



Obesity And Environmental Chemicals: Research Probes Potential Link

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DURHAM, N.H. -- Could your couch be making you fat?

A team of researchers at the University of New Hampshire is investigating whether the increasing ubiquity of chemical flame retardants found in foam furniture, carpeting, microwaves and computers might be related to the climbing rate of obesity in the United States.

"Environmental chemicals are a possible third component to the obesity epidemic, along with diet and exercise," says Gale Carey, professor of nutrition at UNH and a leader of the research project, along with professor of nutrition Anthony Tagliaferro and Deena Small, assistant professor of molecular biology and biochemistry. The trio received funding for the project from the UNH President's Excellence Initiative Awards, which provide support for interdisciplinary research.

The flame retardants, called polybrominated diphenyl ethers (PBDEs), have been produced since the 1960s; they're now found in consumer products like carpeting, upholstered furniture, computers and hair dryers, where they retard the combustibility of these products. It's estimated that American consumers come into contact with up to 100 products containing PBDEs per day.

While chemical manufacturers say PBDEs can reduce by 45 percent the risk of death and injury by fire, they are an emerging environmental chemical – and an emerging concern, as their impact on the human body becomes documented. Their persistence in the environment has PBDEs compared to now-banned toxins like PCBs and DDT; the use of two types of PBDEs is prohibited in European Union countries.

Carey, Small and Tagliaferro, working in collaboration with clinical assistant professor of animal science Alice Roudabush, D.V.M., and 11 undergraduate and graduate student researchers, are exploring how PBDEs affect fat storage and production. "We know PBDEs are fat-soluble – they dissolve in fat tissue," says Carey. "What are they doing in the fat as they sit there? Nobody has asked that question yet."

Building on research conducted by two of Carey's graduate students, the faculty trio will expose laboratory rats to PBDEs through pregnancy and lactation, stages Carey describes as critical windows for exposure. At the molecular level, Small will examine what PBDEs are doing to stem cell populations within the adipose tissue and the effects of PBDEs on gene expression. Does exposure to PBDEs, which mimic estrogen and thyroid hormones in the body, make cells more likely to develop into fat cells? "Everything I do has to do with how changes in signaling result in changes in gene expression," she says.

Carey's work is at the cellular level. Isolating the fat tissue of these animals, Carey will explore the insulin sensitivity of fat cells. Preliminary data from her lab suggest that chronic exposure to PBDEs could cause fat cells to become less sensitive to insulin, which is a

forerunner to developing Type II diabetes. The fat cells of growing male rats that were fed PBDEs daily for a month acted metabolically like the fat cells of obese rats, although the PBDE-fed rats weighed the same as a control group.

Tagliaferro, whose research interests concern whole-body energy and metabolism questions, will assess sensitivity of all body tissues to insulin, as well as examine the food intake, body weight changes, and energy metabolism of the rat pups once they are weaned from their mothers. PBDEs, the researchers note, seem to interrupt thyroid hormone levels, which may impact caloric expenditure.

"There's much more to obesity than eating too much McDonald's and not exercising," says Small. "PBDEs may be one of the confounding factors to obesity."

With the research just getting underway, the scientists are duly cautious about predicting outcomes. If findings implicate PBDEs in obesity, Carey notes, the news would be good and bad.

"From a scientific standpoint, it would be very interesting if these animals began to put on weight," she says. "But part of me hopes they don't, because these chemicals are all around. But that's the good thing about science: You try to get to the truth, and then when you get the truth, you can do something about it."