

New Data from CDC Confirms Human Exposure to Bisphenol A in the United States is Far Below Safe Limits

November 1, 2007

Summary

The US Centers for Disease Control and Prevention (CDC) has recently published biomonitoring data on bisphenol A from a large-scale study that is representative of the US population. That data indicates that typical human daily intake of bisphenol A is approximately 50 nanograms/kg bodyweight/day. These levels are about 1 million times below the levels where no adverse effects on reproduction and development were observed in comprehensive multi-generation animal studies. Likewise, these levels are about 1 thousand times below lifetime daily intake levels conservatively set by government bodies in the US and Europe. Exposures below the lifetime daily intake levels are expected to have no adverse effect on health.

Overall, the CDC data indicates that human exposure to bisphenol A is very low and strongly supports the conclusion that exposure to bisphenol A poses no known risk to human health.

What Did CDC Report?

Since 1999, the US Centers for Disease Control and Prevention (CDC) has conducted the National Health and Nutrition Examination Survey (NHANES) to assess the health and nutritional status of adults and children in the United States. The survey, which currently examines about 5,000 people each year, includes a detailed interview and a range of physical examinations. The survey is designed to produce information that is representative of the US population aged 2 months and older.(1)

Urine and blood samples are collected for clinical chemistry testing and a subset of these samples are also analyzed for the presence of various natural or synthetic substances, a technique known as biomonitoring.(2) For the first time, CDC has analyzed urine samples from a nationally representative group of people for the presence of bisphenol A in the NHANES 2003-2004 survey. Their evaluation of this data has recently been published in a scientific journal.(3)

A total of 2,517 urine samples from people of 6-85 years of age were analyzed for bisphenol A. Since the NHANES survey also collects demographic information, CDC's report includes statistical analyses for the entire study population as a whole, as well as analyses for several subgroups defined by gender, age and other demographic parameters.

What Does the Data Say About Human Exposure to Bisphenol A?

Bisphenol A was detected in 92.6% of the urine samples, which is representative of the US population. For the whole population, the median concentration of bisphenol A in urine was 2.7 nanograms/milliliter (parts per billion). There were only slight differences found between the demographic subgroups that were separately analyzed, with all median values in the range of 1.9 to 4.2 nanograms/milliliter. This indicates that no subgroup is exposed to bisphenol A at substantially higher or lower levels versus the population as a whole.

In the human body, bisphenol A is efficiently converted to a metabolite known as a glucuronide,(2) which has no known biological activity and is rapidly and entirely excreted into urine. Before analysis, human urine samples are first treated with an enzyme that hydrolyzes the glucuronide back to bisphenol A, which is easier to measure. Although bisphenol A is measured and reported by CDC, this does not mean that bisphenol A itself is present in the body or in urine.

Because bisphenol A is so rapidly excreted from the body into urine, it is possible to estimate daily intake of bisphenol A from the concentrations measured in urine.(4) For the population as a whole, the median daily intake of bisphenol A is estimated to be approximately 50 nanograms/kg bodyweight/day. Consistent with the concentration values, daily intakes do not vary substantially among the different demographic subgroups with median values ranging from approximately 33 to 80 nanograms/kg bodyweight/day.

What Does the Data Tell Us About the Safety of Bisphenol A?

To put the biomonitoring data into perspective, it is helpful to compare typical daily intakes to acceptable daily intakes set by government bodies. The acceptable daily intakes are derived from toxicity studies to which conservative safety factors are applied to estimate lifetime exposure levels that are expected to be without adverse effects. Typical daily intake values can also be compared directly to doses shown to cause no adverse effects in toxicity studies.

A typical daily intake of 50 nanograms/kg bodyweight/day is about 1 million times lower than levels where no adverse effects on reproduction or development were observed in multi-generation animal studies, (5) which indicates a very large margin of safety.

By application of safety factors, the European Food Safety Authority (EFSA) has recently set a Tolerable Daily Intake (TDI) of 50 micrograms/kg bodyweight/day.(6) This value is identical to the Reference Dose established by the US Environmental Protection Agency.(7) In comparison, a typical daily bisphenol A intake of 50 nanograms/kg bodyweight/day is 1 thousand times lower; this indicates that there is a substantial margin of safety between actual levels to which the US population is exposed and safe exposure levels.

Overall, the new CDC biomonitoring data on bisphenol A indicates that actual human exposure to bisphenol A is far below levels that could cause adverse health effects and strongly supports the conclusion that exposure to bisphenol A poses no known risk to human health.