MedicalXpress

BPA could affect reproductive capabilities, cause infection of the uterus

March 20 2012

Researchers at the University of Cincinnati (UC) have found evidence that, in addition to affecting the heart, brain and nervous system, bisphenol A (BPA), could affect a mammal's ability to reproduce by altering the structure of the uterus in ways that can progress to a potentially fatal infection.

These findings are published in March 9, 2012, advance online edition of the *Journal of* Reproductive Toxicology.

Infection and inflammation of the uterus, or pyometra, is most commonly seen in animals like dogs and cats but can also affect humans. It is a result of hormonal and structural changes in the uterus lining and can be deadly if left untreated.

BPA is an industrial chemical and environmental pollutant found in many hard plastic products.

"This condition can be caused by chronic exposure to estrogens; however, it is unknown whether estrogenic endocrine disruptors, like bisphenol A, can cause pyometra," says Scott Belcher, PhD, professor in the department of pharmacology and cell biophysics and principal investigator on the study. "We wanted to see if dietary exposures to BPA induced the condition in animal models of differing sensitivity to estrogens."

Researchers in this study exposed the models to different dietary doses

of BPA in their food, ranging from four to more than 4,000 micrograms per kilogram of body weight per day, or 17α-ethinyl estradiol (EE), a semi-synthetic steroidal estrogen, in doses of one to greater than 150 micrograms per kilogram of body weight per day. A control group received no dose of BPA or EE.

"Using two different strains of mouse models, we monitored to see which doses of endocrine disruptors affected which strains," Belcher explains. "In a commonly used strain of mice, C57BL/6, pyometra occurred with 15 micrograms per kilogram of body weight per day of EE and 33 micrograms per kilogram of body weight per day of the BPA treatment groups."

He continues that at the effective concentration of BPA, immune cell numbers in the uteri of the C57BL/6 strain animals exposed were increased five-fold compared with control animals. In a different strain of mouse (CD1), a similar increase in immune cell numbers required 100 times greater exposure.

"These results suggest that BPA enhances the immune responsiveness of the uterus and that the heightened responsiveness in the C57BL/6 strain of females is related to increased susceptibility to pyometra," he says.

Belcher adds that the reason for this study was to compare appropriate concentrations of dietary estrogenic chemicals to allow reproduction—not to determine whether or not BPA had specific effects on reproduction or fertility.

"However, in the case where food consumption is altered and reproduction was completely blocked, some interesting and valuable insight to the impact of these dietary estrogens is possible," he says. "It seems likely that the immunologic and structural differences between the strains indicate a potential key difference in susceptibility to developing

pyometra, which is related to the immune response. We are extremely interested in understanding why some strains or individuals are insensitive to the effects of endocrine disruptors, while others are resistant to the harmful actions of these chemicals.

"The results here suggest that pyometra in the C57BL/6 strain might serve as a sensitive endpoint for understanding the mechanisms responsible for the impact of estrogen and estrogenic endocrine-disrupting chemicals on reproduction and also immunity. Further studies using the C57BL/6 strain might serve as a useful model of sensitive subpopulations at risk for developing immunological disorders related to exposures to estrogen disruptors like BPA."

Provided by University of Cincinnati