Human biomonitoring of PAHs in the INQUIRE project. Analysis and preliminary results

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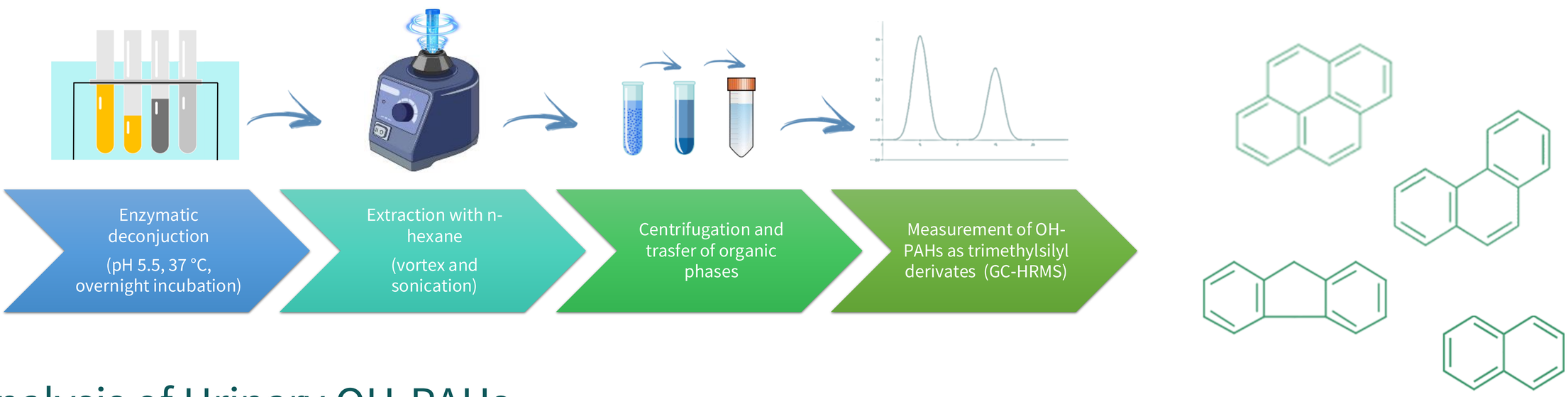
Background

Polycyclic aromatic hydrocarbons (PAHs) are a class of organic compounds composed of two or more condensed aromatic rings. PAHs are considered as one of the main toxic component in indoor air, due to their carcinogenic, mutagenic, genotoxic, and teratogenic properties. Tobacco smoking, cooking, heating processes, and inflow of outdoor air are common sources of PAHs in indoor environment. After entering the human body, PAHs undergo a series of biotransformation processes, including the formation of hydroxylated metabolites (OH-PAHs) and their conjunction with glucuronic acid or sulfate to facilitate detoxification and extraction through urines and feces.

Within the project human exposure to PAHs from indoor sources will be evaluated. Ten OH-PAHs (the principal metabolites of naphthalene (NAP), fluorene (FLU), phenanthrene (PHE), and pyrene (PYR)) will be analysed in urine samples.



Analysis of Urinary OH-PAHs

- Urine samples are hydrolized with β-glucuronidase/arysulfatase
- Samples are added with ^{13}C–labeled OH-PAHs and extracted with *n*-hexane by sonication
- The extracts are derivatized to their trimethylsilyl derivatives with MSTFA and analysed by HRGC-HRMS

Limits of quantifications (LOQ) were in the range of 10–100 pg/mL

Accuracy of the analytical procedure is controlled by participation in international proficiency tests

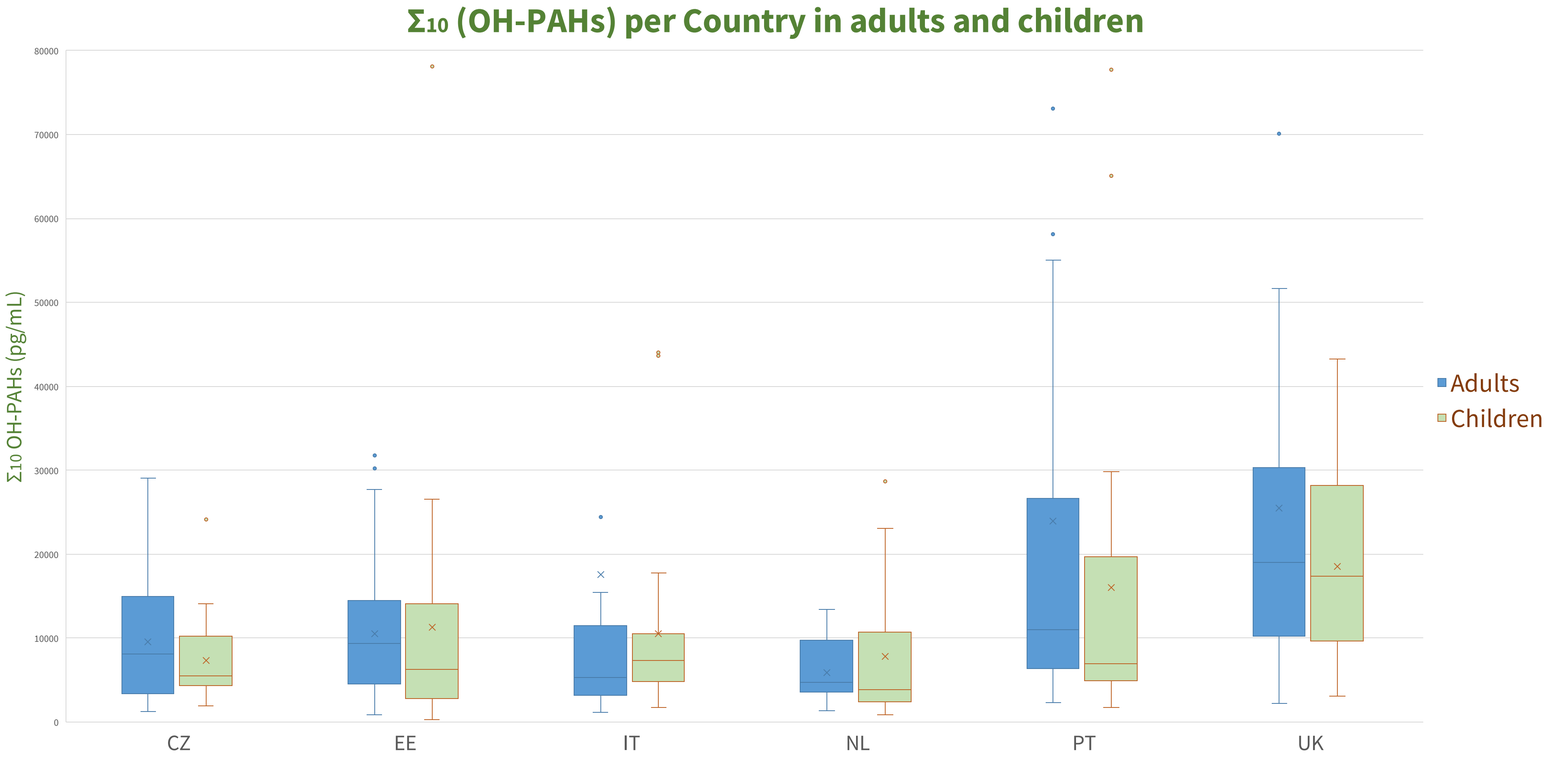
Preliminary results

Results of the analysis of OH-PAHs are available for six Countries: Czechia, Estonia, Italy, The Netherlands, Portugal and United Kingdom.

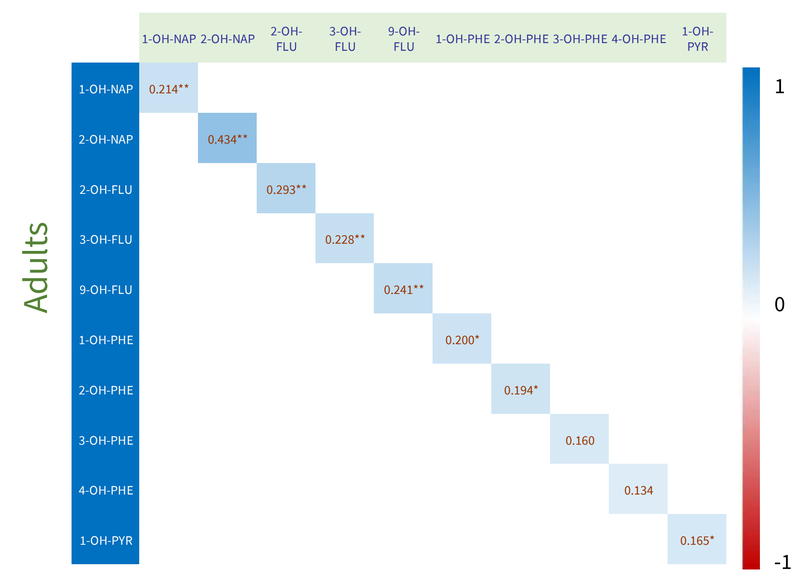
Positive correlation between concentrations in adults and children was observed for all OH-PAHs. It was significant at 0.05 level for OH-NAPs and OH-FLUs, at 0.1 for 1 and 2 OH-PHE and 1-OH-PYR.

Concentrations of Σ_{10} OH-PAHs are mostly higher in adults than in children and almost comparable in most of the Countries included in the analysis, with slightly higher levels in PT and UK.

Σ_{10} (OH-PAHs) per Country in adults and children



Spearman's correlation coefficients between urine concentrations of OH-PAHs in adults and children.



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