

Fracking chemicals exposure may harm fertility in female mice

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Prenatal exposure to chemicals used in hydraulic fracturing, or fracking, may threaten fertility in female mice, according to a new study published in the Endocrine Society's journal *Endocrinology*.

The study was the first to find a link between [chemical](#) exposure and adverse reproductive and developmental outcomes in [female mice](#). Scientists exposed the mice to 23 chemicals commonly used in fracking, as well as oil and gas development, to study their effects on key hormones.

Researchers have previously found that these chemicals are endocrine-disrupting chemicals (EDCs) that mimic or block the body's hormones—the chemical messengers that regulate respiration, reproduction, metabolism, growth and other biological functions. More than 1,300 studies have found links between EDCs and serious health conditions such as infertility, diabetes, obesity, hormone-related cancers and neurological disorders, according to the [Endocrine Society's 2015 Scientific Statement](#).

"The evidence indicates that developmental exposure to fracking and drilling chemicals may pose a threat to fertility in animals and potentially people," said the study's senior author, Susan C. Nagel, PhD, of the University of Missouri in Columbia, MO. "Negative outcomes were observed even in mice exposed to the lowest dose of chemicals, which was lower than the concentrations found in groundwater at some locations with past oil and gas wastewater spills."

The researchers mixed 23 oil and gas chemicals in four different concentrations to reflect concentrations ranging from those found in drinking water and groundwater to concentrations found in industry wastewater. The mixtures were added to drinking water given to [pregnant mice](#) in the laboratory from day 11 of pregnancy until they gave birth. The female offspring of the mice that drank the chemical mixtures were compared to female offspring of mice in a control group that was not exposed.

The mice exposed to the drilling chemicals had lower levels of key hormones related to reproductive health—prolactin, [follicle stimulating hormone](#) (FSH) and luteinizing hormone— compared to the control group. Mice exposed to smaller doses of the chemicals had fewer ovarian follicles, or pockets where egg cells are stored, which suggests they have a reduced number of eggs and may have a shorter fertile period than other mice. In contrast, the mice exposed to the highest chemical dose had an increase in the primary follicle number, which could signal inappropriate follicle activation and ultimate follicle death.

The mice exposed to the chemicals in utero also tended to weigh about 10 percent more at 21 days of age than mice that were not exposed to chemicals. The mice that were exposed to chemicals had increased heart weights and other indicators for abnormal thickening of the heart muscle, which were not seen in the [control group](#).

"Female mice that were exposed to commonly used fracking chemicals in utero showed signs of reduced fertility, including alterations in the development of the ovarian follicles and pituitary and reproductive hormone concentrations," Nagel said. "These findings build on our previous research, which found exposure to the same chemicals was tied to reduced sperm counts in male [mice](#). Our studies suggest adverse developmental and reproductive health outcomes might be expected in humans and animals exposed to chemicals in regions with oil and gas

drilling activity."

More information: The study, "Adverse Reproductive and Developmental Health Outcomes Following Prenatal Exposure to a Hydraulic Fracturing Chemical Mixture in Female C57BI/6 Mice," will be published online at press.endocrine.org/doi/10.1210/en.2016-1242 , ahead of print.

Provided by The Endocrine Society

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