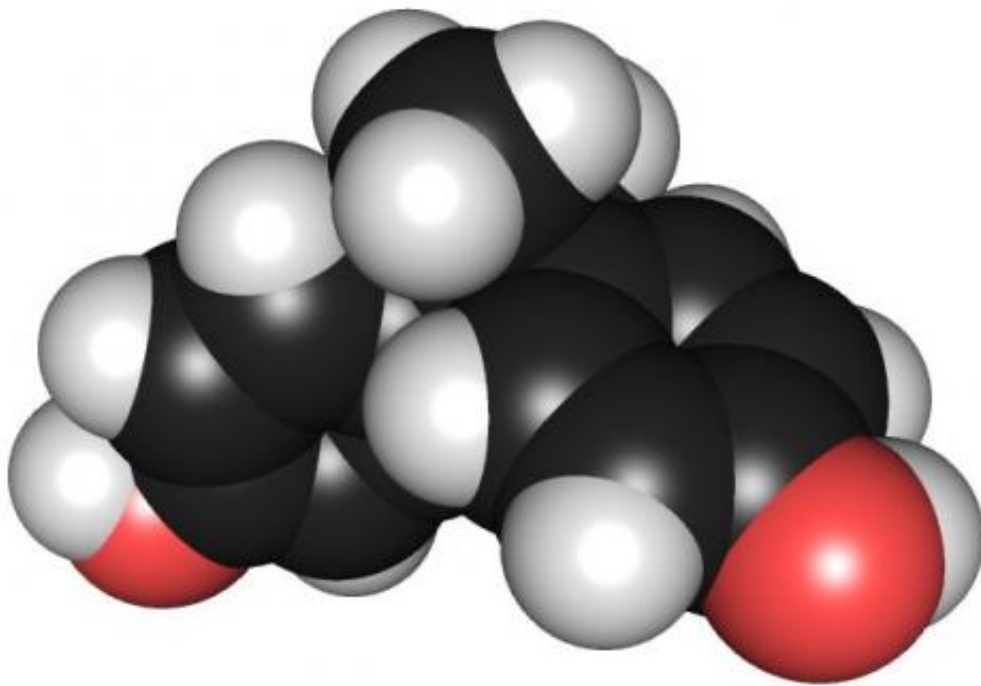


Exposure to BPA during pregnancy may cause health problems for offspring

November 8 2017, by Matt Swayne



3D chemical structure of bisphenol A. Credit: Wikipedia.

A chemical called bisphenol A—BPA—used in plastic packaging and in the linings of food and beverage cans, may be passed from a mother to her offspring during pregnancy and cause changes in the gut bacteria of the offspring, according to an international team of researchers.

In a study on rabbits, the researchers observed that exposure to BPA during pregnancy caused [chronic inflammation](#) in the offspring's intestines and liver. The researchers also noted signs of increased gut permeability—or leaky gut—and a decrease in the diversity of gut bacteria and anti-inflammatory bacterial metabolites, such as short-chain fatty acids, said Jairam K.P. Vanamala, associate professor of [food sciences](#), Penn State.

Leaky gut and decreased gut-bacteria diversity and metabolites are considered biomarkers—or indicators—of inflammation-related chronic diseases, he added.

"Obesity and inflammation-promoted chronic diseases like colon cancer and type 2 diabetes are increasing not just in America, but worldwide," said Vanamala. "We know that many types of cancers are inflammation-promoted, like colon cancer. But, we have not understood what causes inflammation in the intestine and liver. We have previously shown that food is a double-edge sword. Some foods can promote inflammation in the intestine, whereas bright-colored fruits and vegetables, like purple potatoes, can suppress intestinal inflammation. This study shows that we also need to think about the toxins in the environment."

The offspring were not directly exposed to BPA, but received exposure to the chemical from their mother through the placenta and in the milk. This exposure may lead to long-lasting health problems, according to the researchers.

"Even though the offspring are not directly exposed to BPA, the inflammation still persists for weeks," said Vanamala. "What we are seeing is that both intestine and liver tissues are damaged and we see that the gut diversity is low, the anti-inflammatory metabolites are low."

In the future, Vanamala said researchers may investigate how the

influence of diet and environment during pregnancy could affect long-term health.

"What we are trying to understand is how beneficial compounds can favorably influence gut bacteria and, in turn, help fight chronic diseases, as well as how toxicants in the environment and in the food can negatively influence gut bacteria and, in turn, cause chronic disease," said Vanamala. "So now that we have seen this environmental toxicant-induced inflammation, we can study the beneficial anti-inflammatory foods, like the purple potato and others, in this human development model, and see how a mother's health and her levels of toxicants and beneficial compounds will influence the baby's susceptibility to chronic disease."

The researchers used rabbits because of their longer gestation period, which is similar to humans. Rodents have shorter gestation periods, according to Vanamala.

Government agencies, such as the Food and Drug Administration, have recently set limits on the use of BPA in some products. BPA is found in many consumer products, including the epoxy lining of metal food and [beverage cans](#) and plastic bottles. It is present in more than 90 percent of the U.S. population, suggesting widespread exposure, Vanamala said.

While the U.S. Environmental Protection Agency (EPA) offered a tolerable daily intake—TDI—of 50 micrograms of BPA per kilogram of body weight each day, new studies suggest that we are exposed to at least eight times that amount every day, said Vanamala, who is also a faculty member at the Penn State Hershey Cancer Institute.

According to Vanamala and collaborators, the mother rabbit was exposed to about 200 micrograms of BPA per kilogram of body weight each day from day 15 of gestation until 7 days after birth, and the

offspring absorbed BPA via the placenta or milk during that time. The tissues of the offspring were examined at six weeks of age. They reported their findings in the journal *mSystems*, a publication of the American Society for Microbiology.

He also suggested that future research may investigate whether there is a relationship between a decrease in [gut bacteria](#) diversity and food allergies.

"When diversity of bacteria and metabolites is low, and inflammation develops, the immune system isn't trained as well," said Vanamala.

"When the immune system isn't properly trained, our suspicion is that this might make people more susceptible to food allergies."

Provided by Pennsylvania State University

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