



PRESS RELEASE

Exposing frog embryos to a chemical cocktail causes thyroid hormone disruption

Brussels, 7 March 2017 – Findings published today provide evidence that exposure to endocrine disrupting chemicals (EDCs) causes changes in thyroid hormone signalling, which disturbs brain development.

The results are published by *Nature* in a peer-reviewed paper in *Scientific Reports* entitled “Human amniotic fluid contaminants alter thyroid hormone signalling and early brain development in *Xenopus* embryos”. (1)

The tests involved exposing frog embryos to a mixture of chemicals commonly present in the fluid of a human mother’s womb.

Epidemiological studies have already linked maternal exposure to certain chemicals with lower IQ and increased risk of ADHD in children. (1)

The authors say that the new findings suggest that exposure to endocrine disrupting chemicals can adversely affect brain development in unborn children and argue for an urgent revision of the regulatory frameworks.

Professor Barbara Demeneix, an author of the paper and part of a research team of CNRS, which is France’s largest governmental research organisation, says:

“The study showed that the chemical mixture affected thyroid hormone signaling – and undisturbed thyroid signaling is essential for normal brain development in all vertebrates. Since thyroid hormone is exactly the same in frogs and humans, these findings should prompt rapid action to remove these harmful chemicals from the market.”

The study investigated whether brain development in frog embryos could be affected by exposure to a combination of chemicals that are commonly found in human amniotic fluid. Using concentrations of these chemicals that are equivalent to those to which humans are exposed *in utero*, the researchers found that the mixture acted on thyroid hormone signalling. It also altered brain gene expression, reduced neuron volume and inhibited tadpole movement. The authors point out that since thyroid hormone signalling is very similar between different vertebrate species including humans, the results suggest that ubiquitous chemical mixtures could be exerting adverse effects on foetal human brain development.

The effects of the chemical mixture changed according to the dose level. In addition, some of the 15 common chemicals in the mixture were individually shown to disrupt thyroid hormone. They include: triclosan (an anti-microbial chemical), one phthalate - DEHP (a plastic softeners), two organochlorine pesticides - HCB and DDE, two surfactants - PFOS and PFOA, tPCB-153 and BDE-209, methyl mercury and lead chloride.

The paper says that epidemiological studies show that maternal exposure to many of the chemicals studied in this latest research can affect offspring IQ and/or neurodevelopmental disease risk. For example, PCBs, which are now banned, have been linked to IQ loss and increased ADHD risk.

Separately, a report published today by CHEM Trust (2) highlights how chemicals in food and consumer products used in homes, schools and offices could be harming brain development in children. It calls on the EU regulators to phase out groups of hazardous chemicals, rather than slowly restricting one chemical of concern at a time.

Génon K. Jensen, Executive Director, Health and Environment Alliance (HEAL), supports calls for urgent action. She says:

“Children’s brains are under threat from toxic chemicals - exposure starts in the womb and can have effects throughout their lives. There’s no room for complacency or lengthy deliberations that stretch over years or decades. The European Commission should use this latest research to speed up measures to reduce everyday exposure to neurotoxic chemicals and thereby help every child meet his or her full potential.”

The warnings come at a time when more and more children are affected by autism and ADHD. According to a new book (3) by Professor Demeneix, statistics released at the end of 2015 put the incidence of autism spectrum disorder (ASD) in the US at 1 in 45 children.

Meanwhile, the number and quantity of chemicals released into the environment in the last 50 years has increased 300-fold. (1)

The World Health Organization is also increasingly concerned about children’s exposure to chemicals. A report released on 6 March 2017 says: “Children are exposed to harmful chemicals through food, water, air and products around them. Chemicals, such as fluoride, lead and mercury pesticides, persistent organic pollutants, and others in manufactured goods, eventually find their way into the food chain. (4)

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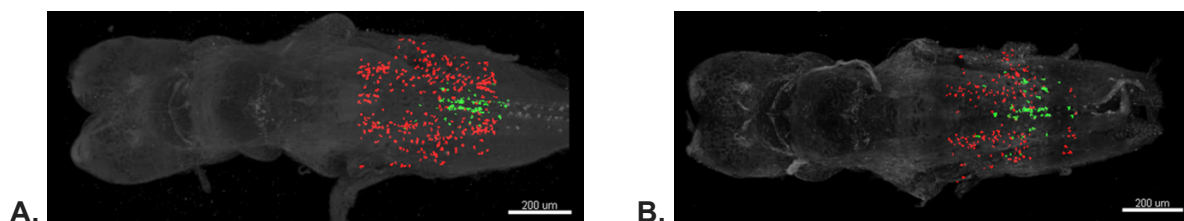
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Notes for journalists

1. The paper, “Human amniotic fluid contaminants alter thyroid hormone signalling and early brain development in *Xenopus* embryos” is available from 10 am UK time on 7 March 2017 in Scientific Reports, nature.com

Illustration from research paper



Embryonic xenopus brains (1 week post fertilization), treated (B) or untreated (A) with the mixture of 15 chemicals. The mixture exposure results in a reduction of neuron number and volume, marked in red (in green: oligodendrocytes). © Bilal Mughal

2. *CHEM Trust's No Brainer report will be available on 7 March 2017 at www.chemtrust.org.uk/brain*
An infographic is available on page 5 of the 'No Brainer' report.
3. Toxic Cocktail, How chemical pollution is poisoning our brains by Barbara Demeneix will be available from Oxford University Press from 23 March 2017. See <https://global.oup.com/academic/product/toxic-cocktail-9780190260934?cc=fr&lang=en>
4. WHO Press release, 6 March 2017 <http://www.who.int/mediacentre/news/releases/2017/pollution-child-death/en/>

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