



Department of Occupational
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Historien om kviksølv på Færøerne

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overlæge

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Faroe Islands: Pilot whales are taken for food, but cause exposures to methylmercury, PCB, etc.

Whale contaminants – Human health concerns

- Mercury (methylmercury)
- Persistent organic pollutants (POPs):
 - Pesticides (DDT, Toxaphene, etc.)
 - Polychlorinated biphenyls (PCBs)
 - Other industrial chemicals (HCB, etc.)
 - Maritime pollutants (organotins, etc.)

Faroese birth cohort studies

- Total of ~2,500 mother-child pairs
- Focus on methylmercury
- Maternal exposure during pregnancy
- Neurobehavioral development
- Blood pressure and growth
- Endocrine function
- Immune function

Committee on the Toxicological Effects of Methylmercury, Board on Environmental Studies and Toxicology, US-National Research Council concluded in 2000:

“On the basis of its evaluation, the committee’s consensus is that the value of US-EPA’s current Reference Dose (RfD) for MeHg, 0,1 µg/kg per day, is a scientifically justifiable level for the protection of public health. However, the committee recommends that the Iraqi study no longer be used as the scientific basis of the RfD. **The RfD should still be based on the developmental neurotoxic effects of MeHg, but the Faroe Islands study should be used as the critical study for the derivation of the RfD.**”

NRC exposure limit calculated from the benchmark dose (and our update)

Mercury concentrations	NRC	Updated
BMDL ($\mu\text{g}/\text{L}$ cord blood)	58	43 ⁺
Cord blood adjustment (1.5 [*])	-	29
Uncertainty factor	(10)	(10)
Exposure limit ($\mu\text{g}/\text{L}$ blood)	5.8	2.9
Converted to $\mu\text{g}/\text{kg}^*\text{d}$	0.1	0.05

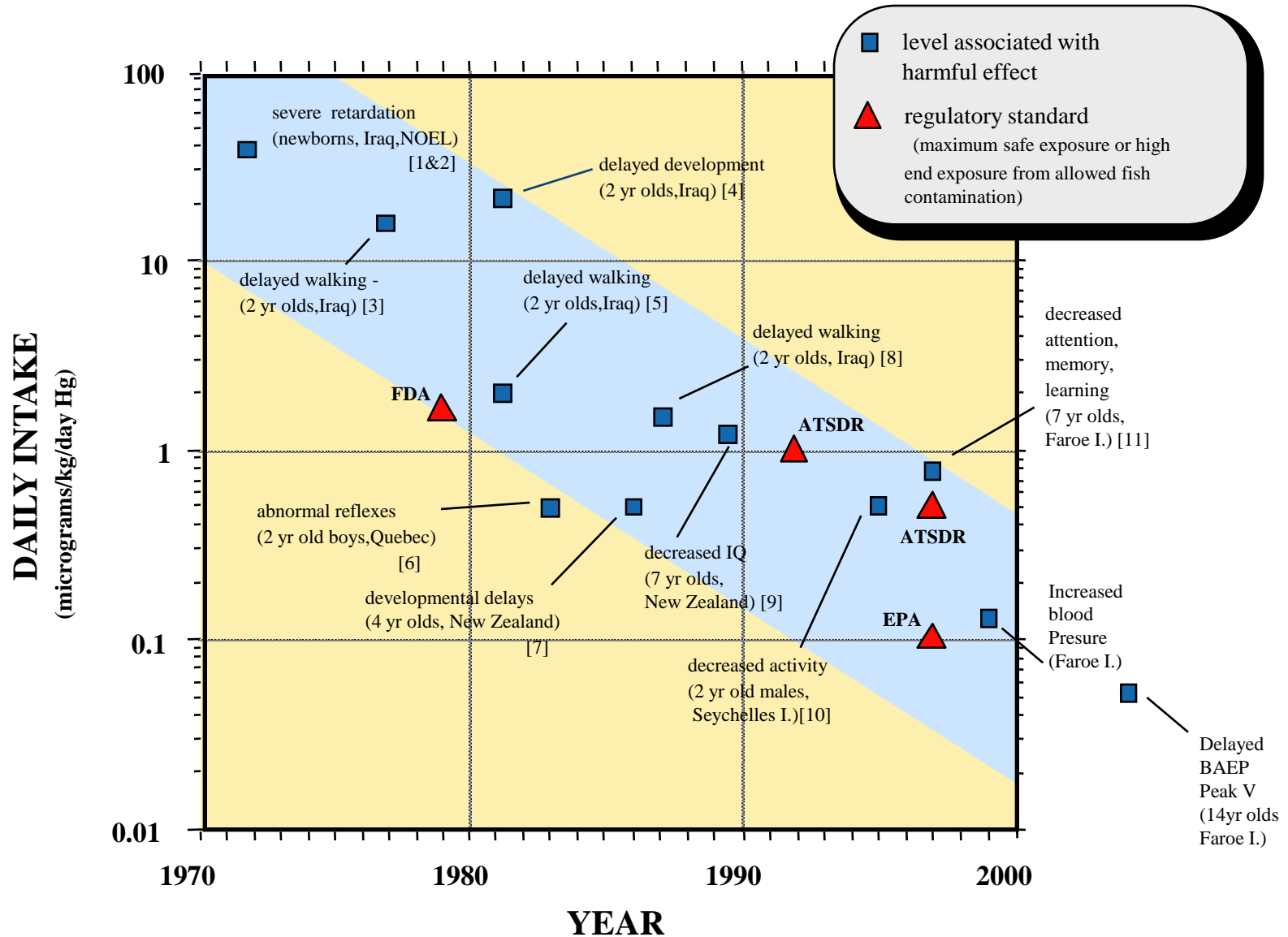
EPA RfD

BMDL: $P_0 = 0.05$, BMR = 0.05, linear slope for BNT

⁺Adjusted for exposure assessment imprecision by SEM

^{*}Based on hair-to-blood ratios in pregnant and non-pregnant subjects

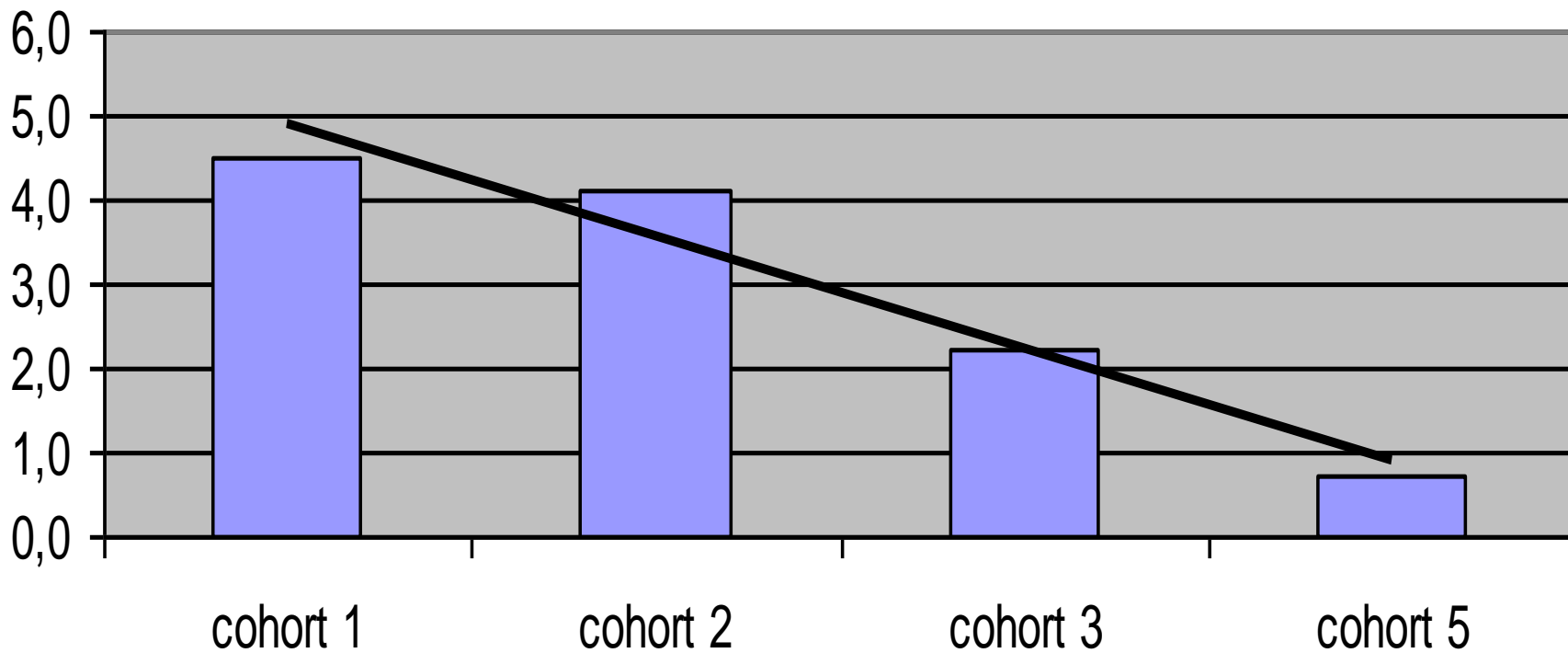
Declining threshold with time



Geometric mean of MeHg (micro g/g hair)

$$y = -1,33x + 6,2$$

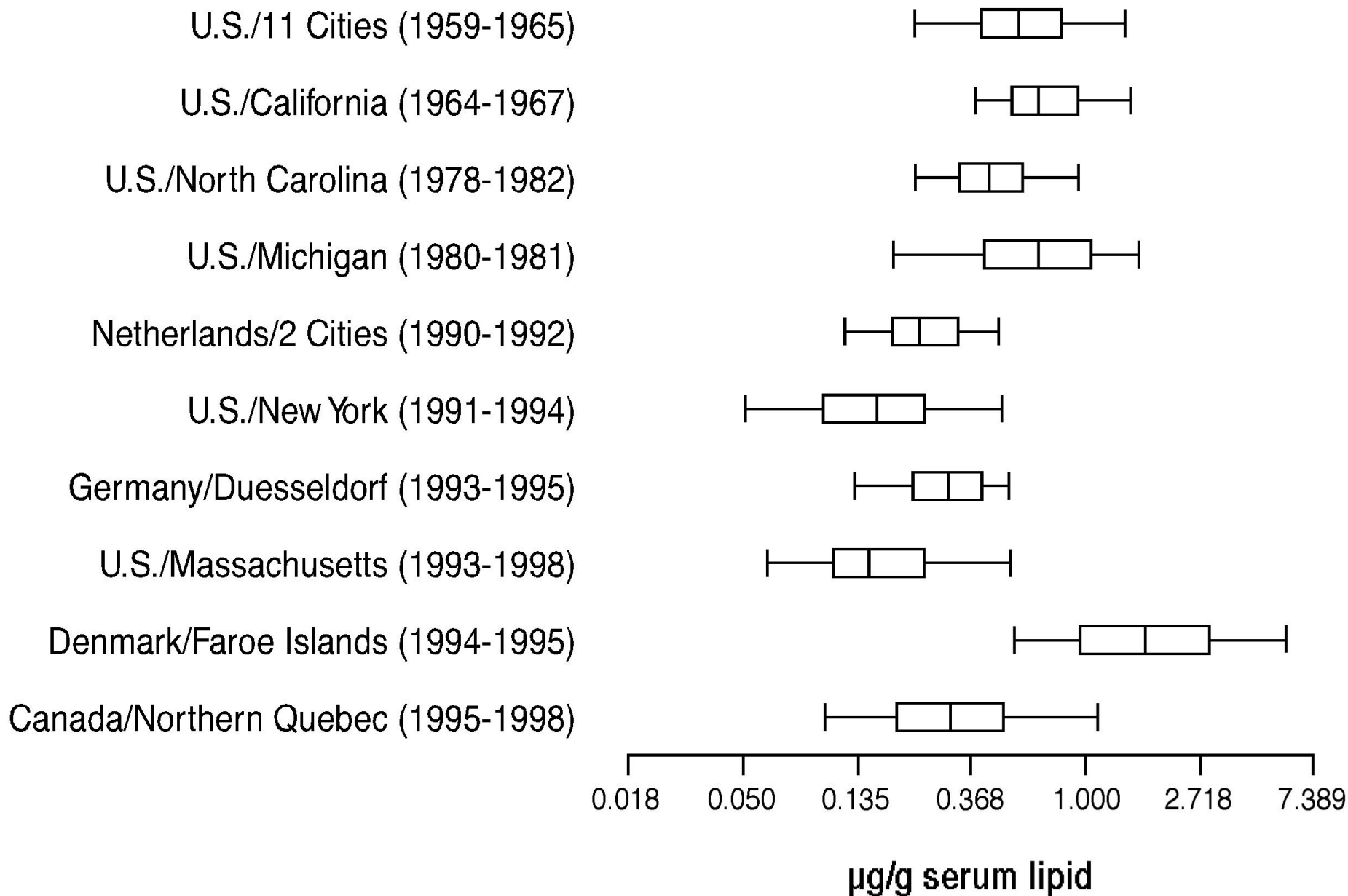
$$R^2 = 0,9482$$



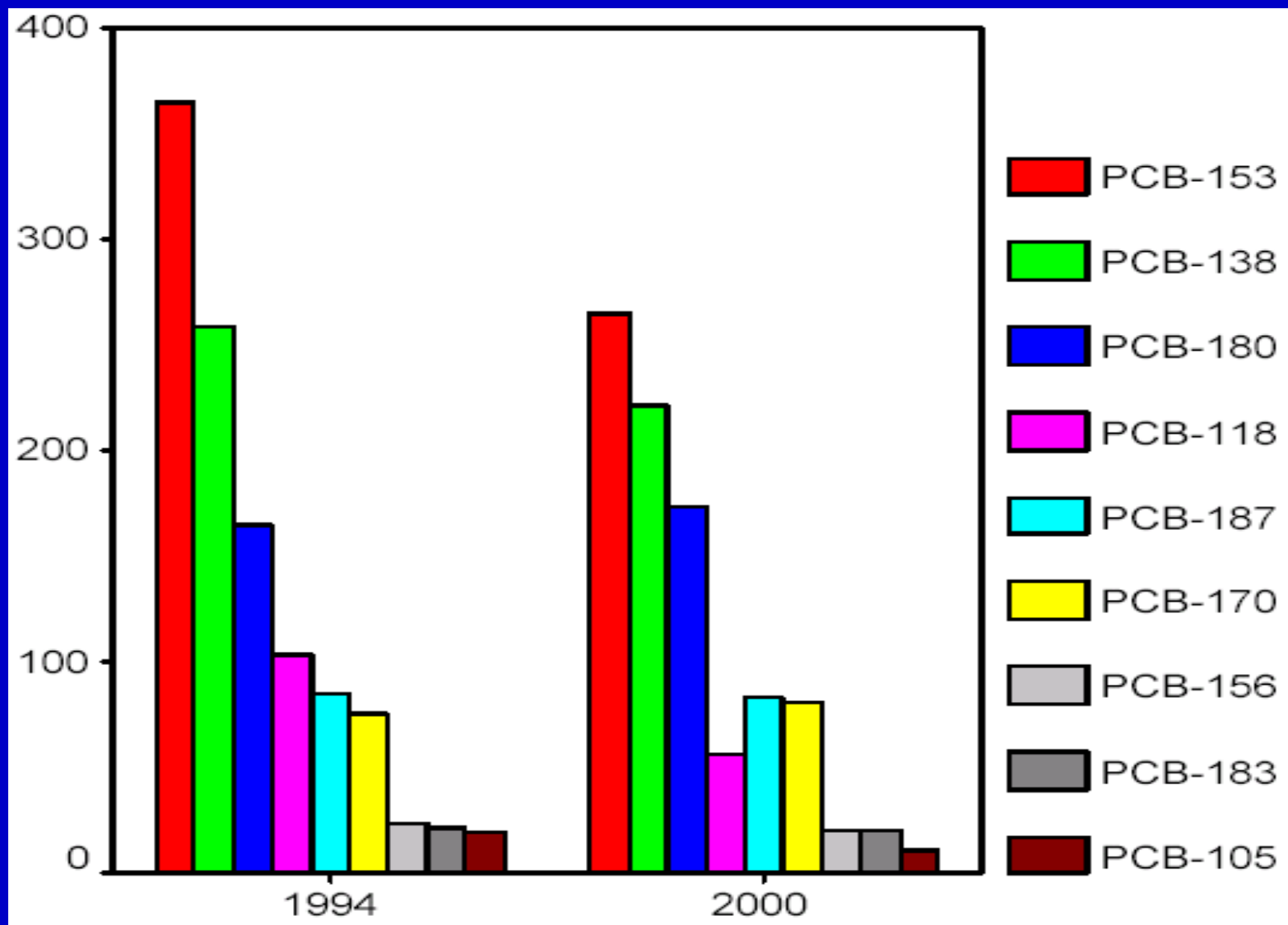
Total mercury in umbilical cord blood in Faroese cohorts in $\mu\text{g/l}$

Cohort	Year	N	Geometric mean	Min.	Max.
Cohort 1	1986-87	894	22.9	0.90	351
Cohort 2	1994	163	20.9	1.90	102
Cohort 3	1998 -2000	603	12.3	1.60	193
Cohort 4 (mother-serum)	2000-2001	148	1,86	.001	7.50
Cohort 5	2007-2009	490	4.59	0.77	44.5

Distribution of total PCBs concentration in serum, 10 studies



Average concentrations of main PCB congeners in the pre-advisory (1994) and post-advisory (2000) cohorts (in ng/g lipid).



Comparing Faroese cohorts

Cohort	Cohort 2 (1994-1995)	Cohort 3 (1998-2000)	Cohort 5 (2007-2009)
Serum Σ PCB* ($\mu\text{g/g}$)	1.12 (0.62-1.87)	1.21 (0.80-1.81)	0.42 (0.25-0.78)
DDE ($\mu\text{g/g}$)	0.72 (0.4-1.21)	0.54 (0.34-0.94)	0.13 (0.07-0.29)
Mercury in cord blood ($\mu\text{g/L}$)	20.4 (11.8-40.0)	12.35 (7.07-20.81)	4.60 (3.02-6.74)
Mercury in maternal hair ($\mu\text{g/g}$)	4.08 (2.45-7.35)	2.14 (1.22-3.96)	0.70 (0.43-1.10)

*sumPCB=(PCB 138+153+180)*2
Geometric mean (25-75%)

Kostanbefalinger

- Landslægen, Fødevarestyrelsen og AMK givet kostanbefalinger vedr. grind i 1998
- Landslægen og AMK anbefalede i nov. 2008 at befolkningen holdt op med at spise grindekød og spæk – stor opstandelse!
- Miljømedicinen bliver herefter af nogen opfattede som en folkefjende og af andre som progressiv budbringer

Miljømedicin på Færøerne

- Forskning af relevans for vores samfundet
- Intervention
- Kostanbefalinger
- En naturlig del af arbejdsmedicinsk afdeling
p.g.a. metodefællesskabet og formålet at
ændre human eksponering

Clinical conference, Tórshavn clinic

