

Exposure to fungicide, tolyfluanid, disrupts energy metabolism

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Mice exposed to the fungicide tolyfluanid (TF) showed metabolic changes similar to those that signify the development of the metabolic syndrome. The results, which were presented Sunday at the joint meeting of the International Society of Endocrinology and the Endocrine Society: ICE/ENDO 2014 in Chicago.

Metabolic syndrome is a cluster of conditions including increased blood pressure, [high blood sugar](#) level, excess body fat around the waist and abnormal [cholesterol levels](#). Together these conditions increase the risk of heart disease, stroke and diabetes.

Rates of occurrence of metabolic diseases such as obesity and diabetes are continuing to increase worldwide. Although poor diet and lack of physical activity are primary causes of the majority of metabolic disease, environmental factors have increasingly been implicated as important contributing causes that may increase the risks of developing metabolic diseases brought on by lifestyle.

"Recently, the attention of scientists has been attracted to endocrine-disrupting chemicals (EDCs), compounds that are suspected of promoting the development of various metabolic disorders via their capacity to impact hormonal and metabolic signaling pathways," said lead author Shane Regnier, a doctoral candidate at the University of Chicago's Committee for Molecular Metabolism & Nutrition. "Our study showed one potential EDC, an agricultural fungicide called tolyfluanid (TF), led to [metabolic changes](#) in [mice](#) including accumulation of body

fat, disruption of glucose metabolism, and reduction of adipose insulin sensitivity."

Adult male mice that consumed a diet containing TF at 100 ppm for 12 weeks showed the types of changes in fasting blood glucose and adipose accumulation that may signify development of [metabolic syndrome](#). In a separate study, mice were exposed to TF only during fetal development and as newborns. When examined at the time of weaning, the young mice displayed reduced body weight, a symptom that has been associated with an increased risk of metabolic disease later in life. These mice were followed to adulthood, and, although experiencing no further contact with TF, male mice that had been exposed only before and immediately after birth nevertheless displayed impaired glucose tolerance as adults.

The results of these two studies suggest that exposure to TF may promote the development of [metabolic disease](#) in humans. While TF levels have been measured in some food crops, in agricultural runoff, and in ground water, TF levels have not been measured in humans. The authors of the study suggest that the results of their two mouse experiments indicate that efforts should be made to characterize exposure of humans to TF to determine whether similar metabolic impacts are seen in humans and that continued use of TF should be carefully considered.

Although approximately 150,000 unique chemicals are registered with the European Chemicals Agency, most are tested only for acute toxicity and carcinogenic capacity. "We are only beginning to understand the role that human-made chemicals play in causing human disease," said Regnier. "The potential for chronic, low-dose exposure to impact and elicit human disease has only begun to be investigated," he added.

Provided by The Endocrine Society

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