intact protein in cows' milk, bovine insulin, may set off a destructive process, suggest immunologist Outi Vaarala and her colleagues at the University of Helsinki. The immune system would attack pancreas islet cells that make human insulin, which resembles bovine insulin, and would produce antibodies.

At 2 years of age, 10 of 89 children getting cows' milk formula had formed antibodies associated with type I diabetes. However, only 3 of 84 babies receiving the treated milk showed these antibodies, says Hans K. Akerblom, a pediatrician at the University of Helsinki.

These autoimmune antibodies, or autoantibodies, are made by immune B cells and appear to dispose of damaged pancreatic islet cells, says Hans-Michael Dosch, an immunologist at the Hospital for Sick Children in Toronto. The antibodies indicate that bovine insulin might be spurring an immune system T-cell reaction against the child's own islet cells, he says. Insulin regulates sugar metabolism in the body.

Research had already determined that having one type of autoantibody to insulin indicates that a baby has roughly a 4 in 10 chance of contracting type I diabetes within the next decade, says study coauthor Suvi M. Virtanen, a nutritional epidemiologist at the University of Tampere in Finland. Having more types of these autoantibodies is a sign of greater risk; having three imparts an 80 to 90 percent likelihood of getting type I diabetes. In this study, 3 of the 10 children in the cows' milk group who had diabetes-related autoantibodies showed one type of such antibody, and the rest had two or more.

The precise cause of diabetes remains unclear. The children in the study were genetically predisposed to it, but most will never get the disease. Something in the environment or diet may trigger it.

Some researchers suggest that changing a predisposed child's diet might derail the disease. However, the proteins and calcium in cows' milk impart great benefits, Akerblom says. "None of this [research] is strong enough . . . to start changing habits about how mothers raise children," he warns.

Dosch agrees but notes that the evidence against cows' milk is piling up. As an example, he cites research from Puerto Rico. There, fewer than 5 percent of mothers breast-feed their children. Instead, nearly all use formula made from cows' milk. Meanwhile, type I diabetes incidence in Puerto Rico is roughly 10 times the rate seen in Cuba, where breast-feeding is nearly universal.

Such findings suggest that the problem may be cows' milk ingested in the first few months of life. After all, Dosch says, "we are the only species that drinks another species' milk. It's a weird thing. We have not evolved to be exposed to [bovine insulin] protein." —*N. Seppa*

Lead and bad diet give a kick in the teeth

For decades, the prevalence of childhood cavities has plummeted, thanks mostly to fluoridated water. But for some children, especially in northeastern U.S. cities and among the most economically disadvantaged, tooth decay remains common. A new study implicates lead as a likely cavity culprit.

The finding adds to a series of health problems for which lead may be to blame, including anemia and impaired mental development. Two other studies, also released this week, suggest that shortages of calcium and vitamin C may put children who are already at the greatest risk for lead exposure in double jeopardy.

In the cavity study, Mark E. Moss of the University of Rochester (N.Y.) Medical Center and his colleagues analyzed data from a nationally representative sample of 24,901 children, part of the Third National Health and Nutrition Examination Survey (NHANES III).

Most of the children's blood contained only a few micrograms of lead per deciliter, and the current federal guideline for blood-lead concentrations is 10 µg per deciliter. For children ages 5 to 17, an increased lead burden of 5 µg per deciliter of blood corresponded to an 80 percent jump in cavities, Moss and his team report in the June 23/30 JOURNAL OF THE AMERICAN MEDICAL Association (JAMA). They estimate that cavities of 2.7 million U.S. youngsters result from lead, about 10 percent of all cases in that age group.

"We've been thinking about tooth decay in a way that's almost like blaming the victim—if your children have tooth decay, it's because you don't brush their teeth right, or maybe their snacking habits are bad," Moss says. "This study says that maybe it's beyond that. Maybe children who are exposed to lead need extra precautions, such as more fluoride or better hygiene habits, than the average."

Previous studies on people hinted at a link between lead and cavities but were inconclusive. William H. Bowen, who heads another research group at the University of Rochester, comments that the new study bolsters that research, as well as his group's finding that lead exposure causes cavities in rat pups (SN: 9/6/97, p. 149). "When you put the whole package together, you've got an extraordinarily convincing story," he says.

The new study doesn't prove that lead causes cavities, Moss notes. Further research will examine whether, as Bowen's rat research suggests, lead stunts development of the glands that produce saliva, which protects teeth from harmful acid and bacteria. Alternatively, lead might hinder enamel growth, perhaps by blocking fluoride's activity.

Children acquire lead primarily from two sources: lead-based paint, which is common in homes built before the mid-1970s, and contaminated soil, a remnant of leaded gasoline exhaust. Because eliminating lead from the environment would be expensive, if not impossible, John D. Bogden of the University of Medicine and Dentistry of New Jersey in Newark, suggests that the best hope for averting lead poisoning in children may be the reduction of lead absorption in their gastrointestinal tract. This can be achieved by boosting the calcium in their diets.

In the June ENVIRONMENTAL HEALTH PERSPECTIVES, however, Bogden and his coworkers report insufficient calcium intake among children living in areas where lead exposure is high. Of the children whose blood concentrations of lead had been measured, almost half exceeded the federal guideline.

Bogden's team found that the diet of 31 percent of 175 children ages 1 to 3 years regularly fell below the federally recommended intake of 500 milligrams of calcium per day. Moreover, 59 percent of 139 children 4 to 8 years old took in less than the recommended 800 mg daily. In both age groups, calcium in the diets of about 7 percent of children fell far below the requirement for good health. These children took in less than 200 mg calcium per day.

"It's depressing," Bowen comments. "It's another health burden for the people who are least able to bear it."

However, Bogden's group also found many children whose calcium intake was well above the recommended level. "With attention to including dairy foods in the diet, it's very doable," he says.

A third study, also in the June 23/30 JAMA and using NHANES III data, finds a link in both children and adults between decreased blood concentrations of lead and increased concentrations of ascorbic acid, or vitamin C. If the finding holds up, increasing vitamin C intake could be "a reasonable, cost-effective way to control lead levels in the population," says author Joel A. Simon of the University of California, San Francisco.

Even if lead hampers the absorption of vitamin C, rather than the vitamin flushing out lead, "the bottom line is the same," Simon asserts. People at high risk for lead toxicity should eat more fruits and vegetables and consider taking a vitamin C supplement, he says.

In an accompanying editorial, Thomas D. Matte of the Centers for Disease Control and Prevention in Atlanta warns that a dietary fix shouldn't replace efforts to purge lead from the environment. Even if a nutritional strategy works, he asserts, "reliance on such an intervention places most of the burden for prevention on those most affected and least responsible for the underlying environmental causes of lead toxicity." —*S. Carpenter*