

There are some things you learn best in calm, and some in storm.

Willa Cather

The Song of the Lark (1915)

FOOD SAFETY

Allergen Labeling Takes Effect

Since 1994 food manufacturers have been required to list all the ingredients on their products' labels. A new law now takes this obligation a step further, requiring manufacturers to notify consumers in "plain language" of certain allergens contained in their products. This is good news for the estimated 11 million Americans who have food allergies. But some question whether the new labels might be too much of a good thing.

The Food Allergen Labeling and Consumer Protection Act of 2004, or FALCPA, applies to foods labeled on or after 1 January 2006. It mandates that the nutritional labels on food packages plainly identify any of eight specified food allergen sources—milk, eggs, fish, crustacean shellfish, tree nuts, peanuts, wheat, and soybeans—that are present in the product. Together, these eight food categories account for about 90% of all food allergies. The law stipulates that the warning label be placed near the ingredient list.

Stephen L. Taylor, who heads the Food Processing Center at the University of Nebraska–Lincoln, lauds the "plain language" requirement as an overdue development. "In the past, you've seen terms like 'casein' and 'whey,'" he says. "Consumers often had to learn the hard way that those terms are synonymous with 'milk.'"

But while the new law makes the presence of certain allergens in food products more understandable, Taylor also contends that the act is too strict in requiring that allergens be listed if they are present in the faintest traces. For example, he says, the law requires

the listing of not only ingredients but also processing aids that may include allergens, such as soybean lecithin, which is used by baking companies as a stick-release agent for pans.

"My view is that in this particular application the exposure to soybean allergens is extremely low, but with the new labeling requirements you're going to be advising all soy-allergic individuals not to eat the vast majority of bakery products," Taylor says. "And I don't think that's particularly in their best interests."

The law makes clear that decisions about allergen labeling for food products will be an ongoing process. It requires that the Secretary of Health and Human Services provide a report to Congress in February 2006 that's to include information about unintentional contamination of foods with allergens stemming from equipment that is used for multiple food processes. In addition, the U.S. Food and Drug

Administration has created the Threshold Working Group to examine approaches that could be used to establish thresholds below which manufacturers would not be required to list food allergens.

Anne Muñoz-Furlong, founder and chief executive officer of the Food Allergy & Anaphylaxis Network (FAAN), a non-profit educational organization, considers the law an important step. "With food allergies, there's no cure," she explains. "[Allergic] individuals depend on other people, whether in a restaurant or the food industry, to provide accurate information so they can make the right choices."

According to figures from FAAN, each year some 30,000 Americans require emergency room treatment for allergic reactions to food, and 150 to 200 people die from such reactions. Furthermore, the number of people with food allergies is increasing around the world.

Of particular concern to many food allergists is the sharp increase of food allergies in children. According to A. Wesley Burks, a professor of pediatrics at Duke University Medical Center, peanut allergies have doubled over the last decade among children under the age of five.

Nobody really knows why allergies are on the rise. One theory holds that improved hygiene leaves the human immune system with less to do, Muñoz-Furlong says, so it identifies a particular food as dangerous and responds by attacking it.

Muñoz-Furlong believes that the next step in the development of allergen labeling should be to create binding guidelines for what is currently the voluntary use of "precautionary labeling," which warns of the possibility that an allergen might be present as the result of shared production processes. As for the longer-term issue of how to establish threshold levels, Muñoz-Furlong says that most of the parents of food-allergic children she's talked to believe the answer is simple: "They want zero. They don't want to risk that their child might be in that small percentage of the population that's below the threshold." —Richard Dahl



Plain talk about allergens. New labeling requirements should make it easier for allergic consumers to tell if a food is safe for them to eat. Next up? Some suggest codifying the now-voluntary use of precautionary labeling (large photo).

CHILDREN'S HEALTH

Breastfeeding: Nature's MRE

Low breastfeeding rates and inadequate emergency planning left many infants dehydrated and hungry in the wake of Hurricane Katrina. Health and educational organizations responded rapidly with breastfeeding information and assistance. Through direct contact with mothers and emergency responders, the groups strove to implement long-standing international guidelines for feeding infants in emergencies.



Comfort food. Breastfeeding, as in this refugee camp in Thailand's Mae Hong Son Province, is best for infants in emergency situations.

Breastfeeding provides optimal nutrition, protection against infection, and a safe, reliable food source for babies—attributes that are critical in emergencies. International health organizations including the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) promote breastfeeding as the best way to feed infants in a crisis. Although formula is an adequate substitute when a child does not receive breast milk, it must be available with a supply of clean water and containers, and instructions for feed preparation must also be available. Yet potable water, formula itself, and even mixing containers may be impossible to acquire in an emergency.

The WHO and UNICEF have long had guidelines that strongly favor breastfeeding in crises. Current guidelines stem in part from the March 1999 Kosovo crisis in which war forced thousands of Kosovar Albanians into refugee camps. Andrew Seal, a lecturer in international nutrition at the London-based Institute of Child Health and coauthor of a 1999 report based on the Kosovo experience, says, "I think the guidelines are quite good, but it's like any other specific technical sector—it depends on having

people within the organization who have the interest and awareness to champion that particular cause when there are one thousand and one other things to be thinking about."

Breastfeeding should begin at birth, but a full milk supply can be established even several days after birth. If a nonbreastfed infant is less than six months old, a mother may be able to relactate; beyond that, it is sometimes possible to induce lactation for a partial milk supply. Health organizations dispute the common beliefs that stress "dries up" a mother's milk and that malnourished mothers cannot produce milk, but emphasize that optimal breastfeeding requires a supportive environment.

Guidelines issued by the American Academy of Pediatrics in 2005 emphasize that children younger than six months old require no other food or fluids beyond breast milk and recommend that breastfeeding continue after solid foods are introduced for at least the first year of life or longer if mother and child wish to continue. The WHO and UNICEF recommend breastfeeding for at least two years.

One significant problem in the Gulf Coast crisis was a lack of breastfeeding knowledge in the affected population. "We sent . . . board-certified lactation consultants into the shelters to start working directly with the mothers who wanted our help," says Katy Lebbing, herself an international board-certified lactation consultant with La Leche League International, an organization that supports and promotes breastfeeding. But few women were already breastfeeding. "Not only did we have to help people with breastfeeding, but we also had to educate people about breastfeeding," she says.

Getting breastfeeding support and information to people in crisis is problematic, though. Says Seal, "We need integrated interventions that acknowledge the reality of a mother's established feeding decisions."

Indeed, one reality is that breastfeeding rates are extremely low in many areas, including Louisiana and Mississippi, which have some of the lowest breastfeeding rates in the nation, according to the Centers for Disease Control and Prevention. Nevertheless, Lebbing hopes that breastfeeding promotion efforts after Katrina planted a seed. "Natural disasters and other types of disasters happen," she says. "The best choice is to breastfeed because you don't have to worry about your baby's milk supply." —**Julia R. Barrett**

Liver Library

Johnson & Johnson's pharmaceutical research and development division has contributed a library of expression profiles for 100 paradigm compounds, primarily hepatotoxicants, to the Chemical Effects in Biological Systems (CEBS) knowledge base based at the National Center for Toxicogenomics, a part of the NIEHS. CEBS users can select arrays corresponding to one or more compounds from the library and use knowledge base tools to identify genes with significantly changed transcript levels. Lists of altered genes can then be annotated with current annotation provided by CEBS or projected onto biological pathways from groups like BioCarta, KEGG, and the Gene Ontology Consortium. CEBS is accessed at <http://cebs.niehs.nih.gov/>.

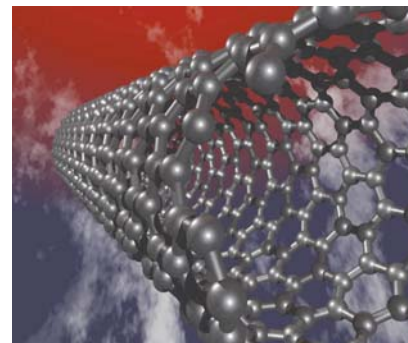


Action for Indoor Air

At its 4 September 2005 congress, the International Academy of Indoor Air Sciences called on the governments, institutions, and corporations of the world to invest more in reducing indoor air pollution. According to the academy, indoor air pollution in developing countries can exceed international health-based guidelines by 20 times or more, and the use of coal contaminated with arsenic and fluorine is poisoning millions in China. The World Health Organization estimates that indoor solid fuel burning causes about 1.6 million premature deaths annually, mainly among women and children. These problems are easily solved, however. Low-cost interventions including education, improved cooking devices and fuels, better stove placement and ventilation, and a focus on reducing children's exposures have been shown to successfully reduce the health effects of indoor air pollution.

Nanodatabase Unveiled

The International Council on Nanotechnology and Rice University's Center for Biological and Environmental Nanotechnology unveiled the world's first database of scientific findings on nanotechnology on 19 August 2005. Available at <http://icon.rice.edu/research.cfm>, the database was created by Rice University researchers, the chemical industry, and the Department of Energy, and will be updated and enhanced over the next year. The database is searchable by author, year, keyword, type of particle, and type of experiment. Currently the database houses only abstracts and summaries of papers from peer-reviewed scientific journals, but policy reports and commentaries on key papers in the field will be added in the future.



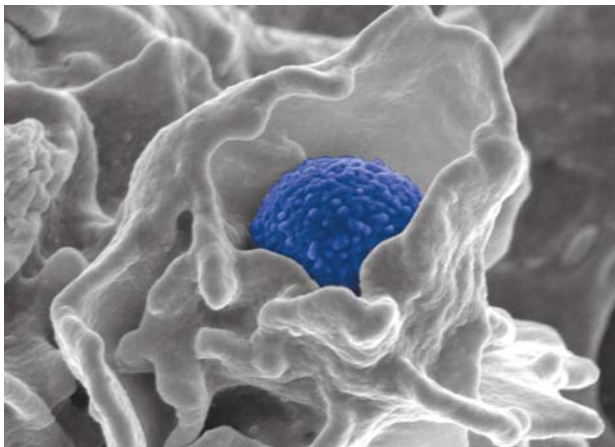
INFECTIOUS DISEASE

Meaner MRSA's

Most methicillin-resistant *Staphylococcus aureus* (MRSA) infections are contracted in hospitals and other health care facilities. Antibiotic use, patients' weakened immune systems, close contact among people, and open wounds all make hospitals prime breeding grounds for these bugs. But community-acquired MRSA strains, which attack healthy individuals with seemingly normal immune systems, are becoming more prevalent. A recent comparison of representative strains of hospital- and community-acquired MRSA's now suggests that the latter are more virulent and that they excel at escaping destruction by white blood cells.

Infectious disease experts suspected that community-acquired strains can overcome a healthy immune system because they operate differently than those acquired from hospital or health care settings. Microbiologist Frank DeLeo of the National Institute of Allergy and Infectious Diseases' Rocky Mountain Laboratories led a multi-institutional team of researchers in comparing the two types. In studies described in the 15 September 2005 issue of *The Journal of Immunology*, they evaluated the potency of three community-acquired MRSA strains (MW2, LAC, and MnCop) and two hospital-acquired strains (MRSA252 and COL).

Healthy adult mice were injected with each strain. All the mice infected with community-acquired strains became ill, and several died.



One bad bug. Community-acquired methicillin-resistant *S. aureus* (in blue) overcomes the immune system by destroying neutrophils, thus breaching the body's first line of defense.

None of the mice infected with the hospital-acquired strains died, and only one mouse became ill. Then the MRSA strains were mixed with human neutrophils (white blood cells), the body's first line of defense against bacterial invasion, which kill bacteria by producing hydrogen peroxide and other toxic oxygen metabolites. After half an hour, the community-acquired strains survived neutrophil destruction better than the hospital-acquired ones. After six hours, the community-acquired strains had begun rupturing the neutrophils and were actually growing.

Next the researchers used microarrays to uncover genes that differed during interaction with neutrophils. Not surprisingly, genes that encode virulence factors, toxin production, and stress responses were induced in all the MRSA strains. However, about two dozen genes that encode surface or secreted proteins of unknown function were upregulated only in the community-acquired strains. Gene knockout experiments are under way to identify whether these genes contribute to neutrophil killing. The researchers are also exploring how the community-acquired strains withstand neutrophils' toxic compounds.

The findings suggest that community- and hospital-acquired MRSA strains differ broadly in their biology and genetics. Will this new information help physicians on the front lines who are fighting MRSA infections? "[The findings] do not have immediate therapeutic implications, but maybe down the line therapies will be developed based on such findings," says Henry Chambers, an infectious disease physician at the University of California, San Francisco, School of Medicine. **—Carol Potera**

INNOVATIVE TECHNOLOGIES

X-Rays Get in Synch

Synchrotrons may have been designed with high-energy physics in mind, but now biologists are starting to see the light too. Jeffrey Gillow, a researcher at Brookhaven National Laboratory, has been making use of the X-ray microscope at the National Synchrotron Light Source (NSLS) in New York to see extremely fine details of bacteria biochemistry in a technique known as X-ray spectromicroscopy.

Gillow's team, funded by the Department of Energy Office of Science, uses "soft" X-rays (up to 800 electronvolts, a relatively small amount of energy) to study the chemical structure of organic compounds. "It's great because you get more than just a detailed picture," says Gillow. "You also get chemical information about your sample."

Gillow uses the synchrotron to precisely tune the energy of the X-rays, knocking carbon electrons out of their orbitals. The resulting disturbance changes the bonds of

molecules, and the researchers can read the spectra to see which elements were bonded to which.

The precise nature of the X-ray microscope allows Gillow to see exacting chemical detail within bacteria. Recently, his team used the 30-nanometer resolution of the NSLS X-ray microscope to observe an immature spore develop within a *Clostridium* sp. bacterium, something far too minute and hidden within its host for any conventional electron microscope. These findings were published in the June 2005 issue of the *Journal of Electron Spectroscopy and Related Phenomena*.

Another strength of X-ray spectromicroscopy is that samples require only minimal preparation. Says Gillow, "There is no staining necessary. Basically you just put the sample on the window and away you go." Without staining or heat fixing, the bacterium maintains its naturally occurring biochemical composition.

However, X-ray spectromicroscopy does require that experiments be conducted in close proximity to a synchrotron. And

even though there are currently 40 of these very expensive machines in the world, only a few have the capabilities to conduct this type of research. Further, no live specimens can be studied due to the extraordinary amount of radiation they receive.

Regardless, X-ray spectromicroscopy offers environmental scientists chemical detail and unaltered observations like never before, which is key to understanding the complex biochemical reactions that bacteria undergo in the environment. For example, groups interested in bioremediation can now see on a molecular scale how bacteria alter the chemistry of metals and radionuclides and remove them from soils and waters.

A better understanding of subcellular microorganism chemistry, specifically sporulation, might also help authorities neutralize bioterrorism threats before they become a problem. "Finding ways to interrupt sporulation could stop bioterrorism attacks," says Gillow. "But I doubt you will ever see a synchrotron at an airport scanning your luggage." **—Graeme Stemp-Morlock**

ehpnet

CDC: Environmental Concerns After Hurricane Katrina NIEHS: Natural Disaster Response

Since Hurricane Katrina struck the U.S. Gulf Coast on 29 August 2005, Americans have sought reliable information on how to safely reenter flood-damaged environments. The U.S. Department of Health and Human Services (DHHS) has been at the forefront of the effort to assist those affected by this disaster. Two DHHS agencies, the Centers for Disease Control and Prevention (CDC) and the NIEHS, have developed websites offering information on dealing with post-hurricane conditions.

The CDC page, located at <http://www.bt.cdc.gov/disasters/hurricanes/environmental.asp>, gives visitors access to information from both the CDC and the U.S. Environmental Protection Agency (EPA). The site contains a 38-page report, released on September 17, summarizing an environmental health needs



and habitability assessment of the city of New Orleans conducted by these two agencies. The report provides conclusions about the habitability of the city as well as recommendations on how best to go about allowing citizens to repopulate the city. There is also a health consultation on the Murphy Oil Company spill, which released 25,110 barrels of mixed crude oil into the area around Meraux and Chalmette, Louisiana.

The site also includes several documents to guide residents as they resume life along the Gulf Coast. There is basic information on cleaning up mold, disinfecting wells, protecting oneself from debris smoke, avoiding carbon monoxide, dealing with animal and insect hazards, and managing chemicals released during flooding. The mold cleanup section also links to other information sources, some of which are available in Spanish and Vietnamese (many Vietnamese have settled along the Gulf Coast since the 1950s). For response and cleanup workers there are links to federal guidelines and recommendations on personal protective equipment, cleaning HVAC systems, and handling and burning hurricane debris.

The NIEHS Natural Disaster Response page is located at <http://www.apps.niehs.nih.gov/katrina/>. The page features geographic information system (GIS) maps that the NIEHS and its academic partners created that identify chemical plants, refineries, Superfund sites, and other potential sources of contamination. It also contains satellite images of the areas affected by the hurricanes. In the future, the section will feature a functional set of GIS layers that will let visitors customize their own maps. These images can help decision makers and others in identifying sources and routes of contaminants, analyzing the potential for future exposures, assessing human exposures in the immediate aftermath of the hurricanes, and predicting long-term health impacts linked with these exposures.

The Questions and Answers page brings together resources from several federal agencies to answer frequently asked questions about mold, sewage, and seafood consumption. This page also contains information on the NIH Katrina Call Center, available at 1-866-887-2842, which provides round-the-clock medical consultation by telephone to anyone affected by Hurricane Katrina.

The NIEHS Program Resources section of the page has links to four programs that the NIEHS had in place long before the disaster struck, which are now being called into action. One of these, the Worker Education and Training Program, offers a PowerPoint presentation for cleanup workers titled *Protecting Yourself While Helping Others*, developed jointly by the NIEHS and other federal agencies to guide those responding to the storms of 2005. This presentation is also available in Spanish and Vietnamese. Visitors can also find safety posters for responders, guidelines for the protection and training of mold cleanup workers, and other checklists, safety plans, and materials.

As a service to NIH- and NIEHS-funded researchers at flooded universities, this site provides links to information for grantees affected by Hurricane Katrina, including notices from the *NIH Guide*. —Erin E. Dooley

Arsenic in U.S. Rice

Researchers from Scotland's University of Aberdeen reported in the 1 August 2005 issue of *Environmental Science & Technology* that U.S.-grown rice contains an average of 1.4 to 5.0 times

more arsenic than rice from Europe, India, or Bangladesh. Most U.S. rice is grown in fields that once grew cotton, which depends on arsenic-based chemicals to kill boll weevils and remove its leaves before harvesting.

Because of the form that arsenic takes in plants, the rice may not pose a threat; arsenic found in drinking water is estimated to be five times more toxic. However, one of the few epidemiological studies on eating a subsistence diet of arsenic-contaminated rice has linked it with an increase in bladder cancer.



Managing Chemicals Together

Representatives of the world's governments, intergovernmental groups, and other stakeholders met in Vienna in September 2005 to finalize the Strategic Approach to International Chemicals Management (SAICM). SAICM is a framework for global policy on chemical hazards and will ensure that by 2020 chemicals are manufactured and used in ways that minimize impacts on the environment and human health—a goal outlined at the 2002 World Summit on Sustainable Development. SAICM also promotes capacity building, technology transfer, and improved chemicals management, allowing better implementation of international treaties on chemicals such as the Basel Convention on the Transboundary Movement of Hazardous and Other Wastes. Three core documents from the Vienna meeting are expected to be adopted at a February 2006 conference in Dubai.

Green Plan for Rebuilding NOLA

In the October 2005 issue of *Environmental Building News (EBN)*, executive editor Alex Wilson outlines a 10-point plan for rebuilding New Orleans. The plan, developed with *EBN's* editorial board and other sustainable planning and design experts, calls first for the formation of a Sustainable New Orleans planning task force. Coast and floodplain

restoration is cited as the first priority. The plan also calls for salvaging and warehousing building materials, rebuilding a stronger levee system that is integrated into a

perimeter park, mandating green building of both housing and commercial structures, creating more sustainable Gulf Coast fisheries, cleaning up the new brownfields using the greenest means, and partnering with industry to clean up factories in the region.

