Exposure to low doses of BPA linked to increased risk of prostate cancer in human stem cells

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Exposing developing tissue to low levels of the plastic bisphenol A, commonly known as BPA, is linked to a greater incidence of prostate cancer in tissue grown from human prostate stem cells, a new study finds. The results were presented Monday, June 17, at The Endocrine Society's 95th Annual Meeting in San Francisco.

BPA is a synthetic estrogen that is used to add flexibility to many common products, including food cans and containers, compact discs, eyeglasses, and even baby bottles. It is universally prevalent, and tests indicate that almost everyone has measurable levels of the chemical in their bodies.

The chemical has received a great deal of media attention in recent years because of its potential to increase the risk of disease. The concern about BPA in the human body is that it is an endocrine-disrupting chemical, which means that it alters the body's hormonal balance by replicating the activity of a naturally occurring hormone. In this case, BPA replicates the activity of estrogen. Of greatest concern are BPA's effects on developing fetuses and infants because endocrine-disrupting chemicals are thought to predispose developing cells to later disease.

In this study, investigators used human prostate stem cells from organ donors to grow prostate tissue in a mouse model. They found that early BPA exposure significantly increased the risk of both prostate cancer and a precancerous condition known as prostate epithelial neoplasia, or PIN. The incidence rates for PIN and prostate cancer were:

- 12 percent of non-BPA exposed tissue
- 33-45 percent of tissue exposed to BPA

"These results suggest that stem cells are direct BPA targets which may explain the long-lasting effects of this chemical throughout the body," said study lead author Gail S. Prins, Ph.D., professor of physiology and urology at the University of Illinois at Chicago. "They provide the first direct in vivo evidence that developmental exposure to environmentally relevant levels of BPA increases human prostate cancer risk."

Investigators were able to observe the effects of BPA on living prostate tissue by isolating prostate stem cells from young men, then combining these cells with undifferentiated cells called mesenchyme, which, for this study, derived from rat tissue. They then grafted this combined tissue to the kidneys of mice where the tissue developed into human prostate tissue. To simulate human BPA exposure, the investigators fed BPA at levels found in humans to the study mice for the first two weeks of the prostate-tissue formation.

One month after the tissue graft, when the prostate tissue had matured, the investigators administered estrogen and testosterone at elevated levels to the study mice to promote prostate disease.

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