Litigation a threat to vaccine supply?

The risk that this year's U.S. kindergarten class will ever contract diphtheria or pertussis (whooping cough) is extremely small, thanks primarily to an infant-immunization program in most states that requires children to be vaccinated against these diseases and others before they enter school. But their younger brothers and sisters might not be so lucky, warns the American Academy of Pediatrics (AAP), if drug companies continue to pull back from vaccine production.

The problem, addressed this week in hearings before the House Subcommittee on Health and the Environment, centers on vaccine liability: Who, if anyone, should compensate the relatively few children who suffer serious, permanent injury after vaccination (SN: 5/15/82, p. 330)? The AAP estimates that one of every 310,000 pertussis vaccine doses results in permanent brain damage, but adds that the pertussis disease that could run rampant without a vaccination program would potentially produce 10 times that rate of brain damage, as well as other serious ailments.

Currently, vaccine-associated injury cases go to court, but drug companies and parents' groups representing the injured children agree — for different reasons — that such cases have not always been settled equitably. Legislation that would establish a no-fault, federal compensation program for such cases — as an optional alternative to court awards — has been batted about both houses of congress for more than a year, with still no final resolution. But the issue, in relation to several vaccines, is rapidly reaching a crisis point, asserts Martin H. Smith of the AAP. In urging quick passage of an alternative to litigation, Smith told the subcommittee, "we are sitting on an explosive situation, and it could have a short fuse."

In June, Wyeth Laboratories of Radnor, Pa., one of the three U.S. producers of pertussis vaccine, suddenly withdrew from that market, citing litigation costs as a primary reason. The result was an acute shortage of vaccine in several areas of the country. Connaught Laboratories of Swiftwater, Pa., and Lederle Laboratories of Pearl River, N.Y., say they have stepped up production to fill the gap and are committed to keeping the vaccine on the market. However, Paul Stessel of Lederle Laboratories told SCIENCE NEWS that the total dollars demanded in suits now pending against the company relating to alleged injury from pertussis vaccine are "200 times the total sales of the vaccine we produced in 1983. You don't need many $10 million lawsuits to wipe out the business," he says.

Despite consensus that a problem exists, new versions of the bills, expected to be introduced in both houses early next year, will face tough opposition unless areas of controversy can be resolved. Some points debated include:

- the compensation levels prescribed,
- the list of compensable injuries, which critics of the bills call vague, and
- the ability of claimants to choose whether they wish to seek compensation through the federal program, or instead pursue a remedy through the court's tort system. Critics, which include the Public Health Service, the American Medical Association and several drug companies, say that there should be no court option.

—D. Franklin

Alzheimer's report: Mapping cell damage

Memory loss is the major symptom of Alzheimer's disease, a brain disorder that is the fourth most common cause of death among U.S. elderly. While the disease has already been linked with the memory-acquiring area of the brain, a recent anatomical study pinpoints the exact cell damage within that area.

A University of Iowa (in Iowa City) research team reporting in the Sept. 14 SCIENCE found a "remarkably specific" pattern to the distribution of damaged brain cells in Alzheimer's patients. The damage, most often in the form of tangled nerve fibers, is concentrated in the layers of cells that relay nerve impulses into and out of the brain's memory center.

Researcher Bradley T. Hyman and colleagues used a staining procedure to examine brain sections gathered on autopsy from five Alzheimer's patients and from five elderly patients with no symptoms of the disease. According to Antonio R. Damasio, a coauthor of the study, the stain specifically dyes a substance in the nerve tangles, thereby mapping the exact sites of the brain damage. The stain in Alzheimer's patients showed that though the hippocampus, which is involved in assembling memories, seemed to be tangle free, the area surrounding the hippocampus was significantly damaged. "The hippocampus is virtually disconnected from both input and output," says Damasio. And the memory loss of the disease, he says, is probably related to the disconnection.

Knowing the site of memory disruption, however, says little about its cause. The next step in the research involves repeating the study and then investigating why these specific cells are vulnerable.

The anatomical study follows another recent report (SN: 9/1/84, p. 132) describing the biochemical differences of Alzheimer-diseased brains. That study found a key chemical activity to be altered and a lower level of protein production. Says neurobiologist Katherine Bick of the National Institute of Neurological and Communicative Disorders and Stroke: "We are just on the threshold of studying Alzheimer's disease in depth." *—C. Mlot*

Sugar/water switch allows dry life

Water is one of those chemicals without which life would be impossible — for most of us. But there are some organisms that can survive drying, among them a microscopic worm called a nematode, brine shrimp, baker's yeast, certain fungal spores and the desert resurrection plant. They resume their normal life when reconstituted with water.

The trick to dry-life living, say John H. Crowe and his colleagues at the University of California at Davis, is a sugar called trehalose. During the drying process, they found, nematodes produce an abundance of it. The sugar replaces the water that had been maintaining the spacing between molecules on cell membrane surfaces.

Because cell membranes from the millimeter-long nematode are difficult to obtain and are not well characterized, the researchers conducted further experiments on cell membranes from lobsters. Unlike nematode cells, lobster cells are destroyed by dehydration.

Cell membranes are agglomerations of phospholipids (molecules of glycerol, fatty acids and phosphoric acid) and proteins, with the proteins "floating" about in the phospholipids. Crowe's group found that as water is removed from lobster cell membranes, the phospholipids get closer together and finally separate out into their own crystals, and the proteins clump together.

But when they added trehalose before dehydrating, these membrane-disrupting events did not occur. "We think inhibition of this phase transition is the crucial event," says Crowe. "We found we can completely dehydrate a membrane that normally would never survive dehydration. A single factor — trehalose — allows it."

James Clegg of the University of Miami, who did early work with Crowe on dehydration, believes the protective effect of trehalose will hold for dry-life organisms other than nematodes. "I'd put my money on it," he says.

While trehalose may also prove to protect water-dependent organisms from the ravages of dehydration, Crowe says using it to enable drying and storing of embryos, transplant organs or food "is a long, long way off."

But it may, he says, prove more immediately valuable with liposomes, little bags made of artificial membranes that are used to carry drugs around the body. Like cell membranes, liposomes contain lipids. But they are relatively unstable for long-term storage in their hydrated state. Trehalose could, says Crowe, enable liposomes to be reduced to a dry powder for later reconstitution. *— J. Silberner*

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