

Bulletin # 69, PFAS Targets, November 16, 2022

Specific PFAS to target organ exposures

	Critical Effect	
Specific PFAS	Target Organ(s)	Chain Length
PFBA	Liver ¹	4
PFBS	Brain ²	5
PFBS	Developing fetus & Development ³	5
PFBS	Kidneys ³	5
PFBS	Reproductive Systems ³	5
PFBS	Thyroid ³	5
PFHpS	Liver ¹	7
PFHxA	Kidney ⁴	6
PFHxS (C6)	Liver ⁵	6
PFNA	Liver ^{3 & 4}	9
PFOA	Liver ⁶	8
PFOA	Development ⁷	8
PFOA	Testicular cancer ⁸	8
PFOA or PFOS	Increase human prostate	8
	cancer risk ⁹	
PFOS	Development ⁷	8
PFOS	Liver ⁵	8
PFOS, PFUA, MPAH, EPAH, PFDO,		
PFSA & PFBS	Heart (total events) ¹⁰	4 to 11
MPAH & PFDO	Heart (congestive heart failure) ¹¹	11
PFNA, PFDA & PFUA	Heart (coronary heart disease) ¹²	9, 10 & 11,
		respectively
PFOS, PFOA,	Placenta ¹³	8 to 9
PFNA & PFDA		
PFOA, PFOS & PFHxS	Pulmonary / lungs ¹⁴	8
6:2 FTOH	Liver & kidneys ¹⁵	6
6:2 FTS	Kidney & liver toxicity ¹⁶	6

¹ ScienceDirect, Occurrence and distribution of per- and polyfluoroalkyl substances (PFASs) in human livers with liver cancer, Ying Liu, November 2021,

https://www.sciencedirect.com/science/article/abs/pii/S0013935121010690

2 ScienceDirect, Environmental Research, Vol 204, Part 1, Use of glioma to assess the distribution patterns of perfluoroalkyl and polyfluoroalkyl substances in human brain, Meng-Yi Xie, March 2022, https://www.sciencedirect.com/science/article/abs/pii/S0013935121013062

³ NIH, PubMed Central, Early life exposure to per- and polyfluoroalkyl substances (PFAS) and latent health outcomes: A review including the placenta as a target tissue and possible driver of peri- and postnatal effects, Bevin E. Blakes, 2020 Oct 2, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7530144/ 4 ScienceDirect, Environmental Pollution, Biotransformation and tissue bioaccumulation of 8:2 fluorotelomer alcohol in broiler by oral exposure, Dongmei Chen, Vol. 267, December 2020, https://www.sciencedirect.com/science/article/abs/pii/S0269749120362990

⁵ ScienceDirect, Ecotoxicology and Environmental Safety, Vol. 96, Profiles of perfluoroalkyl substances in the liver and serum of patients with liver cancer

and cirrhosis in Australia, Leo W.Y. Yeung, 1 October 2013, https://www.sciencedirect.com/science/article/abs/pii/S0147651313002480
6 ScienceDirect, Environmental Pollution, Vol. 263-, Part C, Combined effects and toxicological interactions of perfluoroalkyl and polyfluoroalkyl substances mixtures in human liver cells (HepG2), Atinuke F. Ojo, August 2020, https://www.sciencedirect.com/science/article/abs/pii/S026974911936146

⁷ ScienceDirect, Environmental Research, Vol. 212, Part C, Health-related toxicity of emerging per- and polyfluoroalkyl substances: Comparison to legacy PFOS and PFOA, https://www.sciencedirect.com/science/article/abs/pii/S0013935122007587

⁸ The C8 Health Project: Design, Methods, and Participants, Stephanie J. Frisbee, 1 December 2009, https://ehp.niehs.nih.gov/doi/10.1289/ehp.0800379 and Elsevier, Environmental Pollution, Environmental perfluoroalkyl acid exposures are associated with liver disease characterized by apoptosis and altered serum adipocytokines, John Bassler, C8 Health Study, Vol. 247, April 2019, pgs 1055-1063, https://www.sciencedirect.com/science/article/abs/pii/S0269749118341599#undfig1

⁹ ScienceDirect, Biochemical Pharmacology, Vol. 197, Per- and polyfluoroalkyl substances target and alter human prostate stem-progenitor cells, Wen-Yan Hu, March 2022, https://www.sciencedirect.com/science/article/abs/pii/S0006295221005281



10 PubMed Central (PMC), NIH, National Library of Medicine, National Center for Biotechnology Information, Exposure to Perfluoroalkyl Chemicals and Cardiovascular Disease: Experimental and Epidemiological Evidence, Allessandra Meneguzzi, 2021 Jul 9, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8298860/

11 ibid.

12 ibid.

13 ScienceDirect, Vol 295, Concentrations of per- and polyfluoroalkyl substances (PFAS) in human placental tissues and associations with birth outcomes,

Samantha M. Hall, May 2022, https://www.sciencedirect.com/science/article/abs/pii/S0045653522003666
14 Toxicology in Vitro, Per- and polyfluoroalkyl substances (PFASs) modify lung surfactant function and pro-inflammatory responses in human bronchial epithelial cells, Jorid B. Sorli, 15 September 2019, https://www.sciencedirect.com/science/article/pii/S0887233319304795

15 E&E News, Greenwire, Inside FDA's 'forever chemicals' catastrophe, E.A. Crunden, Ariel Wittenberg, 03/07/2022,

https://www.eenews.net/articles/inside-fdas-forever-chemicals-

catastrophe/?fbclid=lwAR3ovnBO1oDTFSvytplwK1P7JbVF7quCgAql8uyIAFflYYXKOpcznz46Mg0

16 integral consulting inc., National Association for Surface Finishing (NASF), March 2019, p. 1, https://nasf.org/wp-content/uploads/2019/04/Summary-of-Toxicology-Studies-on-6-2-FTS-and-Detailed-Technical-Support-Documents.pdf

Other references

Journal of Exposure Science & Environmental Epidemiology Guideline levels for PFOA and PFOS in drinking water: the role of scientific uncertainty, risk assessment decisions, and social factors, Alissa Cordner, 08 January 2019, https://www.nature.com/articles/s41370-018-0099-9

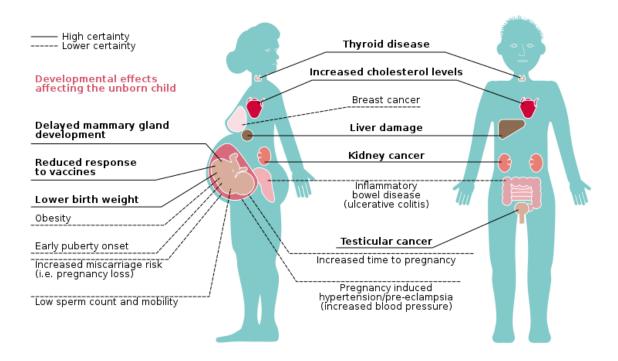
SpringerLink, Individual and mixture associations of perfluoroalkyl substances on liver function biomarkers in the Canadian Health Measures Survey, Michael M. Borghese, 14 September 2022, https://link.springer.com/article/10.1186/s12940-022-00892-6

Society of Environmental Toxicology and Chemistry, Critical Review, Per- and Polyfluoroalkyl Substance Toxicity and Human Health Review: Current State of Knowledge and Strategies for Informing Future Research, Suzanne E. Fenton, 05 October 2020, https://setac.onlinelibrary.wiley.com/doi/full/10.1002/etc.4890

NIH, PubMed Central, PFAS and cancer, a scoping review of the epidemiologic evidence, Kyle Steenland, 2022 Mar 1, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7946751/

Merit Laboratories, EPA Releases Human Health Toxicity Report for PFBS, A PFAS Chemical, November 30, 2021, https://www.meritlabs.com/blog/2021/12/2/merit-laboratories-blog-epa-releases-human-health-toxicity-report-for-pfbs-a-pfaschemical#:~:text=Health%20effects%20that%20are%20associated,effects%20on%20a%20developing%20fetus.

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Long-term exposure to PFAS is detrimental to human health. Credit: European Environment Agency, Wikimedia Creative Commons. (NC Health News, Environmental Health, PFAS evidence piling up, putting polluters on notice, Will Atwater, November 1, 2022, https://www.northcarolinahealthnews.org/2022/11/01/pfas-evidence-is-piling-up-and-putting-polluters-onnotice/)