Study reveals toxic effects of perfluoroether carboxylic acids exposure

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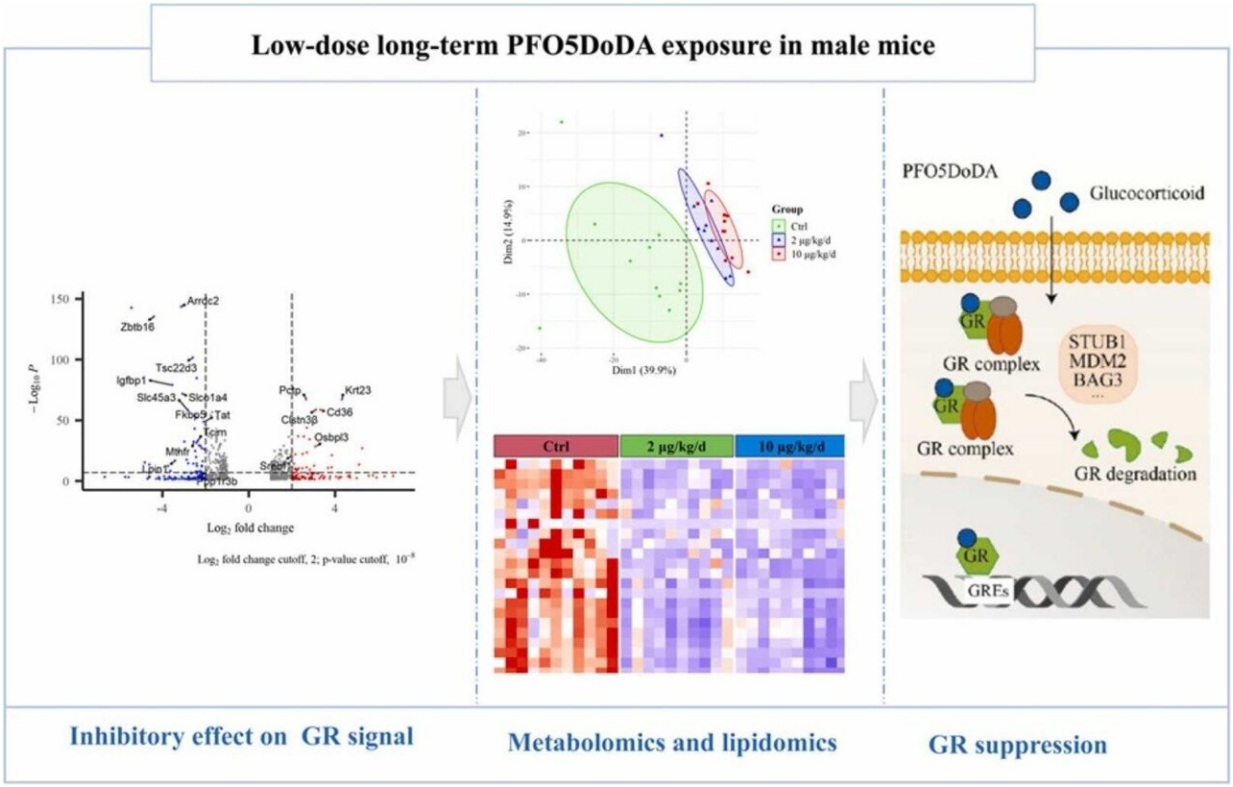

Graphical abstract. Credit: *Journal of Hazardous Materials* (2023). DOI: 10.1016/j.jhazmat.2023.130831

Per- and polyfluoroalkyl substances (PFASs), a class of chemicals, are known for their hydrophobicity, lipophobicity, and thermal stability. Since the 1950s, they have been widely used in a wide range of industrial

and consumer products.

However, PFASs' bioaccumulation and toxicity in wildlife and humans restrict their application. Next-generation PFASs such as perfluoroether carboxylic acids (PFECAs) are needed to replace conventional PFASs.

Recently, a research group led by Prof. Xu Guowang from the Dalian Institute of Chemical Physics (DICP) of the Chinese Academy of Sciences (CAS), in collaboration with Prof. Wang Jianshe from Yantai University, has revealed the toxic effects of PFECAs to mice.

This study was published in *Journal of Hazardous Materials* on Jan. 20.

The researchers explored the effects of PFECAs on mice based on their long-term exposure to environmentally relevant doses of perfluoro-3,5,7,9,11-pentaoxadodecanoic acid (PFO_5DoDA), and revealed that PFECAs exposure suppressed many cellular stress signals and resulted in hepatomegaly.

They found that PFO_5DoDA acted as an agonist of the peroxisome proliferator-activated receptor (PPAR) in vitro and modulated PPAR-dependent gene expression in the liver. In addition, PFECAs had an inhibitory effect on the glucocorticoid receptor (GR), which might contribute to suppression of stress signals. GR suppression induced by PFECAs was not found in conventional perfluorooctanoic acid (PFOA).

Through liver metabolomics analysis, the researchers found that PFO_5DoDA-induced changes in both GR and PPAR signals remodeled hepatic metabolic profiles, including decreased fatty acids and amino acids and increased β-oxidation.

"Our work highlights the potential risk of PFECAs to human and wildlife health," said Dr. Liu Xinyu, corresponding author of this study.

More information: Chang Wang et al, PFO_5DoDA disrupts hepatic homeostasis primarily through glucocorticoid signaling inhibition, *Journal of Hazardous Materials* (2023). DOI: 10.1016/j.jhazmat.2023.130831

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