



quantifying DANGER



Nearly 700 bicyclists were killed in accidents in the United States in 2002. By comparison, it's rare for anyone to die from a nuclear power accident. But we fear nuclear power plants more than we do bicycles.



by Mary Jean Babic

The arrival of West Nile Virus has sown panic in many parts of the United States, and yet fewer than one percent of those bitten by mosquitos develop any symptoms of the disease.



Every day, we face decisions about health risks. When yet another potential threat pops up in the news—SARS, West Nile Virus, mad cow disease, global warming—it can be hard to know how to respond, and whose information to trust.

Last fall, the Environmental Working Group—a public-interest watchdog—released a study showing that fire-retardant chemicals had been found in the breast milk of each of 20 women tested. Two of those women had the highest levels ever recorded in the United States. The report confirmed earlier studies indicating high levels of exposure to polybromated diphenyl ethers, which are found in hundreds of everyday products, from clothing and furniture to drapery and carpeting.

The media duly took note. Widespread coverage launched the worrisome story into public consciousness, raising the obvious question of what to do. Banning the chemicals, as the European Union has done, seemed an obvious answer. But, as is often the case when health-related research, media attention, and public concern intersect, answers are more complex than they first appear.

David H. Garabrant, professor of environmental health sciences at the University of Michigan School of Public Health, points to the flame-retardant story as just one example of the difficult trade-offs inherent in the business of risk assessment. It begins with a discovery: in this case, flame-retardant chemicals in breast milk. "But we have no idea if there are any adverse health effects. We simply don't know," says Garabrant, who teaches a course on risk assessment in the Department of Environmental Health Sciences.

The Exxon Valdez oil spill riveted world attention with dramatic media images of oil-slicked birds, animals, and beaches.



The cleanup of chemical contamination sites can be controversial and take years of litigation.



“So what do we do? Do we ban flame retardants?” Children, he points out, used to burn to death when their clothing caught fire. That doesn’t happen anymore. “But should we wait 30 years to find out the retardants are a threat to fertility or a neurological threat? And if we do ban the retardants, what do we replace them with?”

The School of Public Health’s newly established Risk Science and Communication Center is poised to become a national resource in this important area. The center’s goal is to promote informed decision-making by conducting research into pressing health questions and effectively communicating the results to the public. Housed in the school’s Department of Environmental Health Sciences, the center will draw on expertise from across, and outside of, the university, bringing multidisciplinary skills to the study of diverse health hazards facing people who live in industrialized nations. Garabrant, who is also a physician and associate professor of emergency medicine, and Martin Philbert, associate professor of environmental health sciences and a toxicologist, are serving as the center’s co-directors.

“There needs to be a place where citizens, elected officials, government agencies and industry can be sure they’ll have a neutral and objective investigation of the environmental problems they’re facing,” says SPH Dean Noreen Clark. “Regardless of the political and economic stakes, people will know that if they come to this center, their problem will be analyzed from a neutral stance and the research communicated to broad audiences, regardless of the outcome.”

Clark points out that while other universities have centers that specialize in risk assessment or exposure assessment or communications, Michigan’s center is the only one that will address all three areas. “The risk science center will be in a unique position to investigate environmental problems and communication to various constituencies about those problems.”

Dennis Paustenbach, president and founder of San Francisco-based ChemRisk and a 1977 graduate of the school, believes the new center is “one of the more exciting initiatives” SPH has pursued in recent years. “The University of Michigan is particularly well poised to establish such a center due to the diversity of skill sets within the university, and its success at conducting multidisciplinary research,” he says.

How public health professionals and journalists talk to each other about such issues as new medical procedures, environmental contaminants, and bioterror has an enormous effect on the perception of risk.

In May of 1980, Love Canal residents, frightened by the news of chromosome damage and angered by the lack of government action to relocate their families, held two EPA representatives hostage for two days.

Contrary to what many people believe, the most dangerous time for firefighters is after a fire, when firefighters are exposed to cancer-causing toxins from smoke, fumes, and soot.



Whether it's called risk assessment, risk analysis, or risk science, researching problems and evaluating risk associated with exposures to potentially harmful environmental agents is what environmental health faculty members do all the time, says James Vincent, professor of environmental health sciences and department chair. "That's how we came to the idea of this center," he says. "The bit missing from our department was the communication." The center will communicate its own findings to all interested parties and also conduct research into the public perception of and response to risk.

There's no denying that risk assessment, particularly when it comes to chemical exposure, involves wading into situations that are at best controversial and often adversarial. The picture of combative public hearings between residents angry about contamination in their community and industry representatives defending themselves is a familiar one. "People have very strong feelings, even in the face of evidence that something isn't a problem," Clark says. "Or, conversely, people are disinterested in the face of evidence that there is a problem to be addressed." This speaks to the need for robust, unbiased research that, while addressing the concerns of citizens or industry or public interest groups, is

In 2000, federal officials ordered the slaughter of over 300 Vermont sheep suspected of harboring mad cow virus.



The dangers of certain types of surgery in some patients can outweigh the dangers of no surgery.

beholden to none of them. “They don’t grant our tenure,” Philbert points out. Indeed, all of risk science research should be conducted as an “iterative, participatory process,” says Garabrant. “It’s essential that the people with concerns are involved in risk assessment from the beginning,” he adds. “If you do the research without their input, you might be giving answers to the wrong questions.”

Involving the concerned parties from the beginning, and being open with results, will be crucial to cementing the center’s credibility and building trust in its findings. Jerome Nriagu, professor of environmental health sciences and an environmental chemist who’s worked extensively in the areas of environmental justice and environmental health problems, says that education of community members who aren’t scientists may be necessary so that they can participate meaningfully. “Members expect you to come in and do a risk assessment and, bingo, you have a smoking gun that you can use to go after whoever the culprit is,” he says. “It doesn’t work that way.”

On the other hand, Nriagu doesn’t share the opinion that lay people can’t possibly understand scientific research. “They don’t have to write code or do the modeling,” he says, “but they can appreciate what goes into that.”



Ultimately, Nriagu says, the center’s research projects will benefit from a strong community component. “If the community is involved, they’ll feel better about the numbers.” In his experience, when all sides have faith in the research outcome, they tend to be more willing to move beyond blame and concentrate on the appropriate actions to take next.

Industry, too, has an interest in sound risk science from an independent source. Protecting the health of employees, and remaining in compliance with government regulations, make business sense. “Industry is smarter than it was 20 years ago,” Philbert says. “They want to know the risks and understand them.”

One strong supporter of the center is Charles Gelman, who graduated from the school’s industrial health program in 1958. “It’s very important for people to know what relative risks are, particularly in food and chemical areas,” says Gelman, who with his wife has given \$2.9 million to help fund the SPH center (see sidebar, page 19). “As it is now, there is no one source of authority to know what is a reasonable risk.” He frankly disagrees with some state and federal government definitions of hazardous levels of chemical exposure and believes a university-based center will produce more credible research, in part because it will involve “people dedicated to the science of risk appraisal, who look at more than one aspect of what constitutes risk

The risks of using pesticides in modern agriculture have been hotly debated for decades around the world. Has the increase in farm output come at too high a cost?



rather than studying the toxicology of certain substances in isolation.”

His sentiments are certainly influenced by personal experience. In the 1980s, Gelman Sciences, an Ann Arbor company he founded, fought the Michigan Department of Natural Resources after 1,4-dioxane was discovered in groundwater near the company's site. The state listed Gelman Sciences as a major polluter and ordered the company to clean up the contamination. Gelman claimed the state's ruling was based on a poor understanding of science, and that the dioxane never reached unsafe levels. In 1991, the company and state finally reached an agreement under which Gelman Sciences agreed to a groundwater cleanup that continues to this day. Gelman, no longer involved with the company, believes he and the state could have come to a settlement far earlier if there had been a neutral place like the center to which to turn. “It certainly was a case of public confusion,” he says.

Surveys have shown that what the public and scientists regard as health threats can vary widely. One survey, for example, asked citizens and experts to rank 30 activities and technologies according to potential risk. In the citizens' rankings, nuclear power topped the list. Experts, however, put nuclear power down at number 20—

less risky, in their view, than firefighting, pesticides, riding bicycles, and surgery. Their top vote for risky behavior? Riding in motor vehicles.

What explains such a gap? Certainly, experts focus on statistics such as the likelihood of loss of life. Every year in the United States, around 40,000 people die in car accidents; by comparison, it's rare for someone to die from a nuclear power accident. The public has at least some sense of this; in the survey, citizens ranked motor vehicles second. But driving is obviously an acceptable risk for most people, perhaps because daily life would be too hard to carry on without a car, whereas it's relatively easy to avoid living next to a nuclear power plant. “There's a long history of human endeavor to take risk to put food on the table,” Garabrant says. “We all take on risks to earn a living, some more than others, so the acceptability of risk is different.”

Of course, the mass media play a huge role in the perception of risk. Medical news and environmental hazards make regular appearances on front pages and magazine covers. How public health professionals and journalists talk to each other has an enormous effect on the perception of risk.

Gregory Button, an adjunct lecturer in the Department of Human Behavior and Health Education, has worked on both

There's no denying that the business of risk assessment, particularly when it comes to chemical exposure, involves wading into situations that are at best controversial and often adversarial.

Every year, an estimated 104 children under the age of 20 die of agricultural injuries on United States farms and ranches.

Agriculture has witnessed the greatest proportional increase in fatalities of any United States occupation, even though the number of farm workers has decreased.

The public is more likely to be fearful and panic if they suspect information is being withheld.



sides of that relationship. As a public radio reporter in New England, he covered stories such as Love Canal, Agent Orange, and Three Mile Island. This spurred an interest in public health, disasters, and communities in crisis. He now teaches courses on media coverage of public health issues and risk communication, consults to government agencies and other organizations, and serves as a member of the state of Michigan's Crisis Communications Task Force. After the 2001 anthrax attacks, facing criticism for how it communicated to the public during the crisis, the Centers for Disease Control consulted Button and other experts for advice on how to do better in the future. Among other current projects, Button is researching the long-term psycho-social impact of the Exxon-Valdez oil spill.

Candor, Button says, is the best path to trust and credibility. "Don't lie, don't take a PR approach to make things appear other than they are," he says. "It always works better to be forthcoming and honest." Public health professionals often expect the media to be hostile, Button says, but during the first hours of a crisis they're usually helpful. Later, as the crisis levels out, reporters will ask tougher questions, but "that's their role, and as citizens we should be grateful they perform it. We shouldn't dread tough questions; they need to be asked, and we can answer them." It's also a mistake, he adds, for public health professionals to withhold information for the reason of preventing mass panic, something he's personally witnessed. Fifty years of "robust disaster research," Button says, show that citizens actually seldom panic. "It's hard for people to believe that,"

Button says. "But the public is more likely to be fearful and panic if they suspect information is being withheld; that's when rumors and conspiracy theories spread."

Because public health professionals and journalists work under different constraints, with different goals and objectives, the better they understand each other's jobs, the better the chance of effective communication, Button says. For scientists, uncertainty is a given. It can sometimes take years to arrive at an answer. More often, questions lead to more questions, not solid facts and unqualified answers—exactly what journalists seek. As Philbert puts it, "You have to balance the need to make the issue understandable while staying true to complex science," not easy to do. Journalists, toiling under pressing deadlines, don't have the luxury of time. Their objective is to tell

Around 40,000 people die annually in car accidents in the United States.



"This, We Hope, Will Make a Difference"

\$2.9 Million Gift to Benefit Risk Science Center

a story factually. Button hopes to organize forums between public health and media professionals to reach a better understanding of each other's roles.

He insists that public health professionals, while they may like to think otherwise, are as influenced by the media as anyone else. The values reflected in popular culture become incorporated into policy and research questions. "We're constantly framing and reframing the story," he says. "The way we internalize risk doesn't reflect if we're professionals. We think there's a chasm between 'experts' and 'lay people,' but we're all influenced by these forces in society."

The Risk Science and Communication Center will eventually occupy offices in the new School of Public Health building, which broke ground last fall. In the meantime, the center will be considering research projects and, importantly, locating secure sources of funding to free the center from the necessity of applying for grants every few years. Given the inescapable fact of risk in daily life, the center is certain to have enough work to occupy researchers for years to come. As Philbert points out, "As long as there are human beings on earth, we'll be assessing risk." ■

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For several years toward the end of his life, Isadore Bernstein met every other week with his colleague, close friend, and neighbor Charles Gelman. Bernstein, a professor emeritus of environmental and industrial health at the University of Michigan School of Public Health, was battling cancer—a fight he lost in 1998. Gelman, a 1958 graduate of the school's industrial health program, and in subsequent years a frequent lecturer in Bernstein's classroom, remembers their conversations as being "something like *Tuesdays with Morrie*"—reporter Mitch Albom's best-selling book about his inspirational conversations with a dying teacher.

Bernstein, a world expert in environmental toxicology, was especially concerned about risk assessment, Gelman recalls. "He wanted to know how you convey information to the public about potential threats in an organized, scientific way." Gelman himself had wrestled with the issue a decade earlier when the state listed his Ann Arbor-based company, Gelman Sciences, as a major polluter (see pages 16–17). Not long after Bernstein's death, Gelman and his wife, Rita, established the Isadore A. Bernstein Symposium, a biennial forum sponsored by the SPH Department of Environmental Health Sciences and devoted to the rigorous scientific

examination of such hot-button topics as chemical risk and global warming.

In March, the Gelmans renewed their commitment to Bernstein's ideals by giving \$2.9 million to help fund the school's new Risk Science and Communication



Charles and Rita Gelman

Center. "The Gelman gift is the foundation upon which the center will be built," says its director, David Garabrant, professor of environmental health sciences. "In a larger sense, it has galvanized the school to devote resources and intellectual

capital to this emerging area of science."

"We're in a position to leave some sort of legacy, and we felt this was the most important way to do it," says Gelman. "Chemical and other risks to human health are important issues and are often poorly portrayed by the lay press and poorly understood by the public." Gelman, who dedicated his career to the design and manufacture of microfiltration systems for use in health care, laboratory research, and environmental monitoring, hopes the SPH center will become an internationally recognized source of reliable information for both the public and the media. He also hopes his leadership gift will inspire others to give to the center.

Of fewer words but equal eloquence is Rita Gelman, who says simply, "This, we hope, will make a difference." ■