

Estimating human exposure to perfluoroalkyl acids via solid food and drinks: implementation and comparison of different dietary assessment methods



ADVANCED TOOLS FOR EXPOSURE
ASSESSMENT AND BIOMONITORING

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Blir vi utsatt for miljøgifter fra innemiljøet?

Spørsmålsskjema for deltakere	
Personopplysning	
Navn	(Skriv etternavn og etternavn)
Adressen	Gate
Hvor mange personer bor i boligen?	
Med voksne	Med barn
Hvordan ofte støvsuges det? (Skriv ned alle rom)	
Dusjstøvsuger	Løst gulv
Hvor ofte har du støvet i boligen?	
Hvordan ofte støvsuges det? (Skriv ned alle rom)	
Hvor ofte er i boligen?	
Med	Uten
Er det noen spesielle ting i boligen?	
<input type="checkbox"/> Ja <input type="checkbox"/> Nei	
Hvordan vurderer du egen eksponering? (Skriv ned alle rom)	
Deltaker <input type="checkbox"/> Støvsuger <input type="checkbox"/> Vakkelegg <input type="checkbox"/> Støvsuger <input type="checkbox"/>	



- FFQ
- weighted food diary
- Questionnaire; life style and indoor environment
- Research coll. house dust
- Stationary air samples
- Vacuum cleaner bag
- Personal air samples
- Duplicate diet samples
- Blood
- Blod spot
- Urine
- Hair
- Saliva
- Hand wipes

Methods

2-day weighted food diaries

- weigh and record all items consumed during the two days

1-day duplicate diet study

- collect a duplicate portion of all consumed foods and drinks, prepared as for consumption

Food Frequency Questionnaire (FFQ)

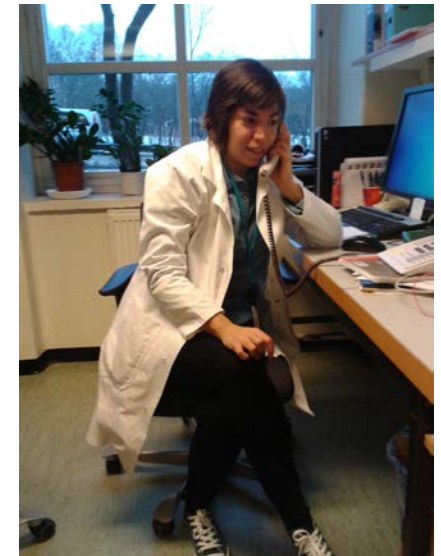
- report average frequency of intake of 255 food items for the last year



Detailed instructions

PFAA determinations in duplicate diet samples

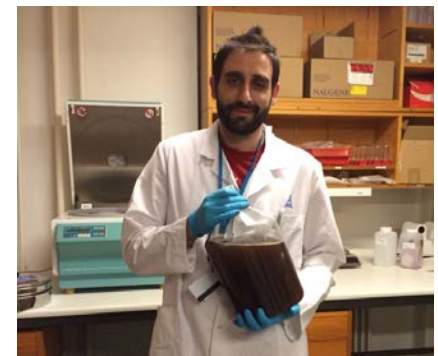
- Determinations performed by Eleni Papadopoulou (post doc) and Somrutai Poothong (PhD student) during a stay at VU Amsterdam
- Method; Ballesteros-Gomez et al. (2010) with slight modifications
- Solid food and liquid food analysed separately



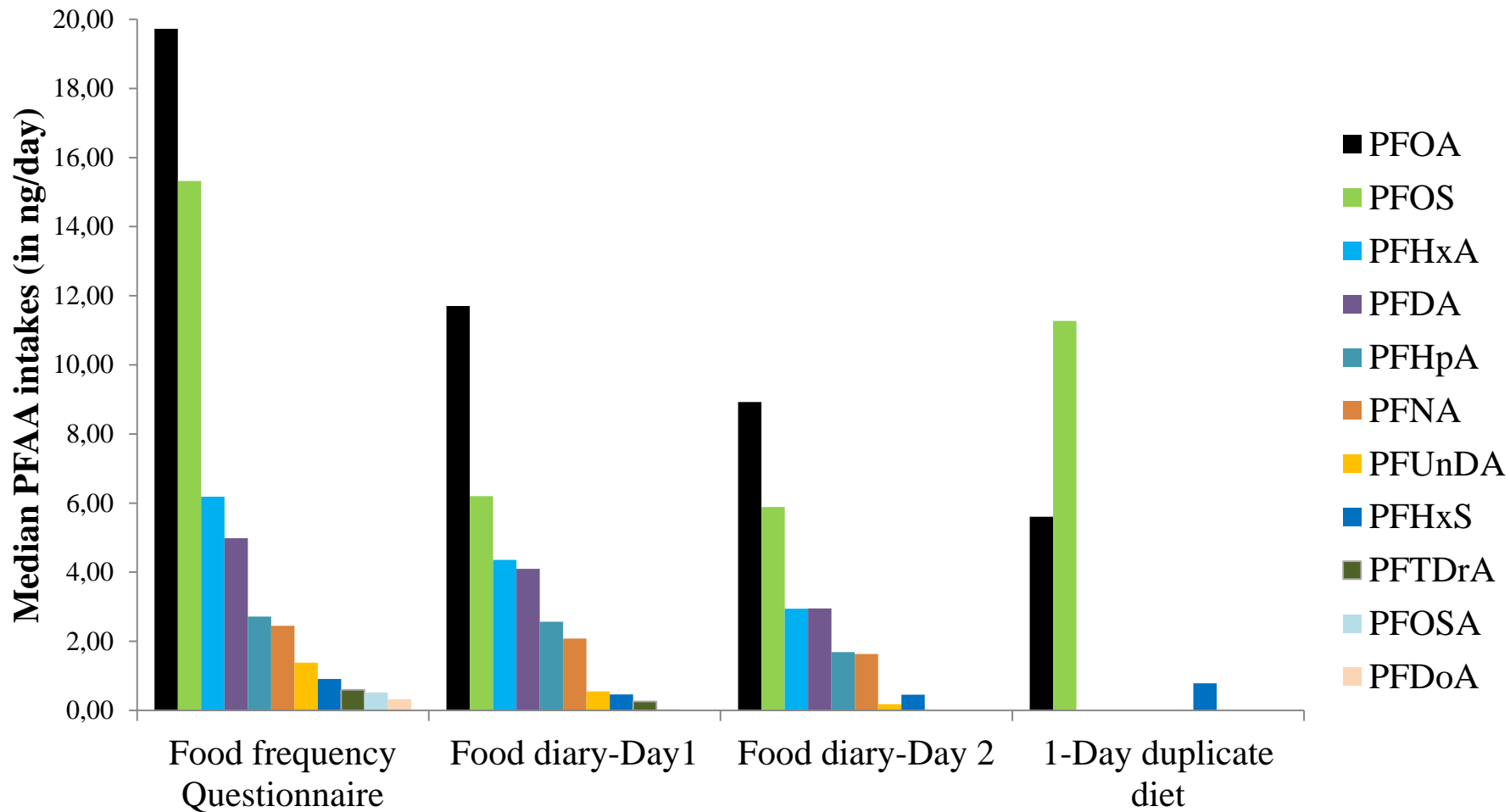
PFAA concentrations in duplicate diets

pg/g sample	Solid foods			Liquid foods	
	PFOA	PFHxS	PFOS	PFOA	PFOS
Detects (n)	43	40	54	54	35
%DF	71	66	89	89	57
Min	0	0	0	0	0
P25	0	0	2.2	0.34	0
Median	3.8	0.88	13	0.59	0.06
P75	6.3	3.0	41	1.3	0.41
Max	87	100	2,005	38	51

Solid: 270-1841 g
 Liquid: 540-4030 g



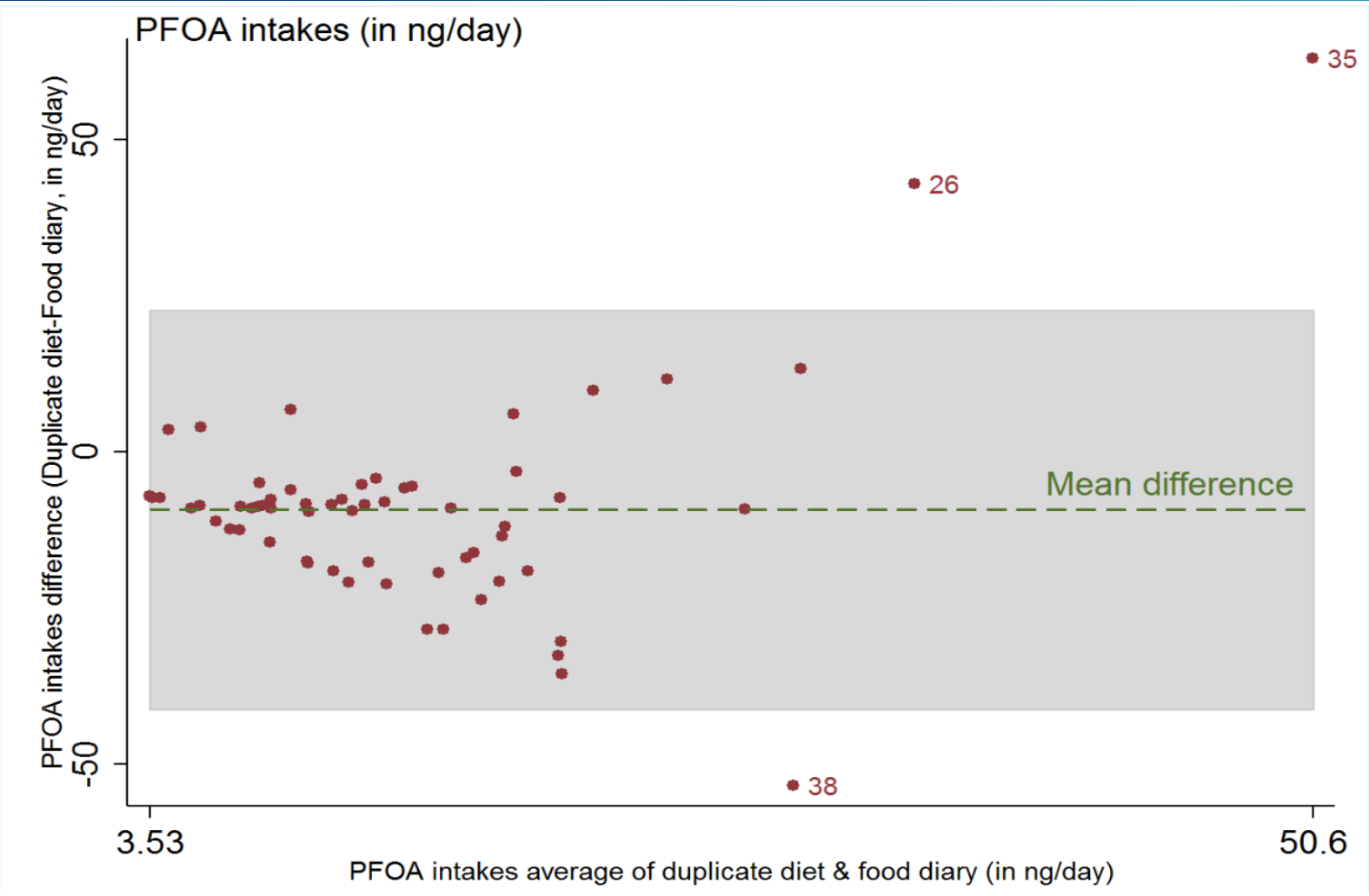
PFAA intakes



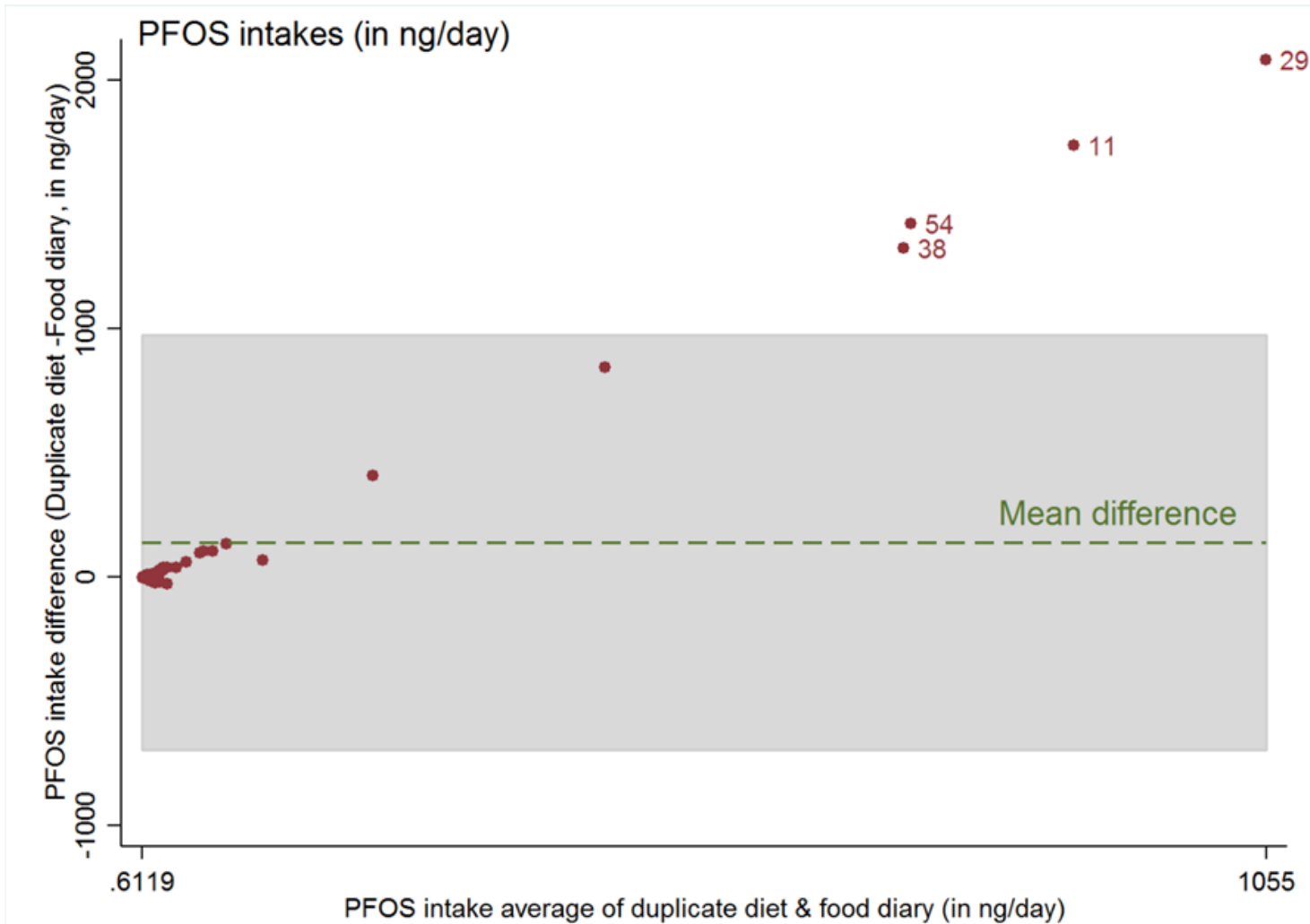
Correlations

	1-Day duplicate diet
	rho (p-value)
Food diary-Day1	
Solid foods	
PFOA	0.12 (0.345)
PFOS	0.27 (0.038)
PFHxS	0.03 (0.827)
Liquid foods	
PFOA	0.34 (0.008)
PFOS	0.13 (0.314)
Total intakes	
PFOA	0.21 (0.108)
PFOS	0.26 (0.041)
Food frequency questionnaire	
PFOA	0.25 (0.055)
PFOS	0.09 (0.489)
PFHxS	0.07 (0.576)

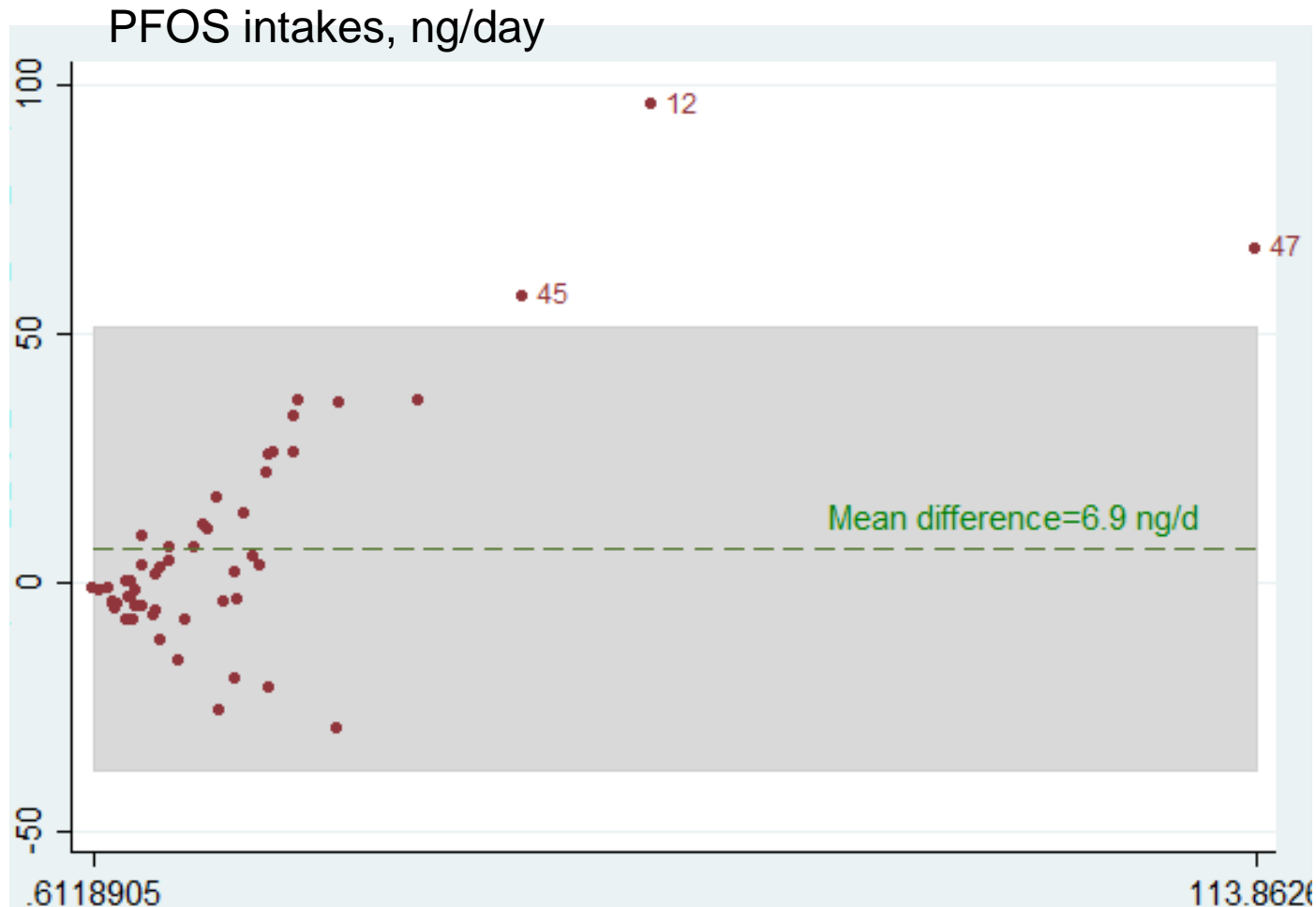
Agreement; duplicate diet vs food diary



Agreement; duplicate diet vs food diary



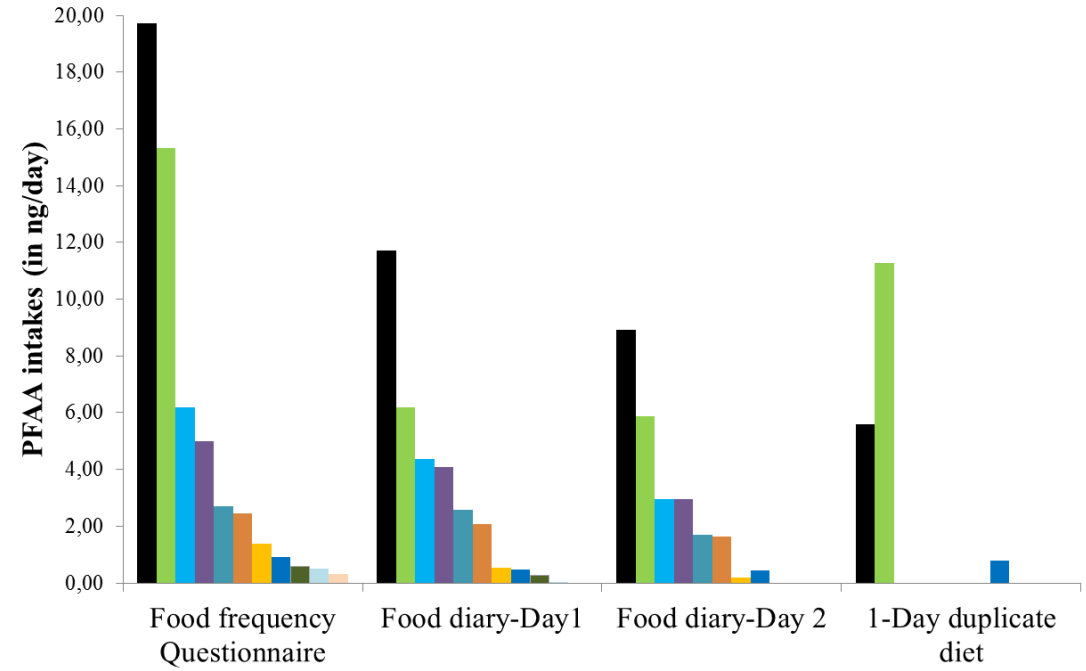
Agreement; duplicate diet vs food diary



Discussion

PFOS and PFOA intakes derived from duplicate diet samples were significantly different to the intakes derived using the other methods

However;
 all three median values are similar to recent reports from European countries

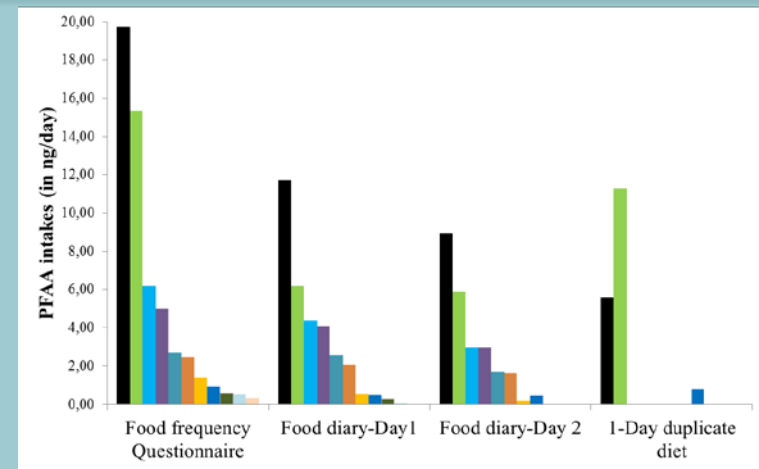


Comparability between methods

consumption

Duplicate diet:

- Consumption; accurate but short time frame
- Levels; accurate and incorporate cooking/storing
- Analysis challenging
- Burdensome collection



Food diary:

- Consumption: Accurate but short time frame
- Levels: not the consumed food but general levels
- Burdensome registration, and need of data to construct database

FFQ:

- Habitual food intakes, average food consumption over a 1-year and include rarely consumed foods
- Levels: not consumed food but general levels
- Need of data to construct database

levels

Conclusion

- We observed a good agreement between the different methods
- The available analytical data for food samples can substantially affect the estimated intakes
- The choice of method to assess dietary exposure to PFAA depends on the aim of the study, as well as practical and financial aspects – but all are feasible

Acknowledgement

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Reference

Papadopoulou E, Poothong S, Koekkoek, Lucattini L, Padilla-Sánchez JA, Haugen M, Herzke D, Valdersnes S, Maage A, Cousins IT, Leonards PEG, Haug LS. *Estimating human exposure to perfluoroalkyl acids via solid food and drinks: implementation and comparison of different dietary assessment methods*. Accepted for publication in Environmental Research last week.