

Dioxin can harm tooth development

In the early 1980s, a Finnish dentist noticed that an unusually large share of her young patients had soft, discolored molars. Because the affected teeth had emerged bearing structural defects, she suspected that during infancy, when the teeth were forming beneath the gums, the children had been exposed to some toxic compound.

The culprit now appears to be breast milk tainted with dioxins, says Satu Alaluusua of the University of Helsinki Institute of Dentistry. She explained her team's findings in an interview this week.

Several groups of epidemiologists worldwide have reported a similar yellowish-brown discoloration of teeth in children exposed to extremely high concentrations of dioxinlike compounds. To probe whether the defects that she was observing might reflect a more moderate exposure to the same pollutants, Alaluusua began exposing adult rats to TCDD, the most potent dioxin. "We saw a similar mottling of teeth," as well as malformations in their mineral structure, she told SCIENCE NEWS.

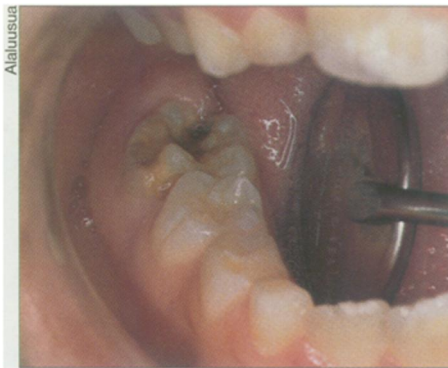
To affect human molars, exposures must begin in early childhood. So, Alaluusua tracked down children whose mothers' breast milk had been analyzed 6 years earlier in a World Health Organization study. She correlated the incidence of the defects in children's newly emerging molars with milk concentrations of dioxins and furans, a class of dioxinlike compounds. Overall, 17 of the 102 children studied bore soft, mottled teeth, which will remain permanently vulnerable to cavities.

In the Jan. 16 LANCET, Alaluusua's team reports that children who had encountered the most dioxin in their mother's milk had the highest rate of these tooth defects. Breast-milk exposure to polychlorinated biphenyls, another group of dioxinlike chemicals, played little if any role.

The group has also homed in on dioxin's target. The pollutant affects cellular receptors for epidermal growth factor (EGF), a hormonelike substance that contributes to development of many tissues.

The researchers removed embryonic tooth tissue from normal mice and from those lacking active genes for the EGF receptor. After exposure to high concentrations of TCDD, only the tissue able to produce EGF receptors matured into structures with the telltale defects, they reported in the December 1998 LABORATORY INVESTIGATION.

The Finnish team's new data "are very exciting in a scientific sense—and very concerning in a public-health sense—because they demonstrate effects from [dioxin] exposures at background levels," says Linda Birnbaum, a toxicologist with



the Environmental Protection Agency in Research Triangle Park, N.C.

Indeed, she notes, the average 50 parts per trillion (ppt) dioxin concentration—

Dark color and broken enamel on a 7-year-old's molar (back tooth) depict a dioxin-caused defect. Less severely affected teeth develop soft, off-white patches.

and the maximum of 258 ppt—that the team measured in the fat of Finnish women's breast milk are within the range at which dioxin taints fat, including that in breast milk, in the U.S. population.

Moreover, Birnbaum notes, the EGF-receptor link to tooth defects "is perfectly plausible" given that a number of studies—including some of her own—have shown that dioxin can alter the number of EGF receptors in various developing tissues, including the tooth buds of experimental animals. —J. Raloff

Mediterranean diet proves value again

For 2 decades, scientists have stewed over Mediterranean cuisine, wondering why the French, the Greeks, and other southern Europeans suffer from less heart disease than their northern neighbors. The discussion came to a boil with a 1994 report from French researchers concluding that former heart-attack patients on a Mediterranean diet—rich in canola oil, fish, fruits, cereals, and beans—had fewer heart attacks over 27 months than a similar group eating a diet more like that consumed in the United States and northern Europe.

In the Feb. 16 CIRCULATION, this same French team unveils what could be called Mediterranean Diet Part Deux. Combining their earlier findings with data gleaned by tracking the same groups for an additional 19 months, the researchers have bolstered the results.

Although the scientists had originally planned for the study to run 5 years, the 1994 findings were so striking that all the participants were told of the benefits of the Mediterranean diet. Nineteen months later, the researchers were able to locate 423 of the 605 people originally monitored and used data from them in a follow-up report.

The new work matched 219 men and women from the original Mediterranean-diet group with 204 from a control group of people who had eaten whatever their doctors recommended. Although the people in this study lived in the Lyon area of France, the control group didn't tend to adhere to a Mediterranean diet.

During the nearly 4 years under consideration, 44 heart attacks occurred in the control group and only 14 among those on the Mediterranean diet. Moreover, people in the control group had recorded 90 hospitalizations for cardiac problems that fell short of a heart attack, such as steady chest pain or the need for angioplasty to open a blood vessel. In only 68 instances did the people in the Mediterranean-diet group re-

quire such hospitalization, says coauthor Michel de Lorgeril, a physician at Cardiovascular Hospital in Lyon. Even accounting for age, sex, alcohol intake, and lifestyle differences, eating a Mediterranean diet reduced the probability of heart problems.

"Our trial confirms what we have known for many years, that coronary heart disease is essentially a nutritional disease," concludes de Lorgeril.

A comparison of eating habits showed that, even after all participants knew of the diet's benefits, the original controls still consumed less fiber and more saturated fats than the original Mediterranean-diet group did. The Mediterranean-diet group also consumed more canola oil, which is high in alpha-linolenic, or omega-3, fatty acids. These have been associated with lower cardiovascular disease rates.

The researchers noted only a slight difference in the groups' proportion of calories from fat—34 percent for the controls and 30 percent for the Mediterranean-diet group. Blood-cholesterol concentrations were similar in the groups.

Frank M. Sacks of the Harvard School of Public Health in Boston says that using a combination of precise diagnosis and multiple symptoms enabled the French group to confirm the Mediterranean diet's benefits. A heart attack is an easily measured event that doesn't allow physicians' opinions or patients' complaints, such as chest pains, to cloud results, he says. "The whole thing hangs together nicely."

"I'm all for using diet" to control cholesterol and to limit heart attack risk, says Scott M. Grundy, a nutritionist at the University of Texas Southwestern Medical Center at Dallas. "But [at-risk] people like these should be taking cholesterol-lowering drugs. We don't want people thinking they can get by with diet alone." —N. Seppa