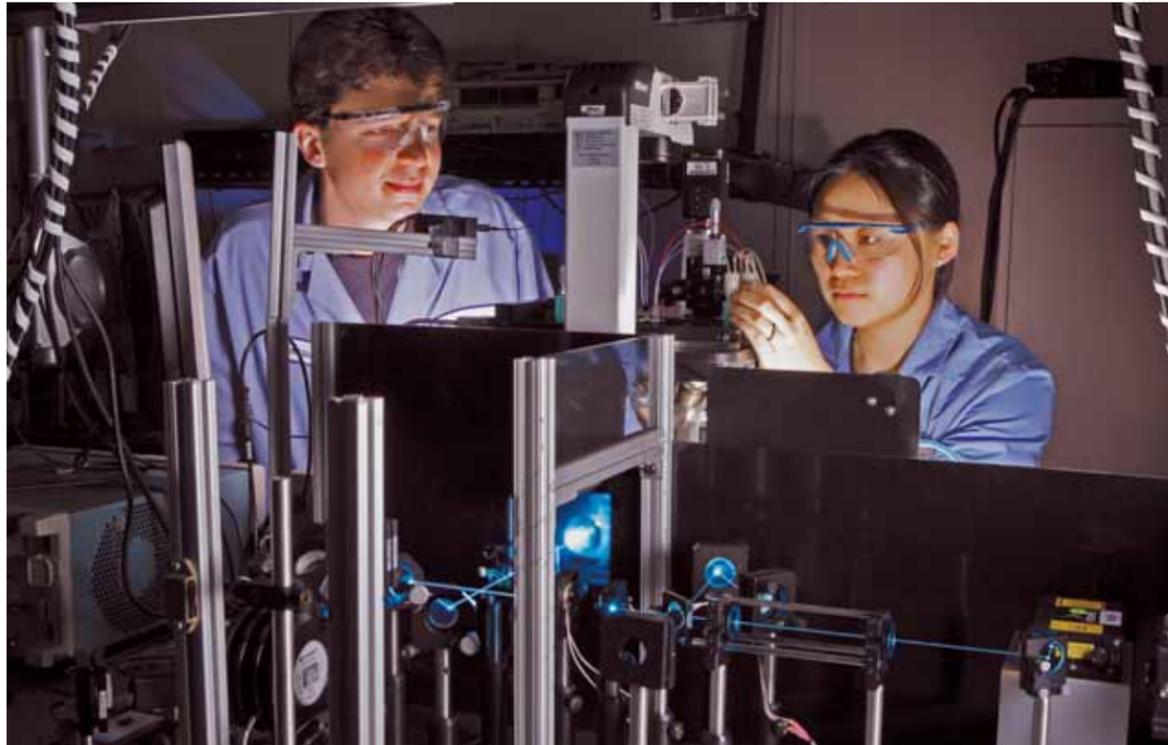


Sandia researchers take new approach to understand biochemistry of immunity to pathogens

Method looks at cells one at a time



OPTICAL TWEEZER designer Thomas Perroud assists biologist Meiyue Wu with sorting of macrophage cells in microfluidic devices using MISL technology. (Photo by Randy Wong)

By Chris Burroughs

A Sandia team led by researcher Anup Singh (8321) is taking a new approach to studying how immune cells respond to pathogens in the first few minutes and hours of exposure.

Their method looks at cells one at a time as they start trying to fight the invading pathogens.

Called the Microscale Immune Studies Laboratory (MISL) Grand Challenge, the work is in its second of three years of funding by the internal Laboratory Directed Research and Development (LDRD) program. Sandia is partnering on the project with the University of Texas Medical Branch (UTMB) at Galveston and the University of California, San Francisco (UCSF).

Anup says the researchers are interested in studying the early events in immune response when a pathogen invades a body. Understanding the early steps could lead to better ways to diagnose and stop disease before there are symptoms, and development of more effective therapeutics.

Most existing research into how immune cells respond has been done by looking at large cell populations. The Sandia researchers say information gathered from a large population of cells

(Continued on page 4)

Discipline, performance improvement policies undergo significant changes

Changes focus on increasing management accountability, streamlining disciplinary process

By Julie Hall

Sandia's policies relating to employee conduct and corrective discipline and the performance improvement process have undergone a major overhaul over the past few months to address a variety of issues identified by line managers and human resources staff.

A cross-disciplinary team revised the policies and procedures over the past few months and developed supplementary documents such as operating instructions to guide implementation and define roles and responsibilities.

"Our goal was to address potential ambiguity and inconsistencies by having clear, well-documented processes that were developed with customer input," says Julian Sanchez, senior manager, Human Resources Operations (3510).

Changes to the policies address management performance and accountability, establish a committee that meets weekly to review conduct and discipline cases, and establish a formal link between conduct and performance issues and the compensation review process, among others.

Consistency, accountability targeted

A series of events led up to the most recent policy and process changes. In 2003 a special management team identified inconsistent

(Continued on page 5)

Sandia LabNews

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Professional Development Program begins for postdoctoral students

Its aim: Improve the experience of Sandia postdoc researchers

By Neal Singer

A Sandia physicist remembers all too vividly how difficult the transition from postdoc to technical staff at Sandia can be. So she has helped start an organization to enable current postdocs to network, learn about research going on outside their own cubbyholed areas, and develop professional techniques to help their careers blossom.

"There's no reason that the career skills I learned about at the last minute should not be available to appointees throughout their postdoc experience," says Gayle Thayer (5711).

At the first meeting last Tuesday of the Post-Doctoral Professional Development Program (PD)²P, the principal speaker was, fittingly enough, 1000 VP Rick Stulen, who had hired his first postdoc in the early '80s before the practice became formal policy at Sandia.

Rick, speaking to about 75 postdocs and mentors in Albuquerque and about 50 video-conferenced at Livermore, says, "I saw the impact [of postdocs hired] at Lawrence Livermore National Labs and latched on to the concept. The level of work was good, and the enthusiasm was personally enriching."



RICK STULEN speaks at the first meeting of a new postdoc professional development program.

The expectations of a Sandia postdoc, he says, should be "to have a solid mentor who is well-connected to what you care about technically, who connects you to other parts of the lab, who cares about your career goals, and who helps access facilities you can't find elsewhere. You're losing a little bit of the Labs experience if you

(Continued on page 6)



Sandians speak at AAAS Annual Meeting

Radiological dispersion devices and ethical issues associated with nuclear weapons work were topics of two Sandians' talks at the February AAAS meeting. See the story on **page 6**.

Also inside . . .

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- HBE Center to receive makeover Page 8
- Wen Hsu is 2007 Asian American Engineer of Year Page 8

What's what

Let's have some incense or temple bells or holy water or an ohhhhhmmmmmm . . . for Michael Pacheco (10827). Not just because he likes the effort in this space at a lighter look at lab life (although we'll take that), but because he takes a lighter look himself, opining that "folks are too dern serious nowadays."

"I'm not a smoker myself," he wrote recently, "but ain't it kinda funny how we work for a weapons lab making nuclear stuff, but ya can't smoke a cigarette cuz it might hurt ya! Maybe with as many educated smart folks as we have out here, we could invent a cigarette that would be good for ya! Maybe make it outta broccoli or carrots! Maybe even one where the smoke would help with the environment and breathing secondhand smoke would be good for ya and perhaps stop the global warming effect!"

"Hmmm . . . wouldn't that really make the lab famous!"

Now, there's something for the Advanced Concepts Group to think about.

* * *

In case you missed the announcement, phone dialing for all of Sandia's locations is changing, effective next week. As of April 2, calling from one lab site to another requires punching 1+area code+seven-digit number.

I don't know about earlier, but when I arrived at Sandia nearly 16 years ago, you punched just the 4 or 5 part of the three-digit prefix, and then four digits, to reach anyone at Sandia/New Mexico. We also had a special setup allowing us to get numbers at Los Alamos directly - no long distance.

Then a few years ago we got a new whizbang telephone switch and had to start punching all seven digits. But we could still reach the Livermore site by punching just the seven-digit number - no area code.

But now (sigh) . . . Progress, I guess.

* * *

Those of us in a specific age range who were watching KNME-TV during one of the periodic PBS fundraising drives a couple of weeks or so ago had a "back to the present" experience - a show called "Soundies" hosted by singer Michael Feinstein.

Soundies were protovideos, produced between 1940 and 1946 featuring music ranging from classical to swing and jazz. Artists included Fats Waller, Kay Starr, Nat King Cole, and the big bands of Woody Herman, Cab Calloway, Jimmy Dorsey, and Duke Ellington, among others.

They were originally shown on film jukeboxes called PanOram Machines installed in train stations, nightclubs, and other public places, and were very popular during the war years. A few years later they began showing up again as fillers in early television programming, which was my introduction to them - really.

- Howard Kercheval (844-7842, MS 0165, hckerch@sandia.gov)



HOWARD KERCHEVAL

Employee death

Gail Szenasi was a second-degree black belt with a powerful inner strength

Courageous, spirited fighter dies March 12

"Gail liked frogs and considered them to be her totem in life," says her friend Rochelle Lari (3912). "She would tell a story about a frog dropped into a pot of hot water. It jumps out immediately unharmed. But if the frog is immersed into a pot of cool water that is heated slowly, it will stay in the pot because it can't tell that it is getting too hot until it is too late. She saw this as a description of the human condition and the importance of awareness."

Gail Szenasi of Diversity, EEO & AA Services Dept. 3512, died March 12 of cancer.



GAIL SZENASI

"She took on efforts to integrate and refine the array of metrics associated with the work," says 3512 manager Margaret Harvey. "She inspired us by a poem she had posted on her door."

Says her friend Georgianne Smith (3550), "I loved the way Gail's mind worked. We talked about how we favor either side of our brain when processing information. Gail recognized that she could get trapped between the two, especially when trying to make a decision. She was the first to laugh at herself, making all of us love her more. She helped us to laugh at ourselves - what a wonderful gift."

"I enjoyed her stories about the Navajo people and about karate," says her colleague Marie Brown (3512). Gail and her son Clay were second-degree black belts.

"Many of us have benefited from her inner strength, her integrity, and her belief that each person she encountered was valuable and worthy of respect," says a friend and colleague.

"Gail shared her feelings about cancer, death, and family," says her friend Robin Jessen (3512). "Each day mattered. It provided more time with friends and family to experience tomorrow's surprises and wonders."

She recognized the many blessings she had in her life while she was aware of the challenges that came her way, says another friend.

Gail is survived by her husband James, her son Robert Clay and his daughter Alanna, son Daniel and his wife Emilie, and son David and his wife Talitha. She is also survived by her father Robert Mersereau and his wife Irene and mother Wanda Sims.

- Iris Aboytes

Cancer is so limited

*It cannot cripple love
It cannot shatter hope
It cannot corrode faith
It cannot destroy peace
It cannot kill friendship
It cannot suppress memories
It cannot silence courage
It cannot invade the soul
It cannot steal eternal life
It cannot conquer the spirit*

Sandia LabNews

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Recent Patents

Note: Patents listed here include the names of active Sandians only; non-Sandia inventors are not included. Following the listing for each patent is a patent number, which is searchable at the US Patent and Trademark Office website (www.uspto.gov).

- Ron Renzi (8125): Edge Compression Manifold Apparatus (Patent No. 7,182,371)
- Clifford Ho (6313): Multi-Pin Chemiresistors for Microchemical Sensors (7,179,421)
- David Melgaard (5534) and Gregory Shelmidine (5915): A Method for Determining the Electrode Immersion Depth in an Electroslag Remelting Furnace (7,180,931)
- Robert Schefer and Jay Keller (both 8367): Method for Control of NOx Emission from Combustors Using Fuel Dilution (7,162,864)
- Bernd Strassner (5345): Reproducible High Performance Patch Antenna Array Apparatus and Method of Fabrication (7,167,129)
- Michael Borden and Jason Shepherd (both 1421): Method of Modifying a Volume Mesh Using Sheet Extraction (7,181,377)
- Patrick Doty (8772) and Doug Chinn (2452): Organic Materials and Devices for Detecting Ionizing Radiation (7,186,987)



Thunderbirds to get 'streetwise' on April 9

The April 9 meeting of the Thunderbird Club (Sandia's retiree organization) will focus on crime prevention. In a talk called "How to Feel Safe and Be Streetwise," a representative from the Albuquerque Police Department will discuss personal safety, residential burglary prevention, sexual assault, and other topics related to crime prevention. The APD representative also will discuss ways to identify the signs of a meth lab in your neighborhood. The meeting will be held at 2 p.m. (or come early for lunch) at the Mountain View Club on KAFB. The meeting is open to all with access to KAFB. No charge (lunch is extra). Call Genelia Boenig at 836-6977 for more information.

Sandia brings the stars within reach

Labs funding helps TOPS offer planetarium to Livermore schools

By Patti Koning

School children in Livermore have seen a ring nebula up close. They've traveled across our solar system to Pluto and back again. They've visited other galaxies and seen the sun up close. All thanks to Sandia.

The Labs provided crucial funding in purchasing a Digitalis portable planetarium for the Livermore school district. The funding came through Lockheed Martin's Gifts and Grants program, which Sandia/California distributes to organizations in the community.

"Bringing this incredible teaching tool into the local schools can hardly be more wonderful," says Sandia Community Relations Officer Jim Simmons (8528). "There is a growing national concern about science education, which we can use our resources to address. This is a perfect example of what we want to accomplish in community relations."

The planetarium is a simple device, consisting of a 10-by-16-foot dome tent, a projector, and a computer. Stellarium, an open-source planetarium program, provides the magic — the images of the stars, planets, and anything else you can find in space.

At a dedication ceremony for the planetarium, Livermore schools Superintendent Brenda Miller said, "This is what true education is — when you can bring a tool into the schools and generate so much excitement."

Sandia not only provided the bulk of the funding for the planetarium, but also the brainpower to prepare the tool for use in the schools. The driver behind the planetarium effort was the Teaching Opportunities for Partners in Science (TOPS) program, which places retired scientists and engineers in the classroom.

The Livermore TOPS program includes retired engineers and scientists from Sandia, Lawrence Livermore National Laboratory, General Electric, and other local technology companies.

When several TOPS scientists borrowed a planetarium from the San Joaquin County Office of Education last year, they decided they had to have it for the Livermore schools. Cost was an issue, as the price tag for the planetarium is \$25,000, plus operation and maintenance costs. Still, the TOPS scientists were well on their way with two donations of \$5,000 each from General Electric and community member Prabha Duneja.

Jeff Manchester, manager of Public Relations and Strategic Communications Dept. 8528, recalls being asked if Sandia would kick in another \$5,000.

"We decided we'd rather just solve the problem, and we donated \$20,000 to complete the purchase," he says. "The planetarium was a wonderful opportunity to provide a science-directed solution for elementary and middle school students."

Sandia retiree Ken Mitchell was part of a team that spent several weeks in December preparing the planetarium for use in schools. The work included writing a user manual, testing the system, and developing scripts to guide teachers through lessons on the moon, distant galaxies, constellations, and planets.

Ken, who spent more than 40 years at Sandia working in stockpile engineering, has been working at Marilyn Avenue Elementary School as a TOPS scientist since he retired in 2000. In January, he led lessons in the planetarium at Marilyn.

"The students just love it. They say it's the best science day they've ever had," he says. "Most kids never even look at the sky at night, but after a lesson in the planetarium they can recognize the Big Dipper, Orion, and other constellations."

When conducting lessons in the planetarium, Ken prefers to stray from the scripts for a more interactive experience. He'll ask the kids questions about what they already know and use that as a basis for delving deeper.

Ken thinks they've just touched the surface of the planetarium's potential as a teaching tool. In addition to astronomy, there are also social studies lessons to be learned. The constellation script not only shows the major constellations, but also demonstrates how the Egyptian, Roman, Chinese, Hindu, Inuit, and Navajo cultures interpreted the stars.

Ken and other TOPS scientists are now working to develop more lessons based on the state content standards and applications for middle



A DEMONSTRATION of how constellations look inside the Digitalis portable planetarium for which Sandia provided the majority of the funding. The planetarium can show virtually anything found in space that has been photographed through the Hubble telescope or at observatories worldwide.

school students. In fact, the biggest limitation of the planetarium is time. With 10 elementary schools and four middle schools in Livermore clamoring for it, the planetarium has to move quickly between sites to give all students an opportunity.

For more information

- Digitalis
www.digitaliseducation.com/
- Stellarium
www.stellarium.org/
- Livermore TOPS program
<http://mail.livermore.k12.ca.us/%7Etops/>

Sandia CaliforniaNews

High School Homeland Security Program puts students in hot seat

By Patti Koning

What if a dangerous chlorine release threatened your hometown, and you had to decide what to do? Recently a group of middle and high school students in Livermore were put in charge of disaster management in such a scenario



TIM SHEPODD helps guide a discussion about emergency preparedness. Tim, who manages Sandia/California's materials chemistry department, has taught Livermore students on a volunteer basis for several years.

through Sandia's High School Homeland Security Program.

Tim Shepodd, manager of Materials Chemistry Dept. 8778, led the local program, which was conceived in 2005 by Sandia/New Mexico manager John Taylor (303) (*Lab News*, Dec. 8, 2006). The six-week course culminated March 5 during an evening class at the Cornerstone Fellowship church facility in Livermore.

Tim, whose own children are home-schooled, taught the course on homeland security and emergency preparedness.

"Both the kids and their parents have been exceptionally responsive to the course," he says. "They're learning a great deal about the difficulty and challenges inherent in emergency response, and consequently have developed a much greater appreciation for the professionals charged with those responsibilities."

During the final scenario-based exercise, students were split into three groups representing federal, state, and local officials. To keep things authentic, information about the chlorine event came in "drips and drabs" rather than all at once.

Communication between the three groups was clearly an important factor in addressing the

fictitious event, but was limited by the instructors during the exercise due to lack of resources, dissimilar priorities and needs of each group, and time issues.

"Communication, thinking clearly under pressure, and active listening all apply to real-life situations that [the students] encounter every day," says Guy Schalin, whose sons Patrick, Kyle, and Brett are students in the class.

"This was a real valuable experience," adds Kyle, 15. "You may want to panic, but you have to stay cool, keep your head, and think things through. It was a stressful situation, so we all needed to keep our composure."

The students will continue their homeland security education by visiting Sandia's facilities to receive program overviews and tour various laboratories.

Later this month, the program will take another step in its development when Sandia/New Mexico hosts the first-ever High School Homeland Security Conference. About 40 students are expected from Livermore, Calif., Needles, Calif., and Albuquerque. In addition to tours of Sandia's labs, the students will participate in a large role-playing exercise similar to those they've studied in their earlier classes.

MISL

(Continued from page 1)

may mask underlying mechanisms at the individual cell level.

"Cells have different life cycles, just like any living being. And not all cells are exposed to the pathogen at the same time," Anup says. "We wanted to look at cells in the same life cycle and same infectious state. This can only be done cell by cell. We also want to study populations, but one cell at a time."

The research is possible because of advances in several Sandia-developed tools, including:

- Microfluidics that allows researchers to do single-cell experiments
- Advanced imaging that allows researchers to image individual cells with much higher information content than possible with current commercial imaging technologies
- Powerful computational modeling that allows researchers to make sense of data obtained from microfluidic analysis and imaging

"Early on we realized that we did not have sufficient biological expertise needed for this project, so in addition to building collaborations with universities, we aggressively pursued hiring biologists at Sandia," Anup says. "The addition of five new biologists has greatly increased our ability to develop biological understanding and reagents required to perform MISL experiments."

Real immune cells are short-lived outside of bodies. To do the type of experiments they wanted, the researchers needed cells that can stay alive more than a couple of hours, have the ability to grow, and represent a relevant model of human immune cells. They obtained "immortalized mouse immune cells" from a collaborator at UCSF that have the needed life span, and are accepted as a model system by the immunology research community.

"We're starting with robust and well-characterized cells, which really simplifies development of our new technologies and methods, says biologist Steve Branda (8321). "We'll soon be working with other cell types, though, like white blood cells directly isolated from human patients. Our approach is designed to be flexible enough to handle many different cell types, and it also minimizes the number of cells needed for analysis, so it should enable us to do some unique studies on rare cell types."

Proteins in the cells of interest are tagged with fluorescent molecules, essentially colored dyes. The dyes range from green to red and give researchers the opportunity to track proteins and see, for example, the dynamic cellular production of proteins or protein-binding processes inside or on the surface of the cells.

The team is developing one platform with two complementary microfluidic modules — one developed for trapping and imaging viable cells during stimulation with pathogens. The second module combines cell preparation steps, cell selection, and sorting followed by analysis of protein content in the selected cell subpopulations.

Mechanical engineer Amy Herr (8321) and coworkers are working on the module that allows for sensitive, robust, and rapid protein quantification. They are analyzing protein levels and protein modifications in both single-cell and small cell populations of less than 1,000 cells at critical time points in the pathogen invasion. The engineering team interfaces directly with Sandia biologists, allowing the engineers to both develop methods useful to addressing biological hypotheses and validate the new tools against accepted methods.

"Specifically our module seeks to quantify protein events with sensitivity that is not cur-

New area of work

Most work in LDRD grand challenges focuses around Sandia's technologies. The first serious large-scale research in the area of biotech was the Interfacial Bioscience Grand Challenge (IBIG) several years ago where researchers attempted to understand the mechanisms of "signaling and intoxication" through which biological agents, such as anthrax or botulism, might breach a cell membrane to cause their harmful effects.

With the experience gained in many LDRD and other projects related to biology, the time was right for Sandia to get engaged in biology research at a "grand-challenge" scale in the area of infectious disease, which is closely linked to Sandia's biodefense mission. Director of Biological and Energy Sciences Terry Michalske (8300) took a team to the University of Texas Medical Branch in Galveston, which is a powerhouse of infectious disease research, and spent two days brainstorming about potential ideas. They came back and formulated the basic concept for the Microscale Immune Studies Laboratory (MISL) Grand Challenge.

rently attainable," Amy says. "Further, we have designed tools that allow complete control over cell introduction, challenge, and analysis — thus enabling measurements of special interest to the ongoing predictive simulations."

Conrad James (1744) and his team are working on the module for trapping and arraying cells so they can be imaged, and ensuring that cells are kept alive and healthy during the experiment. Hyperspectral fluorescence imaging with multivariate curve resolution (MCR) is then used to provide quantitative measurements on multiple proteins simultaneously. The goal is to analyze as many as 10 to 40 proteins and cellular stains at a time in three dimensions.

David Haaland (8332), lead member of the hyperspectral fluorescence imaging team, says his group provides 3D hyperspectral fluorescence imaging of 15-micrometer-diameter cells and their interactions between the cells in real time.

"This gives us the unique ability to quantitatively image many labeled molecules simultaneously in the cells during the host-pathogen interactions," he says.

The end results of the imaging and protein analysis are large amounts of data that must be categorized and understood. That's where computation modeling comes into play, says Jean-Loup Faulon (8333), coordinator of the computational core of the project.

"The goal of the computational core is twofold — to generate hypotheses to be measured experimentally by the biology and platform cores, and to produce a predictive model of immune responses," he says.

Hypotheses are generated using a variety of bioinformatics tools to predict novel interactions between proteins and regulators involved in the innate immune pathways. The predictive model makes use of stochastic dynamics simulations — processes that can be described by a probability distribution. These can be used to ask and answer "what-if" questions about cell pathway responses and complement the experimental efforts.

The computational modeling is performed at both Sandia/California and Sandia/New Mexico.

Anup says using an integrated microfluidic platform sets Sandia apart from the rest of the world. Sandia researchers have been working in the area of microfluidics — the science of designing, manufacturing, and formulating devices and

processes that deal with volumes of fluid on the order of nanoliters — since the 1990s and have a good understanding about how to use microfluids to analyze cell activity. The microfluidic platform is fast and highly parallel and can perform hundreds of measurements 50 to 100 times faster than alternate methods.

Sandia's growing cadre of biological scientists provides key contributions to the grand challenge through the biology core of the project, coordinated by Tony Martino (8332).

"This project integrates a number of areas in which Sandia has a lot of expertise," Tony says. "We are bringing together host-pathogen biology, cell and protein manipulation using microfluidic and BioMEMS technologies, and computational biology. We are building something bigger than the sum of the parts, and that is a great strength for Sandia."

He adds, "We are challenging the way people think about doing biological experimentation. Single-cell measurements and simultaneously measuring protein behavior when there might be just one or a few molecules present will revolutionize biology."

Anup says the end goal is to make a benchtop miniaturized system expected in about two years. It would be placed in Biosafety Level 3 or 4 labs to study immune response to highly pathogenic organisms. Moreover, the integrated platform, biological reagents and computational models developed under this project have applicability beyond infectious disease research. These technologies can also be used for studying cellular signaling involved in diseases such as cancer or by pharmaceutical companies for biomarker discovery.

Glenn Kubiak (8320), MISL project manager, emphasizes the importance of the project of the partnerships with UTMB and UCSF.

"Sandia's expertise in microsystems, advanced chemical imaging, and computing, combined with their expertise in emerging infectious disease and cellular signaling has created a team that is unique in its ability to contribute both to defense against infectious diseases and to therapeutics," he says. "Folks we've briefed in government agencies and companies have been pretty amazed by the strength of our partnership and also by the audacity of what we're doing together. That's why we call it a grand challenge."



JEAN-LOUP FAULON



A SUBSET of the researchers involved in the MISL Grand Challenge gather in the CRDL. They are from left, Steve Branda, Meiye Wu, Catherine Branda, Amy Herr, Nimisha Srivastava, Thomas Perroud, and Kamlesh Patel. Not pictured are Dan Throckmorton, Jim Brennan, Todd Lane, and Ken Sale.

(Photo by Randy Wong)

Team members

Principal investigator: Anup Singh (8321)

Project manager: Glenn Kubiak (8320)

Platform core: Anup Singh (8321, coordinator), Amy Herr (8321), Igal Brener (1721), Jim Brennan (8321), Susan Brozik (1714), Conrad James (1744), Ron Manginell (1744), Matt Moorman (1744), Kamlesh Patel (8324), Thomas Perroud (8324), Surendra Ravula (1727), Ron Renzi (8125), Nimisha Srivastava (8321), Dan Throckmorton (8321)

Biology core: Tony Martino (8332, coordinator), Steve Branda, Catherine Branda, Zhaoduo Zhang, Todd Lane, Meiye Wu (all 8321), Jens Poschet (8332), Bryan Carson, Roberto Rebeil, Bryce Ricken, Kevin Crown, Amanda Carroll-Portillo (all 8331),

Imaging team: David Haaland (8322), Mike Sinclair (1824), Howland Jones (8332), Mark Van Benthem (8332), Rachel Noek (8332), David Melgaard (5534), Chris Stork (1823)

Computational core: Jean-Loup Faulon (8333, coordinator), Jaewook Joo (8333), Shawn Martin (1412), Steve Plimpton (1412), Susan Rempe (8333), Ken Sale (8321)

Policies

(Continued from page 1)

accountability for actions and management tolerance of poor performance as a systemic problem. In August 2005, incremental changes, including a "failure to manage" violation for managers, were made to the Employee Conduct and Corrective Discipline Corporate Process Requirement (CPR 300.4.3) with the recognition that a more comprehensive overhaul would take place later (see *Lab News*, Jan. 20, 2006).

In early 2006, a telephone survey of 25 Sandia managers documented dissatisfaction with the disciplinary and performance improvement processes in areas such as implementation time, clarity of processes, and support from process experts. Overall satisfaction with the processes was about 60 percent, according to the survey.

In June and October 2006, Human Resource Consultants (HRC) Dora Lovato-Teague (3510) and Lisa Ramirez (2002), team leaders for the policy review process, sponsored two lean six sigma "value stream" events. Value stream mapping is a method for understanding a sequence of activities and information flows used to produce a product or deliver a service. Representatives from Legal, Ethics, the Labor Relations Program Office (LRPO), Sandia/California, EEO/AA, and line customers were brought together to discuss and propose improvements. The resulting changes to CPR 300.4.3 and Performance Improvement Process CPR 300.4.4, as well as related process changes, were approved by former 3000 VP Kim Adams in March.

"Our actions were driven by anecdotal information, professional observation, and our surveys," says Julian.

Processes clarified, roles defined

The policy changes address recurring complaints that the old policies provided insufficient guidance and accountability and that the process took too long. Managers were often confused about who they should contact when an issue arose.

Employees on a performance improvement plan now have 60 days to improve performance or face demotion or termination. Previously, the process could take up to 180 days. The 60-day Action Plan for Improved Performance (APIP) replaces the three-stage system of oral, written, and final warnings.

The policy and process changes better define management and HRC roles and responsibilities and create a "hierarchy of documentation," starting at the highest policy level on down to "operating instructions" for the LRPO and HRCs. They also establish the HRCs as the first point of contact for discipline and conduct issues. HRCs will "triage" cases by identifying key issues and then engaging other organizations, such as Ethics, Diversity EEO & AA, or Security, as needed, says Diane Nakos (3513). Establishing the HRC as the point of contact will cut down on the time managers have to spend tracking down information and will also provide them with detailed guidance on policy implementation, thereby promoting consistent, fair treatment of employees, she says.

A new policy statement establishes a clear link between conduct and performance/compensation reviews. Managers must document performance and conduct issues on PMFs and must

consider these issues when they make pay decisions during compensation review, says John McAuliffe (3513), LPRO manager. Previously, there was no explicit tie, he says.

"This requirement means that so long as a performance problem persists, it will be documented and it will follow an employee from job to job within Sandia," he says. "Managers will be required to disclose these issues to an employee's potential new manager."

More management accountability

The policy changes also provide for increased management accountability. A management position comes with a responsibility for dealing with people who are not performing well or who are engaging in unacceptable conduct, Julian says. Managers are expected to provide timely feedback to employees and to address problems quickly and directly through appropriate action. Ignoring conduct and performance problems constitutes "failure to manage."

"Failure to manage is being taken very seriously, and we're giving [managers] the tools," says Julian. "If they don't use these tools, they're going to be held accountable."

"Managers need to understand that they are corporate agents. They have a responsibility to the company to make the hard calls and to be accountable for those decisions," he adds.

Managers also are accountable for their own performance. If they fail to meet performance expectations, they will also have 60 days to improve performance through a Performance Expectation Plan (PEP). Managers who choose not to engage in the PEP can accept a demotion to an available position or resign in lieu of termination.

Managers who are demoted as a result of discipline or performance will have to meet certain requirements before bidding on another management position.

The primary difference between the managers' PEP and the APIP for staff is frequency of monitoring, Diane says. "While employees will have weekly monitoring, the frequency for managers will be left to the discretion of the next-level manager," she says. "This recognizes that managers should not need the same level of oversight."

Discipline Review Committee replaced

A significant change is the replacement of the Disciplinary Review Committee (DRC) with the Corporate Review Committee (CRC). The DRC met only intermittently to review conduct cases that had broad impact, were precedent-setting, or could result in external scrutiny. The DRC considered only six cases in FY05 and five cases in FY06.

As a result, the majority of decisions regarding conduct and performance issues were made by managers with input from HR and other process experts. By using the CRC in more cases, consistency is increased, John says.

While the DRC only reviewed conduct cases, the CRC will meet weekly and review all cases that may result in suspension, demotion, or termination, including APIP cases where performance has not improved after 60 days.

"The CRC will be the deciding body on a larger proportion of cases and no longer a recommending body, as was the DRC," says John.

Sandia terminates about 40 people each year for performance and conduct reasons.

The CRC will include three voting members:

the LRPO Manager (serving as CRC chair), a Sandia director, and the employee's director or designee (senior manager or manager). The CRC will also include representatives from Counterintelligence and Legal, who will continue to be nonvoting advisory members.

The new policies have reduced the number of signatures required and therefore time involved to process a termination action. Signature authority for terminations will now consist of the employee's line manager, senior manager, director, the LRPO manager, and the HR vice president.

Implementation and training

LRPO representatives plan to integrate the policy and process changes into required training for managers. HRCs will offer division-specific training upon request. The LRPO will also resurvey line customers following implementation of the new process.

"We want to emphasize that managers are key to dealing effectively with performance and conduct," Julian says, "and these processes are part of achieving mission success through operational excellence."

Key policy and process changes at a glance:

- Formally link conduct and performance issues to performance review and compensation.
- Eliminate oral, written, and final warnings; replace with 60-day performance improvement plan.
- Replace Disciplinary Review Committee (DRC) with the Corporate Review Committee (CRC), which will meet weekly and review all conduct and performance cases that may result in suspension, demotion, or termination.
- Hold managers accountable for their performance, including for "failure to manage."
- Place managers who are unable to meet performance expectations on a 60-day Performance Expectation Plan (PEP); managers who choose not to engage in the PEP can accept a demotion to an available position or resign in lieu of termination.
- Prevent managers who are demoted as a result of discipline or performance problems from bidding on another management position until certain requirements are satisfied.
- Provide for final review and determination by the CRC in cases where the performance of employees engaged in a performance improvement plan fails to improve.
- Streamline signature approval authority for terminations, consisting of the employee's line manager, senior manager, director, the Labor Relations Program Office manager, and the Human Resources vice president.



HIGH POINT — Jim Galli (2915) of Tonopah Test Range's photometrics support group shot this photo of mountain sheep earlier this month. He says TTR personnel often see sheep on the road to Antelope Peak, where a range antenna is located.

Fred Harper, Linda Branstetter speak at AAAS Annual Meeting in San Francisco

By Stephanie Holinka

Senior Scientist Fred Harper (6417) and Advanced Concepts Group member Linda Branstetter (7000) both presented at the recent American Association for the Advancement of Science (AAAS) Annual Meeting in San Francisco.

Fred Harper's talk, "Radiological Dispersal Devices: Physically Based Dispersal Characteristics and Limitations," was part of the 90-minute "Coping with a Dirty-Bomb Detonation" symposium in the "Understanding and Managing Societal Risks" track.

Fred described potential interactions between high-explosive fireballs and urban surfaces such as dirt, asphalt, concrete, glass, and sand. His work shows that it is more difficult to break down many potentially lethal substances into breathable particles than generally believed, and that much of the material will instead end up as fragments and large particles. Any small particles that do arise could bond with other debris such as sand kicked up into the fireball, rendering the particles too large to be breathed in.



FRED HARPER

Fred also mentioned that worst-case dispersal from the cleanup vantage point might mean the best case for a first responder. When large particles and fragments are produced, they could disperse in a localized area at a high concentration. This

would create a more significant radiation hazard for responding police and firefighters than if small particles were generated and dispersed over a much wider area (at significantly lower concentrations). The wider area dispersal would not be as threatening from an immediate health point of view, but could be more challenging from a cleanup perspective.

These results could mean that first responders would not require full personal protective equipment (PPE) gear like suits and self-contained breathing apparatus to enter emergency areas because they would be entering long after any respirable particles would have left the air. They could instead use full-face or half-face respirators that first responders typically carry with them.

Fewer immediate equipment needs cuts the time that an emergency response unit would require to enter an area, assess any injured people, and keep unexposed people from entering the area.

Steve Musolino, a health physicist from Brookhaven National Laboratory, also shared his work at the symposium, which translates Fred's research into guidelines for first responders.

"Until Fred made this data available," said Musolino "people were using assumptions." He said that agencies often burdened emergency response teams with unneeded equipment because most aerosolized particles would be gone long before the team would have arrived.

Over the past two decades, Fred and his team have conducted more than 600 explosive experiments at Sandia to determine how different types of radioactive material in a dirty bomb would disperse in the environment.

Fred's work has recently been featured in *Science* magazine and in recent NBC News coverage of dirty bomb legislation, among other places.

Linda Branstetter, a long-time systems analyst, discussed her own mindfulness of ethical issues associated with ongoing nuclear weapons work in a talk she titled "Nuclear Weapons, Ethics, and National Imperatives." She shared her personal views as someone inside the US nuclear weapons complex.

She explained that "in the 21st century national security environment, solutions must consider all elements of the complex, adaptive challenges we face and that US policy and the pursuits of our nation's scientific community must account not only for our own national interests, but also consider the interests of all mankind."



LINDA BRANSTETTER

She asserted that only by doing this can the US achieve the influence and moral leadership needed to engage other countries in pursuing multilateral efforts essential to tackle all manner of pressing global problems.

Linda said that the complex and adaptive nature of national security issues and programs has broad implications that cannot be boiled down to simple solutions with easily identifiable paths.

She proposed three imperatives for the US regarding nuclear weapons — imperatives that have underpinned her own choices in supporting the defense scientific community and the national nuclear deterrent capability:

- In lieu of dramatic and unforeseen changes in the international security situation, the US needs to maintain a nuclear deterrent capability and infrastructure that supports it.
- The US needs to ethically pursue its national security objectives.
- The US needs to work harder and more urgently to reduce nuclear threats overall.

Linda describes her experiences as positive, and would encourage Sandians to join the national discussion about ethical (and other) issues concerning national security. "It is possible to present a balanced and helpful viewpoint even while being cognizant of a multitude of constituencies," she said.

Postdocs

(Continued from page 1)

don't take advantage of those facilities."

An open question remained as to whether Sandia should follow the recent leads of its sister labs, Los Alamos and Lawrence Livermore, by formalizing the relationship between postdocs and the Laboratories, with courses for advisors on how to mentor, opportunities for learning and advancement provided to mentees, and more comprehensive definitions of the terms of engagement. Other issues raised included whether postdocs should fill out PMFs (Performance Management Forms) and be able to participate in the LDRD (Laboratory Directed Research and Development) office's call for proposals.

Peter Feibelman (1130) said that "because Sandia has no formalized program, the work has been ad hoc, with responsibilities not clear. At LANL, they have an organization charged with improving the experience of postdocs. It's nice that some people [here] have decided to start an organization like this, but really it's the Labs' responsibility."

The *Lab News* asked Rick why Sandia seemed to be following other labs in this effort rather than leading.

"First," he said, "both LLNL and LANL are run by a university. They tend to think more about education. We're a corporate-run engineering lab whose existence is based on deliverables. It's a different outlook. For LANL, providing a good experience to postdocs is a method of keeping up the flow of new hires from that group."

"In my view," he said, "a healthy postdoc program is critical to Sandia. It keeps us intellectually healthy and challenged. There's an injection of new ideas that contribute to laboratory vitality. We have a responsibility to the nation to be part of this channel. And students from industry and universities help us form a network we can rely on in our later work."

The new organization may help further these ends.

"Currently, there's no easy pathway to find out what's going on in a large laboratory," said postdoc Justin Serrano (1513). "If you don't have a way to talk to other people, you'd never know what's happening beyond your building or center." The *Lab News*, he said, shows only high-profile work that helps him less than personal communication would.

The (PD)²P mission statement — "to become a preeminent postdoctoral springboard for the scientific leaders of tomorrow" — and its goal — "to facilitate postdocs transitioning into careers as outstanding independent researchers by providing resources for professional development,

and to formalize a visible program to organize and network postdocs and highlight postdoc work" — were backed by a calendar listing career development workshops for postdocs and technical seminars by postdocs, as well as the stated intent to track postdocs after they leave Sandia to see where they went and keep the names available for future collaborations and networking.

Workshops included "How to package yourself for jobs in industry," to be led by Rochelle Lari; "The successful postdoc," by Peter Feibelman; and, later, how to obtain academic positions, mentorship, and grant writing.

More information can be found at the group's website, www.sandia.gov/pd2p.

Suggestions, critical or otherwise, are welcome at postdocs@sandia.gov.

Current team members include Linda Canaan (8524), Erica Corral (1815), Anna Gorman (1815), Lisa Gray (8350), Bernadette Hernandez-Sanchez (1815), Tom Hinklin (1815), Wontae Hwang (8362), Sebastian Kaiser (8351), Gayle Thayer (5711), and Dominique Foley Wilson (1012).

The (PD)²P is supported by Wendy Cieslak (1010) in the Science, Technology, and Engineering Strategic Management Unit's Strategic Initiatives Office, with funding from the Nuclear Weapons (NW) People Readiness Portfolio that nurtures NW-critical capabilities for the future of Sandia.

Remodel set for Health, Benefits, & Employee Services Center

By Michael Padilla

Sandia's medical facilities will be going under the knife this summer.

The Health, Benefits, and Employee Services Center will undergo a \$5 million facelift with a goal of creating more privacy and improving professional care for all Sandians, says Dr. Larry Cleverger, director of Sandia's Benefits and Health Services Center 3300.

"The primary reasons for the facility remodel are to bring the medical facility up to contemporary standards, correct deficiencies that have created privacy concerns for patients, expand space for enhanced service, and eliminate certain old temporary facilities," he says.

The remodel will begin once Benefits and other tenants vacate the east end of Bldg. 832. Those offices will move to the new Innovation Parkway Office Center (IPOC) once it is completed, tentatively in July. The IPOC is a 150,000-square-foot leased building in the Sandia Science and Technology Park (SSTP) located outside the Eubank Gate.

By combining Bldgs. 831 and 832, the new medical facility will be 30,000 square feet. The



ARTIST RENDERING of Health, Benefits, and Employee Services Center. The building will undergo a \$5 million makeover to improve patient flow and enhance privacy.

remodeled facility will include a new urgent and emergency care area, new occupational and acute care areas, additional exam rooms, and a set of doctor and administrative offices.

Anna Miller, manager of Clinical Services Dept. 3331, says the remodel will improve the flow of patients and enhance patient privacy.

The plan is to relocate physical therapy, the safety glasses office, and the Employee Assistance Program to Bldg. 831 and move the physical examination programs, urgent care, and disease management to new space in 832.

A new reception and waiting room will be created to offer more privacy for patients. The

main entrance will face north toward F Street. The emergency room entrance will be on the east side of the facility.

Expanded programs include personal health care and chronic disease management, with plans to implement an on-site pharmacy and select specialty clinics such as dermatology and eye care.

"The current facility has outlived its space and there's only so much remodeling we can do," says Larry, adding that last year HBE saw some 8,841 individual patients for more than 67,000 transactions.

The remodel is expected to be completed by mid to late 2008.

Wen Hsu named 2007 Asian American Engineer of Year

By Iris Aboytas

Wen Hsu, manager of Sensing and Energetic Materials Dept. 8368 at Sandia/California, has been named Asian American Engineer of the Year by the Chinese Institute of Engineers, USA. He will receive the award in ceremonies in Washington, D.C., on March 31.

Wen initiated and now manages a multimillion program to develop fiber lasers, an approach that could revolutionize high-power laser technology. The program is well recognized by the international community and has attracted funding from DoD, DOE, and the Department of Homeland Security (DHS).

"Wen is highly deserving of this honor," says Terry Michalske, director of Biological & Energy Sciences Center 8300. "His technical accomplishments are surpassed only by his excitement for new science, dedication to the



WEN HSU

nation, and passion for mentoring young people."

Wen led the evaluation of a treaty monitoring technology project to assess the viability of how sensor and information technologies could be used to engage Chinese government decision-makers on arms control. He conducted several studies on the Chinese nuclear industry's origin, governing bodies, and future direction. He became an expert and briefed DOE, the State Department, the Nuclear Regulatory Commission, and many nongovernment organizations.

Wen, a naturalized US citizen, was born in Taiwan, grew up in the Philippines, spent a year in Malaysia/Singapore, and came to the US his senior year in high school. His parents were born in China and moved to Taiwan before the Communist Party took control of the mainland in the late 1940s. Both his parents have degrees in chemistry.

In post-war Taiwan, Wen's father was one of the few technically educated people in a post-colonial island abandoned by Imperial Japan. He was successful in rebuilding a glass-making factory. His success brought him similar jobs in the Philippines and later Malaysia. The family followed and traveled around Southeast Asia. For

Wen and his two sisters, there was no place to call home.

"Looking back, these periodic migrations may seem exciting," says Wen, "but at the time, they were not. We had to say goodbye to friends many times."

Wen received his BS in electrical engineering from Rensselaer Polytechnic Institute and his MS and PhD in astrophysical sciences from Princeton. Attracted by the mission-directed R&D environment of a national laboratory, he came to work at Sandia. He started in magnetic fusion research and made several innovative research approaches and critical discoveries in edge-plasma physics and plasma-material interactions.

Wen has two children, Lawrence, 21, and Julia, 19. Wen's wife Susan was born in Hong Kong.

Wen serves on the board of directors and is past president of the Chinese American Political Association (CAPA), a community-based non-profit, nonpartisan organization in the San Francisco Bay area. He has been active in community services to promote diversity and is a Sandia recruiter helping to bring the best and brightest employee candidates to Sandia.

BRUSH WITH GREATNESS — As Tiger Woods prepares to vie for another major title next week at The Masters Golf Tournament in Augusta, Ga., one Sandian will be watching the game with perhaps more personal interest than most. Steve Yrene's (5057) brother Donny is a professional golfer based in the Phoenix area. At last year's PGA Championship at the Medinah Country Club near Chicago, Donny Yrene won the trophy as the low-scoring club professional (as opposed to touring professional). Tiger Woods won the event for his 12th major golf title. He and Donny Yrene (at right) shared the spotlight at the awards ceremony following the tournament. Not long after his PGA Championship showing, Donny Yrene was named director of golf at an exclusive Scottsdale club. In an email message not long after the PGA event last year, Steve summed up the family's feeling. The subject line read: "Donny Done Good."

(Photo courtesy of PGA Tour)



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