



Drinking Bottled Water May Lead to Diabetes and Heart Disease

Higher levels of urinary Bisphenol A (BPA), a chemical compound commonly used in plastic packaging for food and beverages, is associated with [type 2 diabetes](#), [cardiovascular disease](#), and liver-enzyme abnormalities, according to a study in the September 17, 2008 issue of JAMA. This study is being released early to coincide with a Food and Drug Administration (FDA) hearing on BPA.

BPA is one of the world's highest production-volume chemicals, with more than two million metric tons produced worldwide in 2003 and annual increase in demand of 6 percent to 10 percent annually, according to background information in the article.

BPA is used in plastics in many consumer products. "Widespread and continuous exposure to BPA, primarily through food but also through drinking water, dental sealants, dermal exposure, and inhalation of household dusts, is evident from the presence of detectable levels of BPA in more than 90 percent of the U.S. population," the authors write. Evidence of adverse effects in animals has created concern over low-level chronic exposures in humans, but there is little data of sufficient statistical power to detect low-dose effects. This is the first study of associations with BPA levels in a large population, and it explores "normal" levels of BPA exposure.

David Melzer, M.B., Ph.D., of Peninsula Medical School, Exeter, U.K., and colleagues examined associations between urinary BPA concentrations and the health status of adults, using data from the National Health and Nutrition Examination Survey (NHANES) 2003-2004. The survey included 1,455 adults, age 18 through 74 years, with measured urinary BPA concentrations.

The researchers found that average BPA concentrations, adjusted for age and sex, appeared higher in those who reported diagnoses of cardiovascular diseases and diabetes. A 1-Standard Deviation (SD) increase in BPA concentration was associated with a 39 percent increased odds of cardiovascular disease (angina, coronary heart disease, or heart attack combined) and diabetes.

When dividing BPA concentrations into quartiles, participants in the highest BPA concentration quartile had nearly three times the odds of cardiovascular disease compared with those in the lowest quartile. Similarly, those in the highest BPA concentration quartile had 2.4 times the odds of diabetes compared with those in the lowest quartile.

In addition, higher BPA concentrations were associated with clinically abnormal concentrations for three liver enzymes. No associations with other diagnoses were observed.

"Using data representative of the adult U.S. population, we found that higher urinary concentrations of BPA were associated with an increased prevalence of cardiovascular disease, diabetes, and liver-enzyme abnormalities. These findings add to the evidence suggesting adverse effects of low-dose BPA in animals. Independent replication and follow-up studies are needed to confirm these findings and to provide evidence on whether the associations are causal," the authors conclude. "Given the substantial negative effects on adult health that may be associated with increased BPA concentrations and also given the

potential for reducing human exposure, our findings deserve scientific follow-up." (JAMA. 2008;300[11]:1303-1310).

Editorial: Bisphenol A and Risk of Metabolic Disorders

In accompanying editorial, Frederick S. vom Saal, Ph.D., of the University of Missouri, Columbia, and John Peterson Myers, Ph.D., of Environmental Health Sciences, Charlottesville, Va., comment on the findings regarding BPA.

"Since worldwide BPA production has now reached approximately 7 billion pounds per year, eliminating direct exposures from its use in food and beverage containers will prove far easier than finding solutions for the massive worldwide contamination by this chemical due its to disposal in landfills and the dumping into aquatic ecosystems of myriad other products containing BPA, which Canada has already declared to be a major environmental contaminant."

"The good news is that government action to reduce exposures may offer an effective intervention for improving health and reducing the burden of some of the most consequential human health problems. Thus, even while awaiting confirmation of the findings of Lang et al, decreasing exposure to BPA and developing alternatives to its use are the logical next steps to minimize risk to public health." (JAMA. 2008;300[11]:1353-1355).

About Type 2 Diabetes

Type 2 diabetes is also referred to as non-insulin dependent diabetes mellitus (NIDDM), or adult onset diabetes mellitus (AODM). Type 2 diabetes affects nearly 21 million in the United States and nearly 200 million people worldwide.

Type 2 diabetes is characterized by high levels of blood sugar, caused by the body's inability to utilize insulin to move blood sugar into the cells for energy. In type 2 diabetes, patients can still produce insulin, but do so relatively inadequately for their body's needs, particularly in the face of insulin resistance as discussed above. In many cases this actually means the pancreas produces larger than normal quantities of insulin.

Diabetes is a major cause of [heart disease](#) and [stroke](#), as well as the most common cause of [blindness](#), [kidney failure](#) and amputations in U.S. adults.

About Cardiovascular Disease

Cardiovascular disease is a broad term that includes several more specific cardiovascular conditions. Cardiovascular disease is the leading killer in the US.

Common heart conditions include:

- **Arrhythmias.** Irregular, or abnormally fast or slow, beating of the heart. The heart beat is controlled by electrical impulses. When the timing or frequency of these electrical impulses are disrupted, arrhythmias develop. Some arrhythmias are quite serious. An example is ventricular fibrillation, a severely abnormal heart rhythm that causes death unless treated right away by providing an electrical shock to the heart (called defibrillation). Others are less severe but can develop into more serious conditions over time. A particular concern is atrial fibrillation. Atrial fibrillation is rapid, irregular beating of the upper chambers of the heart. The chambers can quiver instead of beating in a regular pattern. Blood is not fully pumped out of them and may pool and clot.
- **Cardiomyopathy.** A weakening of the heart muscle or a change in heart muscle structure. It often results in inadequate heart pumping or other heart function abnormalities. These can result from various causes, including prior heart attacks, viral or bacterial infections, and others.
- **Congenital Heart Disease.** Malformations of heart structures, present during pregnancy or at birth. These may be caused by genetic factors or by adverse exposures during pregnancy. Examples include holes in the walls that divide the heart chambers, abnormal heart valves, and others. Congenital heart defects can disrupt the normal flow of blood through the heart. Congenital heart defects are the most common type of major birth defect.

- **Coronary Heart Disease (CHD).** CHD is the most common type of heart disease. CHD occurs when the coronary arteries, that supply blood to the heart muscle, become hardened and narrowed due to the plaque buildup. The plaque buildup and the narrowing and hardening of the arteries is called atherosclerosis. Plaques are a mixture of fatty substances including cholesterol and other lipids. Blood flow and oxygen supply to the heart can be reduced or even fully blocked with a growing plaque. Plaques may also rupture and cause blood clots that block arteries. CHD can lead to a heart attack. Angina, the most common symptom of CHD can also occur. Angina is chest pain or discomfort that occurs when the heart muscle is not getting enough blood. Irregular heart beats, called arrhythmias, can develop. Over time, CHD can weaken the heart muscle and lead to heart failure, a serious problem where the heart cannot pump blood the way that it should.
- **Heart Attack.** A heart attack, also called a myocardial infarction may occur when blood supply to the heart is severely reduced or completely blocked. When blood flow is restricted the heart muscle cells do not receive enough oxygen and begin to die. The more time that passes without treatment to restore blood flow, the greater the damage to the heart. This damage can cause irregular heart rhythms or even sudden cardiac arrest or stopping of the heart beat. Death can result. Coronary artery disease is the chief underlying cause of a heart attack. A less common cause of a heart attack is a severe spasm of a coronary artery that reduces the blood supply to the heart.
- **Heart Failure.** This may also be called congestive heart failure or chronic heart failure. Heart failure is a condition where the heart cannot pump enough blood and oxygen to meet the needs of other body organs. Heart failure does not mean that the heart has stopped, but that it cannot pump blood the way that it should. Heart failure is a serious condition. There is no cure for heart failure at this time, except a heart transplant. Once diagnosed, medicines are needed for the rest of the person's life.
- **Peripheral Arterial Disease (PAD).** Hardening of the arteries that supply blood to the arms and legs. PAD is usually the result of atherosclerosis, the buildup of plaque and narrowing of the arteries. Blood flow and oxygen to the muscles in the arms and legs can be reduced or even fully blocked. Painful leg muscles, numbness, swelling in the ankles and feet, and weak pulse in the feet are some of the signs and symptoms of PAD.
- **Rheumatic Heart Disease.** This condition is damage to the heart valves and other heart structures due to inflammation and scarring caused by rheumatic fever, which occurs from streptococcal infection. Heart disease is an umbrella term for a number of different diseases affecting the heart. Heart disease is a number of abnormal conditions affecting the heart and the blood vessels in the heart.