A 5-year longitudinal follow up trend in levels of POP plasma concentrations extracted using a 96-well plate method

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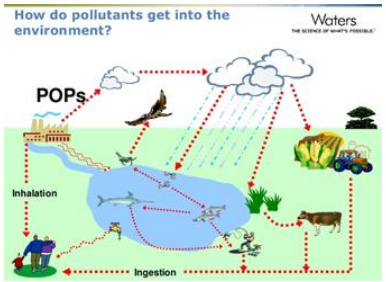
Introduction:



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Longitudinal Sample Collection:

The Prospective Investigation of the Vasculature in Uppsala Seniors (PIVUS) Cohort

Year	2001-2004	2006-2009	2011-2014
Age	70	75	80
Sample number	1,016	822	603
About 50% females			

- Epidemiological study
- Assess Individual-based trend in plasma levels of POPs
- Large sample number
- Low plasma volume

High-throughput Sample Preparation:

150 µL plasma/serum

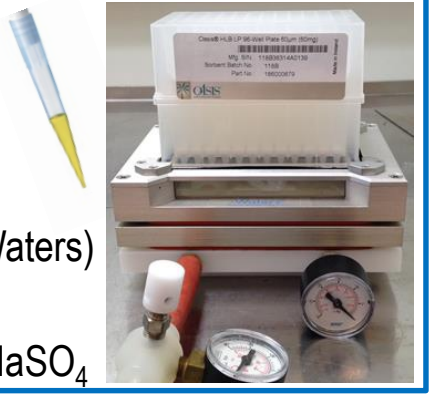
Pretreated with sulfuric acid in water and acetonitrile in water

96-well SPE plate

Oasis HLB 60mg sorbent/well (Waters)

96-well clean-up plate

40% H_2SO_4 modified silica and $NaSO_4$



Instrumental Analysis:

23 POPs: 16 (tetra-deca) PCBs, 4 OC-Pesticides, OCDD and BDE 47

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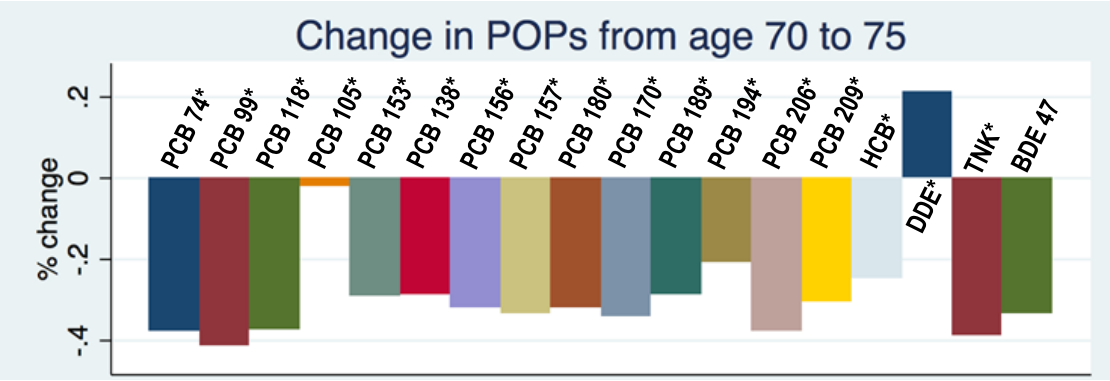
Results and Discussion:



The percent change (shown as decimal) in 18 of the 23 POPs detected in the first 465 plasma samples from the PIVUS cohort after the five year follow up (2001-2004 to 2006-2009). *Trans*-nonachlor is abbreviated as TNK. *Significant changes in concentration were indicated by p-values < 0.05.

Comparison of POP concentrations in PIVUS cohort (age 75) to NHANES pooled serum samples (age 60+)

	PCB 74	PCB 99	PCB 118	PCB 105	PCB 153	PCB 138	PCB 156	PCB 157	PCB 180	PCB 170	PCB 189	PCB 194	PCB 206	PCB 209	OCDD	HCB	DDE	*Trans*-nonachlor (TNK)	BDE 47
Mean (NHANES 60+) 2007-08 (pg/g)	66	54	99	19	407	303	75	18	306	143	7	100	56	45	-	75	3210	325	-
Median (PIVUS 75) 2006-09 (pg/mL)	60.7	56.7	127	32.7	1020	611	106	20	818	333	15.3	98	18	18.7	<LOD	232	1800	97.3	12.7
MDL NBS	12.2	18.1	41.2	16	45.2	45.7	3.4	2.3	6.7	5.3	3	2.1	2.3	2.9	6.1	167	32	5.5	6.9
% Above LOD	99	98	99	87	100	100	100	77	100	100	81	100	80	94	0	75	100	100	37

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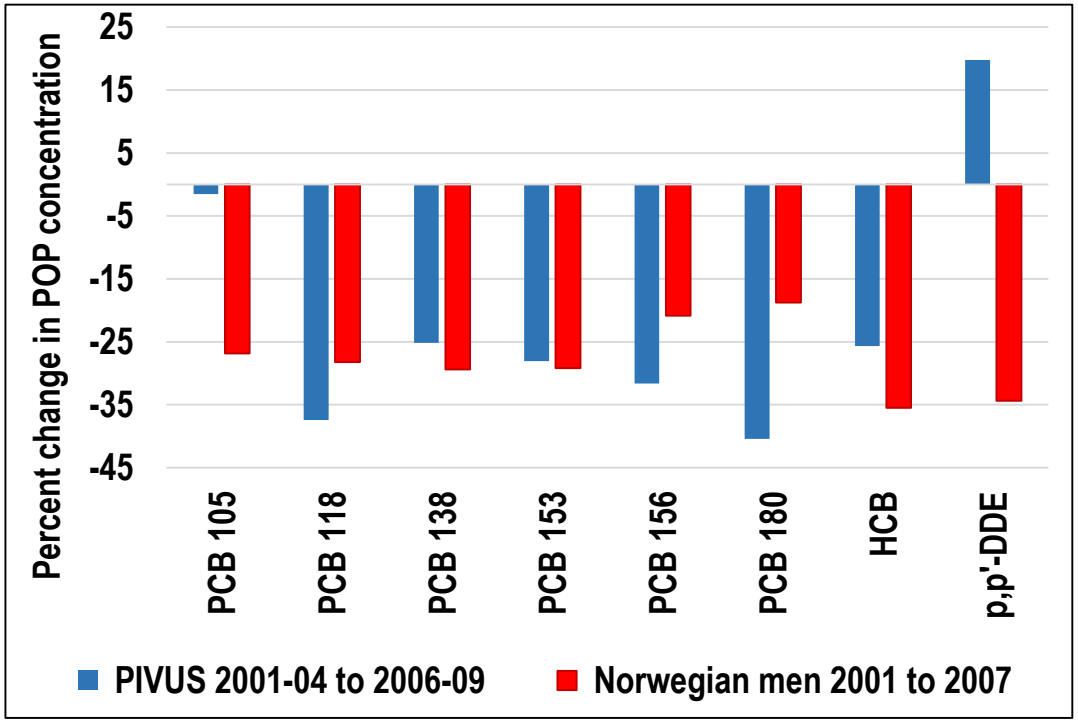
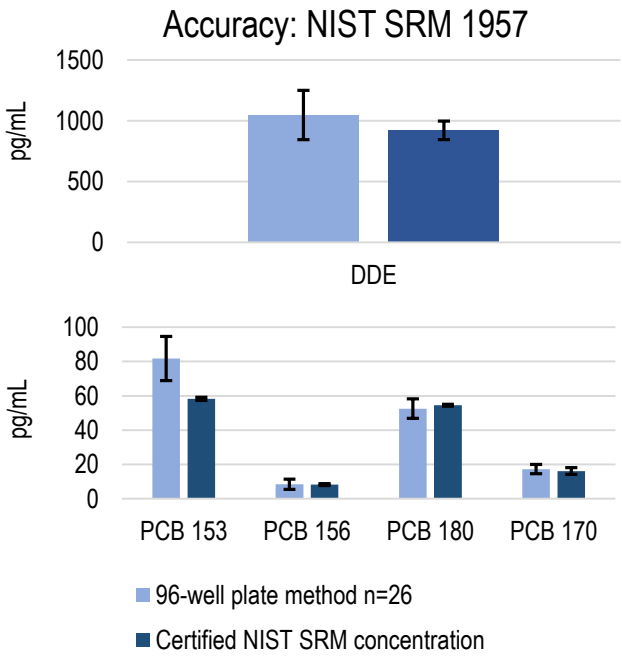
Results and Discussion:



Comparison of the change in POP concentrations measured in the PIVUS cohort (age 70 to 75) to longitudinally sampled Norwegian men (median age 65 to 71)



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Summary and Conclusions:

96-well plate method:

+ Increased sample throughput
+ Reliable and precise quantification of Stockholm Convention POPs
+ Cost-effective and time-efficient (process 73 to 146 samples/week)

PIVUS cohort:

- Significant decrease in all POPs with exception to BDE 47 and *p,p*'-DDE
- Significant increase in *p,p*'-DDE concentrations
  - Not observed in other background level trend studies
- Higher concentrations of PCBs 153, 138, 180, 170, and HCB vs. NHANES 60+
- Lower concentrations of PCBs 206 and 209, *p,p'*-DDE, and *trans*-nonachlor vs. NHANES 60+

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PIVUS cohort

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