

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 Line Småstuen Haug ICCE, 21st of June 2017





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A-TEAM

Silverbiseinstitutte Bir vi utsatt for miljogiter fra innemijoet? Searenigens traditaise Autoricut Marine Mari		
		• Blood
kurda umrei tagen big i bet und de can jasted tagenty ≧ Belank ⊒ ist¢nuj ⊒ figuendeΩ	 Research coll. house dust 	 Blod spot
• FFQ	 Stationary air samples 	• Urine
 weighted food diar 	 Vacuum cleaner bag 	• Hair
 Questionnaire; life 	 Personal air samples 	 Saliva
style and indoor environment	Duplicate diet samples	 Hand wipes

• 61 Norwegian adults (74% women), average age: 42 years







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











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

rig sample		Solid foods	Liquid foods				
p919	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











Database on PFAS concentrations in food

			PFH	ΙхA	PFHpA	PFO	DA	PFNA	PFDA	PFUdA	PFDoA	PFTrDA	PFOSA	PFHx	s	PF	20
FOOD GROUP	N of samples (<lod)< th=""><th>Source</th><th>LB</th><th>UB</th><th>LB UB</th><th>LB</th><th>UB</th><th>LB UB</th><th>LB UB</th><th>LB UB</th><th>LB UB</th><th>LB UB</th><th>LB UB</th><th>LBL</th><th>JB</th><th>LB</th><th>UB</th></lod)<>	Source	LB	UB	LB UB	LB	UB	LB UB	LB UB	LB UB	LB UB	LB UB	LB UB	LBL	JB	LB	UB
WHEAT (WHITE)	1 pool of 13 (11/11 PFASs (LOD)	PERFOOD	0	0,02	0 0,02	0 0000	0,02	0 0,02	0 0,02	0 0,02	0 0,02	0 0,04	0 0,04	0 0	0,01	0	0,004
HONEY	1 pool of 17 (10/10 PEASs (LOD)	PERFOOD	0	0,002	0 0,004	0,0020	0,0020	0 0,001	0 0,004	0 0,015	0 0,001	0 0,001	NA NA	00	0.004	. 0	0,002
LETTLICE (OB SALAD) *	1 pool of 13 (3/11 PEASs (LOD) & 1 pool of 3 (3/11 PEASs (LOD)	PERFOOD & Haug LS, et al.	0.01	0.0165	0.0002_0.0312	0.0053	0.0053	0.0.005	0.0004_0.0128	0 0.0042	0.0007 0.0042	0.0003	0.0.005	0.0	1.003	0.0001	0.0046
SPINACHES	1 pool of 4 (3/11 PFASs (LOD)	PERFOOD	0.03	0.0345											0.01	0,0001	0.002
CHICORY	1 sample (9/11 PFASs <lod)< td=""><td>PERFOOD</td><td></td><td></td><td>106</td><td>0.0002</td><td>0.02</td><td>0,0217 0,0217</td><td>0 0,025</td><td>0,007</td><td></td><td>0 0,009</td><td>0 0,005</td><td></td><td>0,006</td><td>0</td><td>0,009</td></lod)<>	PERFOOD			1 06	0.0002	0.02	0,0217 0,0217	0 0,025	0,007		0 0,009	0 0,005		0,006	0	0,009
ASPARAGUS	1 pool of 3 (3/11 PFASs (LOD)	PERFOOD	0,01	0,0458	0,0,0	0 116	Q 16	0.0003		0 0.007	0,007	0 0,003	0 0,005		0,006	0	0,009
FENNEL	1 pool of 2 (8/11 PFASs <lod)< td=""><td>PERFOOD</td><td></td><td>0,01</td><td>0.0835 0,0 99</td><td>291</td><td>0291</td><td>0,0122-0,0122</td><td>0 02</td><td>0.02</td><td>0 0,007</td><td>0 0,009</td><td></td><td></td><td>0,006</td><td>0</td><td>0,009</td></lod)<>	PERFOOD		0,01	0.0835 0,0 99	291	0291	0,0122-0,0122	0 02	0.02	0 0,007	0 0,009			0,006	0	0,009
CARROTS *	1 pool of 9 (9/11 PFASs (LOD) & 1 pool of 3 (7/9 PFASs (LOD)	PERFOOD & Houg L.S. et al	0,006	0,0057	0 ,0.4	0,0157	4,0 57		0,012	0,048	0,0047	0 0,0045			0,0031	0,0003	0,0048
TOMATOES	1 pool of 10 (3/11 PFASs (LOD)	PERFOOD	0,012	0,0121	0 0,062	0,0032	0,0032	0 0,009	0 0,025	0 0,007	0 0,007				0,006	0	0,009
CAULIFLOWERS	1 pool of 3 (10/11 PFASs (LOD)	PERFOOD	0,010	0,0104				0 0,009	0 0,025 -	0 0,007		0 0,009			0,006	0	0,009
CADDAGES CUCUMBEDS	1 pool of 3 (10/11 PF ASS (LOD)	PERFOUD	0,010		0 0,062	0,0041	0.003	0 0,003				0 0,003			1,006	0	0,009
CULTIVATED MUSHBOOMS	1 pool of 5 (10/11 PEASs (LOD)	PERFOOD	0.010	0.0.01	0 0.062	A 0		0 0.003	0 0.025	0.007	0 0.00	0 0003			1.006	ő	0,000
PEPPERS	1 pool of 10 (10/11 PFASs <lod)< td=""><td>PERFOOD</td><td></td><td>0.01</td><td>1 77</td><td>0.000</td><td>0107</td><td>0100</td><td>rht</td><td></td><td>00</td><td>1100</td><td>110</td><td></td><td>0.006</td><td>Ŭ,</td><td>0.009</td></lod)<>	PERFOOD		0.01	1 77	0.000	0107	0100	rht		00	1100	110		0.006	Ŭ,	0.009
PEAS	1 pool of 3 (10/11 PFASs (LOD)	PERFOOD		0,01	0 0 22	0,083	0,0	0 .00	J 0 .03	0 027	.001	0 0 00	0 ,00	0.0	0,006	0	0,009
BEANS	1 pool of 4 (9/11 PFASs (LOD)	PERFOOD	0,011	0,045		0.008	0,0087			0.07					0,006	0	0,009
POTATOES *	1 pool of 10 (3/11 PFASs (LOD) & 1 pool of 3 (3/3 PFASs (LOD)	PERFOOD & Houg L.S. et al	0,001	0,0066	0,0006 0,0316	0,042%	0,0184	0 0,0 56	0,0015 0,014	0,0011 0,0046	0 0,0053	0 0,003			0,0031	0,0005	0,005
STRAWBERRIES	1 pool of 2 (10/10 PFASs <lod)< td=""><td>PERFOOD</td><td></td><td></td><td>0 0,004</td><td></td><td></td><td></td><td>0 0,004</td><td></td><td></td><td></td><td>NA NA</td><td></td><td>0,004</td><td>0</td><td>0,002</td></lod)<>	PERFOOD			0 0,004				0 0,004				NA NA		0,004	0	0,002
ORANGES	1 pool of 5 (9/10 PFASs (LOD)	PERFOOD	0.040	0,002	0 0,004			0 0,001	0 0,004	0 0,015	0 0,001		NA NA		0,004	0	0,002
GRAPEPRUITS ADDLES	1 pool of 2 [5/10 PFASs (LUD]	PERFOUD [Grapetruits from Italy]	0,018	0,0 0	0 0,004	0,0138	0,0138	0242 0,0248		A 0,01	0 0,001				0,0183	0,006	0,006
PFARS	1 pool of 2 (10/10 PEASs (LOD)	PERFOOD	0,01	0.01	11	T/	0.01	0 0.001		0,015	Ch 001		NA NA		1 0 0 4	0,000	0,000
MELONS	1 pool of 9 (4/10 PFASs (LOD)	PERFOOD	0,00	0,00	0.04	0 012	0.0 24	,0099 0,0099	,022 0, 22	0.01	0 0,001		NA NA		0,0038	0,0056	0,0056
BOVINE MEAT 1	1 pool of 3 (10/11 PFASs (LOD) & 1 pool of 3 (4/9 PFASs (LOD)	PERFOOD & Haug L.S. et al		0,0042	0,0038 0,0063	0,006	0,0085	0,0107 0,0107	0,0115 0,014	0 0,0057	0,0056				0,0011	0,03	0,031
POULTBY MEAT *	1 pool of 3 (3/11 PFASs (LOD) & 1 pool of 3 (4/3 PFASs (LOD)	PERFOOD & Haug L.S. et al			0.010 0.0125			0.0034 0.0659	0 0.014				0.0016 0.0016		0.0022	0.0105	0.0115
PORK MEAT 1	1 pool of 4 (8/11 PEASs (LOD) & 1 pool of 3 (3/9 PEASs (LOD)	PERFOOD & Haug L.S. et al.					U U U III							0.000		0.0161	0.0161
LAMB/SHEEP MEAT	1 pool of 3 (11/11 PFASs <lod)< td=""><td>PERFOOD</td><td>ŏ</td><td>0,005</td><td>0 0,005</td><td>0</td><td>0,005</td><td>0 0,005</td><td>0 0,005</td><td>0 0,005</td><td>0 0,005</td><td>0 0,005</td><td>0 0,001</td><td>0 0</td><td>0,002</td><td>0</td><td>0,002</td></lod)<>	PERFOOD	ŏ	0,005	0 0,005	0	0,005	0 0,005	0 0,005	0 0,005	0 0,005	0 0,005	0 0,001	0 0	0,002	0	0,002
PRESERVED PORK MEAT	1 pool of 6 (11/11 PFASs (LOD)	PERFOOD	0	0,005	0 0,005	0,0132	0,0132	0 0,005	0 0,005	0 0,005	0 0,005	0 0,005	0 0,001	0 0	0,002	0,0123	0,0123
OFFAL (Bovine, Pork, Lamb LIVER)	1 pool of 3 (4/11 PFASs (LOD)	PERFOOD	0	0,005	0 0,005	0	0,005	0,047 0,047	0,0897 0,0897	0,1048 0,1048	0,0404 0,0404	0,0256 0,0256	0,0022 0,0022	0 0	0,002	0,3804	0,3804
HEN EGGS 1	1 pool of 12 (7/11 PFASs <lod) &="" (3="" 1="" 3="" 9="" <lod)<="" of="" pfass="" pool="" td=""><td>PERFOOD & Haug L.S. et al</td><td>0,0065</td><td>0,009</td><td>0 0,0105</td><td>0,015</td><td>0,0175</td><td>0 0,0062</td><td>0,006 0,0085</td><td>0,0172 0,0172</td><td>0 0,0066</td><td>0,0206 0,0206</td><td>0 0,001</td><td>0,00418 1</td><td>####</td><td>0,0796</td><td>0,0796</td></lod)>	PERFOOD & Haug L.S. et al	0,0065	0,009	0 0,0105	0,015	0,0175	0 0,0062	0,006 0,0085	0,0172 0,0172	0 0,0066	0,0206 0,0206	0 0,001	0,00418 1	####	0,0796	0,0796
FRESH WHOLE COW MILK	1 pool of 4 (11/11 PFASs <lod)< td=""><td>PERFOOD</td><td>0</td><td>0,002</td><td>0 0,002</td><td>0</td><td>0,002</td><td>0 0,002</td><td>0 0,001</td><td>0 0,001</td><td>0 0,001</td><td>0 0,001</td><td>0 0,001</td><td>0 0</td><td>0,001</td><td>0</td><td>0,001</td></lod)<>	PERFOOD	0	0,002	0 0,002	0	0,002	0 0,002	0 0,001	0 0,001	0 0,001	0 0,001	0 0,001	0 0	0,001	0	0,001
PRESERVED SKIMMED COW MILK	1 pool of 6 (11/11 PFASs (LOD)% 1 pool of 3 (5/9 PFASs (LOD)	PERFOOD & Haug L.S. et al	0,0008	0,0018	0 0,0014	0,0024	0,0034	0 0,0021	0,002 0,0025	0 0,0018	0 0,0017	0 0,001	0 0,001	0 0	0,0006	0,0035	0,004
CHEESE *	1 pool of 10 (11/11 PFASs (LOD) & 1 pool of 3 (3/3 PFASs (LOD)	PERFOOD & Haug L.S. et al	0	0,0064	0,0037 0,0062	0,0065	0,009	0,008 0,0105	0,0033 0,0058	0,0021 0,0046	0 0,01	0 0,005	0 0,001	0 0	0,0013	0,006	0,007
OLIVE OIL	1 pool of 6 (11/11 PFASs <lod)< td=""><td>PERFOOD</td><td>0</td><td>0,025</td><td>0 0,0125</td><td>0</td><td>0,0125</td><td>0 0,025</td><td>0 0,025</td><td>0 0,025</td><td>0 0,025</td><td>0 0,025</td><td>0 0,125</td><td>0 0</td><td>0,0025</td><td>0</td><td>0,006</td></lod)<>	PERFOOD	0	0,025	0 0,0125	0	0,0125	0 0,025	0 0,025	0 0,025	0 0,025	0 0,025	0 0,125	0 0	0,0025	0	0,006
MARGARINE 1	1 pool of 16 (11/11 PFASs <lod) &="" (5="" 1="" 3="" <lod)<="" of="" pfass="" pool="" td=""><td>PERFOOD & Houg L.S. et al</td><td>0,0013</td><td>0,0138</td><td>0 0,0091</td><td>0,006</td><td>0,0123</td><td>0 0,019</td><td>0 0,0168</td><td>0 0,0205</td><td>0 0,0205</td><td>0 0,025</td><td>0 0,125</td><td>0,00065 0</td><td>0,0019</td><td>0,0012</td><td>0,0042</td></lod)>	PERFOOD & Houg L.S. et al	0,0013	0,0138	0 0,0091	0,006	0,0123	0 0,019	0 0,0168	0 0,0205	0 0,0205	0 0,025	0 0,125	0,00065 0	0,0019	0,0012	0,0042
BUTTER	1 pool of 3 (11/11 PFASs <lod)< td=""><td>PERFOOD</td><td>0</td><td>0,025</td><td>0 0,025</td><td>0</td><td>0,0125</td><td>0 0,025</td><td>0 0,0125</td><td>0 0,0125</td><td>0 0,0125</td><td>0 0,025</td><td>0 0,125</td><td>0 0</td><td>0,006</td><td>0</td><td>0,006</td></lod)<>	PERFOOD	0	0,025	0 0,025	0	0,0125	0 0,025	0 0,0125	0 0,0125	0 0,0125	0 0,025	0 0,125	0 0	0,006	0	0,006
ROCK SALT	1 pool of 13 (3/10 PFASs (LOD)	PERFOOD	0	0,002	0 0,004	0	0,001	0 0,001	0,0036 0,0036	0 0,015	0 0,001	0 0,001	0 NA	0 0	0,004	0	0,002
DEER	1 pool of 13 [11/11 PF ASS (LUD]	PERFOOD	0	0,005	0 0,005	0	0,005	0 0,005	0 0,005	0 0,005	0 0,005	0 0,005	0 0,001	0.0	1,002		0,002
WATER *	2 samples [3/5 & 2/5 PF ASs (LOD)& 3 samples [2/3 PF ASs (LOD) 1 = a - 1 = 6 2 (2)9 DE ASs (LOD)	PERFOOD & Haug L.S. et al	0.014	0,0008	8000,0 0	0,001	0,001	0 0,0002	0,0002 0,001	0,0001 0,0004	0 0,0002	0 0,005	0 0,001	0,00005 0	0,0001	0,0001	0,0002
STDAWBEDDY JAM	1 pool of 3 (5/9 PEASs (LOD)	Houg L.S. et al	0,014	0.007	0,011 0,011	0,051	0.014	0.0037 0.0037	0.0087 0.0087	0 0,013	0 0,013	0 NA	0 NA	0,000 0	30000	0.003	0.003
FISH STICKS	1 pool of 3 (3/3 PFASs (LOD)	Haug L.S. et al	ő	0.018	0.021 0.0210	0.043	0.043	0 0.011	0.017 0.017	0.018 0.018	0 0.013	0 NA	0 NA	0.0016 0	0.0016	0.013	0.013
TEA	1 pool of 3 (5/9 PFASs <lod)< td=""><td>Haug L.S. et al</td><td>Ō</td><td>0,0001</td><td>0,0005 0,0005</td><td>0,0035</td><td>0,0095</td><td>0 0,0002</td><td>0 0,0003</td><td>0,0002 0,0002</td><td>0,0007 0,0007</td><td>0 NA</td><td>0 NA</td><td>0 0</td><td>0,0001</td><td>####</td><td>####</td></lod)<>	Haug L.S. et al	Ō	0,0001	0,0005 0,0005	0,0035	0,0095	0 0,0002	0 0,0003	0,0002 0,0002	0,0007 0,0007	0 NA	0 NA	0 0	0,0001	####	####
WHITE FISH 1	273-437 samples (30-100% samples (LOD) & 1 sample (3/3 PFASs	NIFES & Haug L.S. et al	0	1,8	0 2,4	0	2,4	0 1,8	0 1.2	0 2,7	0 1.8	0 3,6	0 1,5	0 1	8	0	1,8
FATTY FISH *	399 samples (86-100% samples (LOD)	NIFES	0	0.3	0 0.3	0	0.3	0 0.3	0 0.3	0 0.3	0 0.3	0 0.3	0 0.9	0 0	0.3	0	0.3
FLAT FISH *	853-835 samples (63-100% samples (LOD)	NIFES	0	0.9	0.07	0	13	0.03	0.05	0 10	0.08	0.12	0.12	0.0	18	0	0.8
CPAB*	96 complex (88-100% complex (LOD)	NIFES	0	0.6	0.12	0	0.6	0.06	0.06	0.03	0.06	0.03	0.15	0.0	16	0	0.6
MUSSEL	2 samples (100% samples (LOD) & 1 pool of 6 (4/11 PFASs (LOD)	NIFES & PERFOOD	ő	1.8	0 2.4	ŏ	2.4	0 1.8	0 1.2	0 2.7	0 1.8	0 3.6	0 1.5	0 1	.8	ő	1.8
RED FATTY FISH *	253-363 samples (87-100% samples (LOD) & 1 pool of 3 samples (NIFES & Haug L.S. et al	0	0.9	0 0.7	0	1	0 0.9	0 0.5	0 0.5	0 0.8	0 1.2	0 1.2	0.0	0.8	0	0.8
SHRIMP *	37-53 samples (24-100% samples (LOD)	NIFES	ů	1.8	0 2.4	ň	1	0 1.0	0 1.0	0 15	0 0.6	0 14	0 15	0.0	1.6	1.3	1.7
CANNED FISH *	15 samples (13-100% samples (LOD) & 1 pool of 3 (6/9 PEASs (LO	NIFES & Haug L.S. et al	ů	0.3	0 0.3	ň	0.3	0 0.3	0 0.3	0 0.3	0 0.3	0 0.3	0 0.9	0.0	1.3	0.5	0.5
FISH LIVER 1	683-779 (63-1002 camples (LOD) & 1 cample (4/9 PEASs (LOD)	NIFES & Hourd IS et al	ő	15	0 3 0	ő	18	0 15	0.0.9	0 15	0 24	0 24	0 27	0.0	19	رب م	20
SAUSAGES	2 pools of 36 samples (3/4 PEASs (LOD)	Jogsten I.E. et al ("Frankfurt" sousages (n	0.079	0.079	NA NA	ő	0.183	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	0.0	1006	e e	0.015
DIVE M	E pools of voisaliples (or PT Has (200)	Press II at al (Death from Soundar)	0,010	NA NA	NA NA	0.11	0,100	0.21 0.21	0.25 0.25	0.27 0.27	0.20 0.20	106 106	100 100	0.05 0	0000	44.2	4.2
DEDCH M	5 samples (019 PEASs (LOD)	Berger U. et al (Perch from Sweden)	NA NA	NA NA	NA NA	0,11	0,11	0,31 0,31	0,35 0,35	0,31 0,31	0,32 0,32	1,20 1,20	1,02 1,02	0,05 0	0.05	11,0	11,0
TUNA	4 samples	Yamada A, et al (Tuna from Eracco)	0.08	0.1	0.06 0.07	0,1	0.24	0,31 0,31	0,05 0,05	0,31 0,31	0,52 0,52 NA NA	1,20 1,20	1,02 1,02 NA NA	0,05 0	1.03	0.15	0.16
047.1	1 month of 2 (10/10 PEASs (LOD) & 1 month of 3 (8/10 PEASs (LOD)	PERFOOD (asta from Cauch Baseblia Ba	0,00	0.011	0,00 0,012	0.0461	0.0251	0 0,040	0.0101 0.0001	0,04 0,4	0.0105	0 0,0205	NA NA	0.0	007	0,10	0.002
DICE 1	1 and at 10 (10/10 PEASs (LOD) & 1 and at 4 (10/10 PEASS (LOD)	PERFOOD (vise from Calcum Republic, De	0	0.002	0.0001	0,0101	0.001	0 0,0105	0,0021	0.0015	0 0,0105	0 0,0205	NA NA	0.0	0.004	0	0.000
BIGE BYE FLOUR	1 pool of 3 (10/10 PEASs (LOD) & Loool of 4 (10/10 PEASs (LOD)	PERFOOD (rise from Deigium, (tall)	0	0.02	0.0.04	0	0.02	0 0,001	0 0,004	0 0,015	0 0,001	0 0,001	NA NA	00	1.01	0	0.004
BANANA	1 pool of 6 (7/10 PFASs <lod)< td=""><td>PERFOOD (banana from Italu)</td><td>ŏ</td><td>0.002</td><td>0 0,004</td><td>0</td><td>0.001</td><td>0.003 0.003</td><td>0 0,004</td><td>0 0,015</td><td>0 0,001</td><td>0 0,001</td><td>NA NA</td><td>0,008 0</td><td>800.0</td><td>0.007</td><td>0.007</td></lod)<>	PERFOOD (banana from Italu)	ŏ	0.002	0 0,004	0	0.001	0.003 0.003	0 0,004	0 0,015	0 0,001	0 0,001	NA NA	0,008 0	800.0	0.007	0.007
GRAPES 1	1 pool of 5 (7/10 PEASs (LOD) & 1 pool of 5 (10/10 PEASs (LOD)	PERFOOD (grapes from Belgium Italu)	0	0.002	0 0.004	0.0045	0.004	0.0045 0.004	0 0.004	0 0.015	0 0.001	0 0.001	NA NA	0.0	0.004	0.0185	0.0195
PEACH	1 pool of 3 (10/10 PFASs (LOD) & 1 pool of 3 (5/10 PFASs (LOD)	PERFOOD (peaches from Czech Republic	0.009	0.01	0 0.004	0.007	0.0075	0.006 0.0065	0 0.004	0 0.015	0 0.001	0 0.001	NA NA	0.008 0	0.01	0.0065	0.0075
PLUMS *	1 pool of 5 (8/10 PFASs (LOD) & 1 pool of 3 (10/10 PFASs (LOD)	PERFOOD (plums from Belgium, Italu)	0	0.002	0 0.004	0.001	0.0015	0 0.001	0 0.004	0 0.015	0 0.001	0 0.001	NA NA	0.0	0.004	0.0015	0.0025
CHOCOLATE	1 sample	ANSES 2011 (Chocolate from France)	Ő	0,184	0 0,194	0	0,097	0 0,194	0 0,049	NA NA	NA NA	NA NA	NA NA	0 0	0,184	0	0,093
SODA DRINKS *	6 samples (5/7 PFASs <lod)< td=""><td>Eschauzier C et al (Post-mixed cola from t</td><td>0.0003</td><td>0.0003</td><td>0.0004 0.0004</td><td>0</td><td>0.0031</td><td>0 0,0001</td><td>NA NA</td><td>NA NA</td><td>NA NA</td><td>NA NA</td><td>NA NA</td><td>0.0</td><td>0,0006</td><td>0</td><td>0.0003</td></lod)<>	Eschauzier C et al (Post-mixed cola from t	0.0003	0.0003	0.0004 0.0004	0	0.0031	0 0,0001	NA NA	NA NA	NA NA	NA NA	NA NA	0.0	0,0006	0	0.0003
COFFEE	12 samples (0/7 PFASs (LOD)	Eschauzier C et al (Brewed coffee from co	NA	NA	0.0014 0.0014	0.0044	0.0044	0 0.0001	0.0004 0.0004	NA NA	NA NA	NA NA	NA NA	NA N	VA.	0.0006	0.0006
CORN	1 pool of 13 (11/11 PFASs (LOD)	PERFOOD (corn from Italy)	0	0,002	0 0,004	0	0,001	0 0,001	0 0,004	0 0,015	0 0,001	0 0,001	NA NA	0 0	0,004	0	0,002
Abbreviations:																	
NIFES: The National Institute of Nutrit	tion and Seafood Research Bergen, Norway																

PERFOOD: PERFluorinated Organics in Our Diet project (http://www.perfood.eu/)







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









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







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