Impact of PFASs exposure on immune transcriptomic profile

Barbora Rudzanová, Ondřej Adamovský, Luděk Bláha
RECETOX, Masaryk University, Brno, Czech Republic

What are PFASs?

Per- and polyfluoroalkyl substances (PFASs), from which **PFOA** and **PFOS** are the most abundant and studied, are widely used as surfactants. They are sometimes called **forever chemicals** as they are very persistent in the environment. PFASs have been found in the water, soil, sediment, biota and also in humans. They are transported to humans mainly through contaminated food and water. PFASs enter the environment from manufacture sites as well as by using product containing PFASs as firefighting foam, non-stick cookware, food packaging, waterproof textiles (Silva et al., 2021).

Health Effects

Epidemiological studies reported association of PFASs exposure with **cancer, liver damage, endocrine disruption, cardiovascular problems, developmental adverse effects**, and **immune disruption** (ATSDR, 2021).

Immunotoxicity

PFAS exposure has been associated with dysregulated immune response in three categories: **immunosuppression** manifested by altered antibody response, resistance to infectious disease; **hypersensitivity** in the form of asthma, wheezing, eczema, atopic dermatitis, allergies; and **autoimmunity,** while the strongest evidence of link with PFASs exposure is for **suppressed antibody response** (ATSDR, 2021).

Immunotoxicity

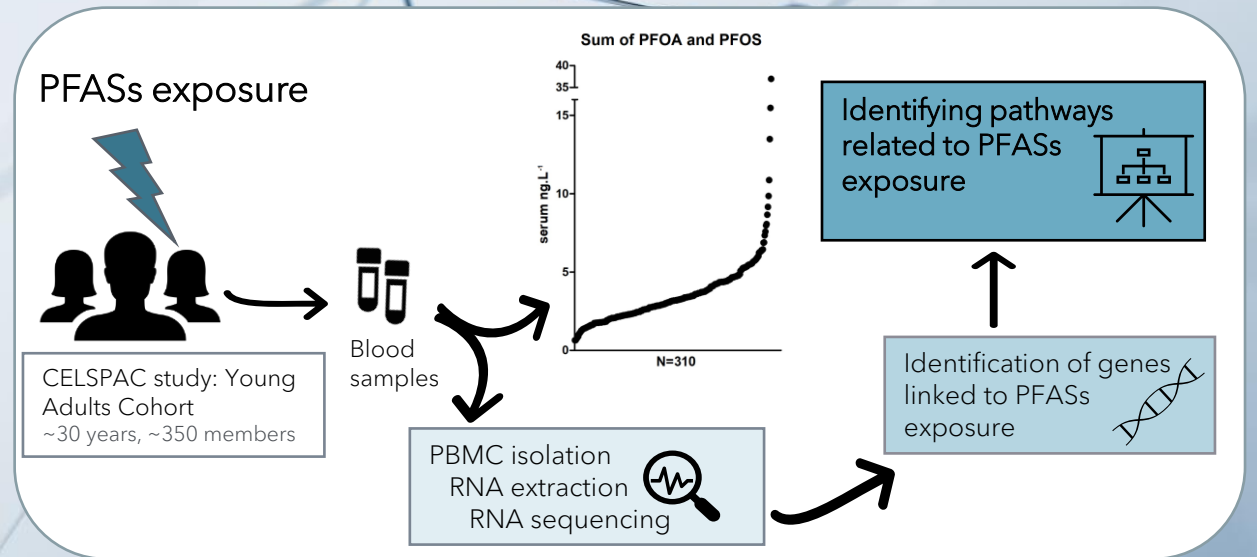
The mechanism of PFASs immunotoxicity has not been fully elucidated yet. The most likely affected pathway is **T-cell dependent antibody response (TDAR).** Potential players responsible for suppression of TDAR due to PFASs exposure are the alpha isotype of peroxisome proliferator-activated receptors **(PPARα)** and/or deregulation T helper cells 2 (**Th2**) (Bell et al., 2021).

Moreover, PFASs exposure has been found to contribute to severity of COVID-19 (Catelan et al., 2021).

Hypothesis and expected results

The aim of the current study is to identify immune pathways, as well as particular genes affected by PFASs exposure and link these ones with potential health adverse outcomes.

As the serum levels of PFOA and PFOS (see figure) differ through population, we expect differences also in expression of genes affected by PFASs exposure.



Study design

Study population: CELSPAC (Central European Longitudinal Studies of Parents and Children) study: Young Adults covers more than 300 participants born in 1991 and 1992 in South Moravian region. PFASs serum concentrations were measured in venous blood (see figure).

Laboratory methods: Peripheral blood mononuclear cells (PBMC) were isolated from venous blood and stored in RNAprotect Cell Reagent.
PBMC samples will be then thawed and RNA will be extracted through available commercial kits. The integrity and quality of RNA will be measured and checked.
RNA samples will be then sequenced by RNA-Seq method (Illumina) with QuantSeq library.

Data processing: Genes correlated with PFOS and PFOA exposure will be identified. These genes will be through both differential gene expression analysis and enrichment analysis classified into particular immune pathways linked to PFASs exposure.

References:

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