Programmed for obesity

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Obesity is generally discussed in terms of caloric intake (how much a person eats) and energy output (how much a person exercises). However, according to a University of Missouri-Columbia scientist, environmental chemicals found in everyday plastics and pesticides also may influence obesity. Frederick vom Saal, professor of biological sciences in MU's College of Arts and Science, has found that when fetuses are exposed to these chemicals, the way their genes function may be altered to make them more prone to obesity and disease.

"Certain environmental substances called endocrine-disrupting chemicals can change the functioning of a fetus's genes, altering a baby's metabolic system and predisposing him or her to obesity. This individual could eat the same thing and exercise the same amount as someone with a normal metabolic system, but he or she would become obese, while the other person remained thin. This is a serious problem because obesity puts people at risk for other problems, including cancer, diabetes, cardiovascular disease and hypertension," vom Saal said.

Using lab mice, vom Saal has studied the effects of endocrine-disrupting chemicals, including bisphenol-A, which recently made news in San Francisco, where controversy has ensued over an ordinance that seeks to ban its use in children's products. In vom Saal's recent study, which he will present at the 2007 Annual Meeting of the American Association for the Advancement of Science (AAAS), he found that endocrine-disrupting chemicals cause mice to be born at very low birth weights and then gain abnormally large amounts of weight in a short period of time, more than doubling their body weight in just seven days. Vom Saal

followed the mice as they got older and found that these mice were obese throughout their lives. He said studies of low-birth-weight children have shown a similar overcompensation after birth, resulting in lifelong obesity.

"The babies are born with a low body weight and a metabolic system that's been programmed for starvation. This is called a ‘thrifty phenotype,' a system designed to maximize the use of all food taken into the body. The problem comes when the baby isn't born into a world of starvation, but into a world of fast food restaurants and fatty foods," vom Saal said.

More research must be done to determine which chemicals cause this effect. According to vom Saal, there are approximately 55,000 manmade chemicals in the world, and 1,000 of those might fall into the category of endocrine disrupting. These chemicals are found in common products, from plastic bottles and containers to pesticides and electronics.

"You inherit genes, but how those genes develop during your very early life also plays an important role in your propensity for obesity and disease. People who have abnormal metabolic systems have to live extremely different lifestyles in order to not be obese because their systems are malfunctioning," vom Saal said. "We need to figure out what we can do to understand and prevent this."

"Perinatal Programming of Obesity: Interaction of Nutrition and Environmental Exposures" is the title of vom Saal's AAAS presentation. Also presenting with vom Saal at the AAAS symposium are Reth Newbold of the National Institute of Environmental Health Sciences, Bruce Blumberg of the University of California-Irvine, George Corcoran of Wayne State University and James O'Callaghan of the National Institute for Occupational Safety and Health.

Source: University of Missouri-Columbia