ENDOCRINE DISRUPTIVE POTENTIALS OF MIXTURES PRESENT IN TWO SIZE FRACTIONS OF INDOOR DUST FROM VARIOUS MICROENVIRONMENTS IN THE CZECH REPUBLIC

Research centre for toxic compounds in the environment
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INTRO

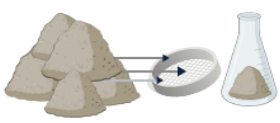
People spend more than 90% of their lives in indoor environment. Dust from indoor environment may represent a sink for various known and unknown chemicals, these chemicals may impose a risk for those exposed over life-time. Toddlers and those chronically ill represent risk groups.

AIMS:

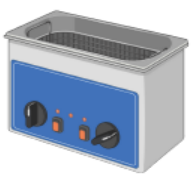
Assess the potential endocrine disruptive (ED) effects from dust obtained from several indoor environments in the Czech Republic

METHODS

1. The dust samples were collect from seven microenvironments namely: cars, houses, offices, kindergartens, flats, public spaces and schools in the Czech Republic

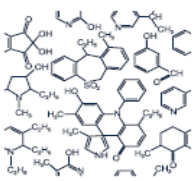


2. The dust samples were sieved to yield two size fractions i.e., <0.25 mm (fine particles) and bulk



3. Two extraction solvents were employed in order to obtain a polar (MetOH) and a nonpolar (Hexane: Aceton) fractions in both, fine particles and bulk

4. Stably transfected cells with luciferase reporter gene under the control of Aryl Hydrocarbon Receptor (AhR), androgen receptor (AR), estrogen receptor (ER) and thyroid receptor (TR), were employed to assess the ED potential (Fig 1 -6)



5. Chemical analyses are being conducted to identify the toxic drivers related to the observed effects

RESULTS

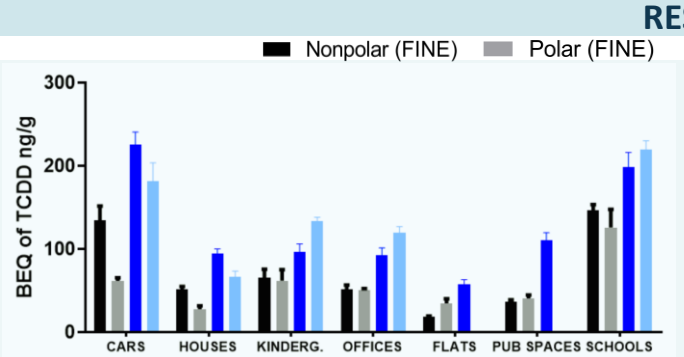


Fig 1. Aryl hydrocarbon receptor-mediated activity expressed as Bioanalytical Equivalent [BEQ] of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD); missing columns = <LOQ (Below Limit of Quantification)

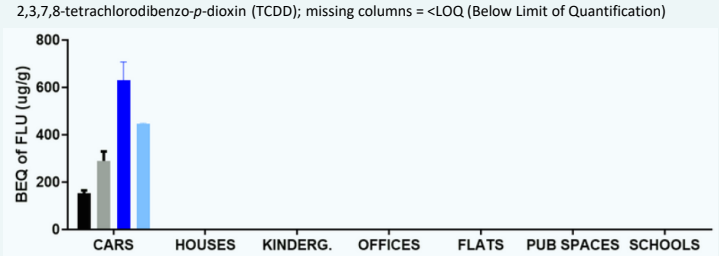


Fig 2. Antiandrogenicity expressed as Bioanalytical Equivalent [BEQ] of Flutamide (FLU); missing columns = <LOQ (Below Limit of Quantification)

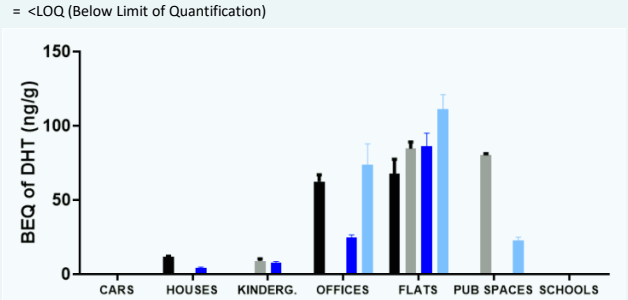


Fig 3. Androgenicity expressed as Bioanalytical Equivalent [BEQ] of Dihydrotestosterone [DHT]; Missing columns = <LOQ (Below Limit of Quantification)

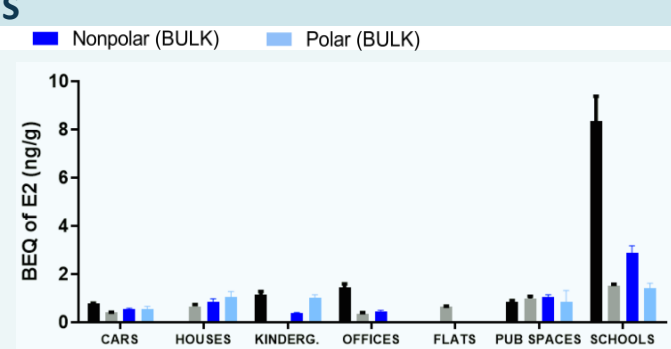


Fig 4. Estrogenicity expressed as Bioanalytical Equivalent [BEQ] of 17β-estradiol (E2); missing columns = <LOQ (Below Limit of Quantification)

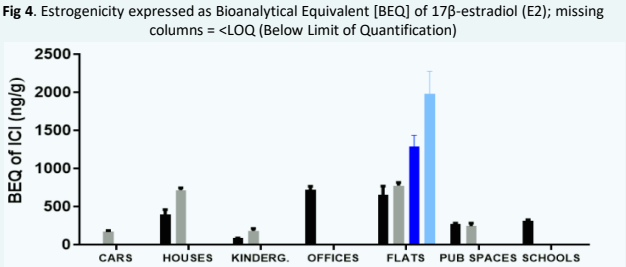


Fig. 5 Antiestrogenic activity expressed as Bioanalytical Equivalent [BEQ] of fulvestrant (ICI); missing columns = <LOQ (Below Limit of Quantification)

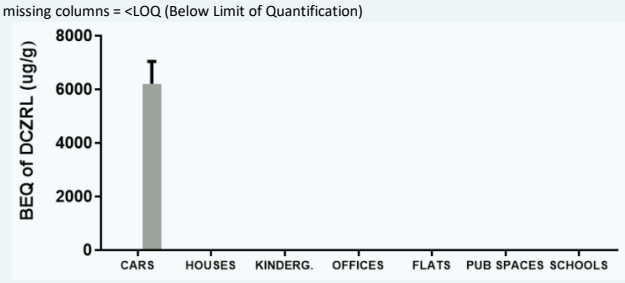


Fig 6. Antagonistic effects on Thyroid hormone receptor expressed as Bioanalytical Equivalent [BEQ] of Diclazuril; missing columns = <LOQ (Below Limit of Quantification)

The dioxin-like effects are more potent in the bulk dust and all the samples are able to exert agonism on AhR receptor (Fig. 1).

The anti-androgenic effects were detected just in samples from cars; bulk samples are more potent than fine particles (Fig. 2).

The androgenic effects present heterogeneous distribution. Dust samples from flats showed greatest androgenicity (Fig.3).

Estrogenicity was detected in all tested microenvironments (Fig.4). Samples from flats showed higher anti-estrogenic potential (Fig.5).

The anti-thyroid effects were assessed just in the polar fractions of the fine particles sampled from cars (Fig.6).

The present study did not find any samples able to induce agonism on TR receptor, but its detection was complicated by high cytotoxicity.

DISCUSSION

The ED potencies assessed in the samples indicate heterogenicity in the distribution of the chemicals in the dust and differences among the various microenvironment types. Samples from flats showed the highest effects for both androgenicity and anti-estrogenicity, which may indicate a potential interaction on the gonadal axis

CONCLUSION

Indoor pollutant mixtures can interfere with endocrine regulation via various modes of action. The complex mixtures present in dust samples from microenvironments in the Czech Republic may represent a potential risk for those exposed over the life-time.

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