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Study links 'forever chemical' PFOS with colorectal cancer

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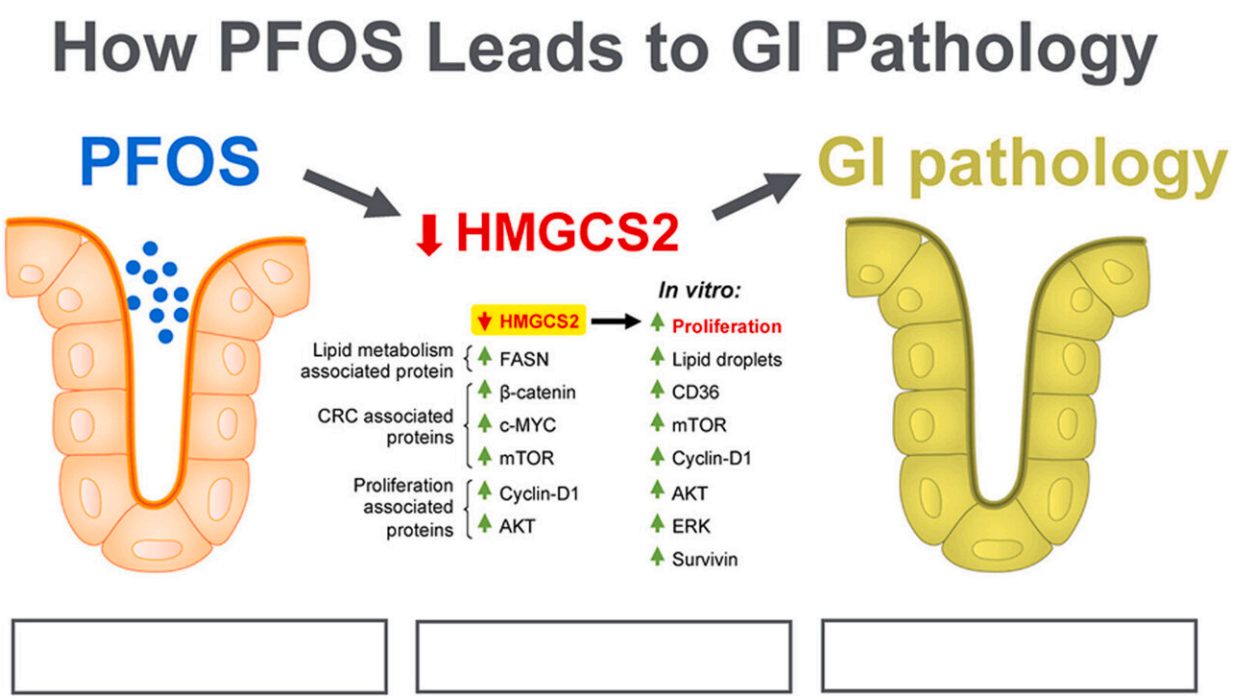

Credit: *Chemosphere* (2024). DOI: 10.1016/j.chemosphere.2024.142332

A recent University of Kentucky Markey Cancer Center study sheds light on how the environmental pollutant perfluorooctanesulfonic acid (PFOS) may affect our intestines and possibly increase the risk of developing colorectal cancer.

Published in *Chemosphere*, the research study led by Josiane Tessmann,

Ph.D., a postdoctoral scholar in the laboratory of Yekaterina Zaytseva, Ph.D., is the first to show that long-term PFOS exposure can lead to changes in intestinal cells that are linked to the development of colorectal cancer.

PFOS belongs to a group of chemicals called PFAS (perfluoroalkyl and polyfluoroalkyl substances), which have been widely used in industrial applications and consumer products. Often referred to as "forever chemicals," PFAS don't break down easily and can stay in the environment and the human body for a long time. Exposure is linked to negative health outcomes including metabolic disorders, reduced immune responses and increased risk of cancer.

While previous research has linked PFOS to several types of cancer, including breast, liver, and kidney cancer, this study is the first to demonstrate a potential connection between PFOS exposure and colorectal cancer.

"Understanding how PFOS harms intestinal cells gives scientists new ideas on how to prevent these effects," says Zaytseva, an associate professor in the UK College of Medicine Department of Toxicology and Cancer Biology. "This study opens up a new area of investigation that could change how we approach colorectal cancer prevention in communities with high PFOS exposure."

Zaytseva added that these findings are especially important for Kentucky: PFAS chemicals are found in 90% of surface waters tested in the state, with PFOS one of the most common.

The study in mice found that PFOS exposure caused lowered levels of a ketogenic enzyme in the intestines called HMGCS2, which plays an important preventive role in several cancers, including colorectal cancer. At the same time, exposure increased levels of proteins that are linked to

cancer growth. Zaytseva's team also found similar changes in samples of human intestinal cells when they were exposed to PFOS.

The study results suggest that certain dietary changes might help protect intestines from the harmful effects of PFOS exposure. Future studies will focus on testing dietary interventions including the supplement beta-hydroxybutyrate, which is naturally produced in the body when HMGCS2 is present, to see if they can prevent PFOS-induced changes in normal intestinal tissues.

More information: Josiane Weber Tessmann et al, Perfluorooctanesulfonic acid exposure leads to downregulation of 3-hydroxy-3-methylglutaryl-CoA synthase 2 expression and upregulation of markers associated with intestinal carcinogenesis in mouse intestinal tissues, *Chemosphere* (2024). DOI: 10.1016/j.chemosphere.2024.142332

Provided by University of Kentucky

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