trying to help. Officials at the Russian Academy of Sciences, declaring that they alone understand Russian science, wanted the money to be distributed through academy mechanisms rather than the ISF's ad hoc routes. But Balzer says this demand was only the last twitches of a dying officialdom: "I know we're doing the right thing when the Academy of Sciences is bitterly complaining." He says the ISF intends to "empower individuals, not bureaucracies."

Despite the setbacks, U.S. government officials say that their attempt to help FSU science has a silver lining: Russian officials now acknowledge the need for bank accounts and other mechanisms for distributing research funding that aren't controlled by the traditional hierarchy. And there have been small victories, too: During the debate on the ISTC project, the head of the state tax service agreed to exempt from taxes a range of revenue sources, including income from charitable grants.

Yet even the optimists do not expect the first round of Western aid to cure what ails the former Soviet Union. Instead, they hope that their limited success will pave the way for larger and more sustained programs to keep Russian science alive.

–Christopher Anderson

EPIDEMIOLOGY

New Seveso Findings Point to Cancer

On 10 July 1976, an explosion at a Hoffmann-La Roche chemical plant released a cloud over Seveso, Italy, 13 miles north of Milan. Within a few hours, a mist began settling on the streets, buildings, and gardens of the small town. The vapors seemed harmless enough until, several days later, children began to develop chloracne—an acne-like condition that is a hallmark symptom of occupational exposure to dioxin, a lethal carcinogen in animals. Finally, 17 days after the accident, Italian officials confirmed the presence of dioxin and ordered an evacuation.

Now it appears those exposed to the dioxin cloud have a lot more to worry about than bad skin. In a study published this month in *Epidemiology*, a research team led by University of Milan epidemiologist Pier Alberto Bertazzi found an elevated risk of several cancers for those living in the contaminated regions of Seveso. The study follows a 1989 report from Bertazzi's group, published in the *American Journal of Epidemiology*, that described an increased rate of cardiovascular deaths among Seveso residents after the accident.

Researchers have collected conflicting data on dioxin's carcinogenicity in humans: Some studies of workers exposed to dioxin have pointed to an elevated cancer risk, while others have not. But the latest findings have heightened the fears of many scientists. "I think it's becoming increasingly difficult to maintain the view that dioxin's not a human carcinogen," says epidemiologist Olav Axelson of University Hospital in Linkoping, Sweden, who wrote an editorial accompanying the Italian study. Although Bertazzi himself is quick to point out shortcomings in the Seveso study—such as its lack of convincing exposure data—it's expected to strengthen the hand of U.S. Environmental Protection Agency (EPA) dioxin experts, who are completing a 2-year reassessment of dioxin's health risks that suggests dioxin is a human carcinogen.

Beginning work 9 years after the explosion, Bertazzi's team tracked down medical records for 37,000 people, 99% of those exposed. Bertazzi grouped them into three categories according to their likely degree of exposure to dioxin. Because the researchers rarely had measures of dioxin levels in the blood, they were forced to estimate exposure from soil concentrations of the chemical, as measured soon after the accident in and around Seveso. The researchers compared these groups' cancer rates (from 1976 to 1986) with those of 182,000 people in uncontaminated regions surrounding Seveso.

In none of the contaminated areas was the overall risk of developing cancer significantly elevated; however, the researchers did find increased rates of specific cancers in some populations. For example, among the 4800 people living in moderately contaminated areas, men were twice as likely to develop leukemias and lymphomas, and women five times as likely to get gallbladder or bile-duct cancer, compared with their counterparts in the dioxin-free areas. In the least-contaminated zone, which included some 32,000 people, men were three times as likely to develop soft-tissue sarcomas. "This is very consistent with what's been seen in studies of workers exposed to dioxin," says toxicologist Linda Birnbaum, who heads up EPA's dioxin research.

But one result has puzzled the experts: In the population thought to have had the most acute exposure to dioxin, none of the cancer rates was significantly elevated. Bertazzi says this finding may not be surprising because it is based on too small a number of people (724) classified as highly exposed.

Another puzzle is that the Seveso population apparently showed an excess risk for some cancers within a decade of the accident. In many occupational studies, the time between exposure and the appearance of cancer was at least 15 to 20 years. To Bertazzi and Axelson, the Seveso findings indicate dioxin may be exerting its effects late in the development of cancer. This theory runs counter to occupational studies, which have suggested dioxin acts at an early stage—perhaps as an initiator in the multistep carcinogenic process.

Two possible explanations are that other chemicals may either work in tandem with dioxin or themselves be responsible for the elevated cancer levels. Axelson favors the former; James Collins, an epidemiologist at Monsanto Co., a St. Louis-based chemical manufacturer, argues that other industrial contaminants, such as the carcinogen 4-aminobiphenyl, may be the cause of at least part of the cancer risk attributed to dioxin. Collins bases this opinion on a study his group published this January in *Epidemiology*, which reported that workers exposed to 4-aminobiphenyl during an accident at a Monsanto plant in 1949 later developed, among other cancers, soft-tissue sarcomas. This or some other carcinogenic compound in the Seveso cloud, Collins speculates, may have been responsible for the elevated cancer risk.

Renewed warnings. Motorists were told in 1976 to roll up windows when passing the plant.

Still, some researchers are unimpressed with the 4-aminobiphenyl data. "We haven't ruled it out," says EPA dioxin researcher David Bayliss. "But if this really was a cause of soft-tissue sarcomas, why wasn't it picked up earlier?" he asks, referring to previous occupational studies of cancer incidence among chemical plant workers.

Bertazzi's team hopes to add another important piece to the dioxin puzzle later this decade after completing a 20-year follow-up of Seveso residents. In the meantime, he says, "This is not the final word from Seveso."

–Richard Stone