

Endocrine disrupters accelerate reproductive aging in rats

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Female rats exposed to endocrine disrupters during early development end up with fewer eggs in their ovaries and are at risk of losing their ability to reproduce at an earlier age. These are some of the findings from a study conducted at the National Food Institute, Technical University of Denmark, which has increased our knowledge of how endocrine disrupting chemicals affect the female reproductive system. The results give rise to concern that endocrine disrupters may also affect egg reserves in women and cause earlier menopause.

A number of the chemicals that people are exposed to on a daily basis are suspected of disturbing the hormone system. The toxicological effects of these so-called endocrine disrupters on the reproductive system have so far been tested more thoroughly in boys than in girls.

A study from the National Food Institute has examined the [reproductive effects](#) of developmental exposure to a mixture of some of the endocrine disrupting chemicals that humans are exposed to. The mixture included chemicals such as phthalates, pesticides, bisphenol A and parabens as well as the painkiller paracetamol, and was given in higher doses than humans are exposed to.

Fewer eggs can cause early menopause in women

Even before puberty the egg reserve was smaller in the exposed animals than in the control animals. During the first months of life the

researchers found no detectable effect on oestrus cycles, which in humans corresponds to menstrual cycle in humans. However, after 12 months the cycles became irregular in several of the exposed animals.

Furthermore, ovaries weighed less in the exposed females, and their ovulation was reduced. Altogether this indicates earlier reproductive aging, which corresponds to [early menopause](#) in women.

"As Danish women have become considerably older before they start having children, premature menopause will have a serious impact since it reduces the number of years a woman is able to have children," Senior Scientist Julie Boberg explains.

Risk of overlooking harmful effects of chemicals

A reason why detection of early reproductive aging is important is that most studies of endocrine disrupting effects end before the experimental animals are a year old. Such studies will not detect the potential effects of a chemical on reproductive aging. The current OECD guidelines for chemical testing prescribe that studies of chemical effects on reproduction are generally completed at three months of age.

"We are aiming to identify early markers that can predict disruption of fertility later in life," PhD student Hanna Johansson says.

"Such markers would be beneficial in medical research and they can also improve safety assessments of chemicals that humans are exposed to," Hanna Johansson adds.

The study is described in a scientific article in the journal *Reproductive Toxicology*: Perinatal exposure to mixtures of endocrine disrupting chemicals reduces female rat follicle reserves and accelerates reproductive aging. Hanna Johansson is the article's lead author.

Some of the results are included in Pernille Rosenskjold Jacobsen's PhD thesis: Contaminant mixtures and reproductive health: Developmental toxicity effects in rats after mixed exposure to environmentally relevant [endocrine disrupting chemicals](#), with focus on effects in females.

More information: Hanna Katarina Lilith Johansson et al. Perinatal exposure to mixtures of endocrine disrupting chemicals reduces female rat follicle reserves and accelerates reproductive aging, *Reproductive Toxicology* (2016). [DOI: 10.1016/j.reprotox.2016.03.045](https://doi.org/10.1016/j.reprotox.2016.03.045)

Find the thesis here: [www.food.dtu.dk/english/-/medi ...-Jacobsen.ashx?la=da](http://www.food.dtu.dk/english/-/media/...-Jacobsen.ashx?la=da).

Provided by Technical University of Denmark

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