting of only a single photon. A team of **Yale** scientists, led by **Michel Devoret**, Frederick William Beinecke Professor of Physics and Applied Physics, report creating an amplifier almost as efficient as the laws of quantum physics allow. Quantum computers, like cell phones, depend upon sophisticated microwave amplifiers to ensure that information is accurately retrieved. However, all amplifiers contain inherent flaws—notably, flaws which produce random noise that can obscure the signal. In quantum mechanics, the Heisenberg uncertainty principle dictates that a small amount of noise is inevitable. Using superconducting electrical circuits at cryogenic temperatures, Devoret and his team have created an amplifier that comes close to the limit of the minimum amount of added noise.

**NEW LASER TECH AT CCAT.** The **Connecticut Center for Advanced Technology, Inc. (CCAT) Laser Applications Laboratory (LAL)** has worked with **Trumpf Inc. North America** in Farmington to bring the first Trumpf TruMicro 7050 in the United States to CCAT's facility to test for use in various process evaluation trials. The TruMicro 7050 is an example of a new disk laser technology that Trumpf has been developing. Unlike Q-switch Nd:YAG lasers which have limited pulse width, frequency, and average powers, the new TruMicro 7050 uses a "cavity dump" design which allows for short pulses to be achieved independent of the frequency and at higher

average powers. Another advantage of the system is that the laser energy can be delivered via fiber to the processing work cell.



### Transportation

**UTC POWER & BMW PROTOTYPE.** German car maker BMW has unveiled its prototype hybrid electric vehicle that uses a **UTC Power** fuel cell. **Ken Stewart**, vice president of **UTC Power Transportation**, says it has been working with BMW since 1999 to develop highly efficient, emissions-free fuel cell systems that will operate in frigid temperatures. The car's 5-kilowatt fuel cell is completely self-contained and works in tandem with an internal combustion engine.

**BIOFUELS ON AIRPLANES.** Aviation experts say that within a decade, passenger planes will be flying on jet fuel largely made from plants—flax, marsh grass, even food waste—as airlines seek to break away from the volatile oil market and do their part to fight climate change. The projected shift has raised concern among environmentalists that the potentially insatiable appetite for plant oil will hasten the destruction of tropical forests and the conversion of cropland from food to fuel, but aviation experts say the industry is focusing on fuels that cause minimal environmental destruction.

**LACK OF FUNDING SLOWS CONNDOT PROJECTS.** Some \$12 billion in short- and long-term "have-to-do" highway, bridge and public transit projects in Connecticut will not go forward, at least in the foreseeable future, because they lack funding, said **Department of Transportation (ConnDOT)** officials in April. ConnDOT's 5-year capital plan outlines hundreds of short-term projects, most originally scheduled to be completed by 2014, and two dozen long-term projects that lack financing sources for at least the next five years. ConnDOT has prioritized funding for the next five years to ensure that the most pressing needs are addressed and in March, announced an aggressive new program to more quickly address maintenance issues for the 5,000 bridges around the state.

**SCHOOL DISTRICT OUTSOURCES BUS SERVICE.** **Regional School District 17—Haddam and Killingworth**—outsourced its school bus service in a deal purported to save taxpayers \$2.4 million over five years. The school district agreed to sell its fleet to New Jersey-based Student Transportation of America (STA). STA, which has a bus yard in Groton, paid \$830,000 for the district's existing fleet and said it had placed a \$770,000 order for new buses. STA also serves school systems in **Groton, Guilford, Greenwich, Griswold, Danbury, New London, Naugatuck and Ledyard.**

—Compiled and edited by **Ann G. Bertini, Asst. Dir. for Programs**

### IN MEMORIAM

#### Joseph M. King, 1939-2010

The Academy mourns the loss of Joseph M. King. King had been serving as Project Consultant on the Energy Assurance Planning project that CASE is currently conducting for the state Office of Policy and Management. He served as a committee member on the Academy's 2009 study on *The Feasibility of Utilizing Waste Heat from Central Electric Power Generating Stations and Potential Applications*. Prior to that, King served as study manager on *A Study of the Feasibility of Utilizing Fuel Cells on the New Haven Rail Line* (2007) and *Preparing for the Hydrogen Economy: Transportation* (2006).

He was an outstanding consultant, person, and friend and we will miss him.

## The New England Air Museum: 50 Years of History and Education

The New England Air Museum (NEAM) celebrated its 50<sup>th</sup> anniversary in 2009. Located on the northwest corner of Bradley International Airport in Windsor Locks, CT, the museum serves an average of 60,000 visitors annually.

The museum's collection of over 80 historic aircraft and related artifacts is among the nation's most significant. For the past several years, NEAM's focus has been on the delivery of formal and informal educational programs and special events.

The museum's SOAR (Student Outreach Aviation Resource) for Science program serves approximately 130 classes from 10 school districts each year with their state-mandated science curriculum requirements relating to the laws of motion. Its Scientific Literacy Program has staff on duty on weekends, school holidays and all summer to engage visitors with impromptu activities that are fun and educational.

The Air Museum will be running a number of programs from June to August that promise to be great family activities. Each week there will be a different theme with hands-on activities that will run weekdays beginning July 5 through August 20<sup>th</sup>. Some of the weekly themes are Discover Blimps & Balloons, Fly Rockets, Meet the Heroes of Aviation and Uncover the Secrets of Space Exploration. For information on these events and more, visit the museum's website at [www.neam.org](http://www.neam.org)



Ricardo Granados uses the hoist rope to lift the first parachute to be released in the

## From the National Academies (from page 1)

The report recommends that a single federal entity or program be given the authority and resources to coordinate a national, multi-disciplinary research effort aimed at improving both understanding and responses to climate change. Substantially reducing greenhouse gas emissions will require prompt and sustained efforts to promote major technological and behavioral changes, says *Limiting the Magnitude of Future Climate Change*, another of the new reports. Reducing vulnerabilities to impacts of climate change that the nation cannot, or does not, avoid is a highly desirable strategy to manage and minimize the risks, says the third report, *Adapting to the Impacts of Climate Change*. Some impacts—such as rising sea levels, disappearing sea ice, and the frequency and intensity of some extreme weather events like heavy precipitation and heat waves—are already being observed across the country.

<http://americasclimatechoices.org>

### ◆ Same Scrutiny Urged for Science Behind Food Supplement Health Claims, Drug Approvals

The US Food and Drug Administration (FDA) should apply the same rigor to evaluating the science behind claims of foods' and nutritional supplements' health benefits as it devotes to assessing medication and medical technology approvals, says a new report from the Institute of Medicine. The report, sponsored by the FDA, recommended a new framework the agency can use to consistently and transparently judge the appropriateness and validity of the scientific benchmarks used in studies that companies provide to support health and safety claims for their products.

The FDA has been hampered in its ability to assess the proliferation of health claims being made by food and supplement manufacturers in part because it lacks a process broadly accepted across the regulatory, food, and medical communities to evaluate biomarkers as valid and appropriate measurements to substitute for clinical outcomes. The committee's proposed three-part framework gives the agency a way to consistently and rigorously assess the selection and use of biomarkers across the food, device, and drug areas. In addition, the report calls on Congress to boost the agency's authority to require further studies of drugs and devices after they are approved

if their approval is based on studies using biomarkers as surrogate clinical outcomes, and to give the FDA the authority to conduct studies of how well consumers understand food and supplement health claims and require manufacturers to make changes if needed to promote greater clarity.

<http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=12869>

### ◆ Study Calls for New Standards for Salt Content

Reducing Americans' excessive sodium consumption requires establishing new federal standards for the amount of salt that food manufacturers, restaurants, and food service companies can add to their products, says a new report by the Institute of Medicine. Because the vast majority of people's sodium intake comes from salt that companies put in prepared meals and processed foods, this regulatory strategy would make it easier for consumers to eat lower, healthier amounts of salt, said the committee that wrote the report.

The US Food and Drug Administration should gradually step down the maximum amount of salt that can be added to foods, beverages, and meals through a series of incremental reductions. Regulatory action is necessary because four decades of public education campaigns about the dangers of excess salt and voluntary sodium cutting efforts by the food industry have generally failed to make a dent in Americans' intakes, the committee said.

[http://www.nap.edu/catalog.php?record\\_id=12818](http://www.nap.edu/catalog.php?record_id=12818)

## Rothberg (continued from page 1)

information on a semiconductor chip. The result is a sequencing system that is simpler, faster, more cost effective and scalable than any other technology available.

The New Haven-born Rothberg earned a BS in chemical engineering with an option in biomedical engineering from Carnegie Mellon University and an MS, MPhil, and PhD in biology from Yale University. The recipient of numerous awards, Dr. Rothberg is also member of the National Academy of Engineering.

Visit our web site at [www.ctcase.org](http://www.ctcase.org)

## Tinetti (continued from page 2)

able to evaluate if it is the right intervention and what particular type of walker should be used.

Reducing medications that increase the risk of falls is also very important. A patient's blood pressure should be checked when lying and standing to see if there is a pronounced decrease in the standing position. If that is the case, we would recommend an increase in water and perhaps salt intake as well. It is also important to get rid of tripping hazards. Sometimes we recommend not wearing multi-focal lenses when walking because these can interfere with depth perception.

Mostly, it is important to identify individual risk factors and reduce those.

### **CASE: What do you recommend to strengthen or maintain balance?**

Muscle strength resistive exercises and physical therapy for progressive balance. I sometimes recommend Tai Chi for the older, healthy population and also dancing. These activities can be more fun than physical therapy but should be done only once the person is steady enough to do it safely.

### **CASE: What can the state of Connecticut do to benefit from your research? Public policy programs—public health care, nursing homes?**

After we completed our intervention studies showing that falls can be prevented, the next step was to get these prevention measures incorporated into clinical practice. The Patrick and Catherine Weldon Donaghue Medical Research Foundation, a private Connecticut-based foundation, funded The Connecticut Collaboration for Fall Prevention in 2001. This was a seven-year project that consisted of a team of clinicians who disseminated fall prevention information to older adults and care providers in specific geographic areas.

The team included Dorothy Baker, a PhD nurse; Maggie Gottschalk, Physical Therapist; Denise Acampora, the team manager; and Mary King, a geriatrician at Hartford Hospital. We divided the state in half and decided which clinicians in which settings should do which components of fall prevention. Hartford was identified as the intervention area while the I-95 corridor received usual care. The team visited hospitals, emergency departments, outpatient facilities, home care, physical therapy offices and primary care physicians. They spoke with the care providers, instructed them how to incorporate components of fall risk assessment and management into their practices and gave them materials. This took three to four years of going round and round and talking to people. The team literally made thousands and thousands of visits. In each area, we asked

clinicians to be champions and to further disseminate information to their colleagues. It was a very time-intensive initiative.

We then monitored the frequency that older people went to the emergency department of hospitals for fall injuries. Older adults in the Hartford area where we worked with clinicians experienced 11% fewer serious fall injuries than older adults along the I-95 corridor. We consider this to be a pretty successful project.

What this study revealed is that potentially modest expenditures can prevent greater expenditures later. Dr. Baker is still working with the state on fall prevention intervention.

### **CASE: How will the MacArthur Grant help you to further your research and implement your findings?**

The MacArthur Foundation grant works to provide funding for projects that recipients think can be pushed forward in areas they think are most important. I'm not sure exactly how I will use the fellowship. An area that I am now working on is clinical decision making for older adults with multiple chronic diseases. I am looking at how to decide what is most effective and most cost effective for treating for older people. That is the area that I will probably work on more.

— Wendy Millstein, freelance science writer