Practice Prevention

Obesogens

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What are obesogens?

"Obesogens" are chemicals that can promote weight gain. We know that some pharmaceutical drugs affect the body's hormone system and can influence weight and metabolism. The potential for these drugs to affect our bodies may be greatest when exposure occurs during sensitive periods of development, such as in the womb or in early life. Chemicals that act like hormones may have the same ability. These obesogenic chemicals may influence an individual's weight and metabolism, even if exposure occurred much earlier in life.

Diet and exercise are clearly important in the development of obesity. However, the obesity epidemic cannot be explained by diet and exercise alone: six-month-old babies are heavier than they used to be. Laboratory animals with the same diet and exercise as always are heavier than they used to be. Even feral rats living in both agricultural and urban areas are heavier than they used to be. What other factors might help to explain these trends? Widespread exposure to environmental chemicals is a likely contributor.

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Which chemicals are obesogens?

If a mother smokes during pregnancy, her child has a higher risk of being overweight or obese during childhood and adulthood. Exposure to chemical obesogens during development may cause a similar effect. Studies of both animals and humans are beginning to point to many chemicals as potential obesogens (see the list on the next page). However, research into obesogens is still very new – scientists are just beginning to uncover the role of many chemicals in regulating our metabolism and weight. The information in this column may turn out to be the tip of the iceberg, as the vast majority of chemicals in use today have not yet been tested for potential obesogenic ability.

One chemical linked to weight gain in animals is bisphenol A (BPA), a chemical used in can linings, plastics, and carbonless copy paper, and found in 93% of US residents tested. When pregnant rats were exposed to small amounts of BPA, their babies gained more weight throughout their lives than those who were unexposed. Numerous follow-up studies with animals have found weight gain resulting from developmental exposures to BPA, although how these results apply to humans is not clear.

Human studies to date show that exposure to some hormone (endocrine) disrupting chemicals is associated with an increase in body size. The results depend on the chemical, exposure level, timing of exposure, and gender. (See our column on endocrine-disrupting chemicals for more information on these chemicals.) Exposure in the womb may cause permanent changes that predispose us to later weight gain. The effects of many obesogens are worsened by a high-fat diet, and thus healthy dietary choices are still an important factor in weight control. Obesity also increases the risk of diabetes, and many of these and other chemicals are linked to the development of diabetes as well.

Potential chemical obesogens

Animal studies

- Bisphenol A (BPA) (found in some plastics, carbonless copy paper and can linings)
- Perfluoroalkyl compounds (used in nonstick cookware and water-repellent and stain-resistant fabrics)
- Organotins (used in agriculture and industry, used as wood preservatives in marine areas)
- Dithiocarbamates (found in cosmetics and agricultural products)
- Nonylphenol (found in cosmetics and household cleaners)
- Fine particulate matter (air pollutant from burning fuels and wood, from road dust, aerosols and other sources)
- Organophosphate pesticides (used for termite control, in home garden products, and in some pet collars)
- Atrazine (pesticide used in agriculture that can contaminate drinking water)
- Nicotine

Human studies

- DDE (a breakdown product of DDT, a persistent pesticide that is now banned)
- PCBs (persistent chemicals used as lubricants and flame retardants, now banned)
- HCB (a persistent fungicide, now banned)
- Oxychlordane (a persistent pesticide, now banned)
- Beta-hexachlorocyclohexane (a persistent insecticide, now banned)
- Dioxins and furans (persistent chemicals formed by incineration of PVC plastic and other substances)
- Maternal smoking during pregnancy

Both animal and human studies

- PBDEs (flame retardants that are still used in consumer products)
- Phthalates (found in some plastics)

How are we exposed to obesogens?

Obesogens are a diverse group of chemicals, and exposure can occur in a variety of ways: from our eating, drinking, or breathing them, or by absorption through our skin.

Eating and drinking: Persistent compounds take years or decades to degrade in the environment, and often these chemicals make their way into food and water even long after they are banned from use. Many persistent chemicals accumulate in animal fats, including livestock and fish. In addition, chemicals in plastics, cookware, or can linings, can leach into food that is prepared or stored in plastic or nonstick items. Pesticides can also be consumed with food.

Breathing: Breathing in chemicals in air and dust is a common way that we are exposed to some obesogens. Flame retardants are found in furniture, fabrics and most plastic appliances such as televisions, computers, and kitchen appliances. As the plastic in these appliances degrades over time, the chemicals accumulate in house dust. Agricultural chemicals sprayed on crops can also drift into neighboring areas and contaminate air and dust. Because children often put items and hands into their mouths, they are more likely than adults to swallow dust. We also breathe in obesogenic air pollutants including very fine particles from auto exhaust, road dust, cooking, aerosols, and smoke from cigarettes and from burning wood or other fuels.

Absorption through skin: Chemicals found in household cleaners, cosmetics and other items can be absorbed through the skin when we use them. For example, BPA can enter the skin when we handle cash register receipts or paper money that can contain this chemical.

For more information or for other Practice Prevention columns, visit CHE online: www.healthandenvironment.org or call 360-331-7904.

How can we reduce our exposure to obesogens?

The Endocrine Society, a professional society that specializes in the role of hormones in human health, states that growing data point to the potential role of endocrine disrupting chemicals in the development of not only obesity, but also diabetes. They recommend following the Precautionary Principle ("better safe than sorry") for decisions about health risks from potential endocrine-disrupting chemicals. They point out that the effects of these chemicals may appear later in life following developmental exposure, raising the possibility that previous exposures may contribute to current conditions. Reducing exposure, then, is particularly important for pregnant women and young children.

To avoid exposure to obesogens, consider these steps:

- Purchase organic food when possible.
- Avoid canned and packaged food as much as practical.
- Avoid animal fats, which are high in persistent toxics.
- Avoid a high-fat diet, which appears to exacerbate the obesogenic effects of various chemicals.
- Avoid air pollution when possible, both indoor and outdoor. Refrain from burning anything in your home, and ventilate your home with clean air when possible. Use your kitchen exhaust fan when cooking and especially when frying. HEPA filters may be effective, but just opening windows may reduce indoor pollutants.
- Minimize exposure to carbonless paper, thermal paper (e.g., cash register receipts) and do not use recycled paper products in contact with food.
- Avoid using aerosol products.
- If possible, avoid purchasing furniture or foam products that are labeled to conform to "California Technical Bulletin 117 (TB 117) as they likely contain toxic flame retardants.
- Minimize or avoid the use of nonstick cookware.
- Minimize the use of all forms of plastic, particularly for food storage and preparation. Glass and stainless steel are best.
- Use nontoxic cosmetics and household cleaners.
- Dust your home with a damp rag frequently to reduce dust. A dry rag pushes dust into the air where it will be more easily inhaled.
- Vacuum regularly, preferably with a HEPA filtered vacuum cleaner.
- Wash hands before eating or preparing food.

While actions such as these have been found to lower individual exposures, many of these chemicals are present in the environment and some exposure is unavoidable. Ask employers and school boards to take these same steps to reduce exposures at work and at school. Ask your local, state and federal representatives to pass laws to regulate these chemicals and to ensure that chemicals used in consumer products are safe.

Further reading

The Obesogen Hypothesis, from Health & Environment:
http://healthandenvironmentonline.com/2011/03/25/the-obesogen-hypothesis/

Big on obesogens, from the University of California, Irvine:
www.uci.edu/features/2009/10/feature_obesogens_091019.php

Do these chemicals make me look fat? from Environmental Working Group:
http://blogs.edf.org/nanotechnology/2011/01/19/do-these-chemicals-make-me-look-fat/

Resources

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