Diabetes In the Drinking Water?

In a survey of 2,016 adult participants by the National Health and Nutrition Examination Survey, diabetes prevalence was strongly associated with blood concentrations of six persistent organic pollutants (POPs). My Bastyr University naturopath friend, the late Walter Crinnion, thinks there's something to this. And he's not alone.

October 20, 2018 By Mike Barr

In 2016 the WHO published its first Global Report on Diabetes, highlighting several alarming statistics we've all kind of grown inured to: that the incidence of diabetes has doubled since 1980, and at last check, it was the fifth leading cause of death worldwide, in more or less a tie with Alzheimer's: just above 1.5 million deaths annually from each.

Excessive body fat is the strongest risk factor for the development of T2DM, while other risk factors include higher waist circumference, higher body mass index (BMI), and being an active smoker. One factor not considered in the WHO overview of diabetes, however, is the potential impact of environmental toxicants.

Environmental toxicants and diabetes

Exposure to environmental toxicants can occur through the air, contact with the skin, contaminated drinking water, and food. Many environmental pollutants do not degrade over time, and thus continue to accumulate in the environment; these chemicals are classified as persistent organic pollutants (POPs).

In a survey of 2,016 adult participants, performed by the National Health and Nutrition Examination Survey (NHANES), diabetes prevalence was strongly associated with blood concentrations of six POPs. Interestingly, obese persons who did not have elevated POPs were not at elevated risk of diabetes. This suggests that the POP exposure, rather than the obesity, was responsible for the increased risk.

A brief burst of geekiness: The term dioxin can refer both specifically to 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) and more generally to other polychlorodibenzo-p-dioxin congeners, polychlorinated dibenzofurans, and coplanar polychlorinated biphenyls. Like other organochlorine compounds, dioxin-like compounds (DLCs) are persistent, lipophilic, and prone to bioaccumulation. Most toxicologic work has been carried out with TCDD, and the toxicologic behavior of other DLCs is usually assumed to be similar.

Environmental toxicants have the ability to affect genetic transcription, disrupting DNA

methylation and altering the organization of chromatin which normally serves to prevent DNA damage and control gene expression. Exposure to environmental pollutants can lead to epigenetic changes, which have the potential to affect more than just one generation. In addition to obesity and diabetes, environmental toxicants have been associated with several types of cancer,[5] respiratory disease, cardiovascular disease, infertility, allergies, autoimmune disease, and many other conditions.

Endocrine-disrupting chemicals (EDCs) wreak havoc on the hormones, and can negatively affect male and female reproductive health, sexual development, risk of breast and prostate cancer, neuroendocrinology, thyroid function, metabolism, and cardiovascular health. EDCs include pollutants like organochlorinated pesticides and industrial chemicals, plastics and plasticizers, fuels, and many other chemicals.

Exposure to bisphenol A (BPA), a known endocrine disruptor, has been linked to obesity, diabetes, cardiovascular diseases, polycystic ovarian disease (PCOS), and low sperm count. BPA is found in the polycarbonate plastics that are used in many types of food and drink packaging including food storage containers, water bottles, the internal protective coating of canned foods, and baby bottles. The degree to which BPA leaches from these materials into food depends mostly on the temperature it is exposed to, with hotter food leading to higher amounts. BPA can also be found in the breast milk of mothers with high levels of exposure.

In data analyzing 4,389 adults with diabetes, higher urinary BPA levels were associated with higher hemoglobin A1c (HbA1c) levels, a blood marker monitored in diabetics. In another recent study, increased exposure to BPA was associated with insulin resistance in overweight or obese children. BPA inhibits the release of adiponectin, which helps to protect humans from obesity, diabetes, and heart disease. Mice exposed to BPA in the prenatal and newborn period developed glucose intolerance.

Dioxins are persistent organic pollutants classified as EDCs. In both men and women, a high serum dioxin level was shown to be an independent risk factor for the development of diabetes, independent of age and weight. Dioxins are absorbed and stored in adipose tissue, therefore they accumulate in the fat of the animals we eat, as well as our bodies. More than 90 percent of human dioxin exposure is through food.

Other environmental chemicals such as polycyclic aromatic hydrocarbons and volatile organic compounds have been shown to cause oxidative stress in a dose-response fashion. Oxidative stress contributes to insulin resistance, a hallmark of metabolic syndrome and type 2 diabetes.

Natural agents that minimize harm

Lifestyle changes to reduce exposure to harmful compounds such as these may have beneficial effects on health. In addition, certain natural products have been shown to help mitigate the harm caused by environmental toxicants.

N-acetylcysteine (“NAC”), an antioxidant that also provides cysteine for the production of glutathione, has been found to attenuate the inflammation, oxidative damage, and related

cognitive dysfunction associated with BPA exposure. Quercetin, a natural compound that is also available as a supplement, has evidence it helps mitigate oxidative damage to the liver and kidneys that can be caused by BPA. In addition, silymarin, found in milk thistle, helps protect against the oxidative damage induced by environmental contaminants.

Berberine, a compound found in botanicals such as Oregon grape, goldenseal, and barberry, has a multitude of actions that may help reduce damage from these environmental compounds as well as clinical evidence of its benefits for diabetics. It serves as an antioxidant and anti-inflammatory agent, improves insulin resistance, promotes insulin secretion, inhibits gluconeogenesis (glucose production) in the liver, and stimulates glycolysis (glucose breakdown) in peripheral tissue cells. Berberine also helps balance the gut microbiota and regulates cholesterol production.

Lipoic acid is one additional antioxidant that helps protect against BPA toxicity. Studies show that lipoic acid can mitigate the peripheral neuropathy complications of diabetes, reduce HbA1c levels, support blood vessel health, and improve glucose utilization.

So while environmental toxicants are pretty much everywhere and pretty impossible to avoid completely, we need to be extra vigilant with our food and activity (or inactivity) choices as well as availing ourselves if indicated of these natural substances that appear to help to mitigate the harm.

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