Persistent organic pollutants (POPs) induce changes in MCF-10A and in acini structures isolated from pregnant mice exposed in vivo

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Introduction

Persistent organic pollutants (POPs) bio accumulate in living organisms and can be found in high concentrations in animals and humans. Examples of POPs include polychlorinated biphenyls (PCBs), dioxins and flame retardants (BFRs) and perfluorinated compounds (PFCs).

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Living organisms are usually not exposed to single POPs, but to a complex mixture of substances where adverse health outcomes cannot be predicted based only on knowledge about single components.

Aims

- Investigate how a complex mixture of POPs (n=29) relevant for human intake, affect polarization of breast acini made from mouse cells exposed in vivo.
- Investigate how a complex mixture of POPs (m=29) relevant for human intake, affect polarization of breast acini made from primary mouse cells exposed in vivo.
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Results

1) Single POPs (PFCs) cause polarisation failure and compromises lumen formation in human breast cells (MCF10A)

2) A mixture of POPs affects acini development in primary mouse breast cells

3) Transcription of apoptosis regulating genes in MCF10A is upregulated after PFC exposure

Conclusions

POPs impaired polarization of MCF-10A acini structures.
- TNFRSF21, DFFA and IGFR1 were upregulated after PFC exposure, with the most prominent change in IGFR1 which is anti-apoptotic.
- A complex mixture of POPs, relevant to human exposure impaired polarization of acini structures from murine primary breast cells.
- Since luminal filling is often observed in breast cancer, these results suggest that POPs may play a role in breast cancer development.
- The current methodology can be useful in studies of breast development and breast cancer in other species, for example in dogs.