

NEWS in Science and Technology

from the



CONNECTICUT ACADEMY OF SCIENCE AND ENGINEERING

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The following is an Executive Summary of the Academy's quarterly Bulletin (Vol. 25,2) that includes topics and issues in science and technology deemed by the Academy to be both timely and relevant to Connecticut's interests. Each item is briefly summarized from press releases and reports of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. Hyperlinks are included to the original online source, where more detailed information is available.

NOTE: Online versions of this newsletter and the Bulletin are available on the Academy website at www.ctcase.org.

FEATURE ARTICLE

➤ MacArthur Fellow's Research Challenges Assumptions about Elderly Falls

CASE member Mary Tinetti, MD, of the Yale School of Medicine was named a 2009 MacArthur Foundation Fellow in recognition of her research on fall prevention in the elderly. (www.macfound.org) The MacArthur Fellows Program awards \$500,000, "no strings attached," to talented individuals who have shown exceptional creativity, promise for important future advances and the potential for the fellowship to facilitate subsequent creative work.

Dr. Tinetti is Yale SOM's Gladys Phillips Crofoot Professor of Medicine and Epidemiology and Public Health/ Division of Geriatrics, the Director of the Program on Aging and Director of the Claude D. Pepper Older Americans Independence Center. She studied geriatrics at the University of Rochester and Monroe Hospital in Rochester under Dr. Frank Williams, who believed falling was a health problem like heart disease – a problem that could be understood and addressed.

Some Facts and Figures

- Between 10,000 and 12,000 older people die from falls annually. Falls are between the sixth and seventh most frequent cause of death for older adults. Dr. Tinetti notes that older people tend to die of the cumulative effect of assorted conditions, and falls may be a contributing factor.
- Falling during usual activities increases in frequency around age 70 to 75.
- Men and women are probably equally likely to experience falls after age 80. Some studies indicate women may be more likely to fall than men. If a fall occurs, women are more likely to experience a fracture, due to osteoporosis; whereas men are more likely to experience a head injury.
- The rate of falling is much higher for people living in nursing homes compared to older people living in the community, generally because those living in nursing homes are more frail.

Fall risk factors for older adults

There have been dozens of studies and we found that no one factor is more important than others. Some primary risk factors are

- An unsteady gait.
- A drop in blood pressure when people stand up.
- 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.

- Vision, particularly in terms of depth perception. Cataracts that interfere with depth perception.
- A disease like Diabetes increases risk. Diabetes affects vision and can also result in decreased proximal muscle strength, making it difficult to transfer from bed or chairs. Peripheral neuropathy decreases proprioception [the sensory input and feedback that tells us about movement and body position-Ed.] Also, diabetes medications may cause falls if glucose gets too low.
- Tripping and falling hazards in the environment.

Fall Prevention Measures

The most effective prevention is multi-factorial. It is important to identify individual risk factors and reduce those.

- We examine balance and gait, and suggest physical therapy to show people how to walk more safely. The physical therapist (PT)

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Connecticut Medal of Technology Awarded to Jonathan 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.

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

also instructs on progressive balance and muscle strengthening exercises.

- A walker or cane may be recommended. Sometimes walkers are over-used, sometimes under-used. A PT can best evaluate if a walker or cane is the right intervention and the type to be used.
- Reduce medications that increase the risk of falls.
- Check a patient's blood pressure while lying and standing. If there is a pronounced decrease while standing, we would recommend an increase in water and perhaps salt intake.
- Remove tripping hazards.
- Sometimes we recommend not wearing multi-focal lenses when walking because these can interfere with depth perception.

The Connecticut Collaboration for Fall Prevention Study

After completing intervention studies showing that falls can be prevented, the next step was to get 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.

- The seven-year project consisted of a team of clinicians who disseminated fall prevention information to older adults and care providers in specific geographic areas.
- Hartford was identified as the intervention area while the I-95 corridor received usual care.
- The team made thousands of visits to hospitals, emergency departments, outpatient facilities, home care, physical therapy offices and primary care physicians. They spoke with the care providers on how to incorporate components of fall risk assessment and management into their practices.
- We then monitored the frequency that older people went to the emergency department of hospitals for fall injuries. Older adults in the Hartford area experienced 11% fewer serious fall injuries than older adults along the I-95 corridor.

The study revealed that potentially modest expenditures can prevent greater expenditures later, said Dr. Tinetti. She is still looking at how she will use the MacArthur 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."

— Excerpted from a CASE Bulletin feature article by Wendy Millstein

[http://www.ctcase.org/bulletin/25_2/25_2.pdf]

NEWS FROM THE NATIONAL ACADEMIES

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

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

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*.

One of the reports known as, *Advancing the Science of Climate Change*, concludes: "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." 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 is also 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. The

report recommends that a single federal entity or program be given the authority and resources to coordinate a national, multidisciplinary research effort aimed at improving both understanding and responses to climate change.

Another of the new reports, *Limiting the Magnitude of Future Climate Change*, notes that substantially reducing greenhouse gas emissions will require prompt and sustained efforts to promote major technological and behavioral changes. 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—are already being observed across the country.

[<http://americasclimatechoices.org>]

➤ Same Scrutiny Urged for Science Behind Food Supplement Health Claims

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, says a new report from the Institute of Medicine. The report, sponsored by the FDA, recommended a new framework for the agency to consistently and transparently judge the appropriateness and validity of the scientific benchmarks used in studies by companies 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 measurements substituting clinical outcomes. The 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. The report also calls on Congress to boost FDA 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.

[<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 prepared meals and processed foods, this regulatory strategy would make it easier for consumers to eat lower, healthier amounts of salt, said IOM committee. 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]

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