Podcast: Obesity & the Environment

Anne Johnson: [music] Welcome to Environmental Health Chat, a podcast about how the environment affects our health, from the National Institute of Environmental Health Sciences Division of Extramural Research and Training. I'm your host Anne Johnson.

Today we're talking about the role of the environment in a condition that affects an estimated one-third of American adults. Obesity means having too much body fat. Being obese increases the risk of diabetes, heart disease, stroke, arthritis, and some cancers. Its rising prevalence costs the country billions of dollars in excess medical expenses.

Preventing obesity is at the top of many public health priority lists. The CDC, World Health Organization, and numerous states have all declared their intention to help people maintain a healthy weight.

But one persistent problem is that we don't fully understand what causes a person to become obese, or what exactly is behind the surge in obesity rates in recent decades.

The conventional wisdom is that obesity is purely the result of people eating more calories than they are using. But some researchers think there may be more to the story.

Our guest today is Dr. Bruce Blumberg. He's a professor of developmental and cell biology and pharmaceutical sciences at the University of California, Irvine. He says not all calories are created equal.

Blumberg: It's true that if you take a group of people and give them less calories than they need to maintain their body weight, it doesn't matter what kind of calories you feed them, they're will lose weight. But in cases of caloric excess, when you give people more calories than they need to maintain their body weight, the nature of the calories makes a crucial difference in whether they gain weight or whether they don't.

Anne Johnson: The other thing that might make a difference is the chemicals you're exposed to through your food, water, air, and other sources. Bruce says there's increasing evidence that certain chemicals could make you gain weight even if you're not eating too much.

Blumberg: I and my colleagues working in this area have shown that animals who have been exposed to chemicals that we call obesogens will gain weight despite a normal diet. They don't need a high-fat, high-carbohydrate diet; our animals which gain weight as a result of chemical exposure eat a very normal diet. So according to me an obesogen is a chemical that can make an organism, including humans, gain weight. And they can do that by directly acting on fat cells to make more, bigger fat cells, or obesogens can do that indirectly by affecting the control of appetite and satiety and metabolism.

Anne Johnson: A chemical that affects the control of appetite and satiety, for example, could make feel hungry even after eating a big meal. Eating right and exercising are clearly key to preventing obesity. But Bruce says these obesogens could be stacking the deck against some people by making them feel hungrier or predisposing them to accumulate more fat.

Blumberg: Examples of obesogens—we work on one called tributyl tin; other people have shown that environmental estrogens can be obesogenic; we've shown that a whole host of fungicides are obesogenic.

Anne Johnson: Scientists are still figuring out exactly how these chemicals might contribute to obesity. Bruce's research focuses on a chemical called tributyl tin. It used to be painted on ships' hulls to keep sea creatures from attaching to them and slowing down the ship. It's not used for that any more, but traces of it still linger in our environment. It's found in some plastics and it's been detected in house dust.

Bruce's research has shown that tributyl tin activates switches in the body that can lead to weight gain. These switches are normally controlled by hormones, but when tributyl tin is around, the chemical tricks the body into thinking it's a hormone. Tributyl tin activates a switch called PPAR-gamma, known as the master regulator of fat cell development.

Blumberg: If you express PPAR-gamma in a stem cell, that stem cell is now a pre-fat cell. If you activate PPAR-gamma in a pre-fat cell, it becomes a fat cell. And if you activate it in a fat cell, that fat cell accumulates more lipid from the environment. So it's a very key player.

Anne Johnson: Given that PPAR-gamma is such a key player, exposure to tributyl tin could potentially drive the body to produce more fat cells and make existing fat cells, well, fatter. Studies in mice have shown that it can have this effect even in miniscule concentrations. Bruce has also found that if a mouse is exposed to tributyl tin while pregnant, her offspring gain more weight. What's more surprising is that their offspring—and their offspring's offspring—will also be affected, even though the third-generation mice were never exposed to the chemical.

Tributyl tin is just one of many chemicals that are being studied for their role as obesogens. What most of these chemicals have in common is that they interfere with the body's endocrine, or hormone, system. Bruce believes obesogens may well be contributing to the dramatic increase in obesity's prevalence.

Blumberg: I think the surge in obesity is not caused by any one factor. I think that there are multiple factors at play here, and one of those factors is almost certainly increased exposure to obesogenic chemicals—chemicals that have come into use in the last 30-40 years.

Anne Johnson: The good news is that if there are chemicals that trigger our bodies to gain weight, it's also possible, in theory at least, that there could be other factors that would work in the opposite way and help us maintain a healthy weight. The other good news is that there are things you can do to try to limit your exposure to potential obesogens.

Bruce suggests avoiding exposure to pesticides and fungicides, especially for women who are pregnant. He also suggests storing foods and beverages in glass or stainless steel containers, instead of plastics. And, he says, watch out for problem chemicals in cosmetics and personal care products. Stay tuned for more on that topic in a future podcast.

Thanks to our guest Dr. Bruce Blumberg of the University of California, Irvine for telling us about his research.

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