



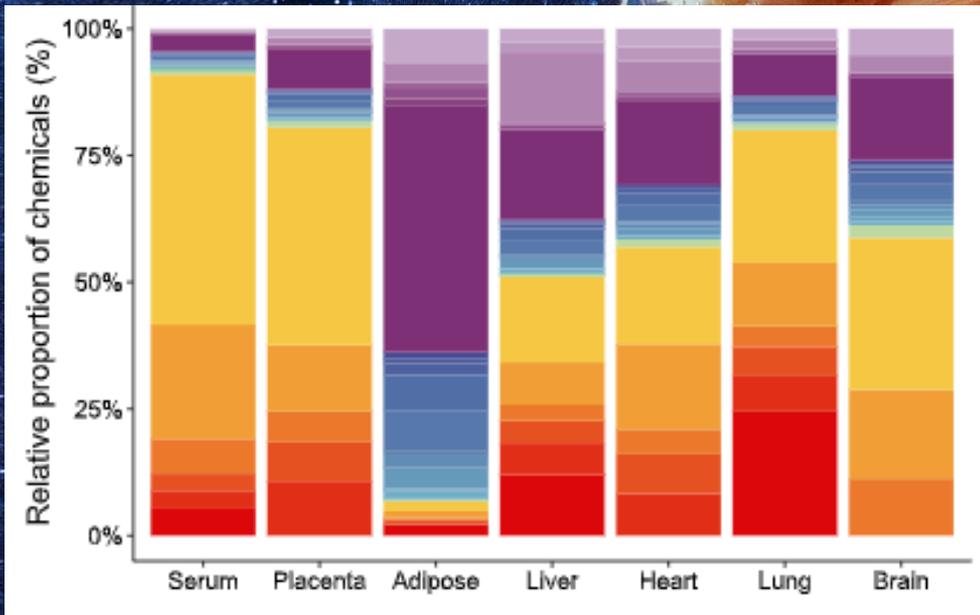
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# Unmasking the threat: PFAS exposure and its human health impact

**Mattias Öberg**

*PhD, Assoc. Prof., European Registered Toxicologist*

- OCPs**
- PeCB
- HCB
- $\alpha$ -HCH
- $\beta$ -HCH
- $\gamma$ -HCH
- Oxychlorthane
- Transnonachlor
- p,p'-DDT
- p,p'-DDE
- PCBs**
- PCB 74
- PCB 99
- PCB 118
- PCB 138
- PCB 153
- PCB 156
- PCB 170
- PCB 180
- PCB 183
- PCB 187
- PBDEs**
- PBDE 47
- PBDE 99
- PBDE 153
- PFAS**
- PFOS
- PFOA
- PFNA
- PFDA
- PFUnA
- PFHxS



# Health effects and risk assessments

- 2008 – 1500 ng/kg/day  
→ Animal studies, liver toxicity

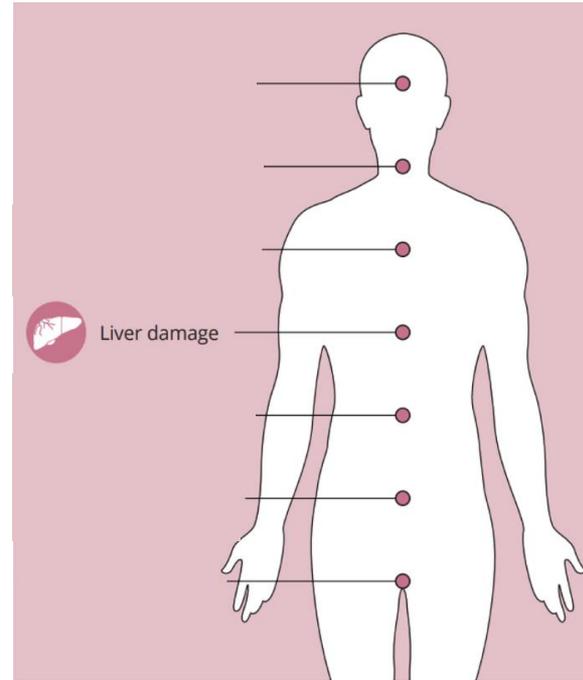


Illustration: HBM4EU <https://www.hbm4eu.eu/>

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- 2018 – 6 ng/kg/day  
→ Epidemiology, blood lipids, development

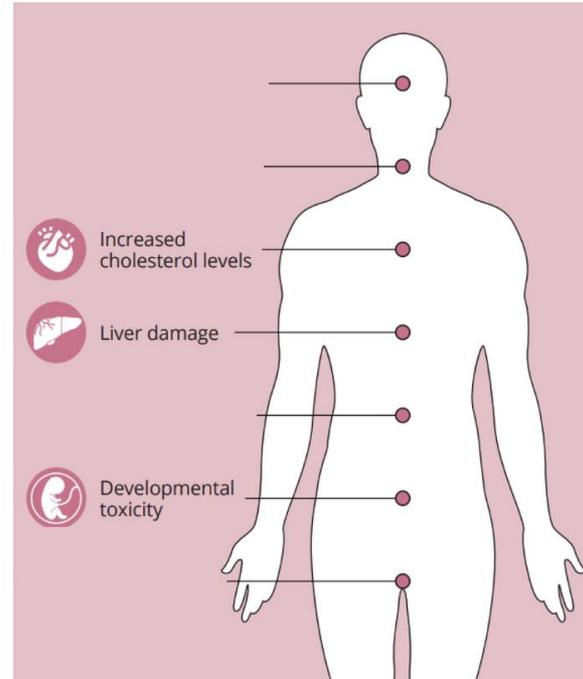


Illustration: HBM4EU <https://www.hbm4eu.eu/>

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→ Children's immune system  
→ Mixtures (PFAS-4)

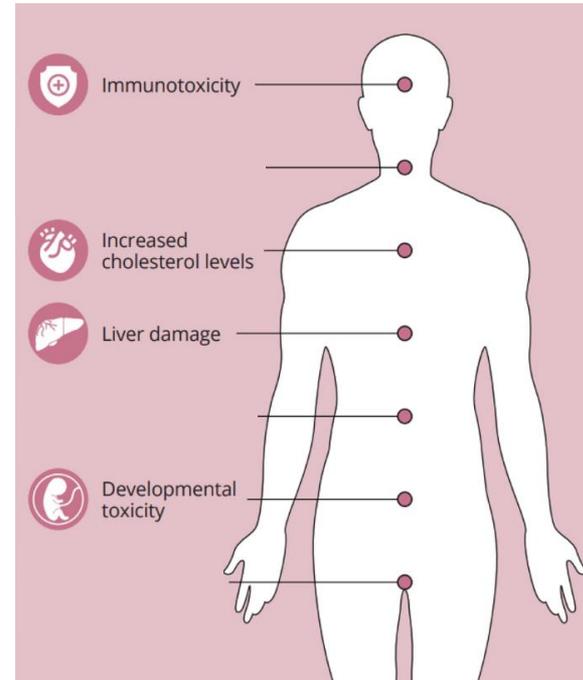


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- Today  
→ Carcinogenic to humans (IARC, 2023)  
→ Endocrine disruptor

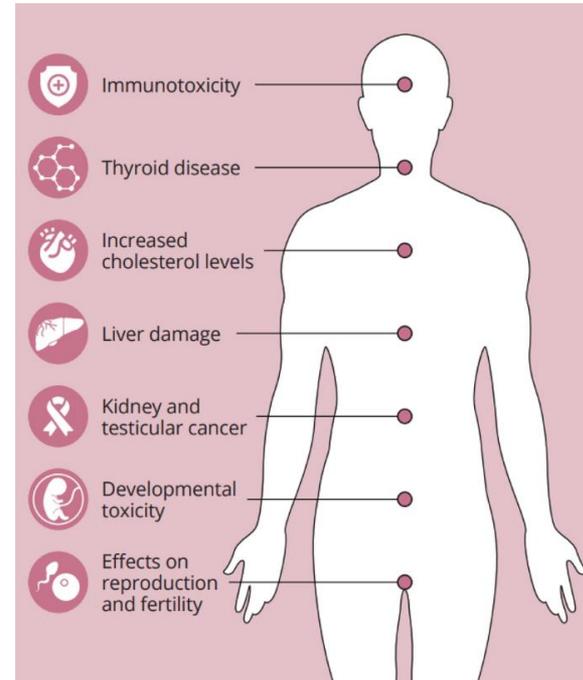


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# Report of the Environmental Control Commission (SOU 1972:31) before the Act on Goods Hazardous to Health and the Environment

- Long-term effects remain insufficiently understood
- Should be treated as potential risk factors in policy and regulatory decisions
- Extremely persistent in the environment

## Högre fluoriderade kolväten

Ett stort antal högkokande fluoriderade kolväten eller fluoriderade kolväteblandningar, alifatiska såväl som aromatiska, är i dag kommersiellt tillgängliga (23). Oftast är i dessa alla väteatomer i moderkolvätena utbytta mot fluoratomer; ett exempel är decafluorbifenyl, en fluoranalog till PCB. Kunskapen om sådana ämnens långtidseffekter på växter och djur är obetydlig, men de måste bedömas som potentiella riskfaktorer på grund av högfluoriderade kolvätenas motståndskraft mot kemisk och sannolikt mot biologisk nedbrytning.

# Hand written notes from 1971

Fluorinated substances are becoming increasingly widespread in industry. For example, as plastics, oils and gases. There is every reason for concern...

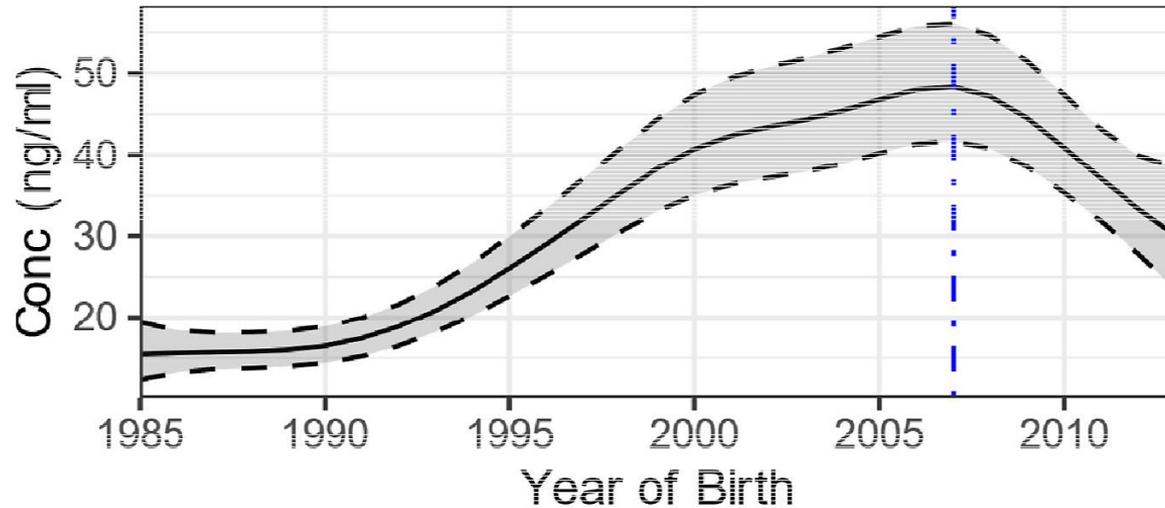
...paper products, textiles, waterproofing agents, fire fighting foam...

örändringar  
bestående  
enär, leder,  
er blodleried,  
edförändringar  
och vissa för  
örändringar  
blodets  
mmansätt-  
ing. (Blod)  
Kärl

Fluorhaltiga ämnen vinner  
alltmer inslag i industrier, som  
s. ex. ~~visserligen~~ <sup>visserligen</sup> slafs plöster,  
~~och~~ oljor, och gaser. Det  
finns all anledning att  
se upp. Freoner har  
ganska oväntat visat sig  
kunna ändra nervernas  
förmåga att fungera. (De  
löser sig i nervernas fettväv,  
vilket är betydligt, eftersom  
de används som "drivmedel"  
(propellant) i tryckfär-  
packningar av färger, lacker,  
reklamkrämer m. m.) Vissa  
pappersarter, som engångs-  
duskar och engångslakan tillverkas  
innehåller fluorhaltiga ämnen.  
Åtskilliga "antivätsmedel" och  
skumolöslare innehåller fluor-  
haltiga ämnen.

# The EU introduced strict restrictions on PFOS (Directive 2006/122/EC).

PFOS in dry blood spots from newborn babies i Ronneby, Sweden



Blomberg et al., (2025) 10.1016/j.envres.2025.121397

# Risk assessment paradigm

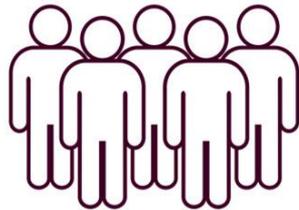
Safe dose



Uncertainty factors  
to protect all humans



Safe exposure  
level for humans

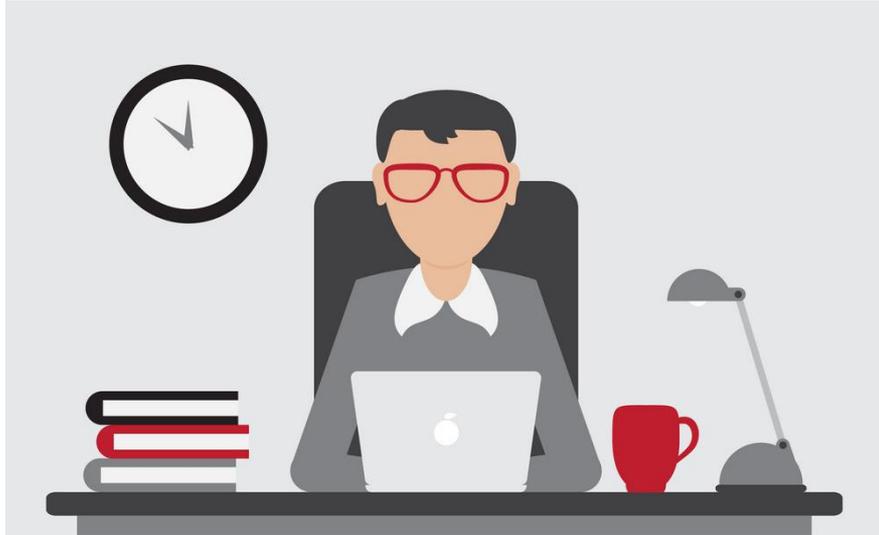


- 1 Selection of endpoint and dataset
- 2 Selection of Response Rate
- 3 Biological interpretation

- 1 Interspecies factor — 10
- 2 Intraspecies factor — 10
- 3 Subchronic → chronic — up to 10
- 4 LOAEL → NOAEL — up to 10
- 5 Database deficiency — up to 10

- 1 Mixture uncertainty
- 2 The whole life cycle

# Ignorance through regulatory structures



- Existing chemicals are assumed safe
- Low volumes mean low scrutiny
- One chemical at a time
- Secrecy over safety
- Authorities work in silos
- Real-world use remains unknown



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