



**Pacific Northwest
National Laboratory**
Operated by Battelle for the
U.S. Department of Energy

Sharing THE Excitement OF Science AND Technology

Breakthroughs
for the
Northwest

Richland, Washington

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Virtual lung models respiratory system



A virtual lung model developed at the Pacific Northwest National Laboratory may help predict the impact of pollutants on respiratory systems and provide new insights into pulmonary diseases including asthma, a condition afflicting 15 million American adults. Researchers developed a prototype computer model of the nose, larynx, and lungs of a rat in

hopes of better understanding how pollutants affect those systems. The virtual respiratory tract provides an unprecedented three-dimensional view of how pollutants enter, travel and collect in the entire respiratory system. Efforts are underway to similarly model the respiratory systems of monkeys and humans.

“We designed a tool that will open up new possibilities for understanding how our environment affects our bodies,” said Rick Corely, principal investigator and a PNNL environmental toxicologist. “The virtual respiratory tract is a major accomplishment in modeling biological systems. It will be the springboard for detailed modeling of the body’s organs as a complete system.” (<http://www.pnl.gov/news/2001/01-33.htm>)

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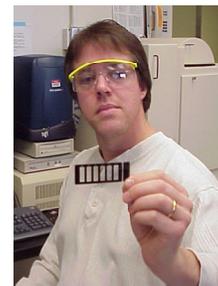
- **A model of breathing**
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An improvement for pathogen detection technologies

Researchers at Pacific Northwest National Laboratory, in conjunction with Washington State University, are improving the way that collections of tiny probes are placed on glass. These fabrication improvements could speed the detection of pathogens such as anthrax and small pox and make detection technologies more readily available to analytical laboratories.

Microarrays contain hundreds or thousands of tiny probes that are “printed” onto glass “chips.” Each probe is sensitive to a specific pathogen or gene in an environmental or clinical sample. Microarrays allow samples to be checked for multiple pathogens or genes simultaneously, at rates much faster than conventional techniques. Microarrays can be applied to a broad range of fields from bioremediation to human and veterinary diagnostics, however DNA microarray technology is found primarily in large laboratories.

According to Darrell Chandler, PNNL’s principal investigator on the project, the new approach to binding the DNA probes to glass surfaces reduces the cost of fabricating microarrays by up to 80 percent. Reducing the cost of microarrays will allow them to be distributed more widely among individual investigators. (http://www.science.doe.gov/feature_articles_2002/January/Microarrays_Pathogens/Microarrays_Pathogens.htm)



Coming soon to a TV near you

Pacific Northwest National Laboratory is “sharing the excitement of science” by making videos of its Science Seminar Series available to public broadcast stations in Seattle, Portland, Olympia, Spokane, Yakima and the Tri-Cities.

“Biomaterials: Past, Present and Future,” a presentation on medical technologies given by PNNL’s Allison Campbell, is scheduled to air on eight regional stations in February. The presentation describes the evolution of materials used to repair joints, replace missing parts of the body and effectively deliver therapeutic agents for treating cancer and other diseases.

A schedule of air times is available at <http://www.pnl.gov/speak/seminar/video.html>. To request a copy of the video, contact Mindy Strong at 509-375-2599 or mindy.strong@pnl.gov.

DOE rates Laboratory operation 'Outstanding'

For the fourth consecutive year, the U.S. Department of Energy's Richland Operations Office awarded Battelle the highest rating possible for its operation of the Pacific Northwest National Laboratory.

"The high quality of scientific and technological work performed at PNNL is gaining more national and international recognition," said Paul Kruger, DOE's Richland Operations Office Associate Manager for Science and Technology. "At the same time the Laboratory is creating academic and industry relationships benefiting the Pacific Northwest and is a well-respected contributor to the socioeconomic health of the Tri-Cities and the mid-Columbia region."

DOE determined that Battelle's overall performance in the areas of science and technology, operations, and leadership and management was outstanding for the 2001 fiscal year. As a result, Battelle receives \$7 million in performance-based fee.

Throw another rock on the fire

Pacific Northwest National Laboratory researchers have joined with scientists in a collaborative effort to pursue a massive energy reserve that, by itself, could keep America powered into the next century. Retrieving that resource, however, poses quite a challenge because it is trapped within rock three-quarters of a mile below Alaska and Canada's frozen tundra, and in offshore locations scattered around America's coastline.

In early 2002, PNNL researchers will obtain frozen core samples from the MacKenzie Delta in Canada that contain methane gas trapped in an ice-like substance called gas hydrate. These "rock gas" samples from the Mallik Research Well may unlock clues to future U.S. energy independence if a safe and economical harvesting process can be perfected.



Sensor makes paper perfect

An innovative sensor developed by researchers at Pacific Northwest National Laboratory, in collaboration with industry and a local university, may improve the quality of fine paper products while saving energy and costs.

The Full Web Basis Weight Sensor can monitor the weight and detect flaws across the full width of a paper product. The sensor is a stationary system that can measure the entire paper web area at all times. It allows essentially 100 percent inspection, unlike the single-point scanning sensors used now by the pulp and paper industry. The sensor was tested on a fine paper machine at Boise Cascade.

Staff at PNNL; ABB Automation, a leading manufacturer of scanning gauges for the paper industry; Boise Cascade and students from Washington State University Tri-Cities collaborated on this project funded by the Department of Energy's Office of Industrial Technologies. PNNL is now seeking additional funding to further develop the sensor's capabilities.

Day's Pay project collects money for New York fire truck



The staff at Pacific Northwest National Laboratory were among those who participated in the "Day's Pay for USA" project, a community effort in the Mid-Columbia to raise money to purchase a fire truck for New York City.

The Day's Pay drive was sponsored by local fire departments and modeled after the area's World War II effort to raise funds for a B-17 bomber. At that time, workers at the U.S. Department of Energy's Hanford site donated one day's pay to raise the money for the plane.

The 2001 Day's Pay project has raised approximately \$235,000 to date, with PNNL staff members contributing about \$42,000. (<http://www.adayspayforusa.org>)

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