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Medical Sleuths

Fear of Toxic Materials Creates More Demand For Epidemiologists

Dow Chemical Study Seeks Link Between 24 Deaths And Work at Texas Plant

A Tedious, Frustrating Trail

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It reads like a detective story.

Twenty-four men from a small area on the Texas Gulf Coast are mysteriously dead of a rare disease, brain cancer. Investigators have sifted through thousands of pages of evidence and talked with people who might know something about the case, but so far they don't know what caused the disease. One theory holds that the deaths are related to the men's work. All 24 were employed at a Dow Chemical Co. plant in Freeport.

The detectives are epidemiologists, medical specialists who study the causes of disease in people. A typical team might include physicians, some of whom have doctorates in public health; non-physicians with graduate degrees in public health; biologists (specialists in classifying diseases); statisticians, and clerks.

Epidemiologists are in demand more than ever these days. As the public becomes more aware of health problems caused by toxic substances, pressure has increased on corporations and government agencies to show that products and working conditions are safe.

A Household Word

Dow, for example, has more than 100,000 people working in epidemiology. In the 1960s it had one. During the 1960s, Hills-based recruitment for health jobs, says requests for epidemiologists increased at least fourfold in the last five years. "Now people are everywhere," says one epidemiologist.

Today, epidemiologists are employed by dozens of major corporations, government and educational institutions. The Dow Chemical Co., a major employer in Freeport, has a large epidemiology department. In 1978, it recently announced that it was studying the health of its employees who work in the Freeport plant, a combination of work and living conditions.

Outside the chemical industry, epidemiological methods are being used to seek a link between tampons and toxic shock syndrome. "There will be even more studies," predicts Ralph R. Cook, Dow's chief epidemiologist. "The public is asking more sophisticated questions."

Providing the answers is costly. A physician with a doctorate in public health can earn about \$70,000 in industry. Union Carbide says its brain-cancer study will cost \$250,000. Dow spends more than \$20 million a year for research on health and environmental

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Too Costly for Small Companies

And the outlays are rising, at the point at which some smaller chemical companies may be hard pressed. "There will be tremendous distortions in the chemical industry," says Ercyl Blair, Dow's vice president for health and environmental sciences. "Small companies that don't have the resources will be shut out."

The case of the 24 Dow workers in Texas illustrates how much time, effort and money are consumed in epidemiological studies, and how the inherent imprecision can lead two groups to draw different conclusions in a single situation.

It began in November 1978, when a worker at Union Carbide's plant not far from Dow's was diagnosed as having brain cancer. He knew two other workers at the plant who had died of brain tumors, and he called the Occupational Safety and Health Administration's regional office in Clear Lake City, Texas, wondering if the disease could be related to working at the plant.

OSHA's regional office quickly turned up two other brain-cancer deaths of Carbide workers, and later the list of cases discovered was 10—ironically not including the worker who approached OSHA, since his cancer began in another part of his body. OSHA and Union Carbide are jointly investigating those cases.

But while searching for brain-cancer deaths among Carbide workers, OSHA investigators discovered the similar deaths among workers at the Dow Chemical plant in the same area.

Twice the Risk

OSHA compared the national brain-cancer deaths among Dow workers with the rate of such deaths in Brazoria County, where the Dow plant is located. It concluded that Dow workers faced twice as much risk of contracting the disease as other people.

Dow, which has a larger and more established epidemiology staff than Carbide, quickly did its own study. In the study, it checked the work histories and concluded that there wasn't any link between the chemicals they worked with and their disease. It also said that when adjusted for the age of the workers, the number of deaths at the plant wasn't much out of line with national averages.

It could be years before the case is solved. Based on the preliminary data, government researchers remain convinced that the brain cancers are work related; company officials still think they aren't.

OSHA and Dow agreed to conduct a more thorough investigation, which has been running for about a year; data-gathering should be completed by this summer. About 2,000 employees—a random 5% sample of the more than 40,000 men (women don't contract the disease nearly as often) who have worked at the Dow plant since it opened in 1940—are being studied. The two teams will share data but write separate reports.

It's by no means certain they will agree. There are indications that the two sides

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don't trust each other. "Some government studies are fishing expeditions," says Perry Gehring, a Dow vice president. "They find anything they can catch."

On the government side, Victor Alexander, an OSHA physician, says, "We encourage companies to do all the epidemiology they like. We also have an obligation to do the best job we can. We might want to look into things they don't." Questioned directly, however, both deny there's any mistrust, just legitimate differences in methodology. "It depends on how you slice up the information," says J. William Lloyd, an OSHA epidemiologist.

Epidemiology isn't an exact science. People, unlike laboratory animals, are exposed to many substances every day, and it's often difficult to isolate the harmful ones. "It's exasperating," says Irving J. Selikoff, a professor of environmental medicine at Mount Sinai School of Medicine in New York. "There are no instant answers."

And a study of cancer deaths is always difficult. To begin with, there's still a lot to learn about the disease. Although it's widely agreed that environmental factors contribute to most cancers, there are clearly other causes, too: Not all smokers contract lung cancer, for example. Current research seems to indicate that several factors working together may sharply increase the risk. For example, asbestos workers who smoke develop cancer at a far higher rate than either smokers who don't work with asbestos or asbestos workers who don't smoke.

Because cancer sometimes takes 20 to 30 years to develop, it's nearly impossible to know all the substances the victims were exposed to. As Dow's Dr. Cook says, "The ideal thing would be to implant a monitor in the right buttock at birth."

Brain cancer presents still further problems. Because it is rare—an estimated four cases a year per 100,000 population—investigators have few cases to work with. A single statistical error can affect results. What's more, brain cancer is frequently misdiagnosed.

All of this means that a study like Dow's takes a long time, even though it involves only a 5% sample. And, like a criminal investigation, the work isn't dramatic or glamorous. Dr. Cook says, "Things come in like the tide. It's dealing with paper."

Even the simplest tasks are frustrating.

Slogging Through the Files

Personnel records at Dow are filed alphabetically. It would be easier for epidemiologists if they were arranged by date of employment or by department—that way workers who were hired at a particular time or who worked in a particular department could be reviewed separately. When the study started, there were no indexes. Many records are on microfiche, requiring researchers to spend hours reading enlargements on machines.

It takes a major effort just to determine how many former workers have died, and

the causes. Investigators say they now know whether nearly all of the sample is alive or dead; it wasn't easy to find out even that. Reviewing personnel records for date and cause of death and death certificates from three counties surrounding the plant was just the beginning.

A list of names was sent to the Social Security Administration in Washington to find out whether a death claim had been filed or where retirement benefits were being sent. The names of those still missing were sent to the Texas motor-vehicles bureau. Government agencies can ask the Internal Revenue Service for a last known address, and there are high-school and college alumni records and checks of local telephone books. "It's shoe-leather epidemiology," says Dr. Cook.

Investigators may never know what workers were breathing and handling in the plant. Before the Occupational Safety and Health Act was passed in 1970, few companies measured or analyzed chemicals in the workplace. Protective equipment, if it was available, wasn't always worn. "The companies don't know, nobody knows," says Mount Sinai's Dr. Selikoff. "Our inadequacies of the past are coming home to roost."

More Mysteries

Even work histories don't always help. Building names and numbers have changed, as have manufacturing processes and job titles. The Dow plant is one of the largest in the world. Hundreds of chemicals are made there, and others are used in the manufacturing process. "Even if you know someone worked in an ethylene plant for 10 years, you may not be able to tell if he was an operator in an air-conditioned control room or a production person sloshing around in the stuff," says Gordon Reeve, an epidemiologist with the National Institute of Occupational Safety and Health.

Workers did slosh around in chemicals in the early days of the plant. "Back in the 1950s, you went in with your hands and washed tools, clothes and parts in carbon tetrachloride," recalls O.D. Kanemura, president of the Freeport Metal Trades Council, an association of unions who worked as a pipetitter in the plant. "They wouldn't let a drop of it on the floor now." Carbon tetrachloride, once a commonly used cleaning fluid, has been shown to cause cancer in laboratory animals.

Working conditions have changed so much, in fact, that epidemiologists concede that even if there was a problem years ago, it may no longer exist. They continue to be concerned, however, because so many workers still could face health problems caused by previous exposures, or a cancer-causing substance could remain.

"The real potential danger is that there's a chemical in the plant that no one suspects," says Dr. Alexander, the OSHA epidemiologist. "We won't see the benefits of improved controls until the turn of the century."