

What does the PFAS-analysis tell you?

PFAS ekvivalents in risk assessment

Generell risks to consider during risk assessment and remediation guidelines

Definition OECD long: Carboxylic acids C6 and up, Sulphonic acids C8 and up

Long PFAS	Short PFAS
High ability to bioaccumulate	Low or no bioaccumulation
Long half life in tissue and serum	Short half life in tissue and serum
Uptake mostly to root system	Uptake to all parts of plant
Many reliable remediation methods	Few reliable remediation methods
Mobile – semi mobile	mobile - very mobile
Moderate adsorption	Very low adsorption

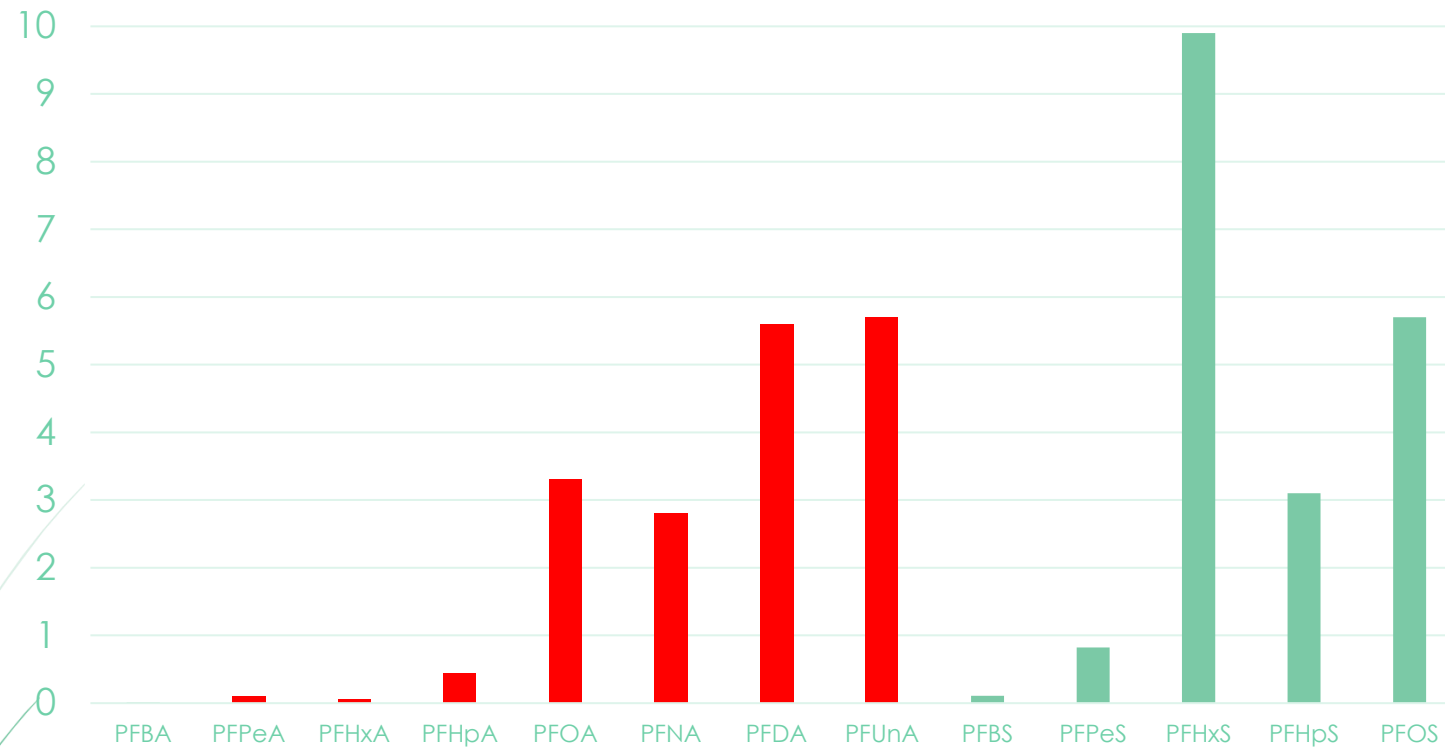
Tabell C-1. Half time in human blood (in years) for calculation of PFAS-halter to PFOSekv. Based on Swedish EPA ΣPFAS11

bold text included in PFAS-11. **Red text** is considered unreliable values

PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnA	PFBS	PFPeS	PFHxS	PFHpS	PFOS	CI-PFESA	Reference
		0,002	0,002	2,3										Bartell et al 2010
				3,3										Jurado-Sanchez et al 2014
				4,4								8,67		Brede et al 2010
0,009		0,088												Burris et al 2002
				3,8								4,8		Chang et al 2008
				5,1										Chang et al 2012
				4,7						19,9		60,9		Costa et al 2009
				3,1						7,5		8		Fu et al 2016: male
				2,4										Fu et al 2016: female
				2,8								5,35		Gomis et al 2018
0,008				8	3,4			0,08		8,5		5,4		Harada et al 2007
								0,08						ATSDR 2018
				3,5				0,07						Olsen et al 2006
				3,8						8,5		5,4		Olsen et al 2009
0,008				5,4				0,07		10,4		4,35		Olsen et al 2007
		0,088		2,8				0,08		7,3		4,8		Pizzurru et al 2019
			0,192	2,4										Russel et al 2013
				3,1	3,4					8,5		5,4		Russel et al 2015
				2,9										Reade et al 2019
0,009		0,088						0,1		8,5				Seals et al 2011
				3,5										Kjølholt et al 2015
												4,7		US EPA 2002
												4,3		Wang et al 2015: män
				3,9						15,5		3,3		Wang et al 2015: kvinnor
				3					1	4,7	4,7	2,9		Worley et al 2017
														Li et al 2019
				2,4						4,7		3,1	280	Shi et al 2016
				2,8						7,4		4,6		Li et al 2018: kvinnor 15-50år
				2,7						5,3		3,4		Li et al 2018: män 15-50 år
	0,1	1,63	0,17	1,8				0,12	0,63	2,87	1,46	1,6		Li et al 2018: män
			0,82	2,6	3,2	7,1	4			25		18		Xu et al 2020
			1	2,1	1,7	4	7,4			7,1		5,8		Zhang et al 2013: män ochkvinnor >50 år
0,009	0,1	0,059	0,437	3,3	2,8	5,6	5,7	0,107	0,82	9,9	3,1	5,7	280	Zhang et al 2013: kvinnor<50 år
0,002	0,018	0,01	0,077	0,59	0,49	0,97	1	0,019	0,14	1,74	0,54	1	49	Average original data in years RPF PFOSekv/g



Average half time in blood serum after long time exposure has decreased



What happens during chronic exposure?

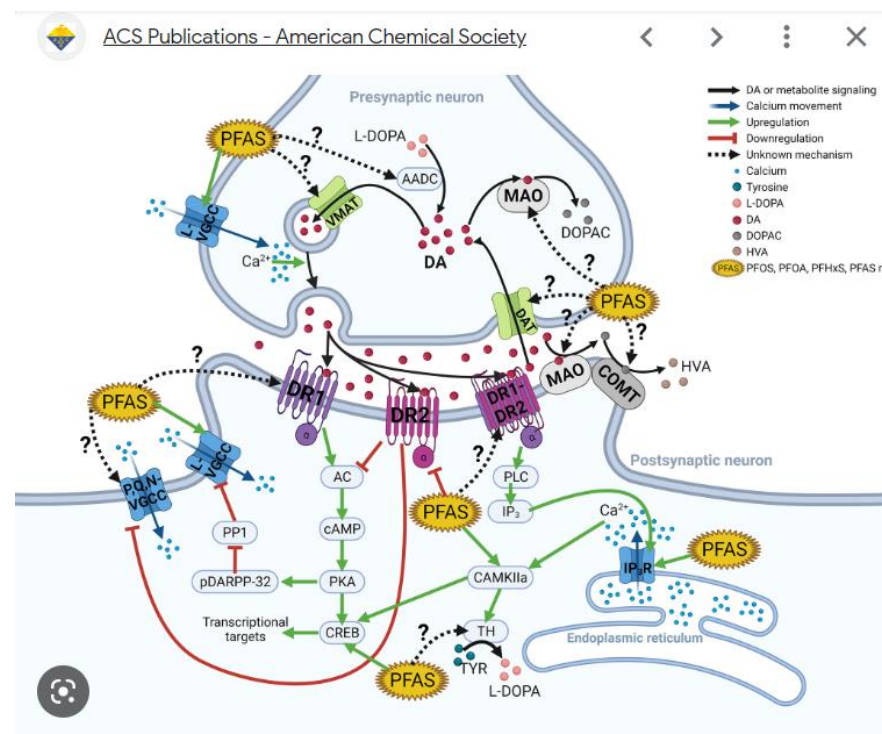
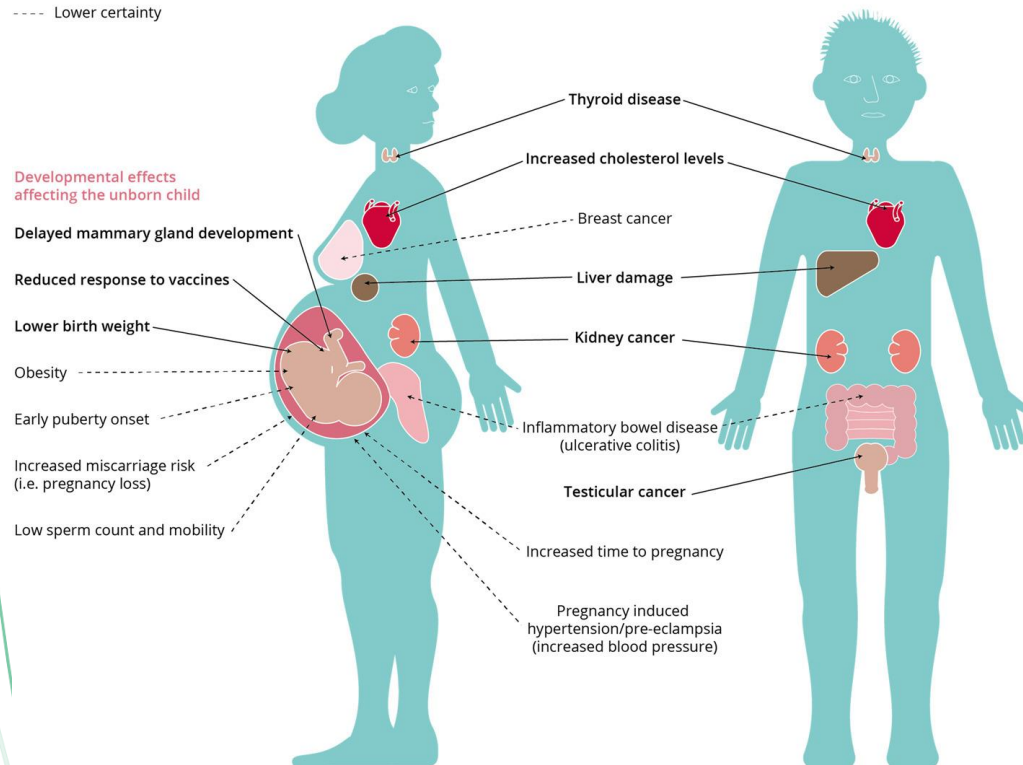
Needed research:

- The long chained PFAS increase until ?
- The short chained - do they reach equilibrium?

How should we group the risks?

Per- and Polyfluoroalkyl Substance Toxicity and Human Health Review: Current State of Knowledge and Strategies for Informing Future Research

— High certainty
- - - Lower certainty



Neurotransmission Targets of Per- and Polyfluoroalkyl Substance Neurotoxicity: Mechanisms and Potential...

Besök

Enviro Toxic and Chemistry, Volume: 40, Issue: 3, Pages: 606-630,
First published: 05 October 2020, DOI: (10.1002/etc.4890)

Influence in ecosystems?

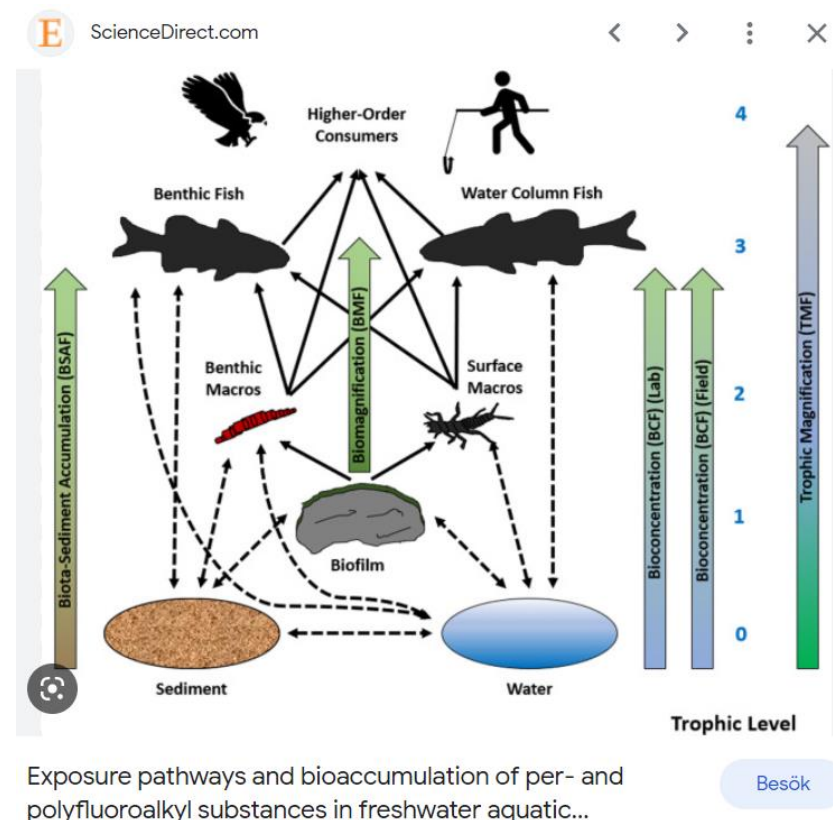
To many uncertainties

Needed research:

- Bioaccumulation highest in mammals
- Trophic magnification is a key factor
- Long chained PFAS bioaccumulate, especially in organs – transferred through the food web
- Short chained PFAS do not bioaccumulate – but what happens during chronic exposure?
- Are there key species that are especially sensitive?

Uptake from:

- Water/soil-vegetation-insekts-birds, bats, frogs- ?
- Water/soil-crops-live stock-humans



Conclusions?

We need to start remediation at contaminated sources to significantly lower downstream risks.

Analyze so you at least can evaluate PFAS-4, PFAS-20, common precursors and PFAS-24 (23).

Analyze the distribution between long and short PFAS to be able to evaluate possible risk reduction

We have sufficient knowledge and methods to start remediation of long PFAS – which significantly reduces risk for humans, mammals and high trophic level animals.

We don't know enough about the impact on the ecosystem or humans to evaluate chronic exposure

