

Toxins could make you fat - depending on gut bugs

November 3 2011, By Stacey Shackford

Could persistent pollutants like DDT and PCBs or chemicals found in plastics be making you fat or diabetic? The answer may depend on what sort of bacteria you have churning around in your gut, according to Cornell scientists.

In a paper published Oct. 31 in the online version of [Environmental Health Perspectives](#), Suzanne Snedeker, visiting fellow in the Department of [Food Science](#), and Anthony Hay, associate professor of microbiology, raised the possibility that interactions between gut ecology and [environmental chemicals](#) may contribute to obesity and diabetes. Current estimates suggest that the costs associated with obesity alone exceed \$160 billion annually and account for more than 16 percent of [medical care costs](#) in the United States.

After reviewing numerous studies -- including some by their Cornell colleague Ruth Ley -- they concluded that "there is mounting evidence that gut microbiota composition affects obesity and diabetes, as does exposure to environmental chemicals" and that individual variations in gut microbiota may affect the way those chemicals are metabolized in the body.

Gut [microbes](#) outnumber [human cells](#) by a factor of 10, yet we know surprising little about many of these organisms. The microbes serve several functions, many related to weight and insulin control, including energy harvesting, regulation of fat storage, inflammation and satiety. The most dramatic demonstration of this in people has come from

gastric [bypass surgery](#), which rapidly alters gut ecology and improves glycemic control in type II diabetics.

More than three dozen environmental chemicals have been found to be "obesogenic" or "diabetogenic -- affecting pathways leading to obesity and/or diabetes.

Some researchers believe these chemicals may act during critical windows of development around puberty to alter pathways involved in obesity. Snedeker and Hay have highlighted research, for example, showing that pubertal exposure to tributyltin -- used in anti-fouling marine paints as well as in some wallpaper, textiles and floor coverings -- in male mice caused weight gain and higher levels of insulin in the blood.

Several persistent pollutants like the insecticide [DDT](#), dioxin and [PCBs](#) have been identified in the human epidemiological literature as likely culprits affecting type II diabetes risk. Globally, high levels of arsenic in water supplies also have been associated with increased incidence of type II diabetes.

Snedeker and Hay noted a dearth of research on the effects of gut microbes on environmental chemicals. Gut microbes, however, can affect the metabolism of such over-the-counter drugs as acetaminophen and some chemotherapy drugs, making them more toxic. They conclude that a similar mechanism probably applies to chemicals implicated in obesity and diabetes and called for further studies to determine exactly how.

New scientific approaches involving transplantation of gut microbes from humans into laboratory animals are emerging to help scientists explore the impact of gut microbes on environmental pollutants. Snedeker and Hay said they hope that such studies will lead to

personalized treatments for diabetes and obesity and help to stem these global epidemics.

Provided by Cornell University

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