PFAS may increase risk of disease in unborn children, new study suggests

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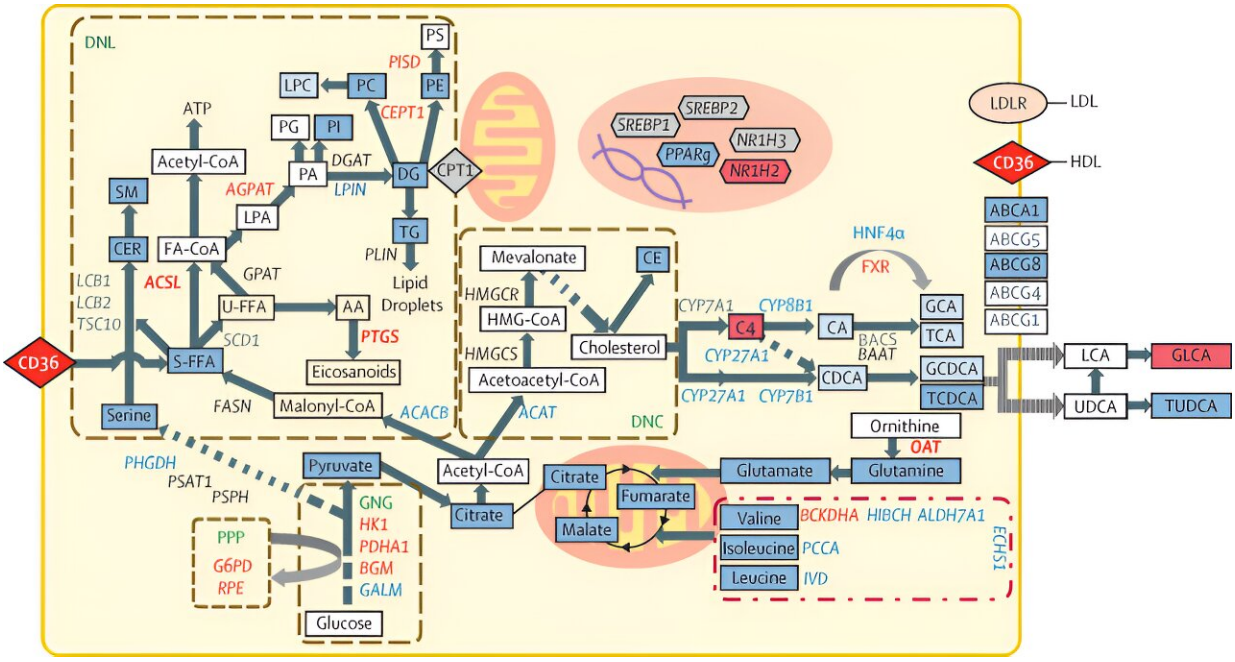

Metabolic pathways and genes associated with perfluoroalkyl exposure. Metabolites showing negative associations with perfluoroalkyl are in blue boxes, positively associated metabolites in red boxes, those metabolites showing no significant associations are in gray boxes, and those not measured are in white boxes. Genes showing negative associations are in blue text, positive associations in red text, no significant associations in black text, and genes not detected in gray text. Credit: *The Lancet Planetary Health* (2024). DOI: 10.1016/S2542-5196(23)00257-7

Per- and polyfluoroalkyl substances (PFAS) are a group of thousands of synthetically produced chemicals used in a wide range of everyday products worldwide. They are often called "forever chemicals" since it takes a very long time for these substances to break down naturally and can remain in the bodies of humans and animals for many years.

There is strong evidence that PFAS can affect both the immune system and metabolism and exposure to certain levels of PFAS is associated with cancer, diabetes, and a variety of other diseases. These chemicals have been used since the 1950s in a wide variety of products, such as non-stick frying pans, ski boots, water-repellent clothing, and food packaging. They are also common in makeup and skin creams.

The team of researchers from Örebro University and the University of Aberdeen have published a study involving 78 fetuses in the journal *The Lancet Planetary Health*. It is the first study of its kind in which researchers have conducted extensive metabolic profiling and measured PFAS in human fetuses.

Professor Paul Fowler from the University of Aberdeen said, "We found PFAS in the livers of the fetuses, and unfortunately, the results provide strong evidence that exposure to these forever chemicals in the womb affects the unborn child. Those exposed to higher levels of PFAS have altered metabolism and liver function long before birth."

The researchers consider it likely that at least some of these effects will be persistent and likely increase the risk of metabolic diseases in adulthood.

"We were surprised by these chemicals' strong association with changes to the fetal metabolism. It's similar to certain metabolic changes occurring in adults. Specifically, we found that PFAS exposure is linked with modified bile acid and lipid metabolism in the fetuses," says Tuulia

Hyötyläinen, professor of chemistry at Örebro University. The liver plays a significant role in human well-being.

"Changes in the central metabolism can profoundly affect the whole body. In particular, changes during fetal development can have long-lasting consequences for future health," added Professor Orešič.

The likely impact of PFAS is similar to the changes that occur as a result of metabolic diseases like diabetes and fatty liver. The 78 fetuses analyzed by the researchers were voluntarily aborted between weeks 12 and 19 and considered essentially healthy.

Several types of PFAS are banned by the EU, where regulations are stricter than in, for example, China. Diseases such as childhood obesity and diabetes have skyrocketed in China in recent years. Researchers believe that PFAS and other environmental chemicals may be one of the causes of this increase.

Professor Orešič continued, "A connection is very likely. And it may turn out that exposure to harmful chemicals has a comparable or even greater impact than lifestyle when it comes to certain diseases."

More information: Tuulia Hyötyläinen et al, In utero exposures to perfluoroalkyl substances and the human fetal liver metabolome in Scotland: a cross-sectional study, *The Lancet Planetary Health* (2024). DOI: 10.1016/S2542-5196(23)00257-7

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