

Study suggests weight-loss surgery may release toxic compounds from fat into bloodstream

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Toxic man-made chemicals—such as polychlorinated biphenyls and organochlorine pesticides—that are absorbed into the body and stored in

fat may be released into the bloodstream during the rapid fat loss that follows bariatric surgery, according to a study from researchers at the Johns Hopkins Bloomberg School of Public Health. The finding points to the need for further research to understand the health effects of this potential toxicant exposure.

For the study, published online November 5 in *Obesity*, the researchers examined 26 people undergoing bariatric weight-loss [surgery](#), and found evidence of post-surgery rises in the bloodstream levels of environmental toxicants that are known to be stored long term in fat, including PCBs, [organochlorine pesticides](#), and PCB-like polybrominated diphenyl ethers. The study also revealed that participants born before 1976—when most of these [chemical compounds](#) were still widely used—tended to have much higher bloodstream levels of the chemicals, compared to younger participants.

"The fact that this increasingly popular type of surgery may be causing these compounds to be released into the bloodstream really challenges us to understand the potential health consequences," says study senior author John Groopman, Ph.D., the Edyth H. Schoenrich Professor in Preventive Medicine at the Bloomberg School.

About 16 million people in the U.S. are morbidly obese, defined as having a body mass index (BMI) of 35 kg/m^2 . Their extreme overweight condition confers a relatively high risk of type 2 diabetes, cardiovascular disease, hypertension, and many cancers. For almost three decades, the U.S. National Institutes of Health has recommended weight-loss surgeries called bariatric surgeries—including stomach stapling and gastric bypass procedures—for people who are morbidly obese and have serious obesity-related conditions such as diabetes, as well as for anyone with a BMI over 40. More than 200,000 bariatric surgeries are now performed in the country every year.

Although bariatric surgeries are known to have potential adverse side effects, including micronutrient deficiencies, the release of environmental toxicants from fat storage isn't one that has been studied before. Recently, though, Groopman and other researchers from the Bloomberg School and the Johns Hopkins School of Medicine realized that as these surgeries were becoming common, and, since they involved rapid fat loss, they could potentially release toxicants such as PCBs into the bloodstream of patients.

A large set of environmental toxicants, including carcinogenic PCBs, are oily, "lipophilic" compounds that tend to be absorbed into—and persist indefinitely in—the fat molecules that are stored in fat cells. In general, they are considered "persistent organic pollutants" (POPs) because they are not broken down quickly in animals, plants, soils, or bodies of water.

The researchers enrolled 27 patients who were morbidly obese and scheduled for surgery at the Johns Hopkins Center for Bariatric Surgery. Of these, 26 patients went through with the surgery and were included in the analysis. Each patient had a blood sample taken at the time of surgery and on four follow-up visits over six months. The analysis, aided by experts at the U.S. Centers for Disease Control and Prevention, focused on the bloodstream levels of 41 POPs, including 24 PCB compounds and 5 organochlorine pesticides, that were detectable in the initial samples. The researchers also classified the patients into two groups: the 17 born before 1976 and the 9 born after. People born before the mid-1970s generally have had greater exposure to POPs. Bans on the U.S. manufacture of PCBs and the organochlorine pesticide DDT took effect in 1979 and 1973, respectively.

The results showed that the patients born before 1976 started the study with roughly 5 times higher serum levels of most of the PCBs, as well as higher levels of organochlorine pesticides, compared to the patients born after 1976. During the six months of weight loss after surgery—in which

the patients lost an average of 23 percent of their initial weight, or nearly 30 kg each—both groups of patients tended to show increases in serum levels of fat-stored POPs. For example, in the older patients, serum levels of most PCBs went up by 15 to 25 percent for every 10 kg of lost weight. The older patients, who started with higher baseline serum levels of most POPs, and presumably had much greater fat stores of these compounds, tended to have higher rates of increases in serum levels of the POPs per unit of lost weight, especially for PCBs.

The researchers note that studies with larger populations need to be done to verify the findings in this small-sample study. Further research, say the researchers, could also determine if there are any biological effects, especially on sensitive, fat-rich organs such as the liver and brain, of the toxicant doses involved—which were mostly on the order of billionths of a gram per gram of serum lipids.

"There is remarkably little information in the literature that relates blood levels of these compounds to effects in tissues," says Groopman. "It would be great if we determine that it's not a problem, and it might turn out not to be. At the same time, the data might suggest that people should lose weight more slowly, or that we should somehow find ways to trap these compounds as they are released into the blood. We also need to recognize that the compounds released from the fat represent lifetime accumulation of toxicants, and we need to address these life course exposures to determine health risk."

More information: Robert H. Brown et al. Mobilization of Environmental Toxicants Following Bariatric Surgery, *Obesity* (2019). [DOI: 10.1002/oby.22618](https://doi.org/10.1002/oby.22618)

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