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Silent danger: researchers tackle chemicals that threaten health and fertility

Endocrine-disrupting chemicals are everywhere – from plastics to cosmetics – silently affecting our reproductive health. EU-funded researchers are shedding light on the risks and developing better tests to protect future generations.

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Professor Majorie van Duursen, a Dutch environmental health expert and toxicologist, has her sights set on improving women's health. Her principal target? Substances known as endocrine-disrupting chemicals (EDCs) found everywhere around us, from the air we breathe and the clothes we wear to the products we put on our skin.

Van Duursen, head of the Environmental Health and Toxicology section at the Amsterdam Institute for Life and Environment in the Netherlands, is part of a growing chorus of European scientists who believe we must take a closer look at EDCs and their impact on our health.

"We need a deeper understanding of how exactly these chemicals harm the female reproductive system and better tests so that these chemicals can be identified before they find their way into the products we use," said van Duursen, who specialises in endocrine toxicology.

Evaluating the risk

EDCs can be found virtually everywhere: in household fragrances, cleaning products, plastic food containers and packaging (bisphenol A), cosmetics (parabens), shampoos and plastic wraps (phthalates). They are also present in non-stick cookware, some pesticides, and in electronics, furniture and textiles.

A large group of scientists scrutinising EDCs are collaborating in an international partnership called EURION. It brings together eight separate research initiatives, all addressing the hidden dangers of these chemicals.

The aim is to improve understanding of the risks posed by these extremely prevalent chemicals and develop new testing methods to reveal their presence and evaluate their safety.

One arm of EURION was a five-year research initiative called FREIA, which explored the specific risks that EDCs pose to women's health.

Although the exact mechanisms by which EDCs harm health are not yet fully understood, they have been linked to serious health issues such as reproductive disorders, developmental problems and certain cancers.

Focus on female health and fertility

The risks are particularly high for women who wish to have children, warned van Duursen, who coordinated the FREIA initiative.

The research team brought together leading experts from Belgium, Denmark, Estonia, France, the Netherlands, Sweden, the UK and the US. A major focus of their work was to explore the ways EDCs affect female reproductive health at different stages of life.

"We've known for some time that the effect of exposure is different in female foetuses, adolescents and adult women, but we had little idea about what was happening in the ovaries at these different points," said van Duursen.

The researchers have now developed human tissue models representing the entire life cycle – from foetal ovarian and adrenal tissues to mature ovarian follicles – to identify biomarkers for EDC exposure.

By studying ovarian tissue in the lab, the researchers have made significant findings. For instance, they found that puberty starts earlier in ovaries exposed to EDCs. Also, ovaries exposed to EDC have fewer germ cells, which divide and create eggs and thus play a direct role in reproduction.

The researchers also found that in-vitro fertilisation is less successful in women when more EDCs have been identified in the follicular fluid surrounding the eggs.

"All this means that, in theory, exposure to these chemicals, even in early development, can lead to fewer eggs and then maybe early menopause and fertility issues," said van Duursen.

Although the FREIA research initiative ended in 2024, the work of the team continues. The next big step for them will be to study egg function in adult women.

Chemical exposure

People can be exposed to EDCs through the food they eat, especially when heated in plastic packaging material, the products they put on their skin, and toxins released into the air by chemically treated furniture and textiles.

Some of these chemicals interfere with the body's hormonal system by mimicking hormones like oestrogen and binding to hormone receptors, effectively blocking our natural hormones from functioning correctly.

"The effects on reproductive health, particularly in women, can be very complex and last a lifetime – even after prenatal exposure," said Alexandra Scranton, director of science and research at the advocacy group Women's Voices for the Earth. The group's goal is to eliminate toxic chemicals that harm women's health and communities.

Scranton stressed that women are not necessarily more at risk of the damaging effects of EDCs than men, but can be disproportionately impacted by these chemicals as a result of occupational gender biases.

“Working in a hair salon or as a cleaner – often ‘invisible’ occupations that are largely female – you are in constant contact with cleaning products, shampoos, hair colours, relaxers, straighteners, styling products, all of which may contain EDCs,” she said.

For Scranton, there is a need to recognise that any use of EDCs is problematic, and she welcomes initiatives like FREIA that focus specifically on women’s health.

Although EDCs are covered by REACH, a comprehensive EU regulation that aims to protect humans and the environment from the effects of chemicals, the EU has recognised the importance of regulating these chemicals more tightly.

Research that improves the ability to identify and test for EDCs can only help in this respect.

To date, the eight projects in the EURION cluster have compiled a list of 100 test methods to improve the identification of EDCs. A number of these tests are now undergoing validation by independent labs. In time, it is expected that some will help to further restrict the use of EDCs.

Information is power

Thankfully, though, there are steps people can already take to protect themselves, and the FREIA research team is keen to help consumers avoid EDCs wherever possible. With this in mind, they published recommendations to help keep contact with these dangerous chemicals to a minimum.

These include simple tips such as washing new clothes before wearing them, not heating food in the microwave in plastic containers, and vacuuming one’s home regularly to remove EDC-laced dust.

“Women deserve to understand the reality they live in, and we have a responsibility to inform them,” said van Duursen.

“We are surrounded by chemicals, but some that are potentially harmful can be avoided fairly easily and inexpensively.”

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More info

- FREIA
- FREIA project website
- EURION project website
- New EU rules to identify EDCs
- EU Framework on Endocrine Disruptors
- REACH Regulation
- EU Chemicals Strategy for Sustainability