Bulletin of the

Connecticut Academy of Science and Engineering

Volume 24,4 / Winter 2009

New Research Suggests Poor Dental Health Linked to More Serious Health Issues

Research conducted in Connecticut and around the world is beginning to suggest that poor dental health is linked to several more serious health conditions. For example, chronically infected gums may increase the risk of diabetes, coronary and heart disease, stroke, and sudden death, according to dozens of studies. Research conducted at the University of Connecticut School of Dental Medicine in Farmington suggests a preliminary link between poor dental hygiene in pregnant women and low birth weight babies.

Dentists believe that better public education about dental health and the emerging discoveries of unsuspected complications resulting from poor oral health are issues that should be addressed by both dental and medical professionals.

Awareness and Access Critical Factors for Success

In Connecticut, state and local dentists and other healthcare providers are fighting to raise awareness of the importance of good oral health. Populations without ready access to regular dental care suffer alarming rates of caries—cavities—and chronically infected gums. Consequently, since 2004 Connecticut has earmarked $2.5 million in state bonds to enhance or expand oral health facilities, established eight regional oral health collaboratives, and developed repayment methods for people on Medicaid or children in the state's HUSKY insurance plan.

An analysis of data showed that in Connecticut, between 2006 and 2007, about 75–85% of children between the ages of 15 and 18 had cavities, according to Ardell A. Wilson, head of the Connecticut Department of Pubic Health's Office of Oral Health until her recent retirement. By age 2, one-third of children have cavities and 1 in 7 have 5 or more cavities. By the third grade, 41% had decay. Of those students, 63% were Hispanic, 50% African-American and 34% white.

The state Department of Public Health hopes by 2010 to prevent and control many of these oral health problems. Specifically, the state plans efforts to reduce caries and tooth loss, seal vulnerable molars, provide access to dental care for the general population and low-income children, reduce levels of gum disease, and detect oral cancers early.

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News from the National Academies

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

◆ "Hidden" Costs of Energy in US Subject of New NRC Report

A new National Research Council report examines the "hidden" costs of energy production and use in the United States—costs that are not reflected in market prices of coal, oil, other energy sources, or the electricity and gasoline produced from them, such as the damage air pollution imposes on human health.

The committee was able to quantify an estimated $120 billion in damages in 2005, a number that reflects primarily health damages from air pollution associated with electricity generation and motor vehicle transportation. The figure does not include damages from climate change, harm to ecosystems, effects of some air pollutants such as mercury, and risks to national security, which the report examines but does not monetize.

Requested by Congress, the report assesses what economists call external effects caused by various energy sources

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Talcott Mountain Academy student Timothy Yung shows off his NASA-themed jacket to Apollo 12 astronaut Alan Bean at Talcott Mountain Science Center. [Photo: Talcott Mountain Science Center]

Science Education Is 'Hands-On' at Talcott Mountain Science Center

Talcott Mountain Science Center (TMSC) for Student Involvement, Inc., in Avon is a regional nonprofit education and research facility dedicated to increasing students' understanding and appreciation of their physical world. This nationally recognized center and Academy have been instrumental in educating students, teachers and the general public with hands-on approaches to science, math and technology for 43 years.

This fall, TMSC was honored to welcome Alan Bean, renowned artist, Apollo 12 astronaut and 4th man to walk on the moon, to the Center. During the visit, Capt. Bean shared his thoughts on NASA and spoke in great detail about his paintings and the painstaking details he includes in each one—each original a piece of history in itself laden with moondust

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Ultimately, public health officials want to halt progression of oral health problems while children are still young.

"The public doesn't know a lot about oral health," said Wilson, noting that "There's only one educational vehicle—the dentist or dental hygienist. They tell you to brush your teeth 2 to 3 times a day, floss, and screen for oral cancer."

"People don't know when to start brushing," she added. "You should start when the baby has two teeth. You must brush at least two minutes and do not leave the baby with a bottle in his mouth. Back teeth should be sealed. A lot of parents just don't know. We need education of the public, dentists, nutritionists, physicians and providers."

But, Wilson noted, "Oral health is not just tooth decay. The mouth is the beginning of the digestive tract." As such, the oral cavity—the mouth—is normally filled with a variety of bacteria. Among the strains contributing to caries are *Streptococci* and *Lactobacilli*.

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These bacteria metabolize sugars left by soda, candy, and other sugary or starchy foods, releasing byproducts that increase the acidity of the mouth. The low-pH environment gradually demineralizes teeth and the eventual result is a cavity.

"Affluent communities consider this a nuisance. They don't look at it like an infectious disease," said Wilson. "This is a transmissible disease. We have 5-year-old kindergartners entering school with chronic dental infections. If one-half to one-third had asthma, there would be outrage."

"Parents with poor oral hygiene have children with poor oral hygiene," Wilson said, adding that a shared spoon or a licked finger is all it takes.

Decay is Just the Beginning

Decay is only the first step in a process that ultimately leads to tooth loss, and a range of additional problems.

"In the grand scheme of things, oral health is considered optional, or a cosmetic option," said Joanna M. Douglass, associate professor of pediatric dentistry at the University of Connecticut School of Dentistry in Farmington. In fact, she noted, studies are suggesting that gum disease is a chronic infection that aggravates diabetes, affects pregnancy, and may contribute to heart disease, cardiovascular disease, and stroke.

Many people experience mild gum disease because they do not floss regularly. During regular, semi-annual scaling as part of routine dental care, the dentist or hygienist can scrape and chisel off the plaque biofilm that otherwise hardens into a calculus of apatite, brushite, whitlockite and other minerals. When minerals and anerobic bacteria begin to form and grow beneath the gums, the body's immune system responds with inflammation. Cytokines, leukotrines, prostaglandins, immunogloulins and other proteins are released and spread through the blood stream.

Research suggests that these defensive proteins in the mouth can damage other parts of the body. Increasing evidence suggests that the link between periodontal disease and rheumatoid arthritis, heart disease, and low birth weight, could be causal. University of Minnesota researchers released a study in October concluding for the first time that gum disease contributes to rheumatoid arthritis.

"We've known for a while that there is an association between gum disease and rheumatoid arthritis," said Jerry A. Molitor, a rheumatologist at the University of Minnesota in a prepared statement. "But our new work," involving 6,616 people, "suggests that periodontal disease is causal," he noted.

Douglass said experiments suggest that people with diabetes are more likely to have periodontal disease. "We've known that for many years," she said. "We also know that with periodontal disease, the amount of sugar in the blood is higher." This is probably because the inflammatory proteins affect small blood vessels, exacerbating diabetes, she said.

Similarly, research by Douglass and colleagues at the University of Massachusetts Medical School found that a mother's oral health directly affects the oral health of her baby. Inflamed maternal gums may also be associated with premature birth and low birth weight, according to research published by Douglass and colleagues in the journal *American Family Physician*.

Pockets of infected gum tissue draw the cytokines IL-6 and IL-8, and the prostaglandin PGE2, a hormone-like substance that participates in a wide range of body functions; these in turn find their way into the amniotic fluid. "Elevated levels of these

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Biomedical Research

BRAIN DAMAGE FROM CHRONIC STRESS REPAIRED. A **Yale University** research team led by senior author **Amy Arnsten**, professor of neurobiology, succeeded in protecting against the effects of stress by blocking the action of a family of enzymes called protein kinase C in rats. Long-term stress triggers excessive activity of protein kinase C, which damages the cytoskeleton of neurons and hinders their ability to transmit information. This loss of the brain's gray matter due to stress has been linked to poor impulse control, a decline in working memory and inability to focus on tasks. Researchers found that dendritic spines of neurons stayed intact and that the rats' ability to perform a task requiring working memory and impulse control was improved. Arnsten said the work has potential for treating bipolar disorder, post-traumatic stress disorder and lead poisoning, all of which can have effects similar to stress. The research was reported in the September 7-11 edition of the *Proceedings of the National Academy of Sciences* (www.pnas.org).

ADVANCES IN CANCER RESEARCH: POSSIBLE VACCINE AND CANCER CELL STOP SIGN. University of Connecticut Health Center (UCHC) researchers, in collaboration with scientists from China, revealed the potential for human stem cells to provide a vaccination against colon cancer, reports a study published in the journal *STEM CELLS* (www.stemcells.com). UCHC immunology experts **Bei Liu** and **Zihai Li**, working closely with the **UConn Stem Cell Institute**, vaccinated laboratory mice with human embryonic stem (hES) cells and discovered a consistent immune response against colon cancer cells. Liu and colleagues believe that cells could generate an immune response against a broad spectrum of cancers. The team also discovered that while hES cells are able to provide this response, artificially induced pluripotent stem cells (iPSC) are not—a significant discovery that challenges the theory that iPSC could replace hES cells.

In two papers in the September 7-11 issue of *Proceedings of the National Academy of Sciences* (www.pnas.org), **Alan Garen** of the **Department of Molecular Biophysics & Biochemistry** at the **Yale School of Medicine** and his colleague Xu Song of Sichuan University in China explain how cancer may overcome an organism's natural "stop sign" for cell division. One mechanism that stops cell proliferation is a family of tumor-suppressor proteins (TSP) that bind to and block the function of proto-oncogenes, or genes that have the potential to trigger cancer. Garen's team found that, in mice, an RNA molecule from an area of the genome that does not produce proteins prevents a type of TSP from inactivating proto-oncogenes. The TSP protein they studied, called PSF, is virtually identical in mice and humans, Garen said. The Yale team succeeded in preventing the formation of tumors in mice by either increasing the amount of PSF or decreasing the amount of the non-coding RNA in a cell. Garen said that both procedures could be the basis of a clinical protocol.

GE RESEARCH TO REDUCE TIME, EXPENSE OF GENOME SEQUENCING. Scientists for Fairfield-based **General Electric** are getting $1.3 million in federal funding to pursue research that will cut the time and expense of sequencing the human genome to a fraction of what it is today, GE says. Scientists in GE's biosciences lab in Niskayuna, NY, were awarded a second round of funding from the National Institutes of Health, to continue research toward reducing the cost and time of sequencing an entire human genome to less than $1,000, in under a day. With current technology, the cost of sequencing is estimated to be approximately $50,000 and can take several weeks.

POWER AND PROMISE OF NEW GENETIC TECHNOLOGY. After a request for help from a Turkish doctor in diagnosing his five-month-old patient, **Yale** researchers used whole exome sequencing to diagnose and change the course of treatment for the baby boy thousands of miles away. Whole exome sequencing is comprehensive DNA sequencing of all the protein-coding genes in the genome. The boy was thought to suffer from Bartter syndrome, a rare, life-threatening disease that causes loss of salt, potassium and water from the kidney. Instead, the Yale analysis led to the discovery of a mutation in both copies of the gene known to cause congenital chloride diarrhea, a rare birth disorder in which the gastrointestinal tract fails to properly absorb chloride and water. The approach is described online in the *Proceedings of the National Academy of Sciences* (http://www.pnas.orghttp://www.pnas.org). "As the cost of DNA sequencing continues to plummet, it seems clear that this technology will be useful for clinical diagnosis in a number of settings," said **Richard Lifton**, senior author of the paper and **Sterling Professor** and chair in the **Department of Genetics** and professor of internal medicine.

Business & Industry

CONNECTICUT'S FASTEST GROWING TECH COMPANIES. The **Connecticut Technology Council** and the accounting firm **UHY LLP** celebrated Connecticut's 40 fastest growing technology companies in October, naming **Alexion Pharmaceuticals** the state's fastest growing tech company in 2009. Companies are recognized in six technology categories and are required to have at least $50,000 in revenue in their first year and $3 million in their fourth year. The companies at the top in their categories are: Advanced Manufacturing, **Bolt Technology** of Norwalk (manufacture of marine geophysical equipment for oil and gas exploration); Energy/Environmental Technologies, **Clean Diesel Technologies** of Bridgeport (sustainable solutions to reduce emissions for on- and off-road engine application); Life Sciences, **Alexion Pharmaceuticals** of Cheshire (global biopharmaceuticals with emphasis on life-threatening, rare diseases); New Media/Internet/Telecom, **M2 Media Group** of Stamford (magazine marketing/circulation and brand partnerships); Software, **L-1 Identity Solutions, Inc.** of Stamford (global identity management); IT Service, **Fandotech** of Manchester (data center and managed network services). To see the full list, visit www.ct.org

GERBER BUSINESS UNITS SOLD OFF TO REDUCE DEBT. South Windsor-based **Gerber Scientific Inc.**, announced the sale in October of nearly all the assets and liabilities of its Canadian-based ND Graphics business to an investor group led by ND chief executive Mark West. Terms were not disclosed. In September, Gerber sold for an undisclosed sum its German laser marking and engraving business FOBA Technology + Services GmbH to Videojet Technologies Inc. of Illinois. Both sales were cited as allowing Gerber to reduce outstanding debt.

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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ZYGO GETS AIR FORCE CONTRACT. Middlefield-based specialty optics maker **Zygo Corp.**, was awarded a multi-million-dollar US Air Force contract to supply helmet-mounted displays for training F-16 fighter pilots. The contract is Zygo's first for jet pilot training, said **John Stack**, president of Zygo's optical systems division. The Army uses the same Zygo equipment to train helicopter pilots, he said.

PFIZER TO CLOSE NEW LONDON R&D HQ. Pfizer Inc. announced Nov. 9 that it will close its **New London** research and development headquarters and transfer most of the 1,400 people working there to its Groton facility. The move is part of Pfizer's reorganization after merging with Wyeth Pharmaceuticals in October. Pfizer will now have five key research centers, each focused on specific disease areas, plus nine other laboratories with specialized research capabilities. Research operations in Princeton, NJ; two sites each in New York and North Carolina, and one in the United Kingdom also will be closed.

Communication

FCC NET NEUTRALITY. The FCC voted unanimously in October on a proposal to start developing regulations for Internet neutrality—a principle that, at its simplest, says that all network traffic should be treated equally. The FCC proposal would forbid Internet service providers from restricting user access to lawful content, applications, and services. The FCC decision sparked debate and prompted Sen. John McCain (R-Ariz) and others to introduce legislation that would prevent the FCC Internet regulation. Internet companies like Google, Facebook, and Craigslist are in favor of Net Neutrality, while broadband providers like AT&T, Comcast and Verizon are against it and say it would stifle innovation.

Education & Cognition

TRINITY'S NEUROSCIENCE PROGRAM HONORED. Trinity College was awarded a chapter of The National Honor Society in Neuroscience (Nu Rho Psi), making the school's Neuroscience Program only the 17th in the country and the first in Connecticut to be granted a charter. Because the program is the first in the state to achieve this exalted status, the **Trinity College Nu Rho Psi** chapter designation will be "Alpha in Connecticut." Trinity's charter application was approved by a panel of three prominent neuroscientists, then affirmed by the executive director of Nu Rho Psi.

UCONN PROGRAM EMBEDS TEACHERS IN RESEARCH LABS. The **University of Connecticut School of Engineering** launched the Joule Fellows Program this past summer. Funded by the National Science Foundation, this five-week program immerses teachers in energy engineering research, where they may gain familiarity with engineering principles, applications and a variety of engineering careers. CASE members **Mun Y. Choi,** Dean of Engineering, and **Kazem Kazerounian,** Associate Dean for Research & Strategic Initiatives, developed the program, along with Assistant Dean for Undergraduate Education and Diversity **Marty Wood.** Eleven teachers from nine schools across Connecticut, Massachusetts and Rhode Island worked with faculty and graduate students in research areas such as biofuels production, fuel cells and fuel cell membranes, flame dynamics in power generation, and super-critical fluids.

MYSTIC FOUNDATION GETS GRANTS. Mystic's Sea Research Foundation received $1 million in grants from the National Oceanic and Atmospheric Administration to increase public understanding of the oceans and the need to protect them. The foundation oversees the **Mystic Aquarium & Institute for Exploration and Immersion Learning** divisions. Foundation CEO **Stephen Coan** said one grant will provide funding for its pilot program, "Exploring Inner Space: Linking Aquariums with Ocean Scientists," to develop partnerships and educational programming using state of the art technology. The second grant will fund the foundation's archaeological exploration of the Northern Black Sea and Eastern Aegean Sea by undersea explorer and CASE member **Robert Ballard**.

YALE TEAM TRACKS RECEPTORS LINKED WITH MEMORY. Yale researchers used advanced imaging technology to track the loss of nicotinic receptors with age (see *Neurobiology of Aging*, September, www.neurobiologyofaging.org). Nicotinic receptors are part of a key neural pathway that enhances learning and memory skills but reinforces addictions. Using SPECT imaging, researchers tracked concentrations of nicotinic receptors in eight brain regions of 47 subjects aged 18 to 85. They observed an age-related loss of receptors in seven of eight brain regions, at a rate of about 5% per decade of life. "These results may encourage the broadening of therapeutic trials to target the cognitive decline associated with healthy aging," said senior author **Christopher H. van Dyck**, director of **Yale's Alzheimer's Disease Research Unit.**

GEOLOGICAL SOCIETY OF CONNECTICUT. The **Geological Society of Connecticut** held its inaugural meeting in November. The new professional organization already has over 100 members. The Society's goals include the advancement of the science and profession of geology and its related branches; contribution to public education of the geology of Connecticut and promotion of the proper use and protection of its natural resources; and the advancement of professional conduct by those engaged in the collection, interpretation and use of geologic data.

Energy

NEW NAME, EXPANDED MISSION FOR FUEL CELL CENTER. The **Connecticut Global Fuel Cell Center** at the **University of Connecticut** has been renamed the **Center for Clean Energy Engineering (C2E2)**. Founded in 2001 with funding from the **Connecticut Clean Energy Fund** and industry partners, the center is enlarging its mission to embrace a range of sustainable energy research, education and industry outreach. "The center will continue to focus on energy conversion technologies, including high and low temperature fuel cells, microbial fuel cells, solar and wind energy," said **Prabhakar Singh**, the UTC Chair Professor of Fuel Cell Technology and C2E2 director. Singh added that other prominent vectors to be integrated under the C2E2 umbrella will include fuel processing and combustion of fossil fuels, carbon sequestration, natural resource conservation, power management and smart power transmission, and efforts aimed at improving the duration and storage capacity quality for hydrogen and batteries.

CONNECTICUT SCIENCE CENTER'S NEW FUEL CELL. The **Connecticut Science Center** installed a **UTC Power** 200-kilowatt hydrogen fuel cell to light, heat and cool the $165 million facility. Installation was completed in November with activation expected in the first week in December, said Science Center spokesman **Edward Main**. The Connecticut Science Center will be the nation's first science center or museum to rely on a fuel cell for the majority of its power, Main said. The Science Center intends to sell the fuel cell's surplus electricity to the power grid.

FUNDING FOR FUELCELL ENERGY. Danbury-based **FuelCell Energy Inc.**, received about $1.9 million in federal stimulus

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funding from the US Department of Energy (DOE) to develop a component designed to improve fuel cell cost and performance. The funding supports the development of a microchannel high temperature recuperator for fuel cell systems. Microchannels are tiny passages in heat exchangers, or recuperators, that significantly enhance heat recovery and potentially reduce recuperator cost. The company said it is also developing coal-based solid oxide fuel cell systems under a $30 million DOE agreement.

OPTIWIND PROTOTYPE. Torrington-based **Optiwind Corp**., a startup developer of mid-sized wind turbines, installed a working prototype of its mid-sized compact wind acceleration turbine system at a Torrington dairy farm. Completed construction is expected at the end of the first quarter of 2010. The company received a $1 million investment from the **Connecticut Clean Tech Fund**, along with another $2 million from its initial backer, Charles River Ventures, of Waltham, MA. The company used the financing to hire additional employees to complete the design—an array of 6 or 12 turbines mounted on a large cylinder that rotates so that the turbines always face prevailing winds. Company spokesman **David Hurwitt** said the design is ideally suited for installation at commercial, industrial and school sites.

CHP GROWTH IN CT. **PepsiCo's Frito-Lay** manufacturing facility in Killingly inaugurated its new combined heat and power (CHP) or co-generation system this past summer. Co-generation captures unused heat generated from a typical power plant and transforms it into usable energy. The system generates almost 100% of the site's electrical requirements; the waste heat is also used to generate steam for use in the manufacture of snack products. Frito-Lay Killingly completed the project with a state grant awarded as part of **Connecticut's Energy Independence Act** and a grant from the US Department of Energy (DOE). Stratford-based **Sikorsky Aircraft Corp.** broke ground a $26 million CHP plant in September. The plant is being built by sister company **Carrier Corp.** and is expected to provide about 82% of Sikorsky's energy needs and save 8,900 tons of carbon dioxide emissions annually.

NEW SOLAR THERMAL INITIATIVE, SOLAR LEASE INCOME ADJUSTMENT. **Governor Rell** announced the **Connecticut Clean Energy Fund's (CCEF) Solar Thermal Incentive Program** in October. This initiative is designed to help homeowners, businesses and institutions "go solar" with hot water systems and is part of the **State Energy Plan** that has qualified for $38 million of federal stimulus funds. CCEF officials say there is enough funding to support 600 residential solar heating installations and about 120 non-residential systems. CCEF also announced an adjustment to income limits for its **Solar Lease Program**, making more Connecticut residents eligible to qualify for financial assistance. Homeowners who earn up to twice the median income for their area are eligible for the program.

Environment

DEP SEEKS NEW WATER PROTECTION RULES. The state **Department of Environmental Protection** has proposed new rules to better balance human and ecological needs to protect Connecticut's more than 6,000 miles of waterways. The proposed rules include new guidelines for activities that alter the flow of rivers and streams, such as withdrawals of groundwater and surface water or the operation of dams or other impoundments. The regulations would establish four classes of rivers and streams:

Class 1 – "natural," little current development in the watershed and unaffected by the removal of water for human uses.

Class 2 – "near natural," sharing many characteristics with Class 1 systems; however with flow standards allowing for some levels of human alteration.

Class 3 – "working rivers," where human uses may have a significant influence on steam flow patterns but still expected to have adequate water resources for supporting viable aquatic communities. Some changes in use may be necessary to restore flow patterns for ensuring these conditions.

Class 4 – where past practices have resulted in a significant deviation from the natural stream flow pattern and restoration to a more natural condition would cause extreme economic hardship.

Another informational session on the proposed regulations is set for Dec. 21 at 1:30 pm in the agency's Phoenix Auditorium at 79 Elm St., Hartford. A formal public hearing is set for Jan. 21 at the same location.

ASIAN LONG-HORNED BEETLE STILL A CONCERN. The **Connecticut Department of Environmental Protection** (DEP) and **The Connecticut Agricultural Experiment Station** (CAES) continue to raise awareness about the threat of the Asian Longhorned Beetle (ALB). The insect can devastate trees and has been found in New York and Massachusetts and may already be in Connecticut. Approximately 52% of the trees in Connecticut's forests are considered susceptible. ALB exit holes are circular and large—about ¼ to ½ inch in diameter. The CAES recommends taking photographs and calling the Deputy State Entomologist at 203-974-8474 if you think you have found an ALB. For more details visit Current Topics on the DEP's web site at www.ct.gov/dep and click on Asian Longhorned Beetle.

Food & Agriculture

ORGANIC LAND CARE ACCREDITATION. The **Northeast Organic Farmers Association** (NOFA) will hold the New Haven edition of its 9th annual Organic Land Care accreditation course from Jan. 21-27, 2010. NOFA is the first organization in the country to offer accreditation for organic landscaping professionals, according to their organic land care standards which were developed by scientists, professionals and activists from different NOFA chapters. The course covers a range of material, including: organic principles; site analysis and design; soil health and biology; composting, rain gardens and stormwater infiltration; care of wetlands, insect pest management; tick management; disease control; weeds; mulches, invasive plants, and running an organic land care business. Visit www.ctnofa.org for more information.

LEAST HEALTHY CEREALS MOST AGGRESSIVELY MARKETED. A study from **Yale University's Rudd Center for Food Policy and Obesity** found that the least healthy breakfast cereals are those most frequently and aggressively marketed directly to children as young as age two. The researchers' evaluation of cereal marketing, the first such study of its kind, shows pervasive targeting of children across all media platforms and in stores. Findings were presented at the 27th annual scientific meeting of The Obesity Society. Researchers studied the nutrient composition and comprehensive marketing efforts of 115 cereal brands and 277 individual cereal varieties. Nineteen brands comprising 47 varieties were identified as "child brands" because their cereals are marketed directly to children on television, the Internet, or through licensed characters, such as Dora the Explorer.

STUDY EXAMINES SODA TAX-BMI RELATIONSHIP. A study by the **Yale School of Public Health**, appearing in *Contemporary Economic Policy*, found that an individual's weight only mildly

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responds to changes in taxation. **Yale Assistant Professor Jason M. Fletcher** and colleagues from Bates College and Emory University analyzed the effectiveness of various forms of soda taxation on body mass index (BMI) over a 16-year period. They found that a 1% tax increase resulted in a BMI decrease of 0.003 points, which is less than a tenth of a pound for a man of average height. "Our results leave open the possibility that large taxes that are communicated to consumers are still worthwhile to consider as policy options, but small tax changes will not work," Fletcher said.

Health

H1N1 UPDATE. According to the most current report available from the **Connecticut Department of Public Health** at the time of publication, Connecticut has had 1,295 confirmed cases of H1N1 influenza virus and 13 confirmed H1N1 deaths, from the period of Aug. 30 to Nov. 24, 2009. The state has received and distributed 682,000 doses of the H1N1 vaccine and continues to receive weekly shipments of the vaccine. More information is available at www.ct.gov/ctfluwatch.

EMERGENCY ROOM CARE NOT TIMELY. **Yale** researchers documented a lack of consistency among US hospitals in how quickly they treat patients in emergency rooms. The report, which is online in *Annals of Emergency Medicine* (www.annemergmed.com), was a retrospective cross-sectional study of a stratified random sampling of 35,849 patient visits to 364 nonfederal US hospital Emergency Departments (EDs) in 2006, weighted to represent 119,191,528 visits to 4,654 EDs. The study showed that 78% of EDs were able to provide timely care to patients, while only 31% of EDs achieved the triage target for more than 90% of their patients. Researchers found that in a typical ED, one-third of acutely ill patients wait longer than recommended at triage to be treated by a doctor, and one-quarter of patients who need to be admitted wait more than six hours for an inpatient bed.

VIDEO GAME TO HELP TEENS AVOID RISKY ACTIONS. Creating a video game to help teens avoid sex, drugs and alcohol use—behaviors that could lead to HIV infection—is the aim of a five-year, $3.9 million research grant to **Yale** from the Eunice Kennedy Shriver National Institute of Child Health and Human Development. The grant will fund work by **Lynn Fiellin**, assistant professor of medicine at **Yale School of Medicine**. Fiellin's study is designed to develop and test an interactive virtual reality-based video game called "Retro-Warriors" that will teach ethnically diverse adolescents how to make healthier choices. The research proposes to create a world in which the game players can engage in role-playing to learn to avoid risky behaviors that could lead to HIV infection.

High Technology

XEROX ANNOUNCES PRINTABLE ELECTRONICS. Norwalk-based **Xerox Corp**, announced that its scientists have developed a new silver ink that paves the way for commercialization and low-cost manufacturing of printable electronics. Applications for the technology include "smart" pill boxes that track how much medication a patient has taken or display screens that roll up to fit in a briefcase. Clothing that monitors body temperature or heart rate may also be possible. Typically, integrated circuits consist of three components—a semiconductor, a conductor and a dielectric element—mounted onto a silicon wafer that is expensive to produce. With its breakthrough silver ink to print the conductor, Xerox says it has developed all three of the materials necessary for printing plastic circuits.

PERSISTENT CURRENT MEASURED. **Yale** physicists made the first definitive measurements of "persistent current," a small but perpetual electric current that flows naturally through tiny rings of metal wire even without an external power source. The team used the novel approach of nanoscale cantilevers to indirectly measure the current through changes in the magnetic force it produces as it flows through the ring. Team leader **Jack Harris**, associate professor of physics and applied physics at Yale, said the research could lead to a better understanding of how qubits, used in quantum computing, are affected by their environment, as well as which metals could potentially be used as superconductors.

Transportation

SAFETY FEATURE ON THE S-92 HELICOPTER. **Sikorsky Aircraft** announced a new feature on the S-92 helicopter that will allow offshore oil operators to do safer approaches in challenging weather conditions. The new system provides an automated approach capability with a higher safety margin than is currently available, according to Sikorsky. A pilot can program the approach into the autopilot and the aircraft flies the approach. This allows the pilots to spend less time concentrating inside the cockpit and more time looking outside for visual cues, the company said, noting that the feature is especially valuable in night and low visibility conditions.

CONNDOT STIMULUS FUNDING. **ConnDOT** has received a total of $455 million in federal stimulus funding. Of that, $302 million has been allocated for highway and bridge projects, including $90.6 million for the municipalities and $153 million for transit and rail projects. In addition, the state's bus program was awarded a $7 million TIGGER (Transit Investments for Greenhouse Gas and Energy Reduction) grant from the Federal Transit Administration. The additional funds will be used to purchase diesel-electric hybrid transit buses and stationary fuel cells to provide primary and emergency back-up power for bus maintenance and storage facilities.

METRO-NORTH NEWS. The first two of 300 new **Metro-North** commuter rail cars have been shipped from maker Kawasaki Rail Car Inc.'s Kobe, Japan, plant. Connecticut agreed to pay $713 million for the M-8 cars for the **New Haven** and **Shore Line East** lines. All cars will undergo quality-assurance tests lasting several months before being put into regular service. Also in rail news, the state bond commission approved $103 million for construction of a Metro-North Railroad commuter station in **West Haven**. Plans for the new station call for over 700 new parking spaces and a 3,000-square-foot building with a waiting room, restrooms and a newsstand. Construction begins in 2010 and is to be completed in 2012.

TRANSPORTATION AND CAMPUS EMERGENCIES. A new report from The Mineta Transportation Institute provides practical information about how college campuses can address the transportation aspects of disaster response and recovery. The report provides a list of materials and a bibliography that can be used to educate campus leadership about campus emergency impacts. It also includes a complete set of Emergency Operations Plan (EOP) checklists and organization charts. Campus emergency planners can quickly update their existing emergency management documents by integrating selected annexes and elements, or they can create new National Incident Management System (NIMS)-compliant plans by adapting the complete set of annexes to their universities' structures. The free document can be downloaded at http://www.transweb.sjsu.edu/MTIportal/research/publications/summary/MTI-0806.html

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

over their entire life cycle—for example, not only the pollution generated when gasoline is used to run a car but also the pollution created by extracting and refining oil and transporting fuel to gas stations.

The report focused on monetizing the damage of major air pollutants—sulfur dioxide, nitrogen oxides, ozone, and particulate matter—on human health, grain crops and timber yields, buildings, and recreation. When possible, it estimated both what the damages were in 2005 (the latest year for which data were available) and what they are likely to be in 2030, assuming current policies continue and new policies already slated for implementation are put in place. The committee also separately derived a range of values for damages from climate change; the wide range of possibilities for these damages made it impossible to develop precise estimates of cost. However, all model results indicate that climate-related damages caused by each ton of CO_2 emissions will be far worse in 2030 than now; even if the total amount of annual emissions remains steady, the damages caused by each ton would increase 50-80%.

http://www.nap.edu/catalog.php?record_id=12794

◆ Smoking Bans Reduce Secondhand Smoke Risks

Smoking bans are effective at reducing the risk of heart attacks and heart disease associated with exposure to secondhand smoke, says a new report from the Institute of Medicine (IOM). The report also confirms that there is sufficient evidence that breathing secondhand smoke boosts nonsmokers' risk for heart problems, noting that indirect evidence indicating that even relatively brief exposures could lead to a heart attack is compelling.

About 43% of nonsmoking children and 37% of nonsmoking adults are exposed to secondhand smoke in the United States, according to public health data. The IOM study, requested by the Centers for Disease Control, was based on a comprehensive review of published and unpublished data and testimony on the relationship between secondhand smoke and short-term and long-term heart problems. Eleven key studies that evaluated the effects of smoking bans on heart attack rates informed the committee's conclusions. The studies found that reductions in the incidence of heart attacks range from 6% to 47%. The repeated finding of decreased heart attack rates overall after bans were implemented conclusively shows that smoke-free policies help protect people from the cardiovascular effects of tobacco smoke, the report said.

http://www.nap.edu/catalog.php?record_id=12649

Website: http://www.iom.edu/en/Reports/2009/Secondhand-Smoke-Exposure-and-Cardiovascular-Effects-Making-Sense-of-the-Evidence.aspx

◆ Improved Voter Database Interoperability Urged

Several actions are needed to help make voter registration databases capable of sharing information within state agencies and across state lines, according to a new report from the National Research Council. These include short-term changes to improve education, dissemination of information, and administrative processes, and long-term changes to make improvements in data collection and entry, matching procedures, and ensure privacy and security.

http://www.nap.edu/catalog.php?record_id=12788#description

◆ New School Meal Nutrition Guidelines Advised

The National School Lunch Program and the School Breakfast Program should adopt a new set of nutrient targets and standards for menu planning, says a new Institute of Medicine report. The report's recommendations, which will bring school meals in line with the latest Dietary Guidelines for Americans and Dietary Reference Intakes, include limiting sodium and the maximum number of calories and encouraging children to eat more fruits, vegetables, and whole grains. Implementing the recommendations will likely increase the costs of providing school meals, particularly breakfasts, largely because of the increased amounts of fruits, vegetables, and whole-grain foods involved, stated the report. A combination of higher federal meal reimbursement, capital investment, and additional money for training food service operators will be needed to make the necessary changes in school cafeterias.

The National School Lunch Program is available in 99% of US public schools and in 83% of private and public schools combined. The School Breakfast Program is available in 85% of public schools. About 30.6 million schoolchildren participated daily in the school lunch program in fiscal year 2007, and 10.1 million children ate school breakfasts.

http://www.nap.edu/catalog.php?record_id=12751

Website: http://www.iom.edu/Reports/2009/School-Meals-Building-Blocks-for-Healthy-Children.aspx

◆ White House Announces 'Educate to Innovate'

President Obama recently announced a new nationwide effort to create public-private partnerships to improve science, technology, engineering, and math (STEM) education and encourage more students to pursue careers in these fields. The campaign, called "Educate to Innovate," will focus on mobilizing resources to help already successful programs reach more young people and on using media such as video games and television to aid learning in math and science, among other goals. The White House said the new partnerships are part of a response to the president's call for an initiative to raise American students "from the middle to the top of the pack in science and math over the next decade," which he issued in a speech to the National Academy of Sciences in April 2009.

http://www.nationalacademies.org/headlines/20091123.html

◆ New Radio Spectrum Management Policies Needed

The current means for managing the radio frequency spectrum—which is used by researchers for myriad purposes, including weather forecasting and astronomical investigations, and by consumers for such technologies as cellular phones and wireless Internet—must be changed, says a new report from the National Research Council. The current policies threaten to thwart scientific discovery, diminish the utility of critical environmental observations, and limit economic growth because of inefficient use of these resources.

http://www.nap.edu/catalog.php?record_id=12800

Talcott Mountain (from page 1)

and scraps of the patches from his spacesuits. Over the next few months, Talcott Mountain Science Center will welcome Richard Alena, LCROSS (Lunar Crater Observation and Sensing Satellite) Computer Engineer; acclaimed physicist Ron Malett; and Mary Carskadon, PhD, Director of the Sleep and Chronobiology Research Lab at E.P. Bradley Hospital. Please be sure to bookmark www.tmsc.org and check back often for dates and times.

Continuing its proud tradition of hands-on education, TMSC is, once again, offering several three-day vacation programs for students in grades K-8. Scheduled for December 28, 29 & 30, Three Days of Winter Fun features diverse subject areas such as weather, magic, chemistry, robotics and iMovie. Interested individuals should visit the Center's website at http://www.tmsc.org and click on "December Vacation Programs" for more information and a registration form.

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Dental Health (continued from page 2)

inflammatory markers have been found in women with periodontitis and preterm birth, compared with healthy control patients," Douglass and colleagues reported.

"There is also a correlation between periodontal disease and coronary disease," Douglass said. "Individuals with periodontal disease are at increased risk for stroke and sudden death. People with heart disease should maintain meticulous oral health. The more bacteria there are in the mouth, the more likely the mouth is to be releasing bacteria all of the time," she said.

Douglass also noted that she and other dentists are working closely with doctors to educate them on the risks of poor oral health. "One reason oral health doesn't get attention is because it is avoided. But there are new anesthetics that make most procedures practically painless," she said.

Meanwhile, she noted, "We require kids to have medical exams for school, but not dental exams."

Lisa Reynolds, executive director of the Connecticut Oral Health Initiative, said the nonprofit organization is updating what must be done in Connecticut to achieve good oral health. Some of the goals set out by the state health department in 2004 have been achieved—assessment, for example—while others, including policy to implement a statewide oral health improvement plan, have yet to be completed.

"Oral health has been looked at as optional. It's almost as if dentists seem to be out of the medical loop. We have to overcome that perception," Reynolds said. At the same time, parents must be educated on the oral health needs of their children, she added, saying that there is no reason for a parent to start decay in a child's deciduous teeth by allowing the infant to sleep with a bottle of juice or even soda.

"We require kids to have medical exams for school, but not dental exams."

"The biggest piece missing is health education for young mothers, to appreciate dental health care," said Bruce Tandy, president of the Connecticut State Dental Association (CSDA).

"We've been working on a lot of things," Tandy said, noting that the state association also has programs to ensure that the state's elderly receive adequate dental care. "There is a connection between oral, and body health" and more people must be educated about this possibly serious risk.

"Give Kids a Smile," is a dental association charitable program that holds clinics across the state. The Connecticut Foundation for Dental Outreach, another association program, is also designed to provide access to care. Full information is available on the CSDA website at http://www.csda.com.

"All in all, the health of kids in Connecticut is better than people perceive it to be," said Tandy. "We see difficulties in terms of fluoridation (for those who depend on well water). Municipal water companies add a trace of fluoride, which strengthens teeth, making enamel less prone to decay. A lot of soda, juices, and sports drinks contribute to decay. Even when care is accessible, only 35–40% of people seek dental care. We're looking to school-based programs to help with that."

"What's happening now is that the more hard scientific data on coronary health, diabetes, and low birth weight babies and oral health there is, the more interaction there is among doctors and dentists," he said. But, he added, "There is still a huge need in the state … We're sort of in a quandary. Better oral health care could prevent later problems," but regardless of how health care reform fares in Congress, he predicted, dental health insurance isn't likely to increase.

— Abram Katz, freelance science writer