

Chemical in Plastic Linked to Prostate Cancer

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Linking prostate cancer to a widespread industrial compound, scientists have found that exposure to a chemical that leaks from plastic causes genetic changes in animals' developing prostate glands that are precursors of the most common form of cancer in males.

The chemical, bisphenol A or BPA, is used in the manufacture of hard, polycarbonate plastic of baby bottles, microwave cookware and other consumer goods and has been detected in nearly every human body tested.

Scientists and health experts have theorized for more than a decade that chemicals in the environment and consumer products mimic estrogens and may be contributing to male and female reproductive diseases, particularly prostate cancer.

The new study of laboratory rats suggests that prostate cancer, which usually strikes men over 50, may develop when BPA and other estrogen-like, man-made chemicals pass through a pregnant woman's womb and alter the genes of a growing prostate in the fetus. One of every six men develops prostate cancer, a rate that has increased over the past thirty years.

Researchers at the University of Illinois at Chicago and the University of Cincinnati exposed newborn rats to low doses of BPA and found the structure of genes in their prostate cells was permanently altered, a process of reprogramming in early life that promotes cancer in adulthood. One key gene was switched on, producing too much of a cell-damaging enzyme that has been detected in cancerous prostate cells but not normal cells.

Also, as the rats aged, they were more likely than unexposed animals to develop precancerous lesions, or cellular damage, in the prostate that have been known for years to lead to prostate cancer in humans.

"The present findings provide the first evidence of a direct link between developmental low-dose bisphenol A ... and carcinogenesis of the prostate gland," the research team, led by Drs. Gail Prins, associate professor of andrology at University of Illinois, and Shuk-Mei Ho, chair of environmental health at University of Cincinnati, reported Thursday in the journal *Cancer Research*. Exposure to the chemical "may provide a fetal basis for this adult disease" in humans, their report said.

Dr. Rebecca Sokol, a University of Southern California medical professor who specializes in male hormone research, called the new study "cutting edge work." She said it adds to a growing body of research, called epigenetics, that suggests environmental chemicals can

alter how DNA sequences turn on and off in a fetus, permanently imprinting the genes of a child and sensitizing him or her to disease in adulthood.

Such findings could have major implications for human disease, and could, at least in part, explain why the prostate cancer rate has surged. Used for about half a century, BPA is a key building block in the manufacture of polycarbonate plastic and ranks among the world's most widely used industrial chemicals.

But Prins, Ho and other researchers cautioned that the study was conducted on rats, which sometimes react differently from humans to chemicals. Replicating the work in humans is virtually impossible, since 50 or more years usually pass from exposure in the womb to the onset of prostate cancer.

"You can't say from the results of this study that this is going to effect humans," Sokol said. But she said the results are in line with previous animal research that shows chemicals can induce genetic changes that alter sperm and other reproductive functions.

The prostate gland, which develops in human males while they are fetuses, is extremely sensitive to natural estrogen. As a result, scientists have long theorized that prostate cancer could be increasing in men because of their exposure to estrogen-like chemicals in the womb.

Unlike carcinogenic chemicals that can cause profound damage to DNA and trigger cancer, BPA seems to inflict subtle changes that are passed from one generation to the next, Sokol said.

Steve Hentges, a representative of the American Plastics Council, representing the plastics industry, called it "fascinating research, a good piece of research" leading to a new theory that should be further studied. But he added, "the real question is what does this mean for human health" because there are too many limitations in the study to apply it to humans.

"No one has actually observed prostate cancer after any treatment with BPA," he said.

Polycarbonate, which cannot be manufactured without BPA, is a lightweight, hard, clear, shatter-free plastic often used to replace glass. In addition to beverage bottles, baby bottles, utensils and other food packaging, it is used in automobiles, medical equipment, compact discs and electronics.

Small amounts of the chemical can leach from plastic containers, especially when heated, cleaned with harsh detergents or exposed to acidic foods or drinks. It also is used in children's dental sealants and as a resin lining metal food cans.