

## T2 INSIDE



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## T2 EVENTS

SSTI 12th Annual Conference  
Cleveland, Ohio  
October 14-16, 2008

LES Annual Meeting 2008  
Orlando, Fla.  
October 19-23, 2008

21st Industry Growth Forum  
Denver, Colo.  
October 28-30, 2008

The Annual Conference on Ecosystems Restoration and Creation  
Plant City, Fla.  
November 6-8, 2008

PACK EXPO International 2008  
Chicago, Ill.  
November 9-13, 2008

## T2 FACT

Leon Foucault (1819-1868), a 19th-century French scientist and physicist, is responsible for giving the name gyroscope to a wheel or rotor mounted in gimbal rings—i.e. a set of rings that permit it to turn freely in any direction. Leon Foucault named his gyroscope in 1852. The gyroscope was used by Foucault as a tool to study the Earth's rotation. Leon Foucault also invented the Foucault pendulum which he used to measure the Earth's rotation. Among his other achievements: in 1850, Foucault proved that light traveled more slowly in water than in air.

- Mary Bellis, About.com

# N<sup>FLC</sup> NEWSLINK

August 2008

The Newsletter of the Federal Laboratory Consortium for Technology Transfer



*"As we move to a more personalized era of oncology, it is clear that we will require multiple agents to target multiple pathways in the same patient. Facilitating that future will challenge how we think of competition, of intellectual property, and even the language of contracts. I believe NCI must step into those areas and become the facilitator between the public, private, and academic sectors." —NCI Director John E. Niederhuber, M.D.*

## CANCER RESEARCH: TOOLS FOR PARTNERSHIP AND COMMERCIALIZATION

by Brooke Hardison Wang

Collaborations, the transfer of technology, and other types of public-private partnerships are critical to the National Cancer Institute's (NCI) mission of fostering the best cancer research and promoting translation of that research from the bench to the bedside. NCI is the primary means of support for cancer research in America, with \$3.8 billion spent in 2007 on cancer research at institutions across the country, and another one billion spent at NCI. NCI's intramural scientific program, which is housed primarily on its campuses in

Frederick and Bethesda, Md., is uniquely positioned to explore innovative diagnostic and treatment development in areas such as orphan drugs or combination therapies—areas where industry and academic sectors often face difficulties due to concerns over marketability, intellectual property, competition and liability. NCI cannot do this research alone, however, particularly because the problems being addressed require special expertise and a multi-disciplinary approach. Partnerships have become an important component of

America's investment in cancer research.

For industry partners, there can be many advantages to collaborating with NCI. NCI's scientists use cutting-edge technologies (functional imaging, genomics, proteomics and new approaches to drug development) to drive discoveries from the bench through clinical studies. NCI has resources that make it possible to conduct more extensive testing of new agents and products, and has experience in regulatory issues and the requirements

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## FORT DETRICK LEADS TECH TRAN INITIATIVE

by Sara Miller, USAMRMC



*Akonni used the \$50,000 it received from FDTTI to further efforts in developing genetic-based diagnostic and disease surveillance products.*

With the heightened focus on biodefense and bioterrorism, Maryland has become a hotbed for biotech companies looking to utilize the state's abundance of research centers, federal laboratories and programs designed to facilitate technology transfer to address these national concerns.

The Fort Detrick Technology Transfer Initiative (FDTTI) was established to provide awards to for-profit small businesses in support of technology development projects. Emphasis is on the development of technologies that meet the medical needs of the Army, as well

*Fort Detrick T2 Initiative, page 8*

## DOE HOSTS FIRST LAB DIRECTORS FORUM

On July 22, 2008, a Laboratory Directors Network Forum—sponsored by the FLC and hosted by the Department of Energy (DOE)—was held in Washington, D.C. The Forum was organized to allow federal laboratory executives to exchange ideas and experiences, as well as to increase mutual awareness of other agencies' capabilities and areas of special expertise. Invitation letters had been sent to Laboratory Directors explaining that the goal of the meeting was to encourage networking and collaboration and to stimulate innovation by operating across agency lines.

With approximately 100,000 scientists and engineers working on a variety of cutting-edge technologies and an

*Lab Directors Forum, page 5*



# FED LABS FLASH | TECHNOLOGY TRANSFER NOTES

## NIST'S ENERGY-SAVING CHILL



*Nanoparticle additives to lubricants commonly combined with refrigerants used in chillers may encourage secondary nucleation-bubbles on top of bubbles. The double-bubble effect enhances boiling heat transfer and, ultimately, could help to boost the energy efficiency of industrial-sized cooling systems.*

Adding just the right dash of nanoparticles to standard mixes of lubricants and refrigerants could yield the equivalent of an energy-saving chill pill for factories, hospitals, ships, and others with large cooling systems, suggests the latest results from National Institute of Standards and Technology (NIST) research that is pursuing promising formulations.

NIST experiments with varying concentrations of nanoparticle additives indicate a major opportunity to improve the energy efficiency of large industrial, commercial, and institutional cooling systems known as chillers. These systems account for about 13 percent of the power consumed by the nation's buildings and about 9 percent of the overall demand for electric power, according to the Department of Energy.

NIST researcher Mark Kedzierski has found that dispersing "sufficient" amounts of copper oxide particles (30 nanometers in diameter) in a common polyester lubricant and combining it with an equally pedestrian refrigerant (R134a) improves heat transfer by between 50 percent and 275 percent. "We

were astounded," he said. Just how nanomaterial additives to lubricants improve the dynamics of heat transfer in refrigerant/lubricant mixtures is not thoroughly understood. The NIST research effort aims to fill gaps in knowledge that impede efforts to determine and, ultimately, predict optimal combinations of the three types of substances.

"As with all good things, the process is far from foolproof," Kedzierski explained. "In fact, an insufficient amount or the wrong type of particles might lead to degradation in performance."

Success in optimizing recipes of refrigerants, lubricants and nanoparticle additives would pay immediate and long-term dividends. If they did not harm other aspects of equipment performance, high-performance mixtures could be swapped into existing chillers, resulting in immediate energy savings.

## SCIENCE OF STORMS

This report is designed to give a view of the immediate response of the U.S. Geological Survey (USGS) to four major hurricanes of 2005: Dennis, Katrina, Rita, and Wilma.

Some of this response took place days after the hurricanes; other responses included fieldwork and analysis through the spring.

While hurricane science continues within the USGS, this overview of work following the hurricanes reveals how a Department of the Interior bureau quickly brought together a diverse array of its scientists and technologies to assess and analyze many hurricane effects.

Topics vary from flooding and water quality to landscape and ecosystem impacts, from geotechnical reconnaissance to analyzing the collapse of bridges and estimating the volume of debris. Thus, the purpose of this report is to inform the American people of the USGS science that is available and ongoing with regard to hurricanes.

In addition to performing the science needed to understand the effects of hurricanes, USGS employees helped in the rescue of citizens by boat and through technology by "geoaddressing" 911 calls after Katrina and Rita so that other rescuers could find persons trapped in attics and porches. They also delivered food and water to residents stranded along the lower Mississippi River for several days.

## SCIENCE EDUCATION

Los Alamos National Security, LLC (LANS) is donating \$500,000 to the Senator Pete Domenici Endowed Scholarship Fund, which has been established in honor of New Mexico's senior senator.

The scholarship, to be managed by the Los Alamos National Laboratory Foundation, recognizes Domenici's more than three decades of support for northern New Mexico, the laboratory, and his efforts championing scientific research for the nation.

"This scholarship will be a lasting legacy to Senator Domenici," said Laboratory Director and LANS President Michael Anastasio. "And it will provide an investment in the future of northern New Mexico and the Laboratory by supporting area students in their pursuit of a higher education."

"I am grateful to have my name associated with a scholarship that will broaden future opportunities for youth in northern New Mexico," said Domenici. "Over the past 12 years, the Foundation has developed nicely into what I envisioned for it, namely an organization linked to the Laboratory that can foster better education and stronger communities."

## NEW STUDY SHEDS LIGHT ON THE GROWING U.S. WIND POWER MARKET



For the third consecutive year the U.S. was home to the fastest-growing wind power market in the world, according to a report released today by the Department of Energy (DOE) and Lawrence Berkeley National Laboratory (Berkeley Lab). Specifically, U.S. wind power capacity increased by 46 percent in 2007, representing a \$9 billion

investment in new wind projects. At this pace, wind is on a path to becoming a significant contributor to the U.S. power mix. Wind projects accounted for 35 percent of all new electricity-generating capacity added in the U.S. in 2007, and more than 200 GW (gigawatts, or billion watts) of wind power are in various stages of development throughout the country.

The 2007 edition of the Annual Report on U.S. Wind Power Installation, Cost, and Performance Trends provides a comprehensive overview of developments in the rapidly evolving U.S. wind power

market. The need for such a report has become apparent in the past few years, as the wind power industry has entered an era of unprecedented growth, both globally and in the United States.

"As we work to implement President Bush's Advanced Energy Initiative by increasing the use of domestic, clean, and affordable renewable energy, we are eager to continue the trend of increasing the use of wind power at unprecedented rates," said DOE Assistant Secretary for Energy Efficiency and Renewable Energy Andy Karsner.

## FLC NewsLink

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# TECH WATCH | LABORATORY TECHS READY FOR TRANSFER

## SECURE TRANSACTIONS

Idaho National Laboratory (INL), operated by the Battelle Energy Alliance, LLC (BEA) under contract with the U.S. Department of Energy (DOE), is offering the opportunity to license, develop, and commercialize new technology to ensure secure, encrypted wireless communications and financial transactions. The system, commonly called the Wireless Sentinel, also secures designated use areas – detecting unauthorized cell phones and permitting only authorized wireless devices to operate in the zone.

The security application of the Wireless Sentinel system can be configured differently for corporations, military or mobile commerce users. For systems installed for national or corporate security purposes, an organization can use the Wireless Sentinel to detect a compromised or unauthorized cell phone and alert physical security officers or surveillance systems. By using the Wireless Sentinel to discover and authenticate wireless devices approved for entry into sensitive areas, an organization can allow approved device use while simultaneously discovering and disallowing non-approved devices. The Wireless Sentinel also detects cell phone break-ins and reports suspicious changes in the phone's operating system to its network. Identification and authentication software is installed on each device.

*More info:* Charity Follett, 208-526-9353

## LUBRICANT DEMAND

Agricultural Research Service (ARS) scientists in Illinois have developed a way to make a vegetable oil based material using several natural compounds. This technology can be used in formulation of biobased-industrial lubrication fluid, potentially replacing petroleum-based fluids.

One of ARS's compounds can be poured at cold temperatures—a property required by the lubrication industry. The compounds also have structures which have the potential to be used to form a new type of surfactant. Many other commercial lubricants and surfactants are available; however, ARS's biodegradable compounds are more environmentally friendly.

The technology has been shown to be usable on the small scale. Global lubricant demand is more than 30 million tons annually, and current surfactant use in the United States and Canada is more than 3 million tons per year.

ARS is seeking a cooperative research and development partner to further evaluate the compounds in this invention, as well as conduct extensive lubricant testing.

*More info:* Richard J. Brenner, CRADA.OTT@ars.usda.gov, 301-504-6905

## TWO-WAY COMMUNICATIONS FOR FIRST RESPONDERS

National Institute of Standards and Technology (NIST) researchers successfully demonstrated a prototype approach to maintain two-way communications with first responders as they make their way in building fires, and mine and tunnel collapses. These and other disasters in enclosed environments are often rife with radio dead spots and conditions that can severely weaken signals.

On Aug. 5, in conjunction with the 2008 Workshop on Precision Indoor Personnel Location and Tracking for Emergency Responders at Worcester Polytechnic Institute in Massachusetts, NIST information technology experts put their version of a “bread crumb communication system” through its paces. The system is highly automated so that it can be deployed on the fly. It features “smart” multihop relays—sometimes referred to as “bread crumbs”—that, in effect, advise first responders when to place the next device as to extend the communications range.

Assembled from off-the-shelf microprocessors and other standard hardware, the relays incorporate NIST-developed software that monitors the status of radio communication signals. The algorithms embedded in the software rapidly assess the strength of received signals so the device can automatically alert first responders to lay down the next relay before they walk out of range and lose the radio signal.

Other approaches to setting up ad hoc wireless networks in emergency situations typically instruct first responders to lay down bread crumb relays, for example, in distance increments, around every corner in corridors or in every stairwell. “Static rules do not take into account all the environmental variables that affect signal degradation, such as attenuation, fading and interference,” explained

NIST's Nader Moayeri. “The communication range in a commercial building corridor is vastly different from that of a factory floor, which is unlike a coal mine.”

That's why Moayeri, Michael Souryal and other members of the NIST team developed software that implements an “adaptive strategy” for maintaining connectivity. Their approach builds on NIST's extensive research on measuring and monitoring radio signals in buildings.

Automated deployment of relays, Moayeri said, is a key performance requirement because it does not divert the attention of emergency personnel. The NIST software also provides advice on placement to improve the robustness of signals.

The NIST researchers evaluated their adaptive bread crumb deployment strategy in computer simulations of a wide variety of emergency scenarios and in several field tests. Tests were conducted with two prototype bread crumb radio systems developed at NIST, one operating at 900 megahertz and the other at 2.4 gigahertz.

Candidate approaches to maintaining continuous communication links between first responders and incident command centers were evaluated on the basis of the number of signal packets lost in transmissions, number of relays deployed, and delays in end-to-end communications.

The NIST team is interested in sharing its prototype technology and underlying concepts with businesses and other organizations working to improve the quality and reliability of first responder communication systems.

*More info:* [www.itl.nist.gov/rtm/](http://www.itl.nist.gov/rtm/)



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*Cancer Research, from page 1*

involved in conducting clinical trials. In addition, NCI funds extensive clinical trial networks that allow larger studies to be conducted across the country, and NCI's large repositories make it possible to perform tests on a wide variety of tumor types and disease settings.

In order to promote collaboration and in response to concerns about U.S. competitiveness in the global economy, Congress passed two laws in 1980 that encourage government-owned and/or -funded research laboratories to pursue commercialization of their research results through collaboration with outside entities. These two laws are known as the Stevenson-Wydler Technology Innovation Act of 1980 (P.L. 96-480) and the Patent and Trademark Amendments of 1980 (P.L. 96-517), also known as the Bayh-Dole Act.

The Stevenson-Wydler Act allows NIH and other federal agencies to enter into license agreements with industry partners to promote development of technologies born out of NIH research. The act provides the American public with a financial return on their investment in the form of royalty payments and fees. The Stevenson-Wydler Act was expanded in 1986 to allow federal agencies to partner, not only in the dissemination of their results, but throughout the entire research process. (For more information on this type of partnership, see the paragraph on Cooperative Research and Development Agreements below.)

The Bayh-Dole Act was intended to address the barriers that can arise around intellectual property, or ownership, of the materials being developed. The Act promotes the advancement of both scientific and economic development by allowing the government to enable the transfer of federally funded technologies to the public by securing patent rights and licensing them to commercial entities. While the Stevenson-Wydler Act applies to collaborations between government scientists (i.e., federal employees) with outside agencies, the Bayh-Dole Act applies to extramural grantees and contractors, and allows the investigator's institution to retain the title (i.e., rights) to the government-funded invention. The grantee or

contractor institution is charged with the responsibility to use the patent system to promote utilization, commercialization and public availability of the invention. If the institution is not interested in pursuing the technology, the government can elect to title the invention.

Collaborations between NCI-funded clinical cooperative groups and industry partners are directed by guidelines set through the NCI Cancer Therapy Evaluation Program, NCI-funded preclinical resources are managed by the Developmental Therapeutics Program, and collaborations between NCI intramural scientists and industry partners are managed through the NCI Office of Technology Transfer. There are several mechanisms through which the NCI, academic and industry partners work together. Some of the most common agreement types are include:

- Cooperative Research and Development Agreement (CRADA). A CRADA allows an NCI-funded researcher to collaborate jointly with researchers in industry and academia to pursue a common research goal.
- Clinical Trial Agreement (CTA). CTAs are used when an NCI researcher, or NCI-supported extramural investigator, is conducting research on a new drug or device and that research is being done in collaboration with an industry sponsor.
- Confidential Disclosure Agreement (CDA). A CDA is used to exchange confidential information. The agreement specifies how the information may be used, and addresses situations in which the information must be shared such as under court order or the Freedom of Information Act. This agreement makes no promises about inventions made through use of this information.
- Material Transfer Agreement (MTA). MTAs are used by NCI and other academic and for-profit organizations to send or receive research materials (such as cell lines, monoclonal antibodies or mouse models) for use by scientists in another institution.
- License. Each year, hundreds of new inventions are made by scientists at NCI. The NIH Office of Technol-

ogy Transfer transfers these inventions, through licensing, to the private sector for development that will benefit the public health.

Over the years there have been several advancements in cancer treatment that have resulted from successful partnerships with NCI. Examples include:

- Gardasil® human papillomavirus (HPV) vaccine, based upon technology from NCI, was licensed and developed by Merck & Co.
- Kepivance®, a drug used to treat oral mucositis (a common side effect of high-dose chemotherapy and/or radiation involving painful lesions in the mouth or throat), is based on keratinocyte growth factor, which was discovered by NCI researchers in 1989. In 1992, Amgen was granted an exclusive license to develop potential therapeutic applications for this growth factor.
- Velcade®, a proteasome inhibitor used for the treatment of multiple myeloma, was developed through collaboration between NCI and Millennium Pharmaceuticals, Inc.
- Laser Capture Microdissection (LCM), a method used for collecting selected cells for genetic or proteomic analysis, was conceived by researchers at

the NCI and one of its sister institutes, the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD). The resulting technology has been used in approximately 1,000 LCM machines for breast, prostate and pancreatic cancer research.

- The Multi-Replica Blotting Kit, which allows simultaneous detection of up to ten different proteins from one gel, is based on layered expression scanning (LES) technology developed by NCI researchers. 20/20 GeneSystems, Inc., Rockville, Md., worked with NCI researchers to refine the LES system and commercialized the Multi-Replica Blotting Kit.

- Taxol®, an anti-cancer drug approved for the treatment of breast, ovarian, and lung cancer, as well as Kaposi's sarcoma, is based on a compound called paclitaxel, which was discovered from the bark of the Pacific yew tree by NCI researchers involved in screening natural products for anti-cancer activity. NCI researchers conducted preclinical and clinical testing, and worked with Bristol-Myers Squibb, New York, N.Y., to develop supplies of Taxol® for clinical development. The resulting treatment has been used on over one million patients.

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# FEDERAL LAB COLLABORATION PLAYS INCREASING ROLE IN U.S. INNOVATION

by Gary Jones  
FLC Washington, DC Representative



Greetings from D.C. There has been a decided shift in the source of technological innovations in the U.S. over the past half century. In the decades following World War II, large firms, often acting on their own (in large-scale industrial labs), were the primary source of innovation in the U.S.

Over the past 20 years, however, according to a new study released by the Information Technology & Innovation Foundation (ITIF), innovation is now more likely to stem from collaborative initiatives with universities and federal labs than large firms acting individually and, further, federal labs have become the “dominant organizational locus” for that collaborative innovation.

Using data from 1,200 award-winning innovations (as defined by *R&D* magazine’s annual R&D 100 Awards), spread evenly over the last four decades, the authors attempted to identify what “types of organizations were responsible for nurturing these award winning technologies.”

Their results are encouraging for those in the federal lab environment working to develop collaborative relationships with the goal of creating and moving technologies from the lab to market.

The study classifies the sources of these 1,200 innovations as private (i.e., firms either acting alone or collaborating with other firms), public or mixed (e.g., federal labs working alone or in collaboration, universities, etc.), or foreign.

Since 1975, while the level of foreign sourcing has remained relatively constant, there has been a “dramatic shift” from private to public/mixed sourcing.

In 1971, 86 percent of R&D 100 Awards went to innovations developed by private sources; by 2006, it was 31 percent. There is an even more dramatic reduction in the presence of Fortune 500 firms in the annual awards: from 41 (1971) to 6 (2006).

From 1988 to present, public/mixed sources have dominated the innovation awards.

Moreover, according to the study, during the past 20 years federal laboratories have become the dominant organization source for winning R&D 100 Awards; they were involved (working alone or in collaboration) in four awards in 1971 and improved to 42 in 2006.

Interorganization collaborations increased in gen-

eral during the period reflecting less than 10 percent of awards in 1971 to nearly 70 percent in 2006.

The overarching trend identified in the study has been one where an increasing number of R&D 100 Award winners reflect collaborative projects, and those projects often involve federal labs working with industry, universities and/or spinoff firms that market technologies developed in the labs.

Even with this good news for federal lab collaborative efforts, the study identifies “three major interconnected weaknesses” in U.S. support for federal innovation: 1) too much decentralization (with potential duplication of effort across agencies); lack of broad public support for federal programs to support the role of federal labs in fostering innovation; and 3) inadequate funding for both collaborative research and commercialization, as well as total R&D spending in general.

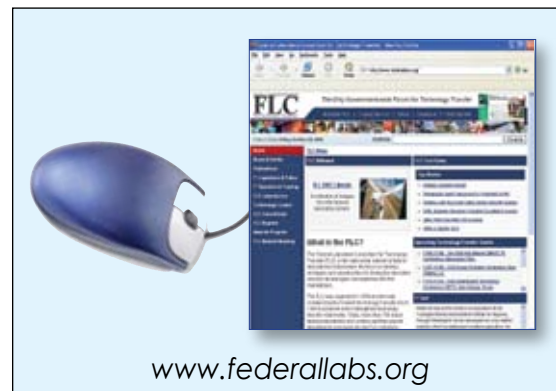
Any study is not without its limitations, and the authors clearly state the challenges to using the data set selected for the purposes of their study (see the report).

But within those limitations, the study generally provides some academic rigor and analysis to what many in our community already know: that federal labs are an essential and—according to this study—often primary source of innovation in the U.S.

Taken a step further, given the prominence in the findings on collaborative work between federal labs and industry, which is a fundamental component of our members’ technology transfer efforts, it’s clear that federal technology transfer is an essential component of U.S. innovation and competitiveness.

“Where Do Innovations Come From? Transformations in the U.S. National Innovation System, 1970-2006” (<http://www.itif.org/index.php?id=158>) can be found on the ITIF website.

Gary can be reached at [gkjones@federallabs.org](mailto:gkjones@federallabs.org).



[www.federallabs.org](http://www.federallabs.org)

*Lab Directors Forum, from page 1*

annual federal R&D budget of over \$140 billion, federal laboratories have the capability to enhance the U.S. economy in an increasingly competitive global environment, while addressing key national issues. This network of laboratory directors, if fully utilized, would be a national asset not found in any other country—which could help to address pertinent issues in a rapid and effective manner.

Ric Trotta, current chair of the FLC National Advisory Council, developed the topics for the forum based on the following issues relevant to federal laboratories:

- Increasing global competition
- Growing demand for resources
- Aging infrastructure
- Acceptance of open innovation
- Increased collaboration with federal labs
- “Not invented here” has changed to “proudly found elsewhere”
- Multi-organization collaboration.

“When Sputnik was launched, there was a sense of urgency and national commitment to ensure that the nation expanded our space program and revised technical and engineering education. We did it—put men on the moon, and changed the science and engineering curriculum throughout the country in record time” said Trotta. “Today, with ever-accelerating globalization and the demand for scarce resources, our economy is more in need of tackling issues with a sense of urgency.”

Following Trotta, Dr. Raymond Orbach, DOE’s first Under Secretary for Science, took the podium.

Orbach outlined how a network of federal laboratory directors could work together to meet the nation’s challenges and the role the FLC could play in working with and between agencies and laboratories to enhance that communication.

Dr. Orbach stressed the need to address STEM education and create new engineers and scientists, both of which are crucial to maintaining our competitiveness. Dr. Orbach asserted that since the state and quality of American science education is currently poor compared to the rest of the top 30 industrialized countries, students need something to galvanize their interest in science and math. To this end, it is important to use all of the resources at our disposal to combat this, including the talent pool in federal laboratories.

Following Dr. Orbach was a presentation by Dr. Starnes Walker, Director of Research for the Department of Homeland Security (DHS) S&T Directorate.

Dr. Walker discussed interagency collaboration from a homeland security perspective, commenting that part of the DHS S&T role is to help the next generation of scientists and engineers.

“DHS has an \$18M/year scholars and fellows program, which they hope to expand with the help of Congress,” said Walker. “About 20% of the DHS S&T budget goes into basic research and about 10% (\$80M) goes into Innovation Technologies,” which he referred to as “leap ahead or game changers.”

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## IRREGULAR EXERCISE MAY ADD POUNDS

by Lawrence Berkeley National Laboratory Public Affairs

The consequences of quitting exercise may be greater than previously thought, according to a new study from the Department of Energy's Lawrence Berkeley National Laboratory, which determined that the weight gained during an exercise hiatus can be tough to shed when exercise is resumed later.

The study, conducted by Paul Williams of Berkeley Lab's Life Sciences Division, found that the key to staying trim is to remain active

year-round, year-after-year, and to avoid seasonal and irregular exercise patterns. Most of all, don't quit. Failure to do so may be a contributing factor in the nation's obesity epidemic. "The price to pay for quitting exercise is higher than expected, and this price may be an important factor in the obesity epidemic affecting Americans," said Williams, whose study is published in the February issue of the journal *Medicine & Science in Sports and Exercise*.

The study should prompt people to think twice before taking a break from their exercise regimens, despite the pressures of family and work obligations or waning motivation.

Using data collected from the National Runners' Health Study, Williams found that the impacts of increasing and decreasing vigorous exercise aren't the same among all runners. At distances above 20 miles per week in men and 10 miles per week in women, the pounds gained by running less were about the same as the pounds lost by running more. At these exercise levels, the effects of training and quitting training are comparable, and the weight gains and losses associated with changes in exercise levels are probably reversible.

However, Williams found that people who didn't run as many miles per week face an uphill battle if they want to lose the pounds accumulated during an exercise hiatus. At these less intense levels, an interruption in exercise produces weight

gain that is not lost by simply resuming the same exercise regimen.

"At lower mileages, there is asymmetric weight gain and loss from increasing and decreasing exercise, leading to an expected weight gain from an exercise hiatus," said Williams. "In other words, if you stop exercising, you don't get to resume where you left off if you want to lose weight."

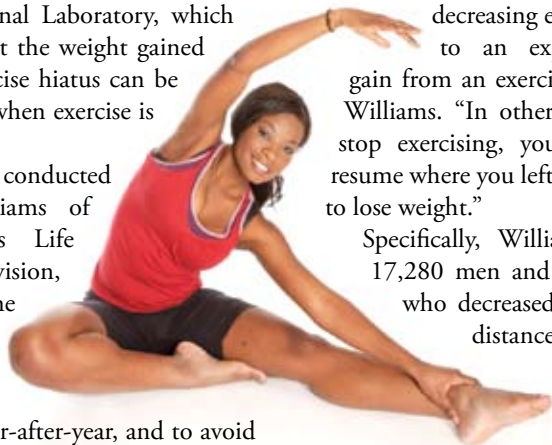
Specifically, Williams compared 17,280 men and 5,970 women who decreased their running distance with 4,632 men and 1,953 women who increased their running distance over a 7.7-year period. He found that runners who decreased their distance from five to zero miles per week gained four times as much weight as those who decreased their distance from 25 to 20 miles per week. He also found that people who started running after an exercise layoff didn't lose weight until their mileage exceeded 20 miles per week in men, and 10 miles per week in women.

Williams says his findings suggest that an effective public health policy for preventing weight gain may need to include a strategy to keep physically active people active. His study also underscores the importance of avoiding start-stop exercise patterns. Exercise designed to prevent obesity may fall short of its benefits if the exercise is irregular, seasonal, or often interrupted.

"We are getting fat because we don't exercise sufficiently and consistently. The real solution to the obesity epidemic is getting people to exercise before they think they need it, and to stick with it," said Williams. "The ounce of prevention is indeed worth a pound of cure."

A study by Williams published in the same journal in August 2007 revealed that middle-age weight gain is reduced by one-half in runners who ran 30 or more miles per week, compared to runners who ran less than 15 miles per week. These results, in conjunction with this

*Exercise May Add Pounds, page 8*



*Lab Directors Forum, from page 5*

He encouraged DHS lab directors to meet with DOE lab directors annually and to hold working group meetings between the DHS and DOE quarterly. He added that "national security is energy security."

Jim Zarzycki, former director of the Edgewood Chemical Biological Center (ECBC) at Aberdeen Proving Ground spoke next.

Zarzycki presented his perspective on collaboration between federal laboratories and presented three major lessons he learned from these endeavors. First, collaboration served important national needs through the rapid transmission of information. Second, the taxpayer "got a great deal" because the physical and intellectual infrastructure had already been paid for, resulting in less time involved and lower startup costs. Third, the laboratory and its scientists benefited from the partnerships; ECBC received payment for its work, and several of its scientists' careers were enhanced.

The final presenter was Dick Paul, past chairman of the Industrial Research Institute (IRI). IRI membership consists of approximately 200 R&D-intensive companies, and the Institute promotes members networking and formulating new techniques for innovation.

Paul discussed possible methods of fostering collaboration between government and industry. He noted that several organizations, including IRI, already have the framework in place to foster these partnerships.

Paul noted that he would like to see the U.S. move more aggressively from a "not invented here" model to a "proudly found elsewhere" model, emphasizing open innovation and working together to find necessary solutions to problems.

He also addressed the associated human resources issues within R&D, including the problem of recruiting, advancing, and rewarding new engineers and researchers, the "retirement bubble" that is causing a

loss of critical skills, and STEM; and he indicated that IRI had a Human Resources network that could provide a good venue for exchange of ideas and best practices between government and industry.

Paul added that "an overarching theme of open innovation is recognizing that good ideas are found everywhere and staying competitive requires actively



*Dr. Raymond Orbach, DOE's first Under Secretary of Science, presented during the FLC's recent Laboratory Directors Network Forum at DOE headquarters in Washington, July 22, 2008. Dr. Orbach stressed the need to address science education in America and to use federal laboratories in this effort.*

seeking and maintaining awareness of all of them."

He believes that although models of R&D differ between government and industry, and collaboration can be daunting, both sectors face many common challenges and issues, particularly at the director level. The potential benefits of collaboration are likely to outweigh the risks. The main areas in which collaboration would prove helpful are technological development, R&D management, and innovation. If government and industry can find a forum for open dialogue in a noncompetitive atmosphere, there is a good chance to develop these possibilities.

Following the presentations, the forum was open to audience comments and questions. Discussion topics focused on laboratory directors and the FLC could be influential in meeting the challenges of STEM initiatives, barriers to innovation and collaboration, and speeding up innovation through government/industry/university partnerships.

# LAB CLASSIFIEDS | AVAILABLE TECHNOLOGIES, FACILITIES, AND PARTNERS

## NAVY FUEL CELL

The Naval Research Laboratory has developed a microbial fuel cell (MFC) capable of harvesting energy in aerobic environments such as a water column or air/water interface.

The replacement of commonly used membranes with nanoporous membranes results in an MFC capable of generating  $\sim 1\mu\text{W}$  that can be connected easily in series or parallel for additional power generation. These MFCs operate by passive nutrient diffusion and thus eliminate energy-draining pumps needed in other MFCs.

*More info:* techtran@utopia.nrl.navy.mil.

## ELECTROACTIVE POLYMER BRAIDS

An electroactive polymer (EAP) is a plastic-like material that changes shape when voltage is applied to it. It can serve as an actuator or sensor and has myriad other applications such as conductors, batteries and transducers. It can handle large amounts of deformation, have many properties similar to biological tissues, and have great potential in the field of robotics.

The Space and Naval Warfare Systems Center-San Diego (SSC San Diego) has woven together single strands of EAPs. These braids are made up of EAP tiles connected by actuators. By controlling the actuators, the EAP braid can perform a wide range of motions, including contracting, elongating, expanding outward or inward, twisting, bending and curving. Braided EAPs also enable scalability for large and small devices alike and can be used in unconventional settings such as at depth in the ocean.

*More info:* Stephen Lieberman, 619-553-2778, or stephen.lieberman@navy.mil

## JUMPSTART SOFTWARE

The National Institute of Standards and Technology (NIST) has developed two demonstration software packages that show how Personal Identity Verification (PIV) cards can be used with Windows and Linux systems to perform logon, digital signing and verification, and other services.

The demonstration software, written in C++, will assist software developers, system integrators and computer security professionals as they develop products and solutions in response to Homeland Security Presidential Directive 12 and the FIPS 201-1 standard.

The software is available at <http://csrc.nist.gov/groups/SNS/piv/download.html>.

## INFLUENZA, PANDEMIC VACCINES

Development of effective vaccines against influenza, especially pandemic or avian, is a subject of intense current research efforts. The NIH is pleased to offer the subject technology, a system to quantitate virus neutralization and entry. This system utilizes pseudotyped lentiviral vectors that mimic properties of the influenza virus. Experimental use of this system has shown an increase in sensitivity more than ten times that achieved with HAI assays. This standardized system can allow influenza vaccine candidates to be evaluated and compared, which can be a critical step in identifying the best product forward. Applications include quick, high-throughput, sensitive and quantitative measure of neutralizing antibodies for vaccine development and identification of therapeutic monoclonal antibodies.

*More info:* Susan Ano, Ph.D.; 301-435-5515, anos@mail.nih.gov.

## CARDIO CRADA

Ischemic heart disease is the cause of human cardiac morbidity and mortality, affecting over 14 million people in the U.S. alone. An NIH invention shows that Cripto-1 is overexpressed in infarcted myocardial tissue, and not expressed or weakly expressed in non-infarct-related heart disease tissues and normal tissues. The technology could represent a new biomarker for the diagnosis of myocardial infarction, as well as a surrogate biomarker to monitor the healing process, including regenerative stem cell activity of the infarcted myocardial tissue.

*More info:* John D. Hewes, Ph.D., 301-435-3121, hewesj@mail.nih.gov

## GUAYULE PLANT FOR LATEX

Agricultural Research Service (ARS) scientists have developed a new technique for transforming guayule plants into a latex substitute. This technique allows more efficient transformation than earlier methods, allowing more rapid guayule improvement that should add value to guayule. Guayule produces a latex rubber that is valuable because it is an alternative to conventional rubber. Guayule latex also possesses hypoallergenic properties, which may have significant medical implications.

With this new technique, agronomically important genes can be more effectively transformed into guayule lines and ultimately boost the latex yield of guayule plants. This new technique is no more expensive than other techniques currently being used. This invention should lead to large-scale production runs for guayule transformation.

*More info:* Tara T. Weaver-Missick, tara.weavermissick@ars.usda.gov, 301-504-6965

## OAK RIDGE'S CRYOBLASTING

Oak Ridge National Laboratory has developed a cryoblasting process using a centrifugal accelerator for accelerating frozen pellets of argon or carbon dioxide toward a target area.

The system utilizes an accelerator throw wheel designed to induce, during operation, the creation of a low-friction gas bearing within internal passages of the wheel, which would otherwise retard acceleration of the pellets as they move through the passages.

A system and method for producing large quantities of frozen pellets from a liquid material, such as liquid argon or carbon dioxide, for use in a cryoblasting process utilizes a chamber into which the liquid material is introduced in the form of a jet that disintegrates into droplets.

Applications include paint stripping, cleaning of radioactive surface contamination, and solvent reduction in cleaning/stripping processes.

*More info:* Mark Reeves, 865-576-2577, reevesme@ornl.gov

## HIV VACCINATION

A National Institutes of Health technology pertains to conjugate polypeptide compositions that are designed to elicit antibody response against HIV. The peptides are conjugates of one gp41 capable of forming a stable coiled-coil structure and another gp41 capable of forming an alpha-helical structure. These structural elements of gp41 were identified as important for playing a role in HIV-1 cell entry. Compositions that elicit neutralizing antibodies against HIV have been elusive to date, but the subject technology may be important in realizing that goal.

*More info:* Susan Ano, Ph.D.; 301-435-5515, anos@mail.nih.gov

*Fort Detrick T2 Initiative, from page 1*

as the commercialization of technologies developed in Fort Detrick's research laboratories.

Funded by Congress, the FDTTI was formed through a partnership between the Maryland Technology Development Corporation (TEDCO), the Frederick County Office of Economic Development (OED), and the U.S. Army Medical Research and Materiel Command (USAMRMC), headquartered at Fort Detrick, Frederick, Md.

"I am working in the United States Senate to make our economy stronger, make America smarter and make our troops and our communities safer—that's what TEDCO stands for as well," said Senator Barbara A. Mikulski. "TEDCO is an anchor tenant of Maryland's 21st century economy. I am so proud to have fought for this federal investment."

Through the FDTTI, companies can apply for and receive awards of up to \$50,000 for eligible projects. Since the initiative was launched in 2005, 16 companies have received awards totaling \$800,000. In addition, the Frederick County OED offers business planning,

development, and financing assistance as needed. Thus far, there have been no failures pertaining to the companies that have received awards.

"FDTTI is a proven vehicle for helping the private sector commercialize cutting-edge innovations developed in Fort Detrick laboratories," said Renée Winsky, president and executive director of TEDCO. "We are pleased to use this federally funded program to carry out TEDCO's mission to help foster and grow early-stage technology companies that will develop innovations for the betterment of society."

Several of the businesses that have taken advantage of FDTTI awards are also housed at the Frederick Innovative Technology Center, Inc. (FITCI), Frederick County's business incubator. FITCI provides Maryland entrepreneurs a low-cost space for startup companies to share resources such as office space, research and development labs, Internet and network management.

Akonni Biosystems, a small Maryland life science company founded in 2003 and also a graduate of the FITCI incubator,

is one such company that won a FDTTI award. It used the \$50,000 to further efforts in developing, manufacturing and selling genetic-based diagnostic and disease surveillance products for infectious and other human health diseases. Akonni's technology is based on a microarray technique developed at Argonne National Laboratory. Currently, Akonni is working with the Fort Detrick-based U.S. Army Medical Research Institute for Infectious Diseases (USAMRIID) to evaluate its microchip identification system to identify possible biodefense threats.

*Exercise May Add Pounds, from page 6*

more recent study, suggest a new way of tackling the obesity problem.

"Many scientists attribute the obesity epidemic to excess calories rather than exercise, because dieting has been shown to produce more weight loss than exercise," said Williams. "My findings suggest that calorie intake and body weight may be self regulating in active individuals."

The study, "Asymmetric Weight

Gain and Loss From Increasing and Decreasing Exercise," is published in the February 2008 issue of the journal *Medicine & Science in Sports and Exercise*. It was supported in part by grants from the National Heart, Lung, and Blood Institute.

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