PARTNERSHIPS
ISSUE 1 2011
Newsletter
Putting Science to Work

PARTNERSHIPS INITIATIVES

Bridging the Gap

Oak Ridge National Laboratory's Partnerships Directorate will host Bridging the Gap, a unique technology commercialization event, April 5–6 at ORNL.

Earlier this year Partnerships and the Tech 2020 Center for Entrepreneurial Growth (CEG) teamed to host an inaugural Spark! event to identify some of the lab's most promising technologies. In late 2010 Partnerships staff provided the CEG team with a list of nearly 100 new inventions. The team narrowed that list to 12 technologies, and then about 30 of the state's preemi¬nent entrepreneurs and investors were invited to participate in a meeting in mid-January to narrow that list to the top six technologies.

The Bridging the Gap event will give investors and entrepreneurs a chance to explore these six top technologies in detail and interact with top ORNL researchers in 12 exciting research areas, including advanced manufacturing, energy storage, and solar energy. There will also be opportunities to tour ORNL's world-class research facilities and network with some of the nation's best scientific minds.

For more information about attending Bridging the Gap, please go to *http://www.ornl.gov/adm/partnerships/events/ bridging_gap.shtml.*

Partnerships Launches New Web Page with Innovative Technology Search Engine

Partnerships recently launched an all new web page (*www.ornl.gov/partnerships*) designed to make it easier for prospective partners to find inventions to license and opportunities to collaborate, as well as to provide useful guidance for partners interested in accessing ORNL technologies and capabilities.

The centerpiece of the new web presence is InSpire, a state-of-the-art technology search engine developed by an Oak Ridge startup company, InRAD, LLC. InSpire uses a proprietary knowledge discovery algorithm to automatically classify ORNL patents, technology summaries, and inventor publications, allowing visitors to the web page to quickly search a database of technologies and identify licensing or collaboration opportunities.

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MESSAGE FROM THE DIRECTOR

Tom Ballard

One of the slides I use in many of the dozens of presentations I make each year describes the role of the Partnerships Directorate at ORNL in these simple terms: "We help connect the lab to the outside world and the world to ORNL." I also regularly advocate for understanding a prospective partner's agenda first. If you help someone achieve his or her goals, the odds are much better that you will build a lasting alliance that will benefit both the individual and ORNL. That's what I call the win-win partnership.

These seem like simple concepts, but I was recently reminded how such concepts, combined with patience and persistence, can pay off in significant ways.

Each issue of our newsletter captures important ways in which our staff works to make the connections between ORNL and the outside world, and this issue is no different. There are articles on new technology license agreements with SecureWaters and LED North America, an article highlighting our new Bridging the Gap conference that builds on the highly successful Global Venture Challenge, and an article about an East Tennessee company that benefitted from the world-leading Spallation Neutron Source.

There is also an article that describes an emerging relationship with a Canada-based company whose CEO I first met during a 2006 trip to Toronto with a group of East Tennessee economic developers. During our meeting and tour of his Toronto facility, I invited Dr. Justin Miller, CEO of Nanowave Technologies Inc., to visit us when he was in the States. Of all the companies our group visited that week in Ontario, I felt we had some of the strongest possibilities of connecting with Nanowave. The proposed visit never occurred because the global economy soured, and Nanowave's need for a U.S. presence was put on hold. Four years later over the Labor Day weekend, my wife and I were again in Toronto, this time on a personal trip (her birthday). I recalled the conversation with Justin and wondered how the company was doing. Within days of arriving back at ORNL, I learned that Justin had similarly recalled our conversation and contacted us to accept the invitation.

We are very optimistic that you will be reading more about Nanowave and ORNL in a future issue of this newsletter. For now the Nanowave story simply underscores the importance of exhibiting a genuine interest in understanding the needs of others, whether they be in domestic or global locations; offering to explore those areas that seem the most promising; and exhibiting patience because, like a fine wine, partnerships frequently take time to mature.

PARTNERSHIPS INITIATIVES (continued from page 1)

New Web Page continued

Additionally, more than 100 new summaries have been added to the page to highlight exciting technologies available for licensing. Featuring inventions ranging from analytical instrumentation to high-performance materials to healthcare technologies, these 1-page data sheets describe ORNL technologies in layman's terms, summarize their advantages over existing technologies, and explore potential commercial applications.

The web page also features extensive new guidance for prospective partners. Sections on licensing, sponsored research, economic development, industrial partnerships, and university partnerships describe the partnering mechanisms available at ORNL, offer suggestions for successful partnerships, and provide sample agreements for review in advance of negotiations.

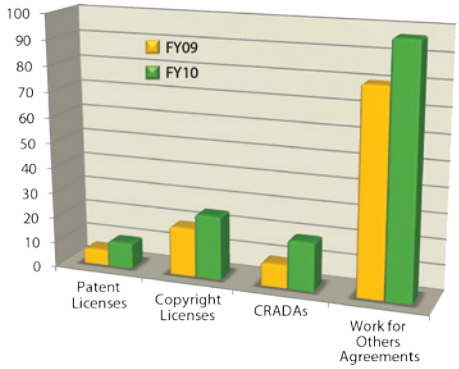
As in the past, the site also provides recent news and upcoming events as well as summaries of recent partnership success stories.

"Our primary goal in updating the web page was to make ORNL technologies and capabilities more accessible to commercial partners," said Mike Paulus, director of Technology Transfer. "We hope this new web presence will make ORNL inventions easier to find and help make it easier for partners to work with us."

Doing Business with ORNL

FY 2010 a Banner Year for ORNL Technology Transfer

The overriding mission of the ORNL Technology Transfer division is to forge agreements that make the lab's scientific discoveries, technical innovations, and unique capabilities available to the private sector for the benefit of the local and national economies. In fiscal year (FY) 2010, the ORNL technology transfer team delivered on this mission, increasing the number of technology licenses, cooperative research and development agreements (CRADAs), and user facility agreements, while at the same time reducing the average time required to complete them. Largely as a result of these increases, licensing revenue grew 47 percent from FY 2009 to $2.07 million and collaborative research revenue grew 21 percent to $39.7 million.



Technology licenses allow companies to use ORNL's patented or copyright-protected intellectual property, typically to create new commercial products. In FY 2010 ORNL executed 10 new patent licenses and 25 new copyright licenses, up from 6 and 19, respectively, in FY 2009. With these additions ORNL now has 115 active technology licenses in place.

CRADAs enable ORNL scientists to collaborate with commercial partners to create new technology solutions of mutual interest. They are one of the federal government's most popular

LED North America and ORNL recently signed an exclusive licensing agreement for carbon foam technology developed by James Klett of ORNL's Materials Science and Technology Division that extends the life of LED lamps. Pictured are (front, l to r) ORNL Laboratory Director Thom Mason and Andrew Wilhelm, president and managing partner of LED North America, and (back, l to r) ORNL Commercialization Manager Alex DeTrana, Klett, Jeff Moser, LED board member Richard Strachan, and ORNL Director of Partnerships Tom Ballard.

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ORNL's AquaSentinel Licensed to an East Tennessee Startup Company

A Tennessee startup, SecureWaters Inc., recently licensed technology developed at ORNL to monitor the safety of water supplies. Municipal, military, and other governmental organizations responsible for safeguarding these supplies now have access to this water-monitoring technology, called AquaSentinel, which offers around-the-clock detection of waterborne toxic agents.

Ray Slatton, CEO of SecureWaters, said AquaSentinel could help protect reservoirs, lakes, and streams that furnish drinking water supplies. "The focus on homeland security has led to an increased awareness of the water supply's vulnerability to accidental contamination and bioterrorist attacks," he noted.

AquaSentinel, developed by Elias Greenbaum of ORNL's Chemical Sciences Division, uses naturally occurring algae that act as tiny biosensors. Like microscopic canaries in a coal mine, the algae provide an early warning of water contamination by responding to toxins with variations in their photosynthetic behavior. Fluorometer measurements capture any photosynthetic changes in the

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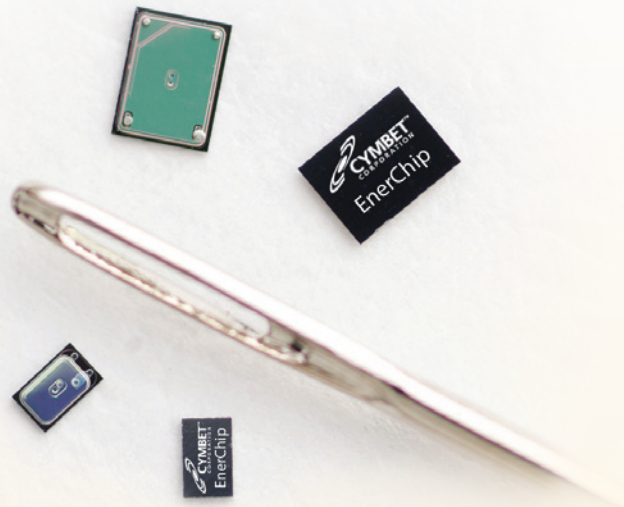
DOING BUSINESS WITH ORNL (continued from page 3)

ORNL Battery Technology Gets a Commercialization Recharge

One of the six licensees of ORNL's thin-film lithium battery technology has become the world's highest volume manufacturer of rechargeable, solid-state batteries (SSBs) based on Oak Ridge technology.

Cymbet Corporation of Elk River, Minnesota, announced December 14, 2010, that it had reached an agreement with X-FAB Texas, Inc., to open the world's highest volume SSB production facility in Lubbock, Texas. This advanced facility will significantly increase Cymbet's manufacturing capacity to meet the rising global demand for its EnerChip devices.



The Cymbet EnerChip battery, based on an ORNL technology, is small enough to pass through the eye of a needle.

EnerChip devices are based on the thin-film lithium battery technology developed by John Bates, Nancy Dudney, and others in the 1990s at ORNL. The Cymbet backup power sources keep time and retain data after an electrical outage occurs, and they can provide power for a few hours to a few weeks, depending on system requirements.

EnerChip SSBs, which can be charged and discharged thousands of times, are being sold as backup power sources for microprocessor controllers, real-time clocks in electronic devices, and wireless sensors, which can be used in security systems and devices for monitoring factory machinery, stresses in buildings and bridges, and hospital patients and equipment. They can also be used for energy storage for solar energy harvesting devices. The SSBs have the same energy storage capacity as larger, bulky, less reliable coin-cell batteries, which can be charged and discharged only a few hundred times.

"This technology has had a long adoption cycle, so it is encouraging to see this company become successful after a long, difficult road," said Alex DeTrana, ORNL commercialization manager. Two years ago DeTrana renegotiated the license, which had initially been negotiated by Ashok Choudhury and signed by Cymbet and ORNL on November 1, 2000. "The purpose of the renegotiation of the license was to update it to better reflect the market conditions and the company's changed business plan," DeTrana added.

Financing for the manufacturing project was secured through a partnership with the Lubbock Economic Development Alliance, Texas Economic Development Bank, X-FAB, and Cymbet. The new Cymbet facility implements a "fab-in-a-foundry" concept, in which the EnerChip manufacturing capability is integrated within X-FAB's Lubbock facility.

"X-FAB is the ideal partner for Cymbet," said Morgan Thoma, Cymbet vice president for manufacturing and operations. "X-FAB's technical capabilities, manufacturing expertise, and quality systems are the perfect match for Cymbet's manufacturing expansion."

Lloyd Whetzel, president and CEO of X-FAB added, "Partnering with Cymbet demonstrates X-FAB's commitment to our customers' long-term success. The EnerChip solid-state battery fabrication facility extends our manufacturing capabilities into new cutting-edge technologies." Production will start in the second quarter of 2011.

"With recent capital investments in our Elk River facility and the new Lubbock production facility, Cymbet is now the only solid-state battery manufacturer in the world to have two geographically diverse manufacturing facilities," Thoma said. "This dual-source manufacturing capability ensures continuous product availability for our customers worldwide."

EDUCATIONAL OUTREACH

UT AND ORNL NAME DIRECTOR FOR INTERDISCIPLINARY RESEARCH CENTER

The University of Tennessee–Knoxville (UTK) and ORNL have named physics professor Lee Riedinger as director of the UTK/ORNL Center for Interdisciplinary Research and Graduate Education (CIRE).

Riedinger joined the physics faculty at UTK in 1971 and held various administrative positions at the university before returning to teaching and research, most recently as interim vice chancellor for research in 2006 and 2007. He has also played an integral role in strengthening the relationship between the university and ORNL in his posts as the lab's deputy director for science and technology beginning in 2000 and associate laboratory director for university partnerships from 2004 through 2006.

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TENNESSEE SOLAR INSTITUTE ANNOUNCES $7.25 MILLION IN SOLAR INNOVATION GRANTS

Grant opportunities available for businesses working in or seeking work in the solar industry.

As part of former Governor Phil Bredesen's Volunteer State Solar Initiative, the Tennessee Solar Institute (TSI), a center of excellence between the University of Tennessee and ORNL, recently announced a commitment of more than $7 million in Solar Innovation Grants. These grants will fund 37 projects throughout the state to spur growth in Tennessee's emerging solar value chain. Twenty-one Tennessee businesses, representing eight of the nine U.S. congressional districts in the state, were awarded grants.

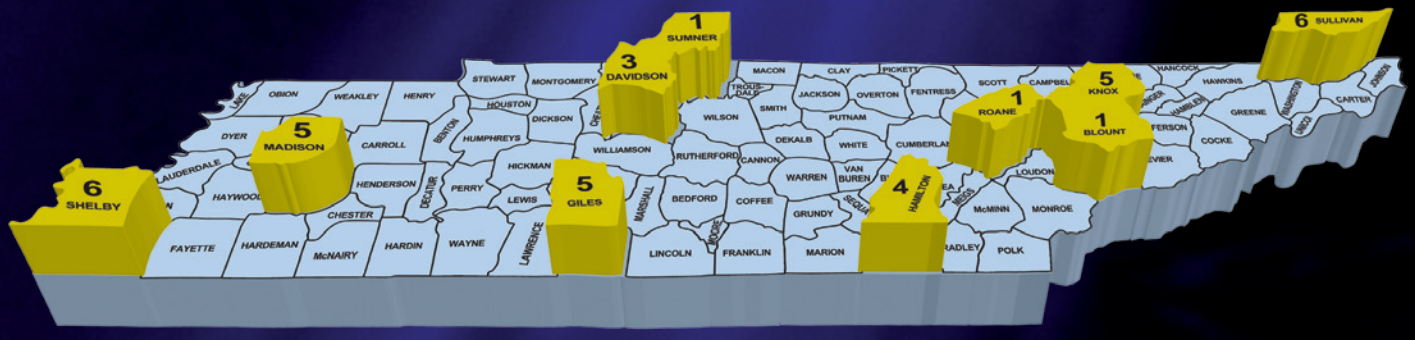
"The grants awarded to businesses across the state represent a wide range of proposed activities, from process improvements to workforce development," said David Millhorn, executive vice president of the University of Tennessee, at the announcement of the grants. "But the one thing they have in common is that they will help these solar firms be more productive, less energy intensive, and more efficient in their processes. Today's announcement is another important step in the establishment of Tennessee as a leader in solar."

All told, the grant funding will leverage more than $13 million in private investments, with a total cumulative benefit to the state's economy in excess of $20 million. Companies receiving grant awards represent a cross section of large and small businesses in Tennessee's growing solar industry. Grant funds will be used to increase energy efficiency and incorporate renewable energy products in the workplace, while decreasing operating costs and increasing profitability. The end result will be the creation of new Tennessee jobs and increased competitiveness across the solar value chain.

"Through the vision of Governor Phil Bredesen, we have worked hard to position Tennessee as a leader in the renewable energy sector," said Matt Kisber, commissioner of the Tennessee Department of Economic and Community Development. "Programs such as the Tennessee Solar Institute's innovation grants will further cement our leadership position and encourage the growth of Tennessee's burgeoning solar industry."

TSI is currently reviewing applications for its next round of Solar Innovation Grants, which will provide an additional $7.25 million of funding to solar industry firms in six categories: technical assistance, workforce development, renewable energy products, process improvements, technology improvements, and facilities and equipment improvements.

The institute brings scientists, engineers, and technical experts together with business leaders and policymakers to help speed the deployment of solar technology. Its mission is to advance the understanding of solar innovation and inspire new ideas that propel the development and implementation of solar-based technology in Tennessee. For more information, visit *http://solar.tennessee.edu.*



DOING BUSINESS WITH ORNL (continued from page 3)

Banner Year (continued)

technology transfer mechanisms because they leverage the strengths of both the federal laboratory and its commercial partner. In FY 2010 ORNL executed 19 new CRADAs, up from 9 in FY 2009 and the most since FY 2002. At the same time new business processes were implemented that significantly reduced the time required to execute these agreements.

Under work-for-others agreements, commercial partners "hire" ORNL scientists to solve specific technical challenges using the capabilities and facilities of the laboratory. In FY 2010 ORNL executed 97 new work-for-others agreements, up from 80 in FY 2009. User facility agreements, on the other hand, bring academic and industrial partners to ORNL to use one or more of the 11 designated user facilities. Two hundred fifty-four new agreements of this type were executed in FY 2010, enabling 2,833 visiting scientists to make use of ORNL's unique scientific assets.

AWARDS AND RECOGNITION

ORNL's Amit Goyal Is R&D Magazine's Innovator of the Year

Amit Goyal

ORNL researcher Amit Goyal has been selected by *R&D Magazine* as the leading technology publication's Innovator of the Year. The presentation was made during the magazine's annual awards event in November in Orlando, at which ORNL researchers were named on nine of the 100 top innovations of 2010.

Goyal, who currently chairs the UT-Battelle–ORNL Corporate Fellows Council, is a Battelle Distinguished Inventor whose pioneering research has had a profound impact on the field of high-temperature superconductivity, both in fundamental materials science and the transition of scientific discoveries from the laboratory to the marketplace.

He has won a total of five R&D 100 Awards, including two this year. These awards, widely recognized as the "Oscars of Innovation," are given to the top 100 technologies or products of the year.

Goyal's technical contributions have been in the area of large-area, low-cost, high-performance flexible electronic devices, including superconductor- and semiconductor-based devices; three-dimensional self-assembly of nanodots of complex materials within another complex material for device applications; and controlled synthesis of one- and three-dimensional nanoarrays for applications.

His other awards include the Distinguished Scholar Medal from the University of Rochester; Distinguished Alumnus Award from the Indian Institute of Technology, Kharagpur; Massachusetts Institute of Technology's *Technology Review Magazine*'s TR100 Innovator Award; NASA Tech Brief's Nano50 Innovator Award; Pride of India Award; ORNL Inventor of the Year (twice); Global Indus Technovator Award; and Battelle Distinguished Inventor.

EDUCATIONAL OUTREACH *(continued from page 4)*

Lee Riedinger

"Lee's impressive accomplishments in nuclear physics research, dedication to teaching, and experience in enhancing the relationship between UT–Knoxville and ORNL make him the perfect person to lead this unprecedented center," Chancellor Jimmy G. Cheek said.

CIRE was developed after state legislation passed in January 2010 authorizing the university to establish an academic unit for interdisciplinary research and graduate education in collaboration with the lab. By combining the educational resources of the state's largest flagship institution with the research capabilities of DOE's largest science and energy labora-tory, CIRE will provide expanded opportunities for graduate students in energy-related sciences and engineering. The center aims to add 20 to 40 high-caliber graduate students each year, moving the university closer to its goal of becoming a top-25 research institution.

The center will be home to one of the first interdisciplinary doctoral programs in energy science and engineering. Students will be able to specialize in nuclear energy, bioenergy and biofuels, renewable energy, energy conversion and storage, distributed energy and grid management, and environmental and climate sciences related to energy. Recruitment for the program will begin in fall 2011.

CIRE will also be home to the newly created UTK–ORNLDistinguished Graduate Fellowship Program, in which students may pursue existing doctoral programs with concentrations in computational science and engineering, materials science and engineering, and nuclear science and engineering. The first class of fellows began studies in fall 2010.

Both programs have an emphasis on entrepreneurship and innovation, including opportunities for interested students to develop and implement business plans with the UTK College of Business Administration. CIRE students will join interdisciplinary research teams at ORNL and UTK that will expose them to large-scale, problem-oriented research and development. The students will be encouraged to develop their research in the context of potential solutions to important national problems and will be given the tools and support to follow an entrepreneurial path consistent with their interests.

Thom Mason, director of ORNL, said the new graduate program represents the maturing of a partnership that began more than 60 years ago. "By leveraging the facilities and talent of the laboratory, we have the chance to help UT strengthen its research program with students who also will contribute to ORNL's energy research," he said.

Preparing for the Future

Nuclear Science and Engineering Directorate Created

Kelly Beierschmitt

ORNL's long history in nuclear energy was recently enhanced with the creation of the new Nuclear Science and Engineering Directorate (NSED), which encompasses nuclear operations and research. Led by Associate Laboratory Director Kelly Beierschmitt, the directorate was established to respond to new opportunities, according to ORNL Director Thom Mason.

"The recent realignment of our nuclear operations into the Nuclear Science and Engineering Directorate under Kelly Beierschmitt is an example of adapting our organizational structure to respond to changes in DOE's mission needs," Mason said. "In this case the growing recognition that nuclear energy is an essential part of an energy solution provides a great opportunity for the laboratory."

The ORNL-led nuclear simulation and modeling hub, known as the Consortium for Advanced Simulation of Light Water Reactors, is housed in the new directorate. ORNL's Partnerships group is responsible for managing intellectual property and commercialization for the consortium.

Beierschmitt noted that many of the key leaders in his new directorate come from other research areas at ORNL. Steve Zinkle is now chief scientist for NSED and will help develop and maintain the strategic vision for nuclear science and engineering at ORNL. Paula Flowers continues as the Oak Ridge Small Modular Reactor Initiative program manager, and Mike Farrar serves as directorate operations manager. Beierschmitt is continuing as director of the High Flux Isotope Reactor.

The new NSED organization comprises the Consortium for Advanced Simulation of Light Water Reactors energy innovation hub led by Doug Kothe; Environmental Management Program Office led by Dirk Van Hoesen; and four divisions: the Fuel Cycle & Isotopes Division led by Jeff Binder, Global Nuclear Security Technology Division led by Alan Icenhour, Nonreactor Nuclear Facilities Division (NNFD) led by Tim Powers, and Reactor and Nuclear Systems Division led by Cecil Parks.

Two of these organizations are primarily focused on nuclear and radiological facility operations. NNFD includes the Nuclear Research Operations staff formerly in the Energy and Engineering Sciences Directorate. The Research Reactors Division is directed by Ron Crone in the Neutron Sciences Directorate, and Sherrell Greene joined the division as director of the research reactors development programs.

Doing Business with ORNL *(continued from page 3)*

ORNL's AquaSentinel (continued)

algae, and the resulting data are then transferred by encrypted wireless telecommunications to a remote facility, where operators can respond to any potential threats. "[The technology] uses the fundamental principles of photosynthesis and state-of-the-art optoelectric instrumentation to provide continuous, unattended protection of all sunlight-exposed primary-source drinking water supplies," Greenbaum said. Because algae naturally grow in all water that is exposed to light, the monitoring technique is applicable for detection purposes in all reservoirs, rivers, and lakes that serve as drinking water supply sources.

Ray Slatton and Robert Clark of SecureWaters Inc. and Elias Greenbaum of ORNL (l to r) discuss the algae that form the basis of the AquaSentinel water monitoring technology developed by Greenbaum and recently licensed to the company.

In addition to its applications in threat detection, AquaSentinel can be used as a tool for companies or utilities to demonstrate environmental compliance. The generated monitoring data are archived for 30 days, allowing users to access historical measurements and see if water quality standards are within mandated limits. "With AquaSentinel, facilities can continually monitor their own effluent in a cost-effective manner," Slatton said. "This technology eliminates the need for personnel to randomly collect water samples in the field as it does not require special training and is self-operating and self-cleaning."

PARTNERSHIPS

UPCOMING EVENTS

February 28–March 2

ARPA-E Energy Innovation Summit: Prepare for the next revolution—clean energy technologies, Washington, DC. *www.ct-si.org/events/EnergyInnovation/*

March 7–11

AURP Spring Training 2011: Learn from innovation experts and research park leaders, Tempe, AZ. *www.regonline.com/builder/site/?eventid=898915*

April 5–6

Bridging the Gap: Take part in this unique commercialization event, Oak Ridge, TN. *www.ornl.gov/adm/partnerships/events/bridging_gap.shtml*

OAK RIDGE National Laboratory | PARTNERSHIPS

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SAFETY REMINDER

Store and Dispose of Medicines Safely

Properly used, medicines help improve health, relieve pain, and even save lives. But abandoned or abused medicines can be dangerous or deadly. Five simple steps can make all the difference.

1. Inventory and monitor your prescription and over-the-counter medicines, including those for your pets.
2. Properly dispose of all medicines that have expired or are no longer needed. Do not put unused or expired drugs in the garbage or down the toilet. Wastewater treatment plants don't remove drugs, and they have been detected in drinking water. Take drugs to an authorized collection location where they will be packaged for incineration. Information is available from city/county police or solid waste departments, such as this one in Knoxville: *http://cityofknoxville.org/solidwaste/meds.asp.*
3. Secure all medicines, including routinely used ones, out of sight and out of reach of children. Always completely lock safety caps. Almost 60,000 children under the age of five wind up in emergency rooms each year due to unsupervised medicine ingestion. Most teens who abuse prescription drugs get them from medicine cabinets belonging to family, friends, and acquaintances.
4. Talk to children, including teens, about the dangers of medicine abuse. Short-term risks include overdosing, incompatibility of drugs or of drugs and alcohol. Longer-term risks include devastating and even deadly addiction. Children who learn about the risks are 50 percent less likely to abuse drugs.
5. Take medicines exactly as prescribed or directed for your safety and to set a good example for children.