AN EXPERIMENTAL APPROACH TO EXAMINE CORRELATIONS BETWEEN EXTERNAL EXPOSURE AND HUMAN BODY BURDENS

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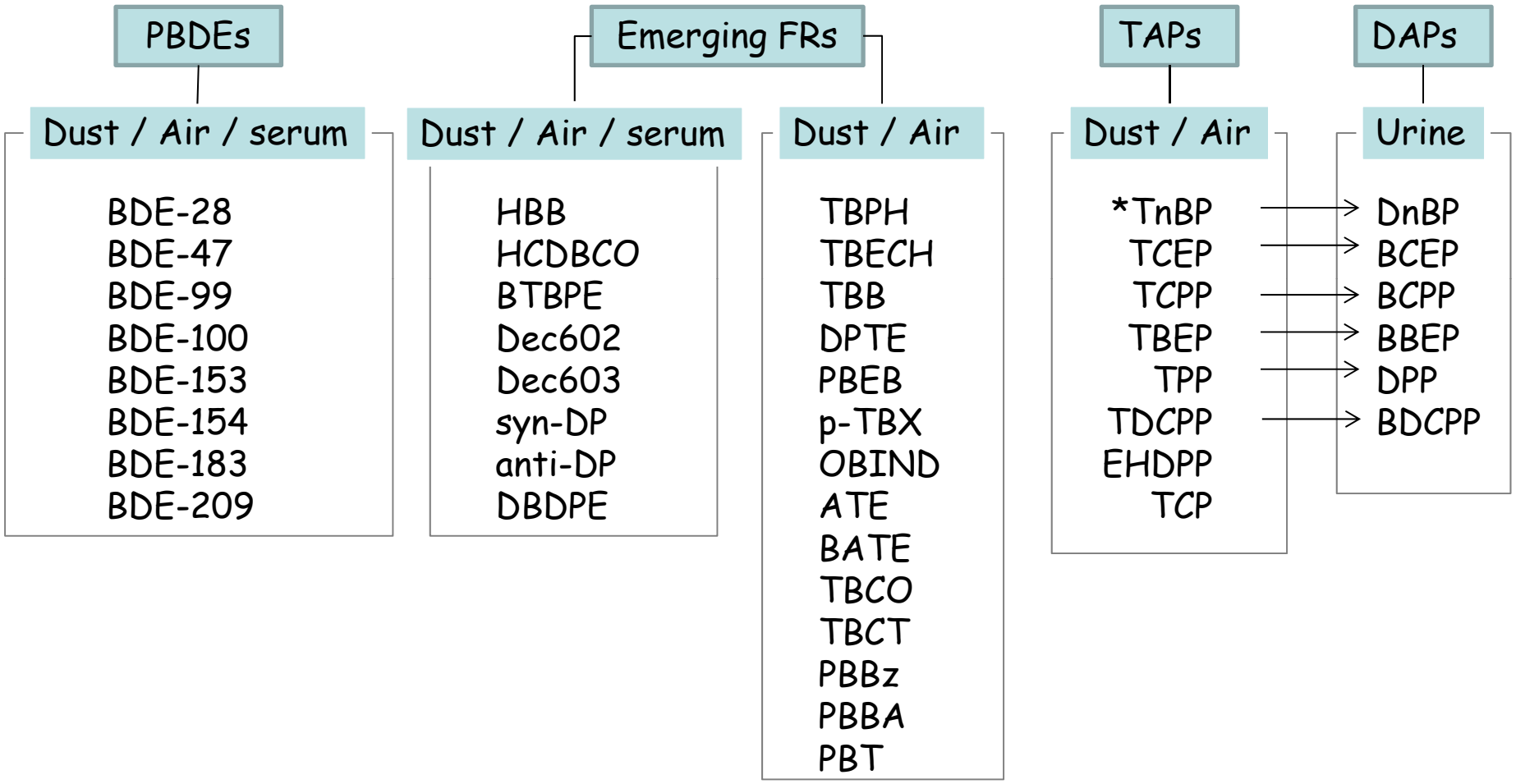
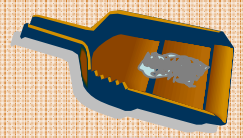
Flame retardants



* used as plasticizer

Indoor exposure to flame retardants

66 (6)

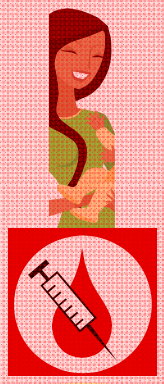


53 (6)

PBDEs | Emerging FRs | TAPs

PBDEs | Emerging FRs | TAPs

46



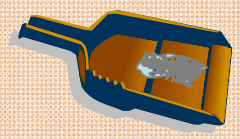
PBDEs Emerging FRs

320

DAPs

Indoor exposure to flame retardants

66 (6)



PBDEs Emerging FRs TAPs

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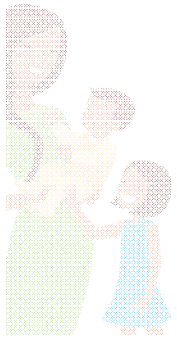
PBDEs Emerging FRs



320

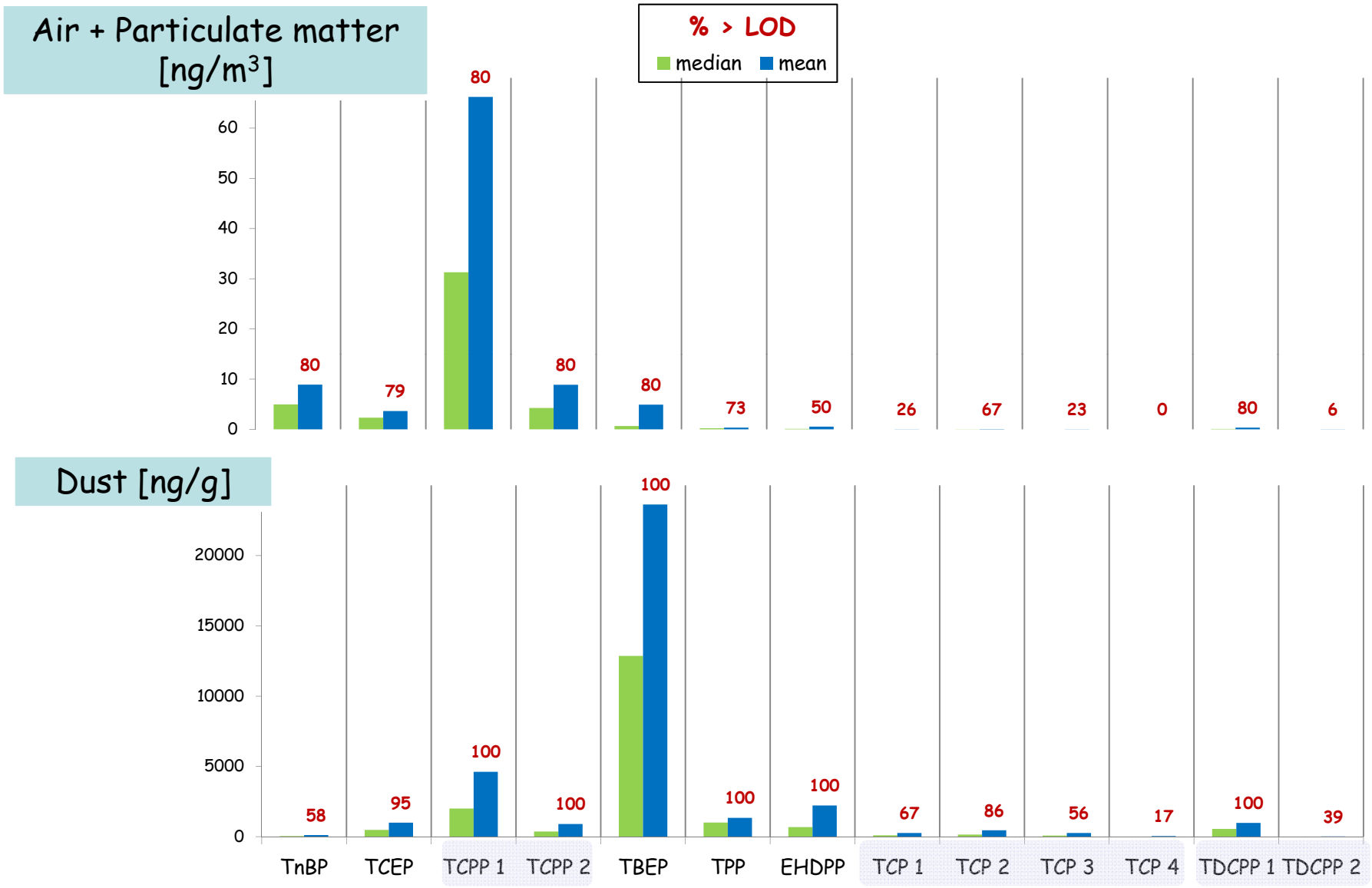
DAPs

Analytical methods

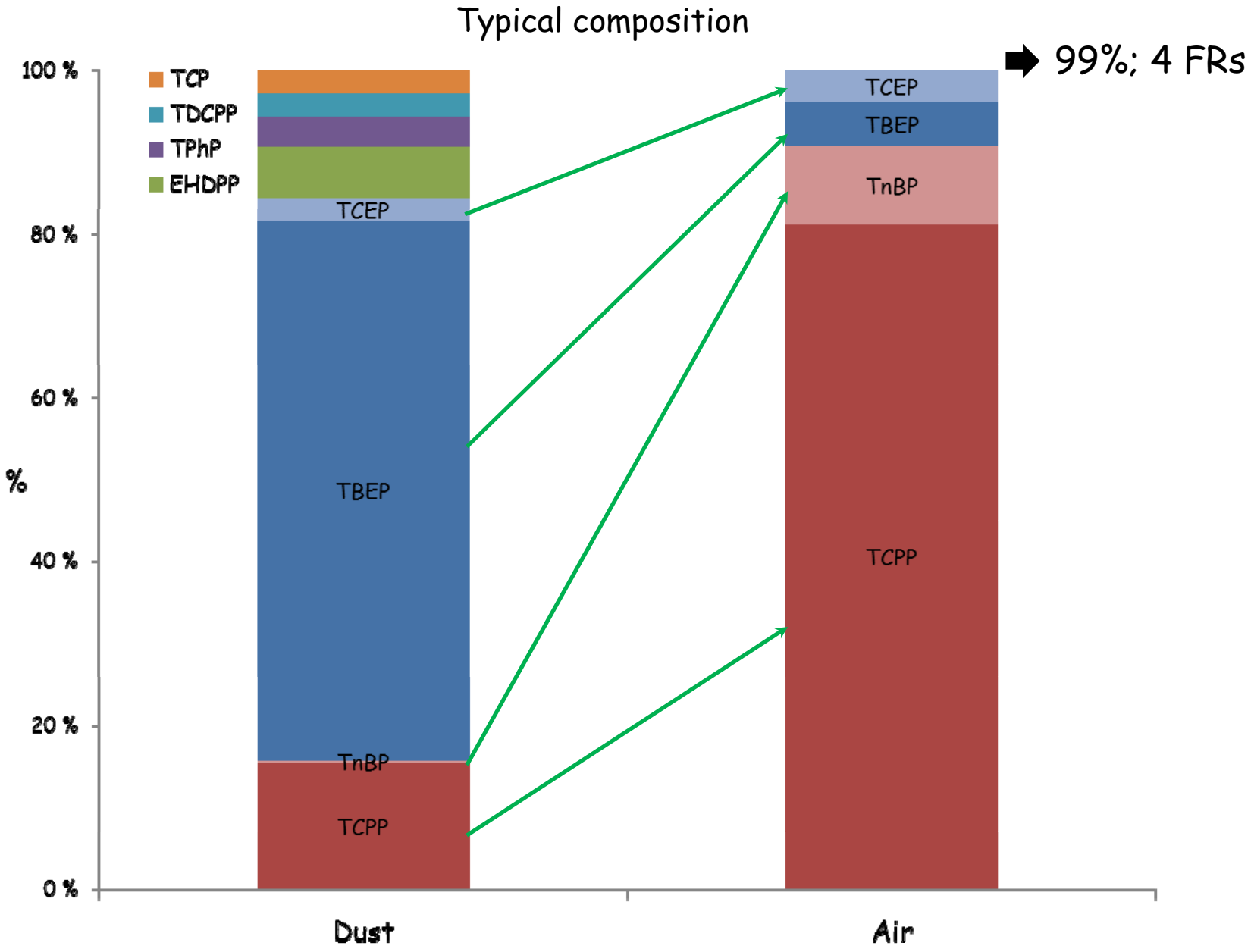
	*Air	*Dust	Serum	Urine
Amount	17 m^3 (PUF)	75 mg (40 mg SRM2585)	2 mL	10 µL
Extraction	Sonication (Hex/Acetone 3:1)	Sonication (Hex/Acetone 3:1)	SPE (DCM)	
		Fractionation		
Clean-up		Silica/H_2SO_4 (except TAPs)	Silica/H_2SO_4	
Technique				
Ionisation	EI	ECNI		ESI-
FR	TAP	PBDE/Emerging		DAP

*Performed at the Toxicological Center, University of Antwerp (Belgium)

OPFRs in air and dust



OPFRs in air and dust



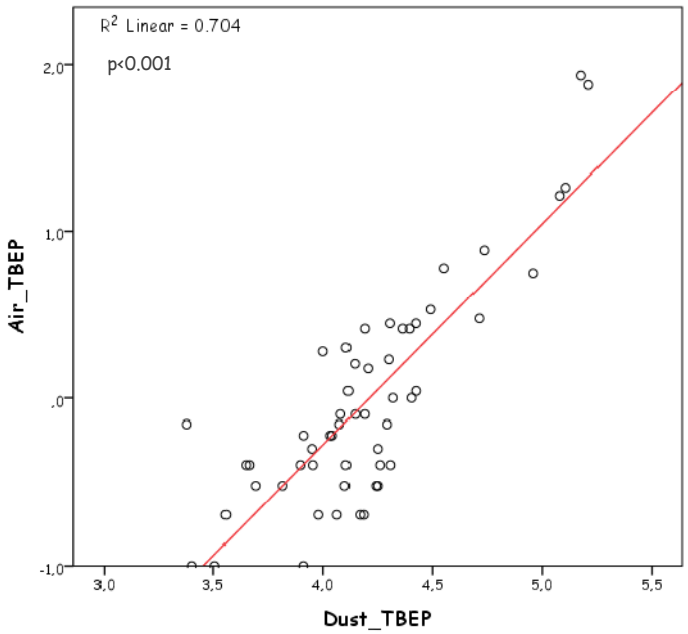
OPFRs in air and dust

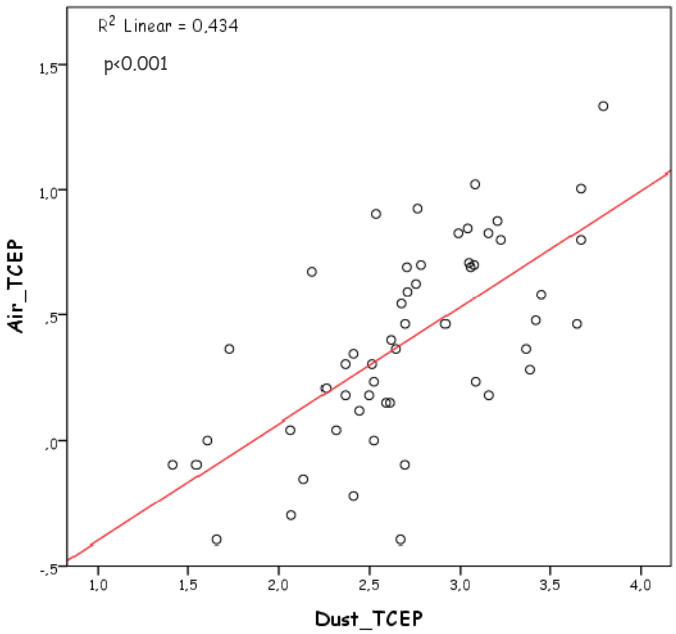
Air units: ng/m3

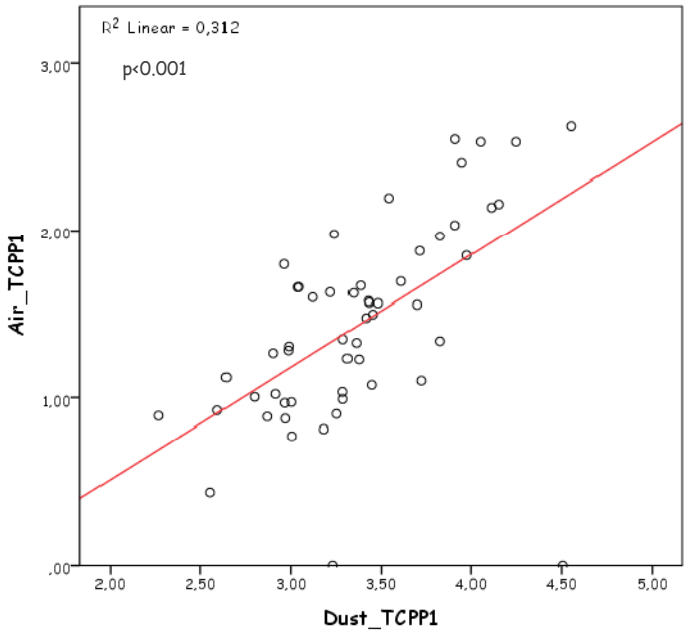
Dust units: ng/g

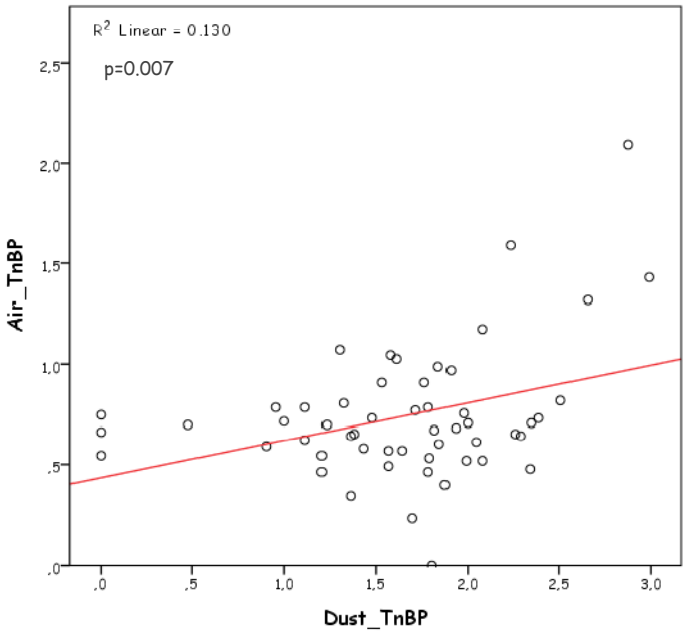
Log transformed data

SPSS v20



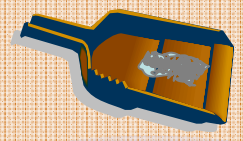






Indoor exposure

66 (6)



PBDEs Emerging FRs TAPs

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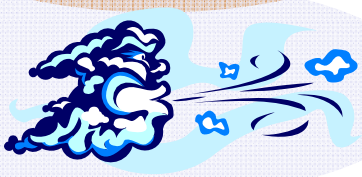

PBDEs Emerging FRs TAPs

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PBDEs Emerging FRs

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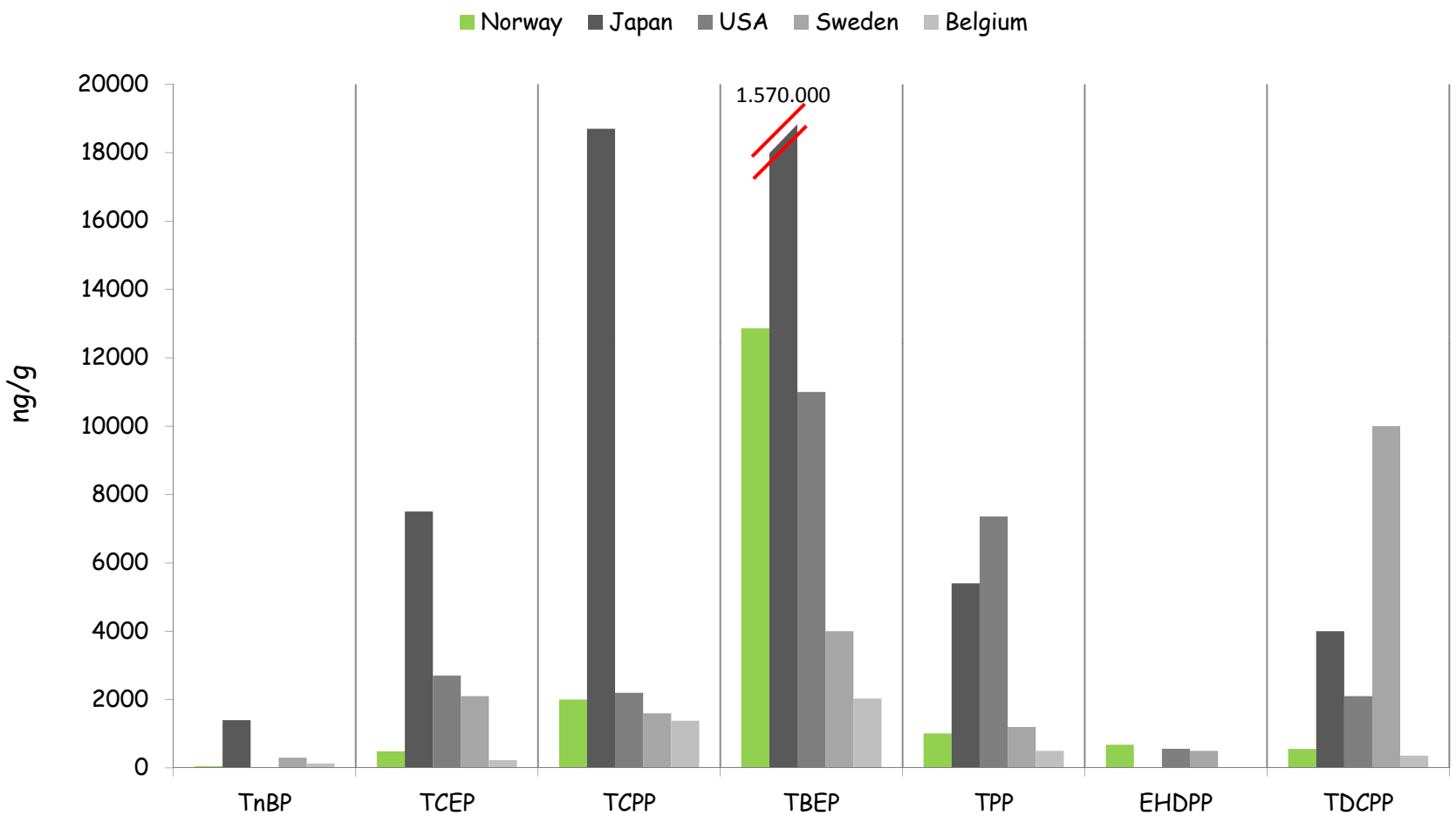
DAPs

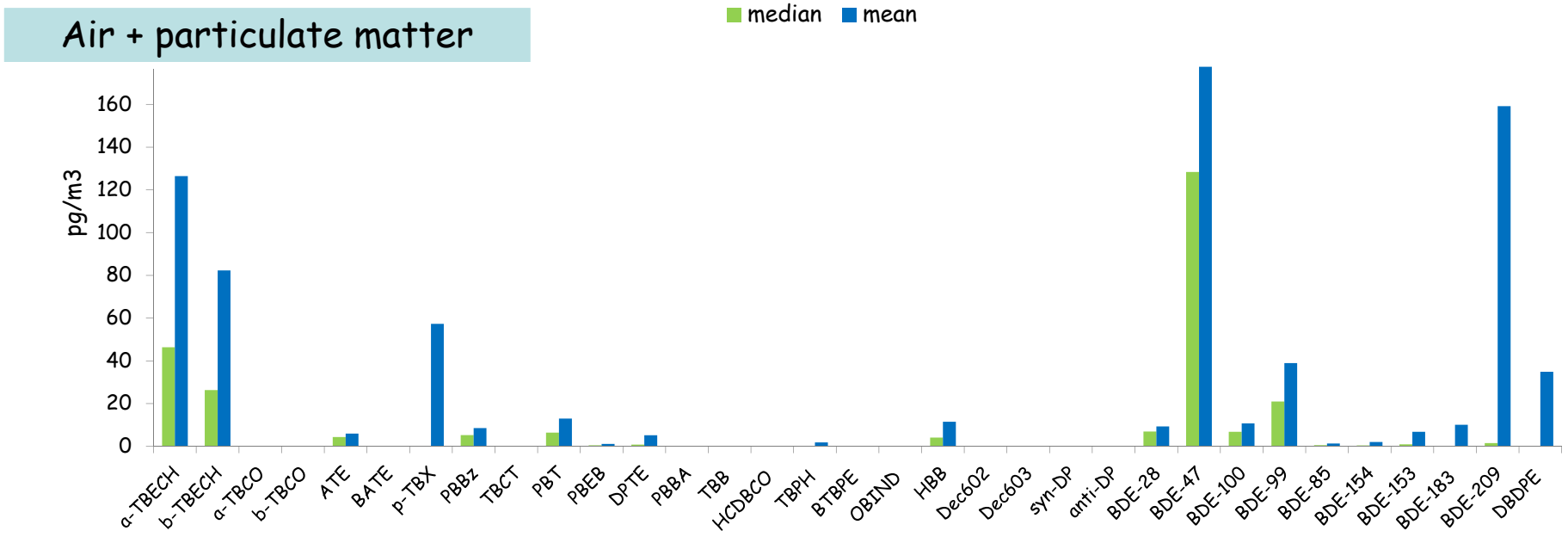
Country comparison of OPFRs in dust



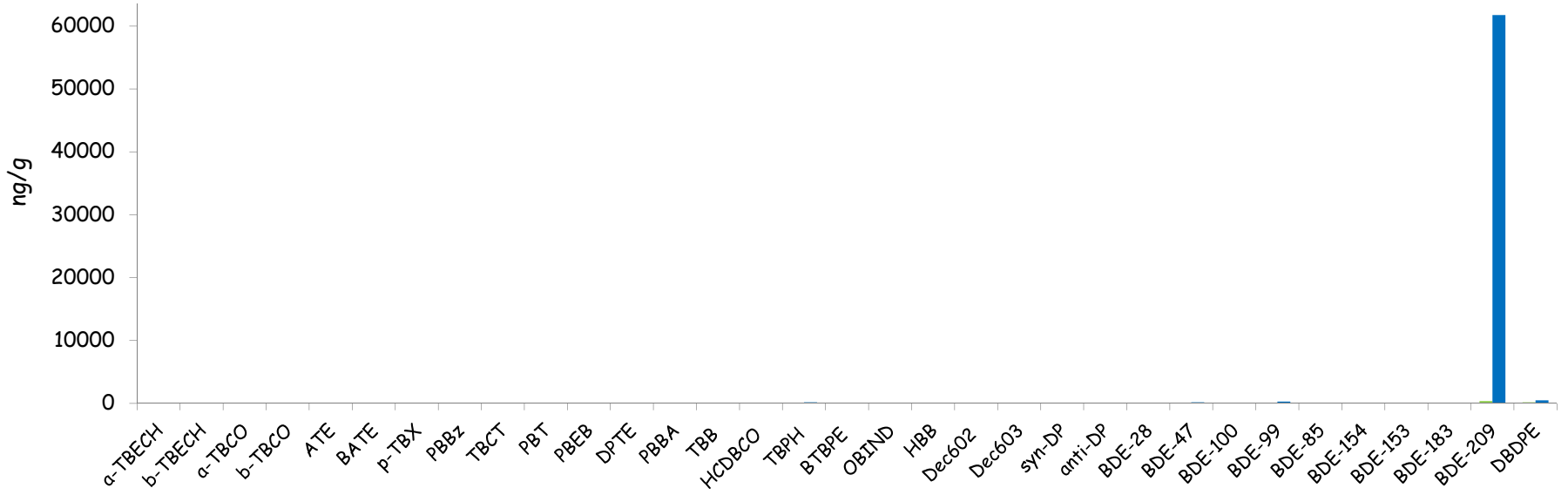
N. Van den Eede et al. Environ. Int. 37 (2011) 454-461
A. Kanazawa et al. Indoor air 20 (2010) 72-84
R.E. Dodson et al. Environ. Sci. Technol. 46 (2012) 13056-13066
C. Bergh et al. Indoor air 21 (2011) 67-76

PBDEs / emerging FRs in air and dust

Air + particulate matter

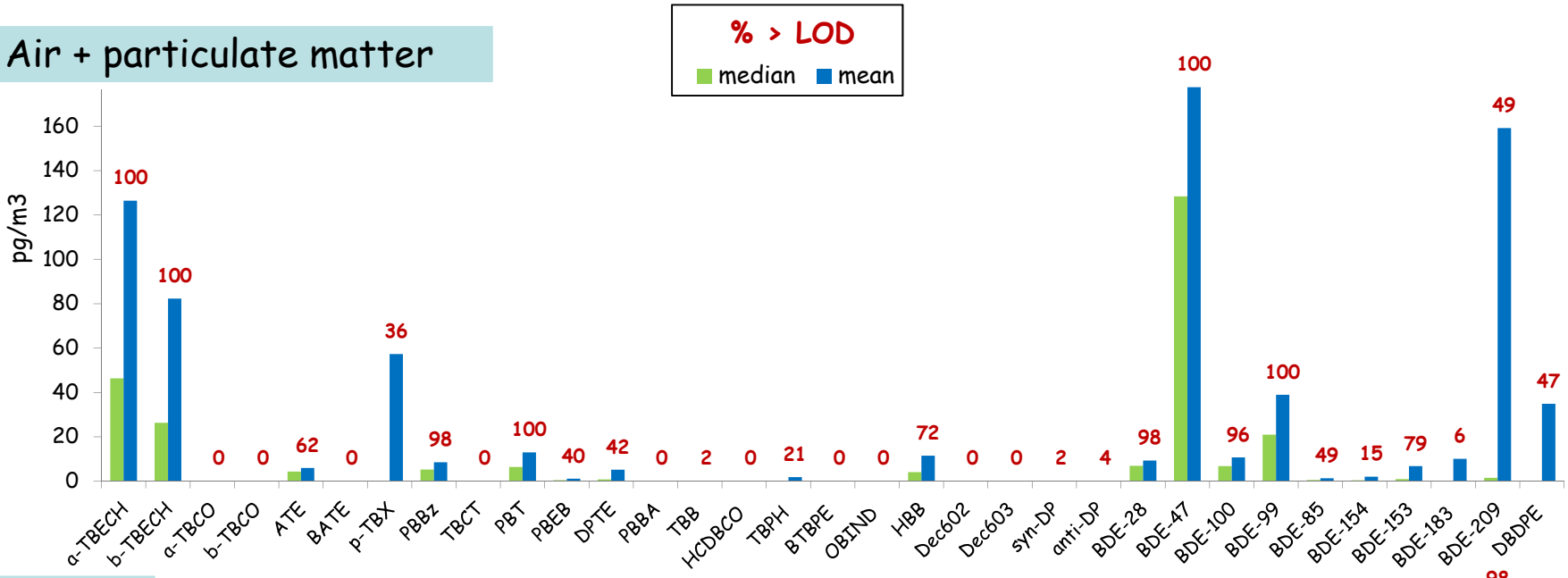


Dust

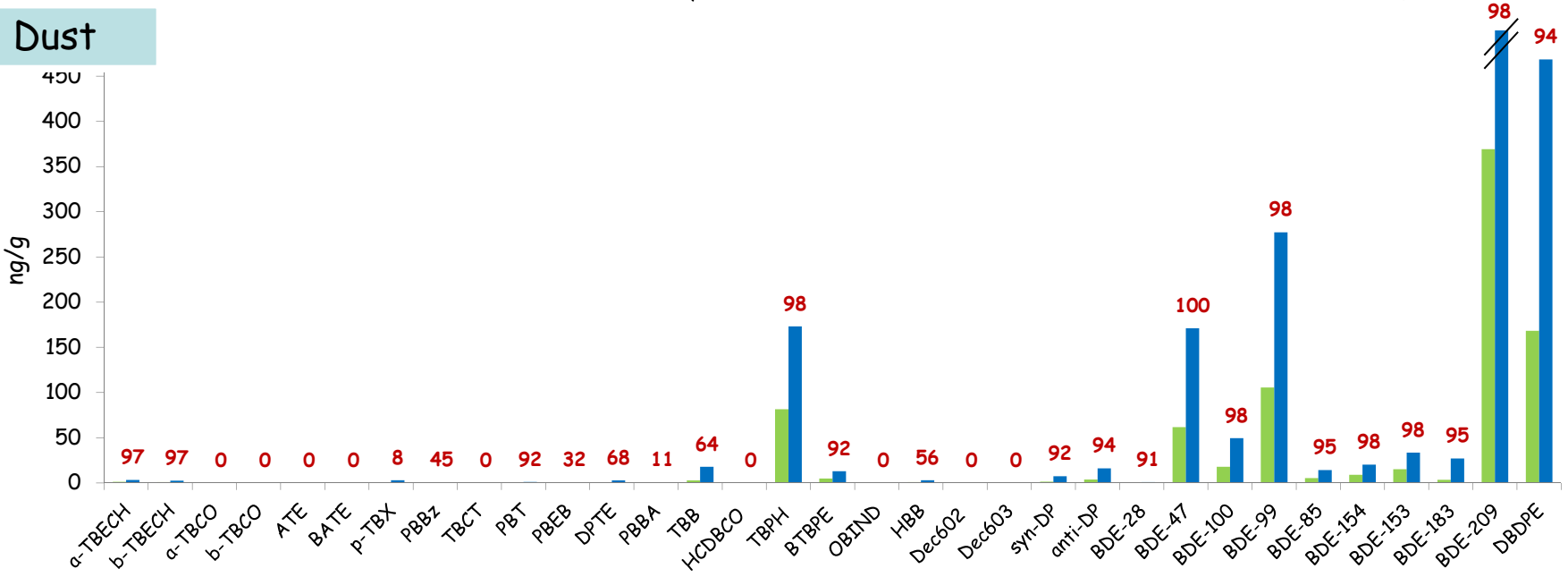


PBDEs / emerging FRs in air and dust

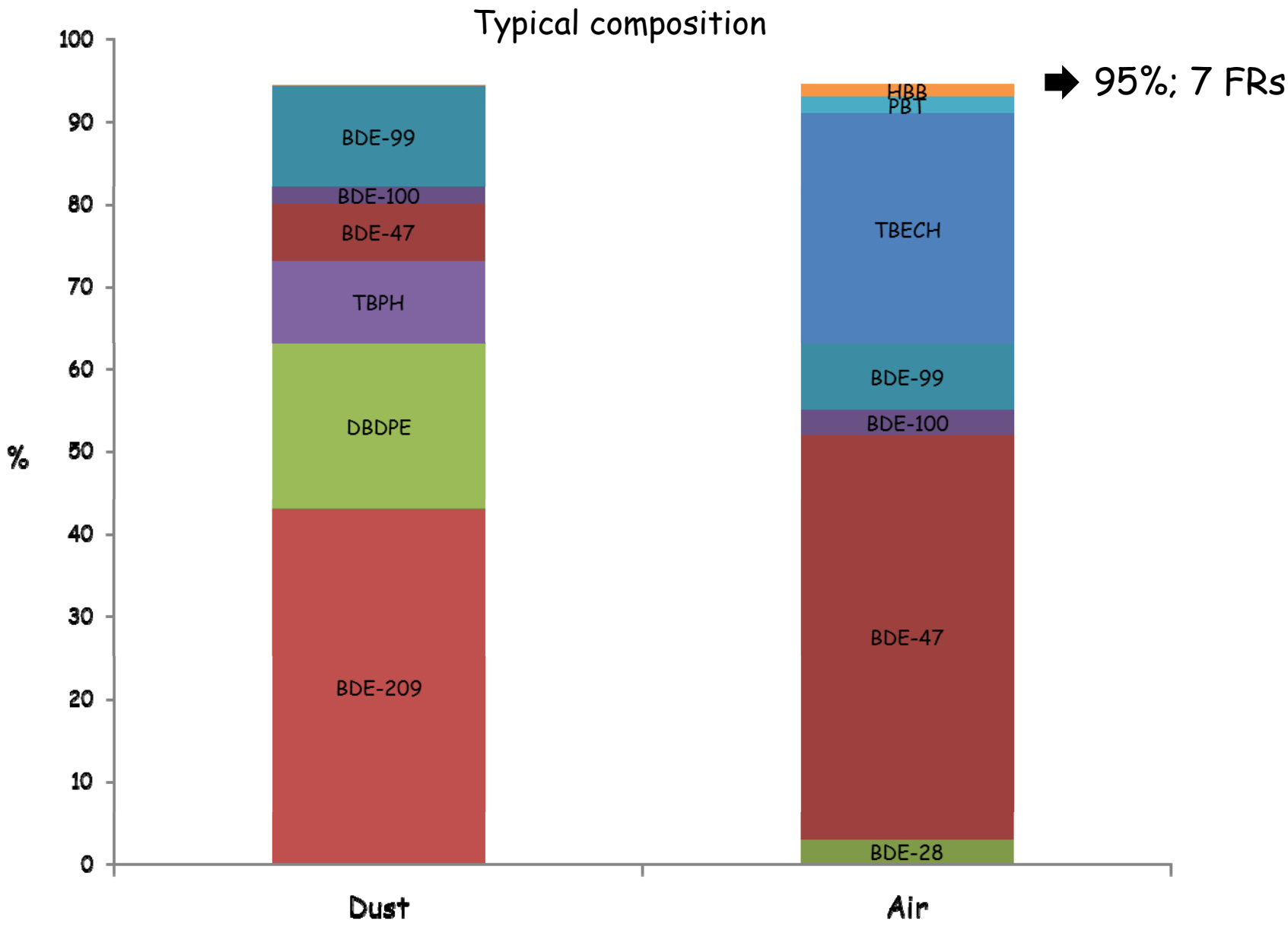
Air + particulate matter



Dust

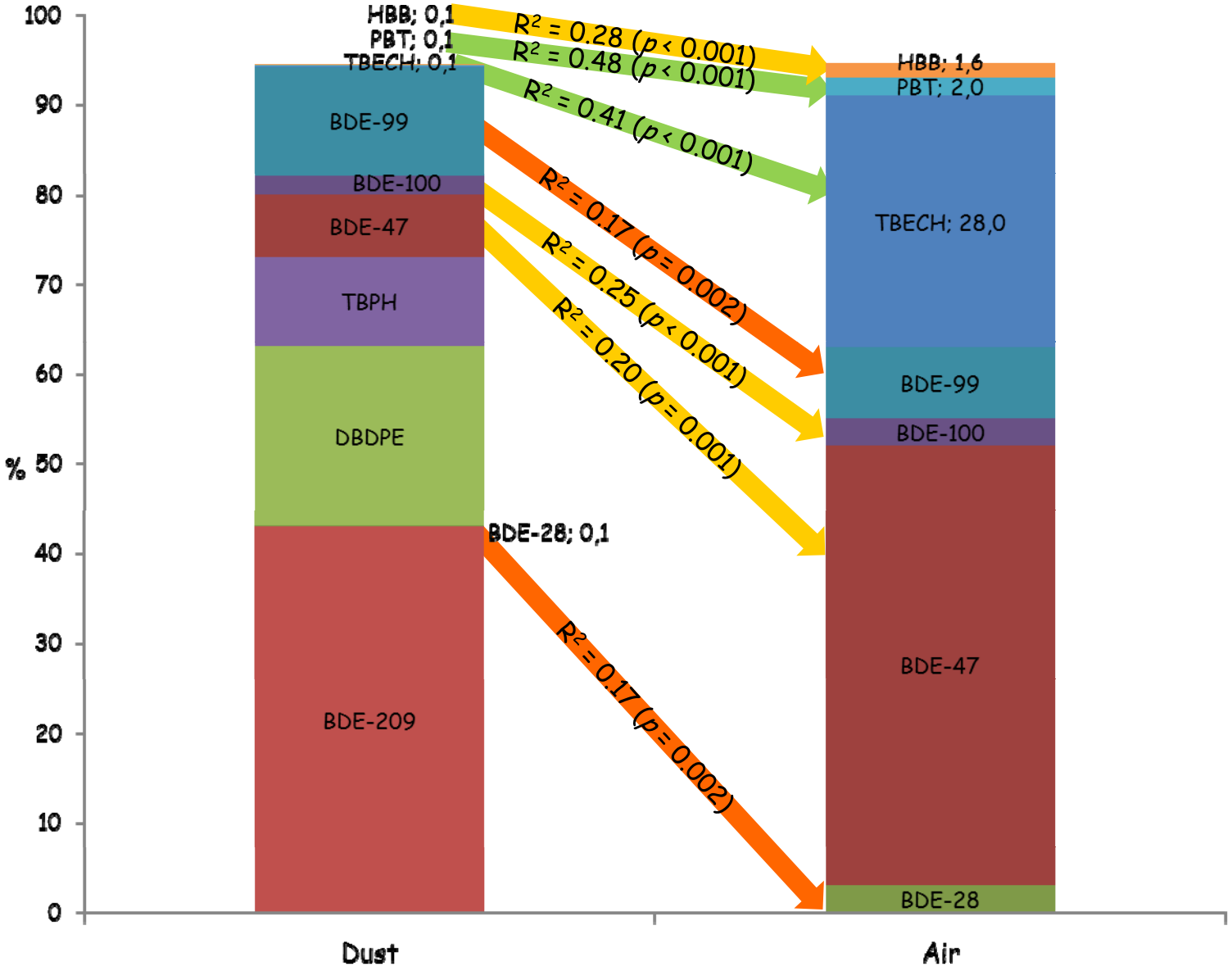


PBDEs / emerging FRs in air and dust



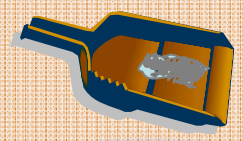
➡ 95%; 7 FRs

PBDEs / emerging FRs in air and dust



Indoor exposure

66 (6)



PBDEs Emerging FRs TAPs

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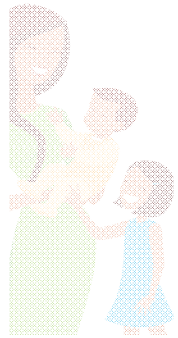
PBDEs Emerging FRs TAPs



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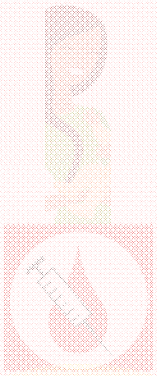

PBDEs Emerging FRs

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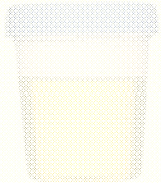
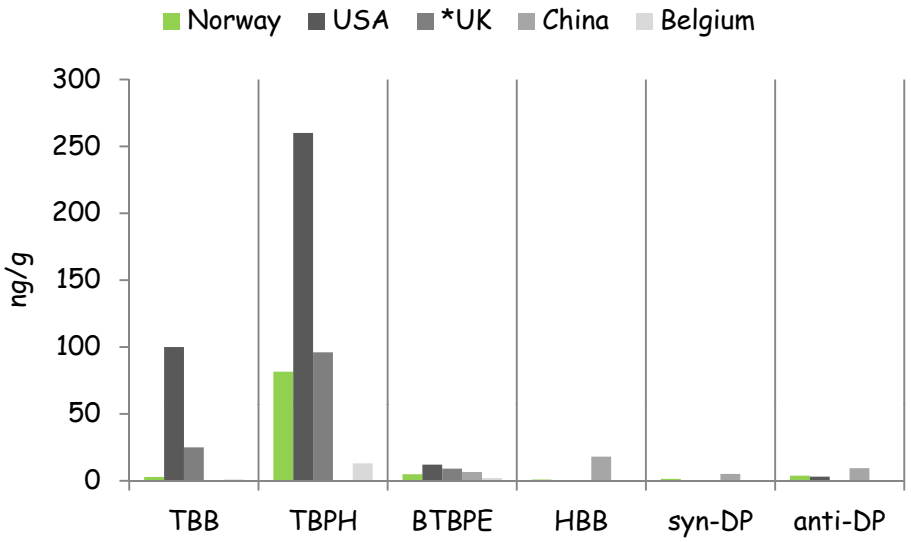
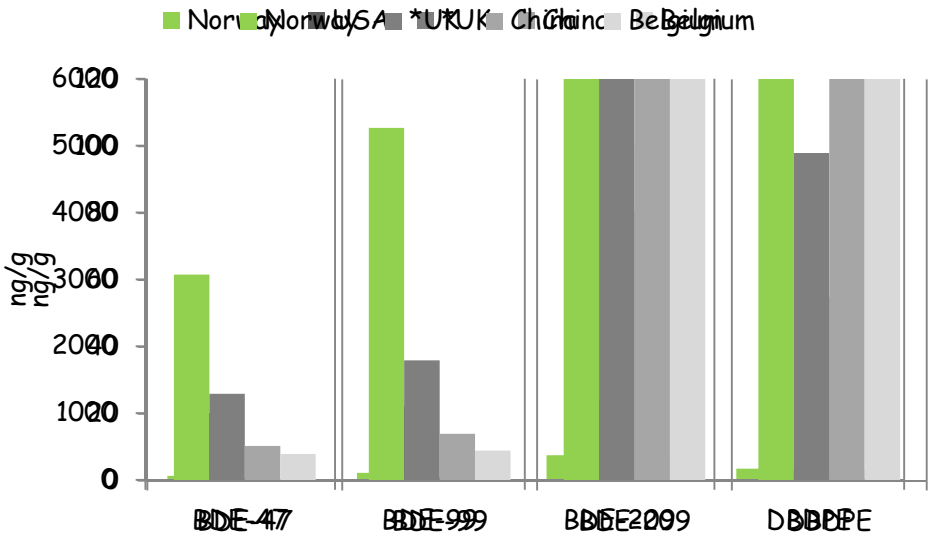


DAPs

Country comparison of PBDEs and emerging FRs in dust



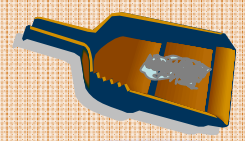
* Classrooms



J. Wang et al. Environ. Int.36 (2010) 535-541
J.Wang et al. Environ. Tox. Chemistry 30 (2011) 1965-1972
N. Ali et al. Chemosphere 83 (2011) 1360-1365
R.E. Dodson et al. Environ. Sci. Technol. 46 (2012) 13056-13066

Indoor exposure to flame retardants

66 (6)



53 (6)

PBDEs	Emerging FRs	TAPs
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PBDEs Emerging FRs

?

DAPs

FRs in air and dust

Take home messages:

◊ 95 % of the air composition of FRs can be predicted from dust concentrations

◊ OPFRs composition

Air	Chlorinated (80%)	> Alkyl (15%)	> Aryl (1%)
Dust	Alkyl (66%)	> Chlorinated (21%)	> Aryl (13%)

TBEP is the dominant OPFR, but their use in Norway is not among the highest

◊ PBDEs and emerging FRs composition

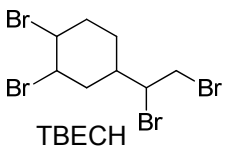
Air	PBDEs (64%)	> Others (36%)	> Dechloranes (0%)	> TBB/TBPH (0%)
Dust	PBDEs (69%)	> Others (20%)	> Dechloranes (1%)	> TBB/TBPH (10%)

High levels, although much lower than USA except BDE-209

DBDPE 90%

Moderately high

Structures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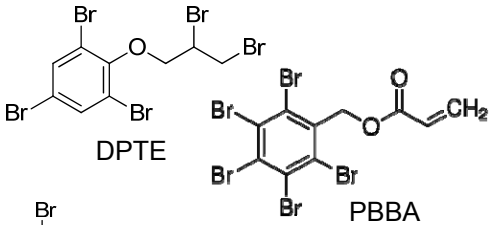
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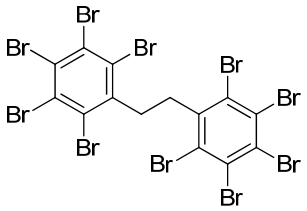
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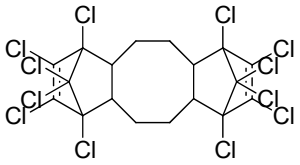
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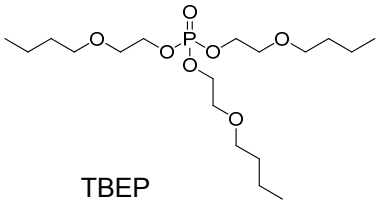
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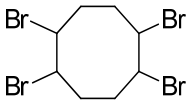
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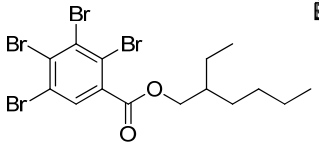
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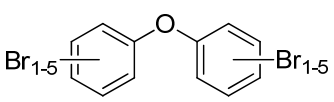
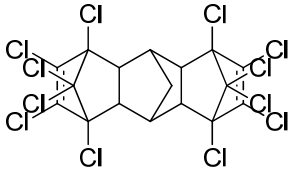

PBDEs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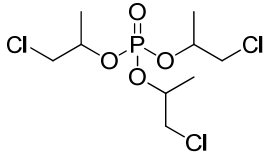
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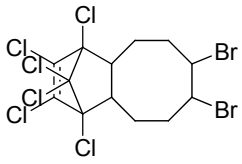
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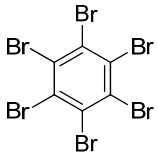
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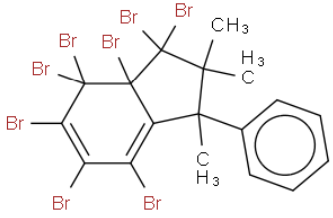
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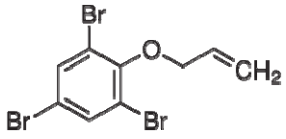
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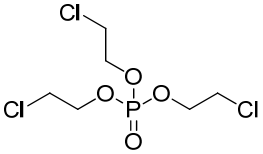
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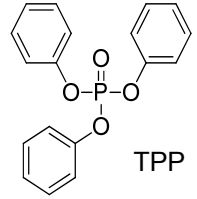
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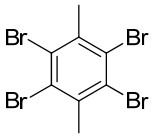
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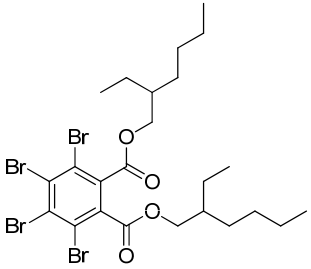
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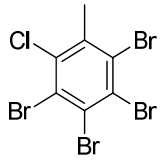
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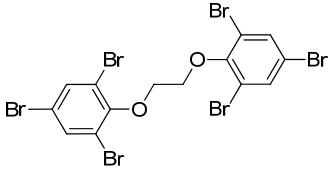
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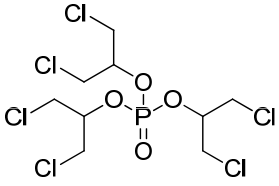
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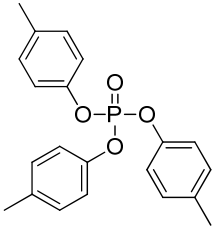

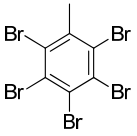
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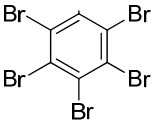
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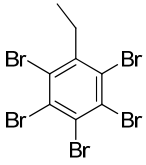
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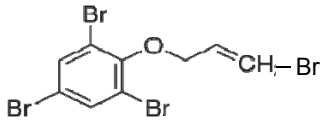
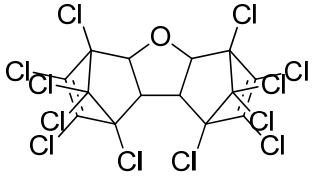
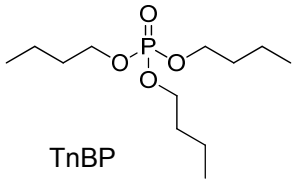
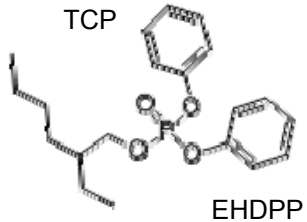

BATE


Dec602

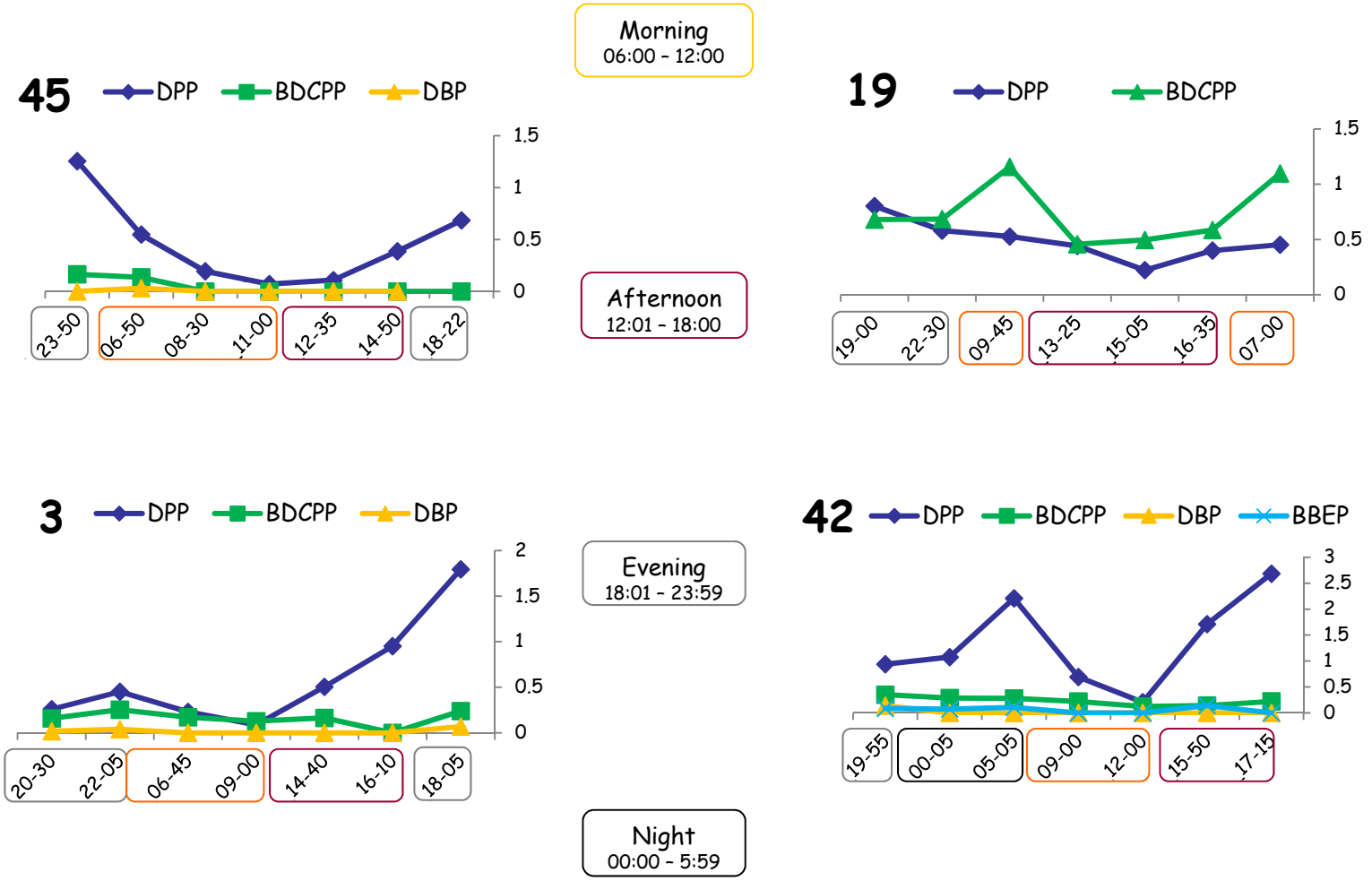

TnBP

TCP


EHDPP

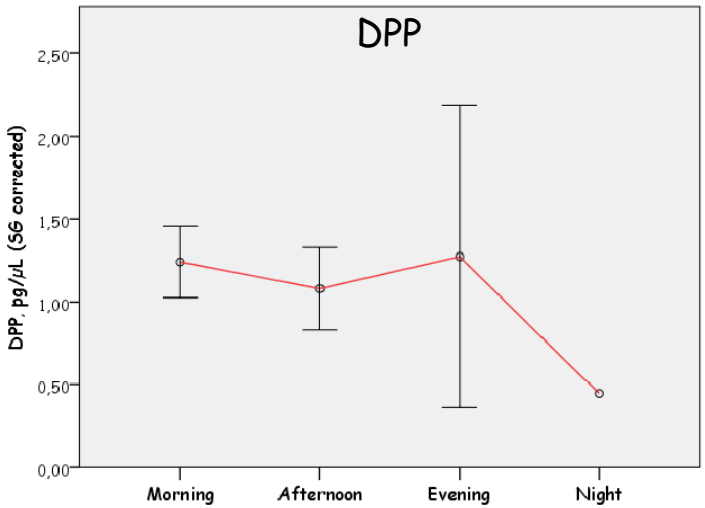
DAP in urine

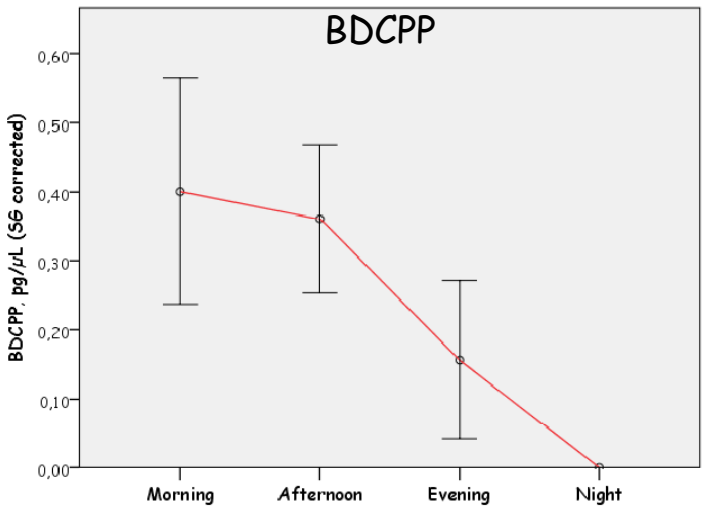
24 h urine collection (pg/µL)



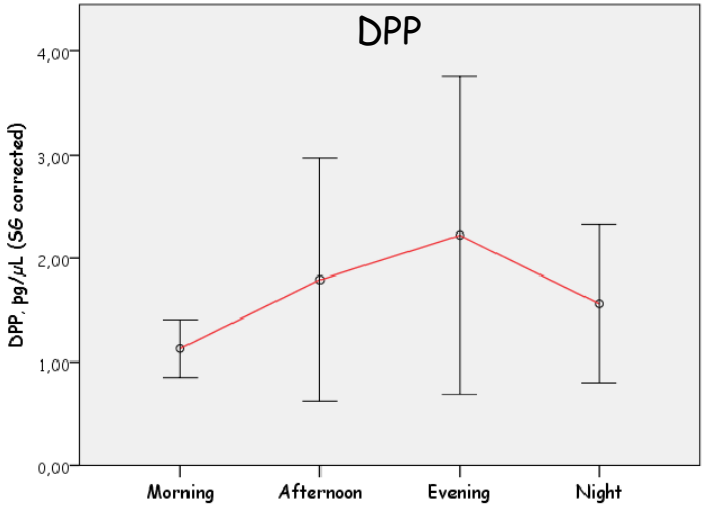
DAP in urine

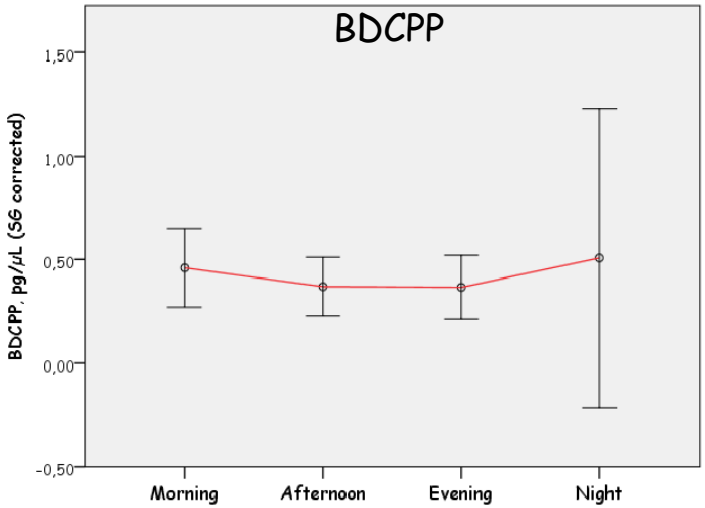
Children





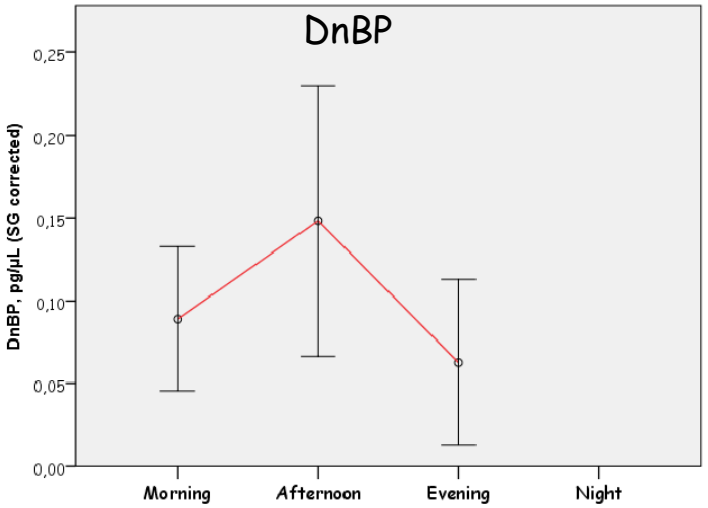
Mothers

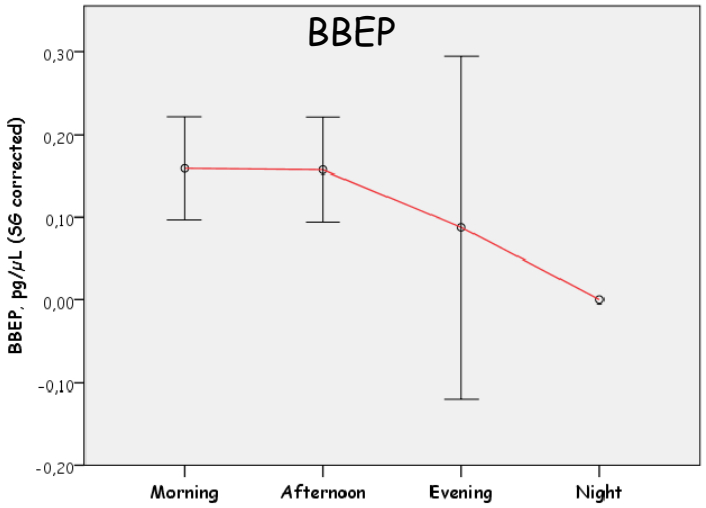




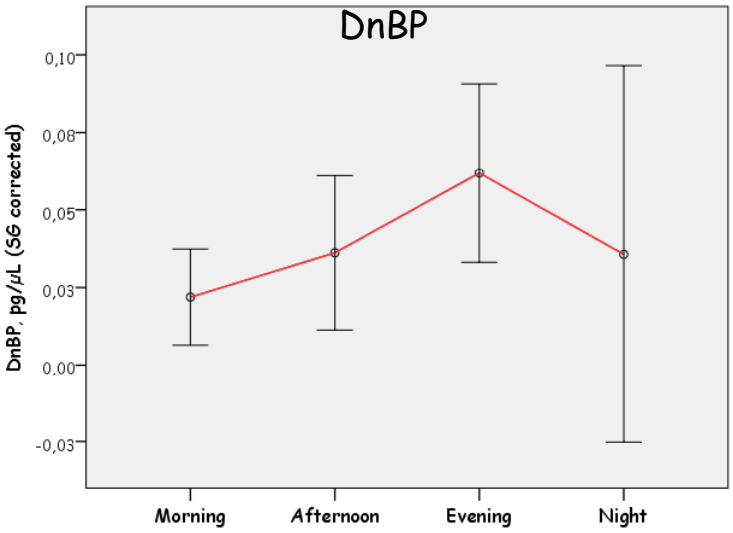
DAP in urine

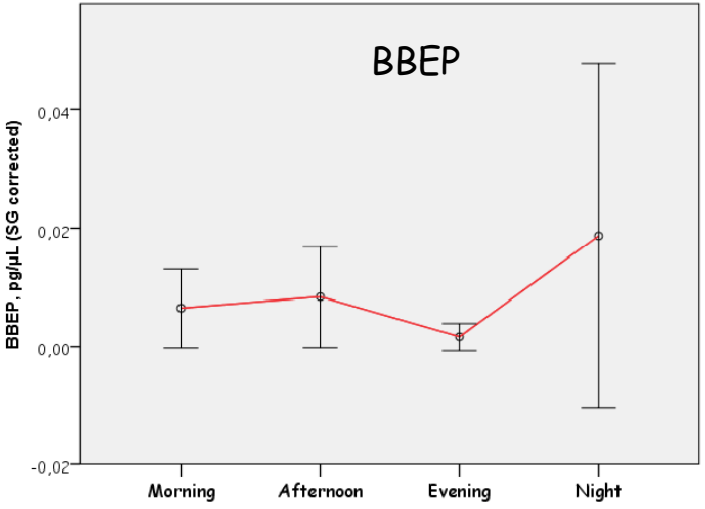
Children





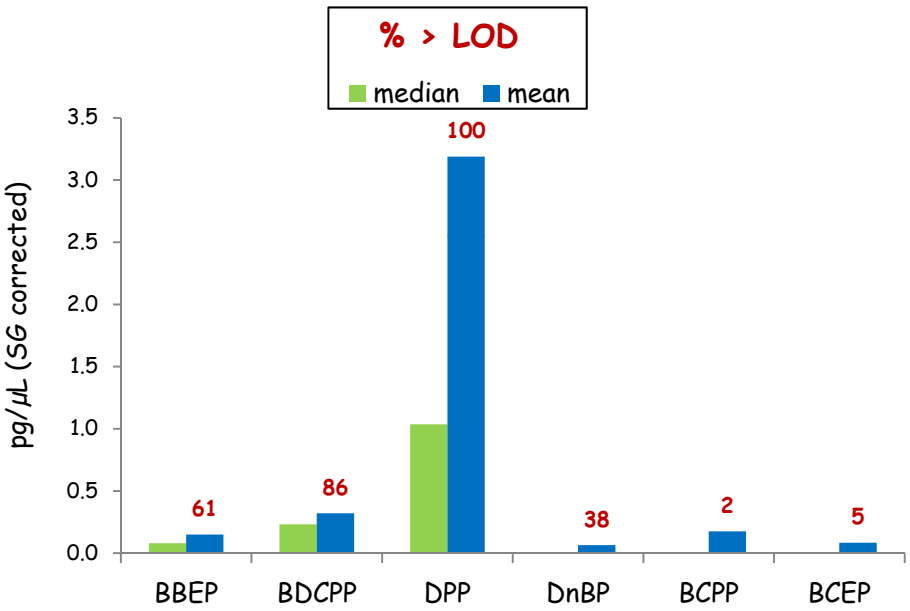
Mothers



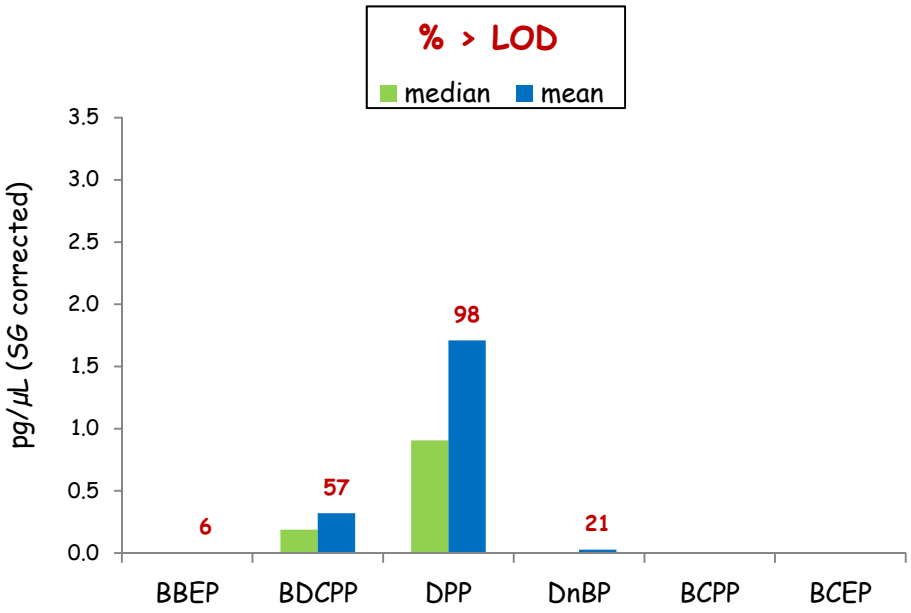


DAP in urine

Children



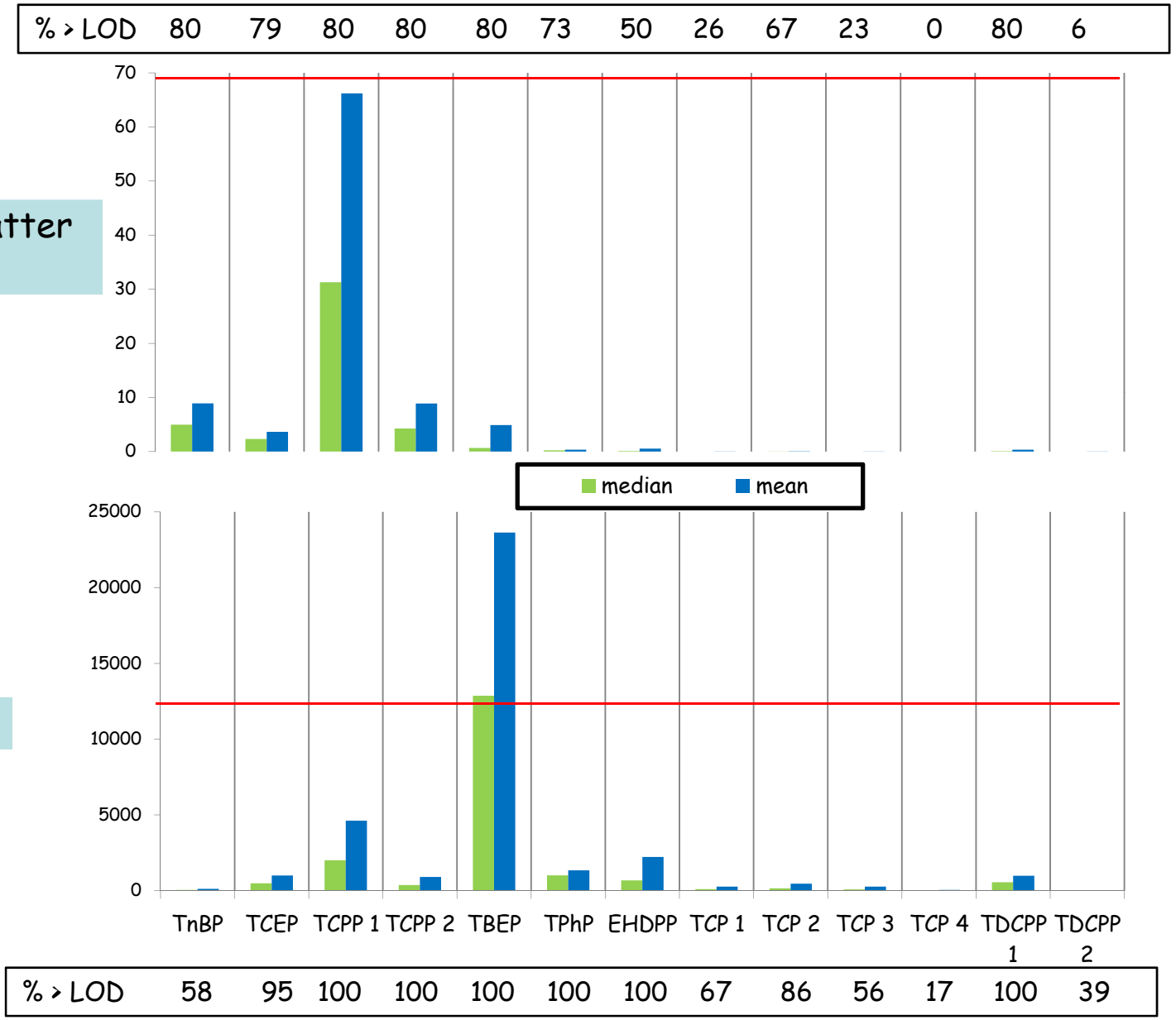
Mothers



Different patterns and levels of exposure

OPFRs in air and dust

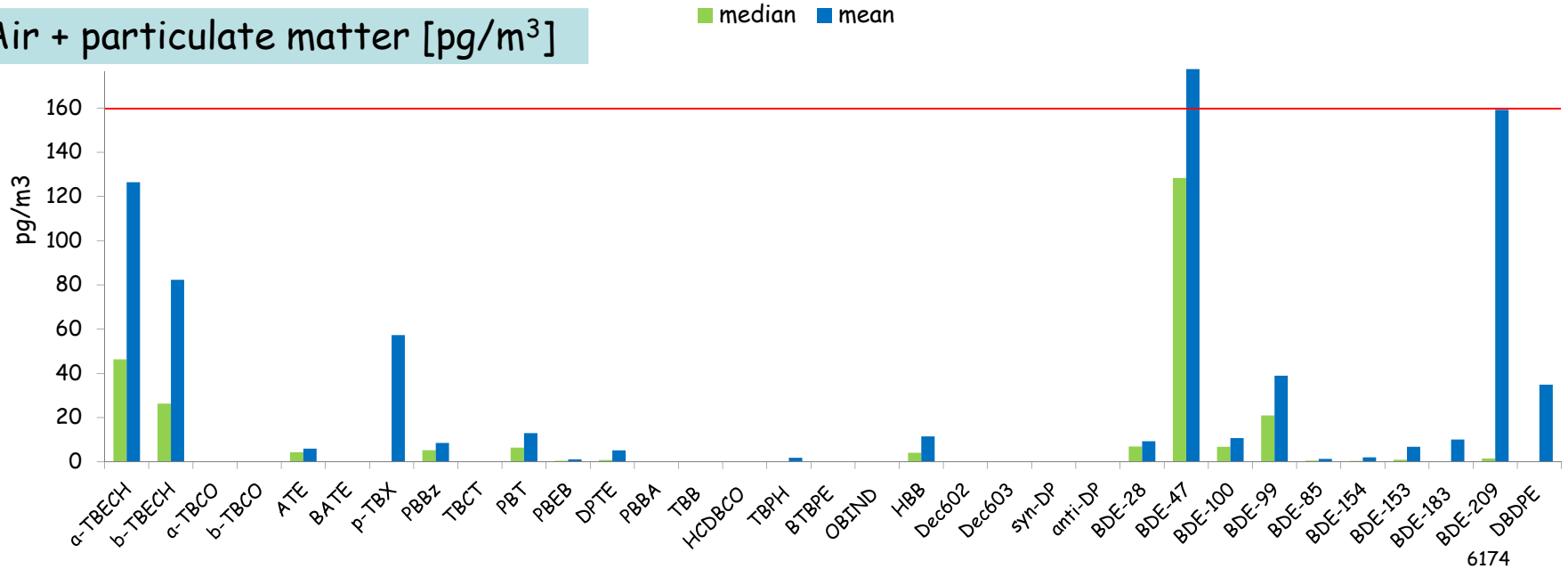
Air + Particulate matter [ng/m³]



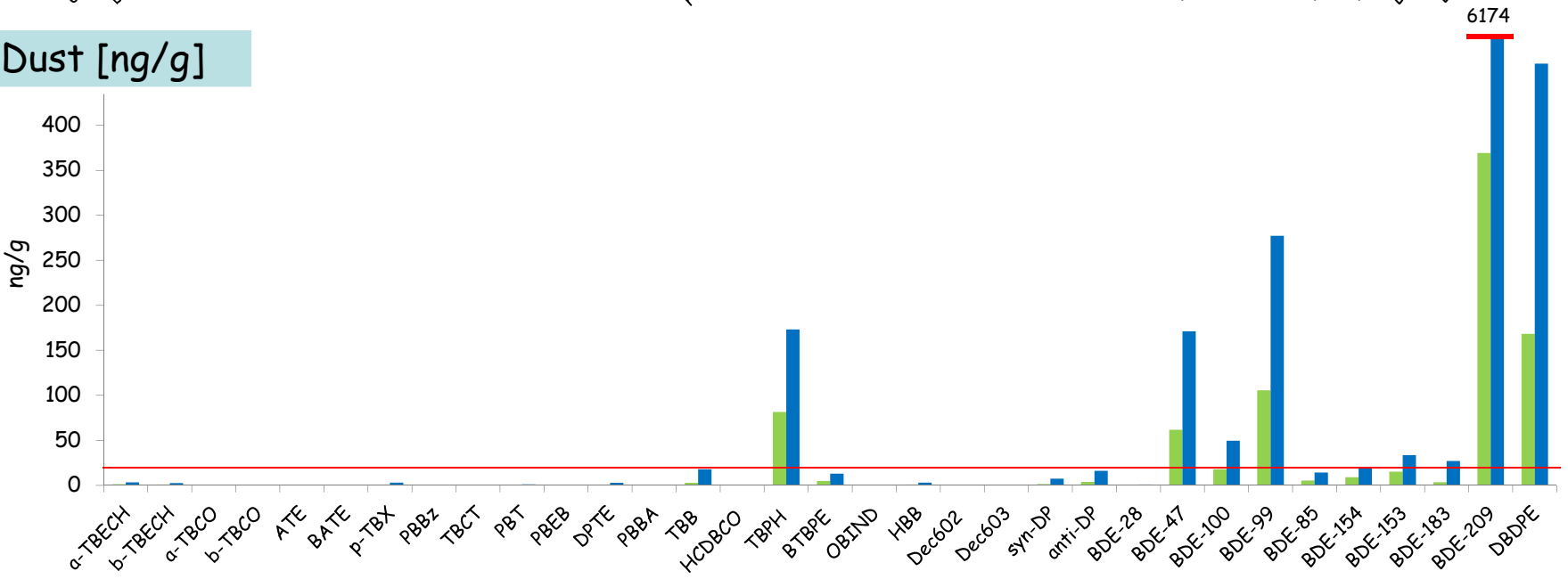
Dust [ng/g]

PBDEs / emerging FRs in air and dust

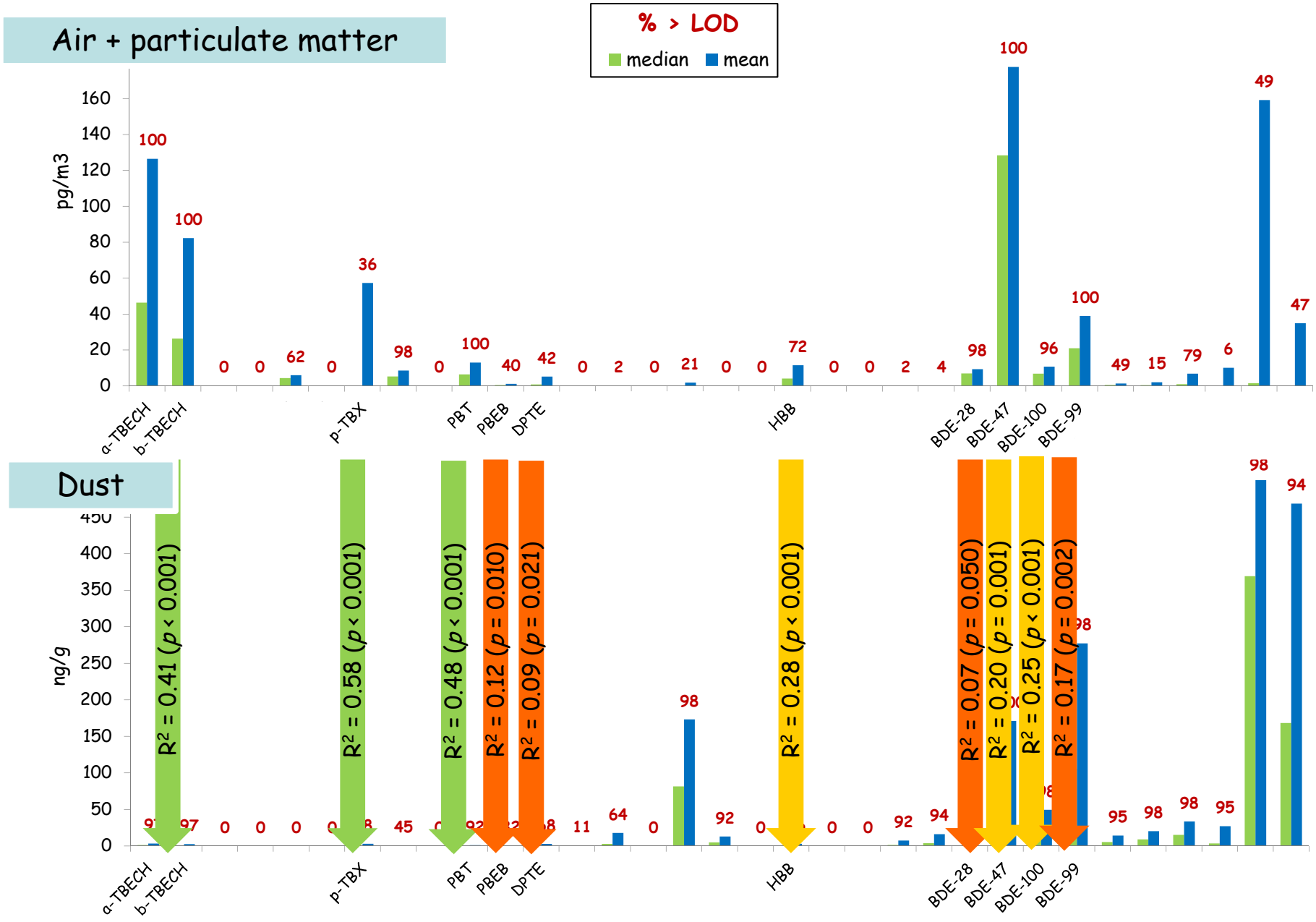
Air + particulate matter [pg/m^3]



Dust [ng/g]



PBDEs / emerging FRs in air and dust



Metabolisable FRs in urine

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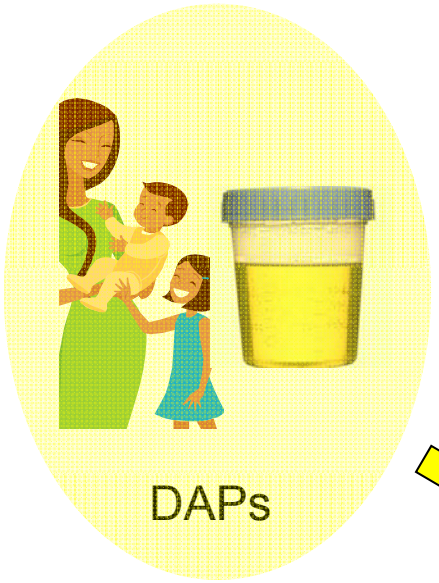
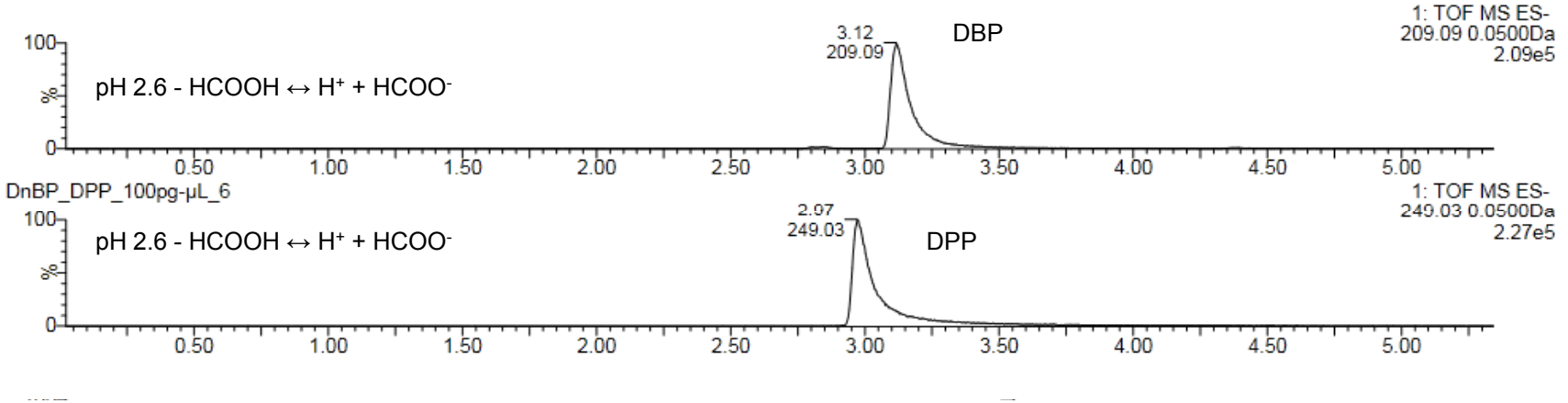


Oasis HLB Acquity BEH C18

LVI-SPE-UPLC Q-TOF (ESI-)

Chromatography – Buffer pH



Chromatography