DIET & DIOXINS

Digital Vision

The Need to Cut Back

Saturated fats in meats and dairy products may be tasty, but to the dismay of millions they are also a health hazard, implicated in obesity, heart disease, and high blood pressure. Now the Institute of Medicine (IOM) has ratcheted the public health battle against saturated fats up another notch. A recent report published by the IOM points out that saturated fats are a key source of human exposure to dioxins, which are a collection of more than 200 related compounds that may be linked to hormonal changes, neurodevelopmental problems in children, and cancer, in addition to other effects. In the December 2003 report, titled *Dioxins and Dioxin-Like Compounds in the Food Supply: Strategies to Decrease Exposure*, the IOM lays out a public strategy to reduce dioxin exposure, chiefly through programs designed to reduce saturated fat intake among the population.

"Fortunately, our findings line up nicely with what we know about good eating habits in general," says Robert Lawrence, chairman of the IOM panel that developed the recommendations and a professor of preventive medicine at the John Hopkins Bloomberg School of Public Health. "If you pay attention to reducing saturated fat from the perspective of your heart, you also get the added benefit of protecting yourself from dioxin."

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—Robert Lawrence
Johns Hopkins Bloomberg School of Public Health

A Basis in Uncertainty

Dioxins are produced in nature as combustion by-products and by man through industrial processes. They are ubiquitous agents that contaminate food as they cycle through the biosphere: fish consume dioxins and concentrate them in edible tissues, and livestock eat the chemicals while grazing on contaminated pastures and feed. Dioxins accumulate in fat because of their lipid-soluble properties. According to the IOM, saturated fats in dairy products, meat, and certain species of fish are the biggest sources of human exposure to these chemicals.

Although hundreds of epidemiologic studies have looked at the human health effects of dioxin exposures, neither the full extent of dioxin contamination nor the magnitude of the associated human health risks are clearly understood. Efforts to quantify dioxin levels in foods and other media are limited by high analytical costs, which can run up to $1,000 per sample. Dioxin sampling programs are expanding, says Richard Canady, a senior science policy analyst at the U.S. Food and Drug Administration. But Canady admits these efforts are dwarfed by the enormous volume of food produced in the United States.

It is known that dioxins are extraordinarily persistent in the environment and have a half-life of 7–10 years in the human body. Dioxins are found in everyone, although levels vary. In laboratory animals, dioxins produce tumors at microgram doses; indeed they are among the most potent animal carcinogens and toxicants known.

Improved industrial emissions controls have produced a 70% decline in environmental dioxin levels since the late 1970s, the IOM report states. The Centers for Disease Control and Prevention state in their *Second National Report on Human Exposure to Environmental Chemicals*, released in January 2003, that serum dioxin levels in humans have decreased 80% since the 1980s. But the public health improvements stemming from this decline are unknown.

Experts agree, however, that there are no benefits to dioxin exposure and that efforts to eliminate the chemicals from the human diet can have only positive effects, even if those effects are difficult to gauge. It is against this backdrop of uncertainty that the IOM was charged by the White House with finding ways to reduce dietary intake of dioxins, says Cliff Gabriel, deputy to the associate director for science at the White House Office of Science and Technology Policy. The findings are intended to guide government agencies in formulating better protection of the food supply against dioxin contamination.

"We recognize there's a lot we don't know about dioxins' risk to humans," Gabriel explains. "Putting the uncertainty aside, we felt it was prudent to get some input from the [National] Academies on ways to limit the dietary intake. We want to make sure we understand the full range of risk management options and any associated risk tradeoffs." Gabriel's office chairs the Interagency Working Group (IWG) on Dioxin, which sponsored the IOM study along with support from the U.S. Department of Agriculture (USDA) and Department of Health and Human Services.

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White House Office of Science and Technology Policy

The Panel's Recommendations

The IOM panel that prepared the report is composed of experts from academia, industry, and public interest groups. In keeping with sponsors' requests to focus on intake reductions, the panel concentrated its efforts on identifying ways to block dioxins' cycling through the food supply, as well as to reduce the potential for human exposures. The panel's conclusions target deeply entrenched practices in food animal production and human eating behavior.

A high priority, the panel states, should be to reduce the amount of dioxin-contaminated feed given to livestock, poultry, and farm-bred fish. Much of this contamination comes from the billions of pounds of recycled animal fat that producers add every year to feed as a growth enhancer. Up to 8% of the animal and fish feed supply can be fat, says IOM panel member James McKean, an extension veterinarian and professor at the

College of Veterinary Medicine at Iowa State University, although this amount will vary between species based on nutrient balance needs and the time of year (for example, animals eat less in summer, so summer feed may be augmented with fat to increase caloric intake). Lawrence adds that fat recycled into animal feed provides an ongoing reservoir of dioxins that ultimately wind up in the human diet.

The panel did not propose any alternatives for recycled fat, but instead emphasized the need for additional sampling to identify hot spots where dioxins are particularly concentrated in animal forage and feed. The goal is to clarify the extent to which contaminated animal feed contributes to human exposure. "We have few data points with which to work," emphasizes McKean. "This paucity of data about levels and distribution of contamination in feeds makes effective intervention strategy development difficult. We need to figure out where this contamination is coming from so we can make intelligent decisions about what to do about it."

The IOM also stressed the need to promote lower saturated fat intake among the population, especially among young girls and women before they become pregnant. Dioxins, being fat-soluble, accumulate in breast milk before being passed on to nursing infants during critical growth periods. Because dioxins are so long-lived in the body, cutting saturated fats just prior to or during pregnancy won't reduce dioxin levels in breast milk appreciably, says IOM panel member Katherine Tucker, an associate professor in the School of Nutrition Science and Policy at Tufts University. The current USDA recommendation for healthy Americans over age 2 is to take in no more than 10% of daily calories from saturated fat.

Girls must reduce saturated fat intake from an early age onward to keep their dioxin body burden low, Tucker says. According to IOM recommendations, the government can advance this goal by limiting the saturated fat content of meals served in the USDA National School Lunch Program and other federal child nutrition programs, for example, by offering more low-fat and skim milk.

But Tucker also warns against overreacting to infant risks from dioxins in breast milk. "Studies consistently show that babies do better when they're breastfed," she says. "In fact, there's a tremendous benefit to breastfeeding, and we have no indication that children do worse from breastfeeding because of dioxin exposure."

The IOM emphasized that dioxin risks must be weighed against nutritional needs. For instance, children under the age of 2 should be given high-fat milk and other dairy products to provide calories for growth. Meats and dairy products are sources of dioxins, but they also provide vitamins, protein, and other important nutrients.

Adults might also weigh dioxin risks from eating fatty fish such as salmon against established health benefits from omega-3 fatty acids, which are compounds in fish oil that protect against heart disease and cognitive decline. "If you eat lean fish, you limit dioxin intake, but you also reduce exposure to these beneficial compounds," Tucker says. "It really comes down to a personal decision."

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>
> **—Michael Taylor**
> Resources for the Future

More Research for Less Dioxin

The IOM report emphasized that more data are needed to understand the dietary risks of dioxins, particularly as they relate to the U.S. food supply, which has been much less intensively sampled than foods produced by European agriculture.

Public health specialists currently have very little information about the extent of dioxin contamination in foods. It's assumed that population-level exposures are fairly uniform, mainly because much of the store-bought food supply is nationally distributed. But subsistence hunters and fishers and other people who rely on wild or locally produced meats and fish may be at greater risk. Government officials and the private sector must develop a coordinated strategy to study how and where dioxins distribute through the food supply, panel members say.

Further research should focus on ways to remove dioxins from animal feed, investigate the effects of the chemicals on the fetus and breastfeeding infant, and develop approaches for achieving beneficial dietary changes in the population. More data will enable the development of effective risk management options, including the setting of regulatory limits for dioxins in food, which are not currently available.

The IOM report called for the formation of an interagency group to coordinate federal research and policy activities related to dioxin levels in food. According to Gabriel, the IWG itself will likely take on this role.

The IWG is already conducting an inventory of government activities related to dioxins, including USDA sampling programs, toxicity research by the Environmental Protection Agency, community education efforts by the Food and Drug Administration, and contamination cleanup by the U.S. Army Corps of Engineers. "Chances are that we'll overlay the IOM's recommendations on top of current efforts," Gabriel says. "We'll have to see how it all comes together."

In the meantime, panel members stress, individuals can reduce their own dioxin intake by selecting lean cuts of meat and poultry, trimming visible fat, and selecting low-fat dairy products. "We've tried to couch our recommendations in ways that neither over- nor underestimated the gravity of the problem," says panel member Michael Taylor, a senior fellow at the Washington, D.C.–based research institute Resources for the Future.

"What we've provided," Taylor says, "is an analytical framework and a set of options to reduce dioxins in food in the short and long term. These are recommendations that we think can help the government move forward on this issue. What impact this has, only time will tell."

Charles W. Schmidt