

Obesity and the Environment

Millions of Americans and people worldwide are overweight or obese. Obesity is a complex health disorder that affects both adults and children. Childhood obesity has become a serious problem in the United States.

Being obese puts people at risk for many health problems. The more body fat a person has and the more they weigh, the more likely they are to develop diseases, such as diabetes, heart disease, stroke, arthritis, and some cancers.

Gaining weight and becoming obese can be the result of many factors. These factors may include lack of exercise; poor nutrition; metabolism, or the way your body converts food and oxygen into energy; family history and genetics; behavior or habits; environment; and more. Scientists are also beginning to explore the role that chemicals may play in weight gain and obesity.

What are obesogens?

More than 80,000 chemicals are registered for use in the United States. Some of these chemicals are toxic to animals and humans, and some interfere with the body's hormone function. The ones that impact hormones are called endocrine disrupting chemicals, or endocrine disruptors, and are linked to a variety of diseases.

Some endocrine disruptors have been shown to be obesogens, or involved in weight gain, and may be contributing to the obesity problem.

The term obesogens was coined around 2006, based on research that showed that exposures to specific chemicals during early development disrupted normal metabolic processes and increased susceptibility to weight gain across the life span.¹



How do obesogens work in the body?

An unhealthy diet and lack of exercise are the main factors that contribute to weight gain and obesity, but studies have found that obesogens may also be playing a role.

Obesogens do not directly cause obesity, but they may increase the sensitivity, or susceptibility, to gaining weight, especially when the exposures occur during development.

A growing body of research is beginning to suggest that many adult diseases, including obesity and diabetes, may be traced back to exposures that occurred during development. This concept is often referred to as the developmental origins of health and disease. It suggests that early life exposures to obesogens can change how the body functions at a very early age, leading to diseases later in life.²

Obesogens are believed to work in several ways. They may change how a person's fat cells develop, meaning they may increase fat storage capacity or the number of fat cells. They also may make it more difficult to maintain a healthy weight, by changing how the body regulates feelings of hunger or fullness, or increasing the effects of high fat or high sugar diets.

What are some of the health consequences associated with obesogens and being obese?

People who are obese, compared to those with a normal or healthy weight, are at increased risk for many serious diseases and health conditions. Obesogens may be contributing to many of these health problems, including Type 2 diabetes, heart disease, and some cancers.

Research has also shown that the most sensitive time for exposure to obesogens is during early development, when the body's weight control mechanisms are being developed. Animal research suggests that early-life exposure to at least some obesogens may be permanent and carry across multiple generations.³

What can I do to reduce my exposure to obesogens?

Try to minimize exposures to environmental chemicals. This is often challenging, since it is hard to know where exposures occur and what products contain these chemicals.

Some general advice is to:

- Eat fresh fruit and vegetables
- Reduce use of plastics
- Do not use plastics in the microwave
- Purchase furniture that has not been treated with flame retardants
- Choose fragrance-free products



Examples of chemicals that may be obesogens

- Cigarette smoke
- Air pollution
- Tributyltin, a chemical that is widely used as a fungicide and as a heat stabilizer in polyvinyl chloride (PVC) piping
- Flame retardants
- Phthalates, a broad class of chemicals that are added to many consumer products to make them softer
- Bisphenol A, a chemical widely used to make polycarbonate plastics
- Some pesticides
- Polychlorinated biphenyls (PCBs), industrial chemicals that were used widely in the past in products such as paints, cements, fluorescent light ballasts, sealants, and adhesives



What kind of research is NIEHS doing on obesogens?

Obesogens is a fairly new field of study. Many data and research gaps remain. However, NIEHS is supporting researchers across the country who are looking at exposures that may be related to obesity and related diseases, such as diabetes.

Also, in-house researchers at NIEHS and the National Toxicology Program, an interagency testing and analysis program housed at NIEHS, are supporting efforts to address the role that chemicals play in the development of diabetes and obesity.

Where can I find more information on obesity?

- Centers for Disease Control and Prevention – Adult Obesity Facts
<http://www.cdc.gov/obesity/data/adult.html>
- U.S. National Library of Medicine – Obesity
<https://www.nlm.nih.gov/medlineplus/obesity.html>

For more information on the National Institute of Environmental Health Sciences, go to www.niehs.nih.gov.

¹ Grun F, Blumberg B. 2006. Environmental obesogens: organotins and endocrine disruption via nuclear receptor signaling. *Endocrinology* 147(6 Suppl):S50–S55.

² Barouki, R, Gluckman PD, Grandjean P, Hanson M, Heindel JJ. 2012. Developmental origins of non-communicable disease: implications for research and public health. *Environ Health* 11:42.

³ Janesick AS, Shioda T, Blumberg B. 2014. Transgenerational inheritance of prenatal obesogen exposure. *Mol Cell Endocrinol* 398(1-2):31-35.