# The Role of Environmental and Synthetic Chemicals in Diabetes

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In today's society, there are so many harmful chemicals and agents that we come in contact with on a daily basis. The study of toxicology has become increasingly important recently as focuses on "the study of the adverse effects of chemicals on living organisms" (9). Toxicologists devote their lives to studying different chemicals and the adverse effects they have on individuals. They also spend their time conducting experiments on different substances, such as drugs, food additives, solvents and herbicides, and then test the effect that they have on laboratory animals or plants. The toxicologists then analyze the data they gather and evaluate the effects of the toxins. Through their research they can create guidelines to give to manufacturers to produce about the safety of their product. There are several different types of toxicologists such as environmental toxicologist, who studies the effect that the environment can have on an individual (9). A recent issue that is being studied by toxicologists is the effect that the environmental and synthetic chemicals have on certain diseases such as diabetes. In recent years diabetes has seen a drastic increase, with its numbers doubling between the years of 1980 and 2008 (4). The three major types of diabetes are type 1, type 2 and gestational diabetes. The most common of these three is type 2, which about 80% of those who have diabetes suffer from. Type 2 diabetes has been previously found primarily in adults, especially in the elderly, but in recent years type 2 diabetes is being found more commonly in young children as well (4). Diabetes is often the result of being overweight or obese and it is commonly believed that diabetes can be controlled by diet and exercise. However, recent studies have shown that this is not true and that diabetes is actually caused in part by environmental and synthetic chemical exposure.

The increase in those with diabetes is what initially drew scientists and researchers to believing that there may be an outside reason to why diabetes is increasing so rapidly. As the

environment changes, so do the pollutants in it and recently the pollutants have been steadily increasing. As a result, we are faced with different pollutants through everyday activities such as drinking from a water bottle or using cosmetics or shampoo (2). We are also faced with the reality that the water we are drinking and air we are breathing is not safe or healthy for us. There are frequent reports of chemical spills or explosions that cause unsafe chemicals to make their way into our lives and cause harm to our bodies. There are several different chemicals that have been explored and tested by scientist and researchers that have been proven to significantly increase the risk factor for diabetes.

A recent study done by the CDC was conducted to prove the influence of environmental chemicals on those with diabetes. 2,350 women participated in this study and were monitored from 2001 to 2008 (6). Through the testing that was done throughout these years it was shown that certain phthalates were linked to women suffering from disease. Phthalates are a type of chemical that are primarily used to make plastic more flexible and harder to break. They are often referred to as "plasticizers" (6). Secondary uses of phthalates include "vinyl flooring, adhesives, detergents, lubricating oils, automotive plastics, plastic clothes, and personal care products" (6). The study showed that this chemical was "linked to double the rate of diabetes in women with the highest levels of phthalate markers in their urine" (6). With the extensive use of phthalates in everyday used items such as cosmetics and shampoos, it is not surprising that diabetes rates have risen at the alarming rates that they have, particularly in women. This is a fairly new study, so scientists have yet to link heavy usage of cosmetics to higher risk factor for obesity, but through the studies they have done so far they sure there is a definite connection.

A recent study done by Dr. Robert Sargis, demonstrated that the chemical tolylfluanid has proven to cause insulin resistance. While the chemical is not used in the United States, it is

used in other countries on produce such as apples, grapes and tomatoes (1). This becomes an issue because we receive so many imported food products, so although it is not used in the U.S we may still be exposed to it. Dr. Sargis came to this conclusion by using mouse fat and studying the effect that tolylfluanid had on the cellular level. He came to the conclusion that "The fungicide and anti-fouling agent tolylfluanide might pose a threat to public health through the induction of adipocytic-insulin resistance, an early step in the pathogenesis of type 2 diabetes" (1). This study shows the importance of eating locally grown, organic produce. Imported foods may be cheaper, but they can also be filled with unsafe, toxic chemicals. It is said that the consumer holds all the power, but as a consumer it is our responsible to stop supporting industrially grown food, and start supporting sustainable and locally grown food that is safe and healthy for our bodies.

The chemical Bisphenol, most commonly known as "BPA" has also been identified as a factor in increasing risk for diabetes. BPA is commonly found in plastics, such as water bottles, toys and the lining in food and beverage cans (10). As awareness about the harm BPA products can cause increases, many people are seeking out products that are labeled "BPA Free." A team of Spanish and Mexican researchers conducted a study on laboratory mice that indicated the chemical BPA is a major endocrine disruptor, which causes insulin resistance in the body (10). The study explains that "Type 2 diabetes occurs when insulin receptors throughout the body fail; this is known as insulin resistance" (5). Previously BPA has been linked with reproductive failure, so finding the link between BPA and an increased risk in diabetes has been a huge advancement in the scientific field. It is important to take advantage of the recent scientific advances and use caution when using plastic and other products with chemicals in them. The

more scientists learn about the link between chemicals and diabetes, the better we will be able to protect ourselves.

These studies show the dangerous nature of chemicals in everyday products that we use. While we might not think twice about drinking from a water bottle or using cosmetics or shampoo, chemicals are being leached into our body and are clearly causing severe harm. Diabetes is only one of the many diseases that have been linked with chemical exposure, but it is a serious impairment because it can cause so much harm. Diabetes can lead to blindness and circulation problems, which may lead to amputation. It can also be very dangerous because many people have pre-diabetes or do not realize they have diabetes at all. The CDC estimated that in 2010, 18.8 millions people had diabetes in the U.S with an additional 7 million having diabetes but being undiagnosed (4).

The discoveries in the toxicity of these chemicals should be a warning for us all. Whether a person suffers from diabetes or not, it is important to be conscious of the things that are being put in and around your body. There is some reasoning behind the drastic increase in diabetes, and the recent research done on different environmental chemicals points to them as a major connection to the sudden increase in diabetes. Now that these chemicals have been identified, it is important that we take steps to eliminate them from the products around us. The EPA has already taken steps in doing this by running chemicals through an "Endocrine Disruptor Screening Program" (5). By doing this they are able to increase awareness about unsafe products and steer people away (especially ones that are high risk). The EPA also advises using the "precautionary principle" whenever dealing with any type of chemical. They advise for individuals to stay away from chemicals because of the possible internal disruption that they can

have on the body (5). By being knowledgeable about the chemicals in the products that we use and the food we eat, we will greatly reduce the risk of diabetes or other diseases.

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