

Endocrine-disrupting chemicals can adversely affect reproduction of future generations of fish

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Medaka, or Japanese rice fish, were used in the study to determine reproductive function following exposure to BPA. Credit: Shizuoka Hamamatsu, Wikimedia Commons.

Bisphenol A (BPA) is a chemical that is used in a variety of consumer products, such as water bottles, dental composites and resins used to line metal food and beverage containers. Often, aquatic environments such as

rivers and streams become reservoirs for contaminants, including BPA. Now, University of Missouri researchers and U.S. Geological Survey (USGS) scientists have determined that fish exposed to endocrine-disrupting chemicals will pass adverse reproductive effects onto their offspring as many as three generations later. These findings suggest that BPA could have adverse reproductive effects for humans and their offspring who are exposed to BPA as well.

"BPA has been proven to mimic the function of natural hormones in animals and humans. Fish and aquatic organisms often have the greatest exposure to such chemicals during critical periods in their development or even throughout entire life cycles," said Ramji Bhandari, an assistant research professor of biological sciences at MU and a visiting scientist with the USGS. "This study shows that even though endocrine disruptors may not affect the life of the exposed fish, it may negatively affect [future generations](#)."

Bhandari and fellow scientists Frederick vom Saal, Curators Professor of Biological Sciences in the College of Arts and Science at MU, and Don Tillitt, an adjunct professor of [biological sciences](#) and a research toxicologist with the USGS, exposed medaka, or Japanese rice fish, to chemicals that included BPA for one week during embryonic development. The team then studied their offspring through as many as four [generations](#). Subsequent generations were never exposed to the chemicals. No apparent reproductive abnormalities appeared in the first two generations of fish; however, the researchers found that future generations showed a reduced rate of fertilization and increased embryo mortality.

"The shorter generations of the medaka fish make it an ideal candidate for this type of study, and we can generally translate the findings from fish to humans as well," Bhandari said. "Findings showed a 30 percent decrease in the fertilization rate of [fish](#) two generations after exposure

and a 20 percent reduction after three generations. If those trends continued, the potential for declines in overall population numbers might be expected in generations far removed from the initial exposure."

"This study examined concentrations of BPA and other chemicals that are not expected to be found in most environmental situations," Tillitt said. "However, concern remains about the possibility of passing on adverse [reproductive effects](#) to future generations at lower levels."

The study, "Transgenerational effects from early developmental exposures to bisphenol A or 17 α -ethinylestradiol in medaka, *Oryzias latipes*," recently was published in the journal *Scientific Reports*.

More information: *Scientific Reports*,
[www.nature.com/srep/2015/15032 ... /full/srep09303.html](http://www.nature.com/srep/2015/15032.../full/srep09303.html)

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