

PFAS Health Risk Assessment

Nathan Kloczko, MPH

Health Assessor

Division of Public Health

City of Madison Environmental
Justice Working Group Meeting

Dec 20, 2021



WISCONSIN DEPARTMENT
of HEALTH SERVICES



Outline

PFAS Overview

Exposure Pathways

Risk Assessment Tools

Groundwater Standards

Hazard Index (HI)

Fish Consumption

Advisories



Outline

PFAS Overview

Exposure Pathways

Risk Assessment Tools

Groundwater Standards

Hazard Index (HI)

Fish Consumption

Advisories



PFAS are a family of man-made chemicals.

PFAS are characterized by a

PFAS are characterized by a **carbon chain**

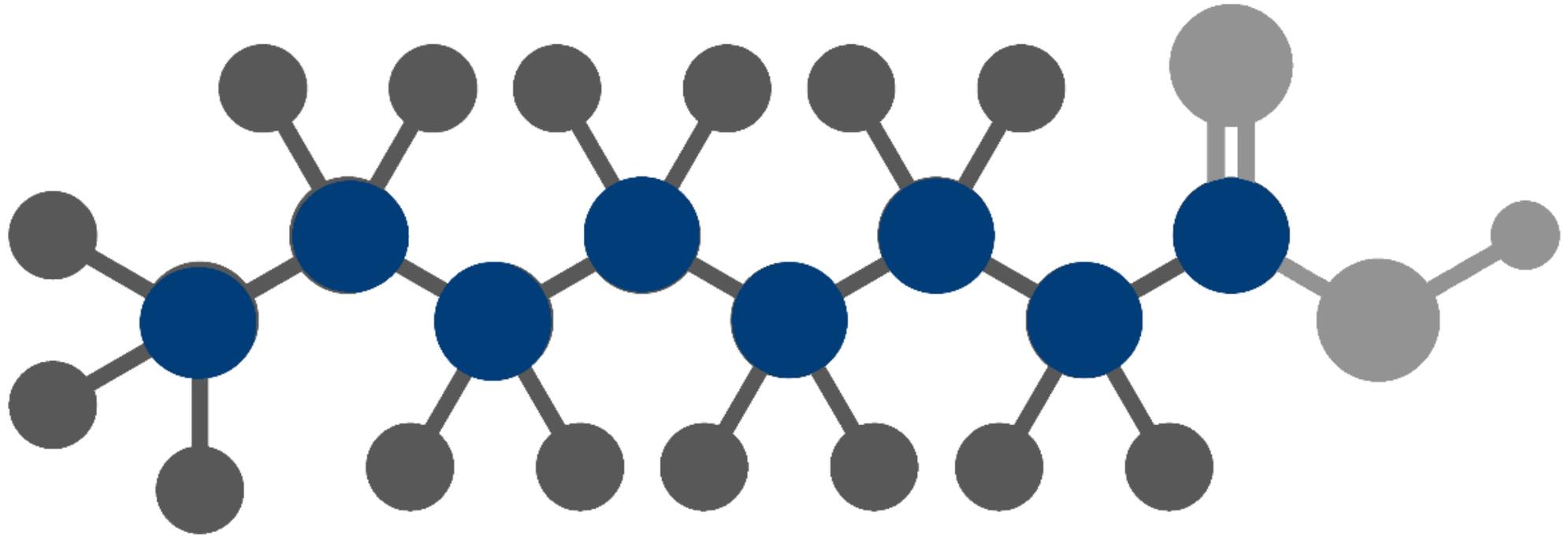


Diagram shows perfluorooctanoic acid (PFOA).

attached fluorines

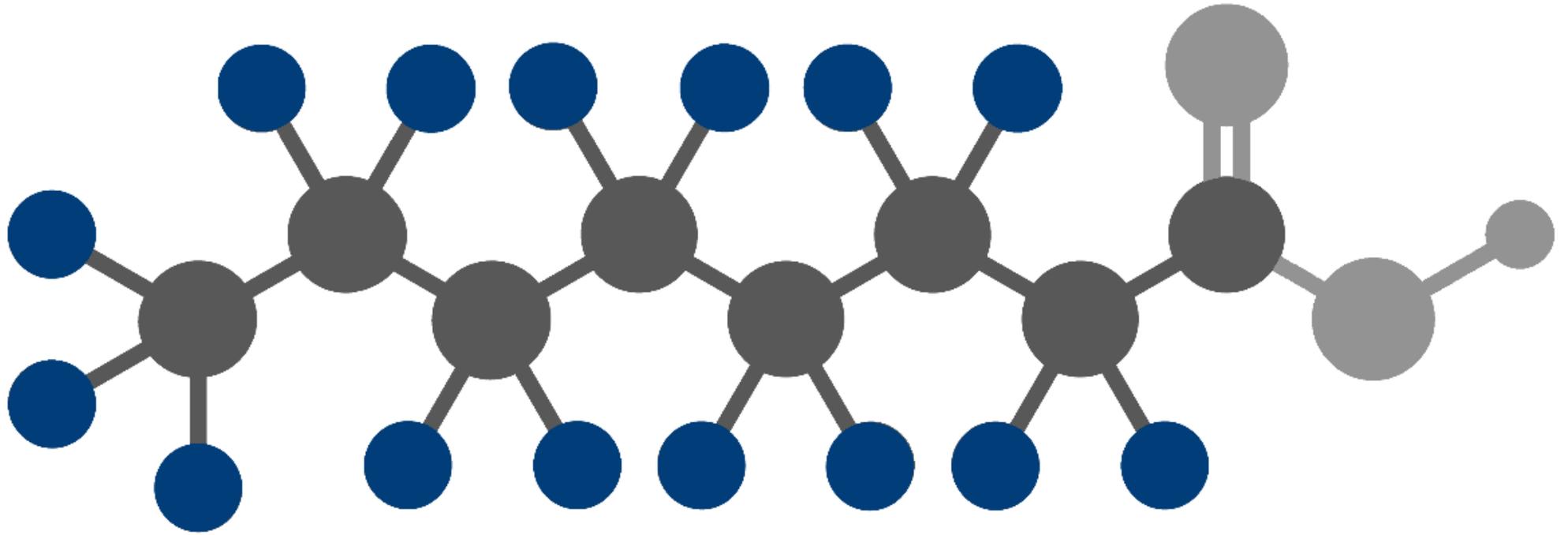


Diagram shows perfluorooctanoic acid (PFOA).

and a **functional group** on the end.

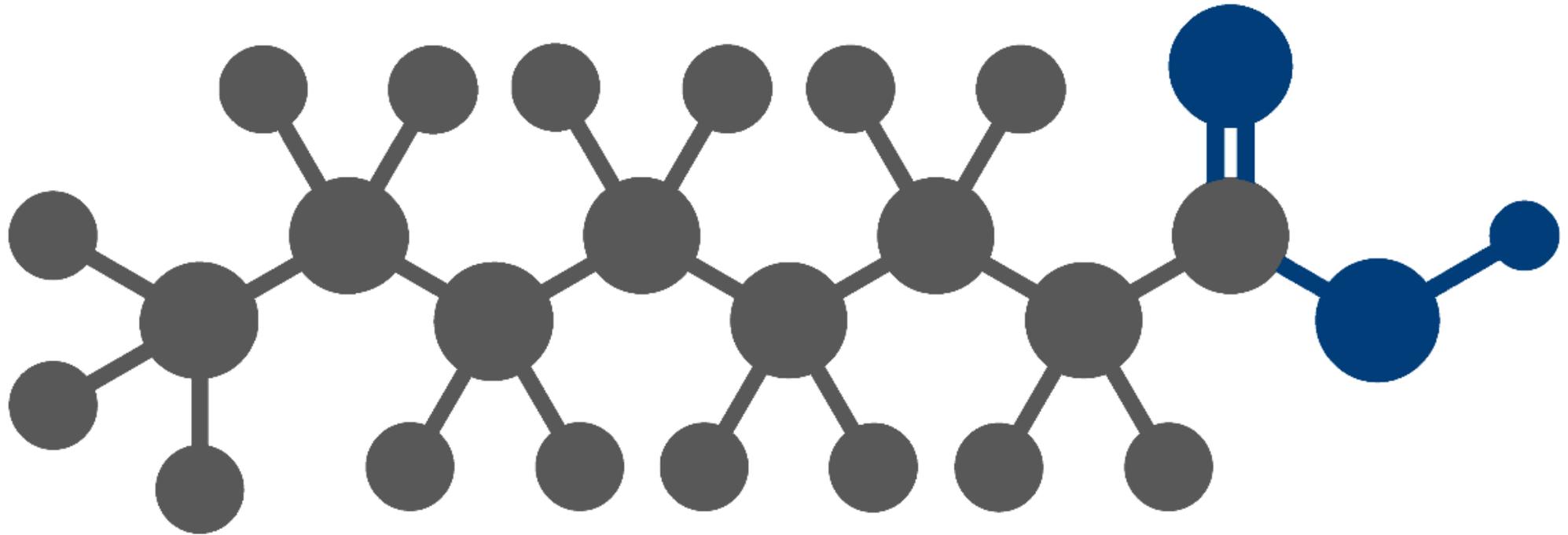
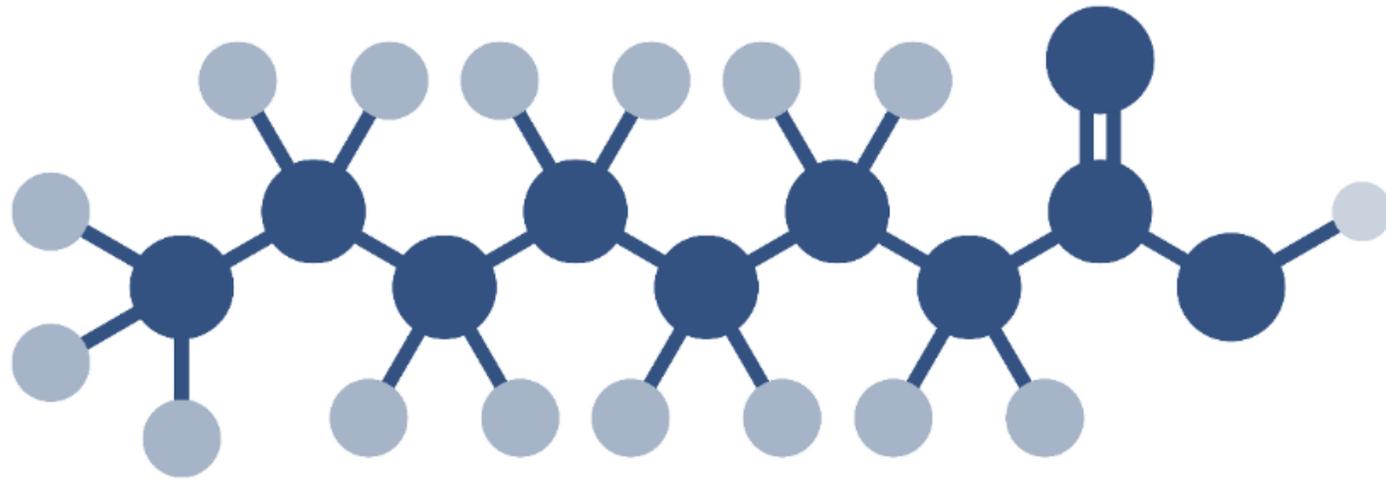


Diagram shows perfluorooctanoic acid (PFOA).



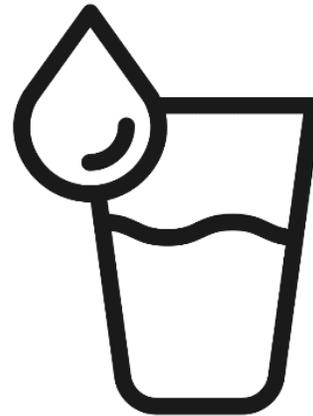
**There are at least 5,000
types of PFAS.**



PFAS are
resistant to



Oil/Grease



Water

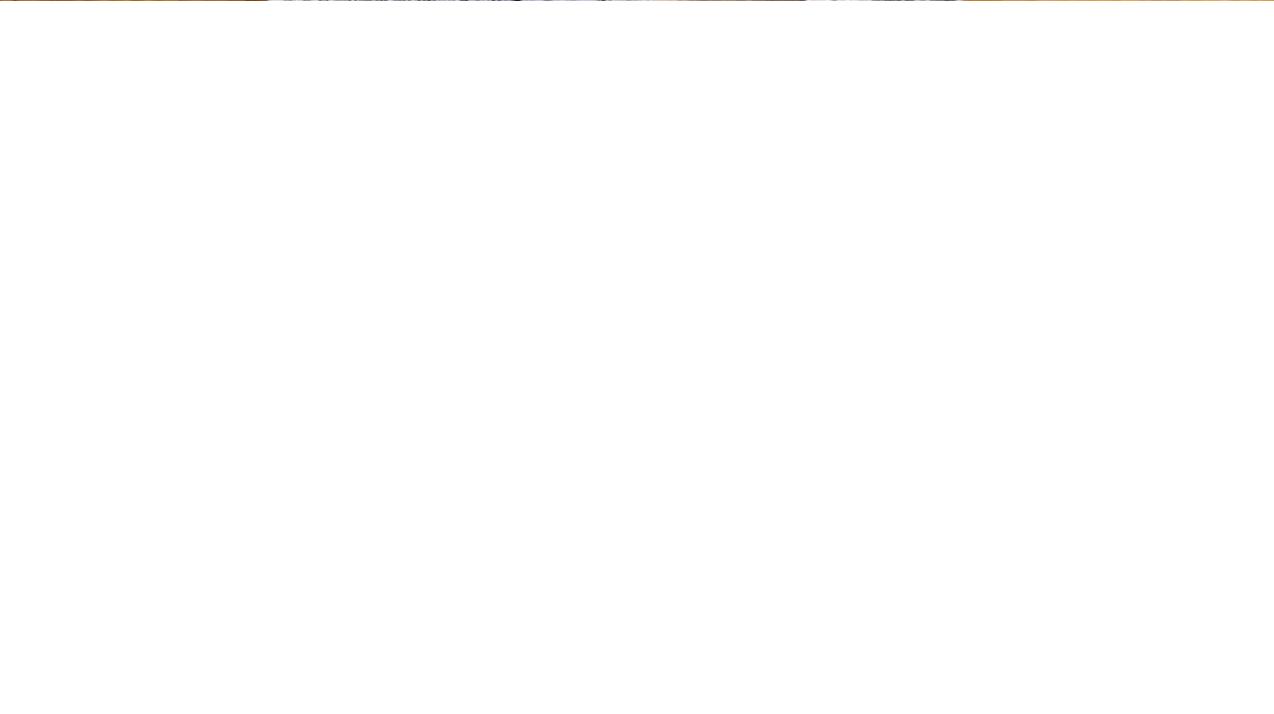


Heat

PFAS have been used in many products.









High levels of PFAS may



Increase
cholesterol

High levels of PFAS may



Increase
cholesterol



Reduce
antibody
response

High levels of PFAS may



Increase
cholesterol



Reduce
antibody
response



Decrease
fertility in
women

Outline

PFAS Overview

Exposure Pathways

Risk Assessment Tools

Groundwater Standards

Hazard Index (HI)

Fish Consumption

Advisories

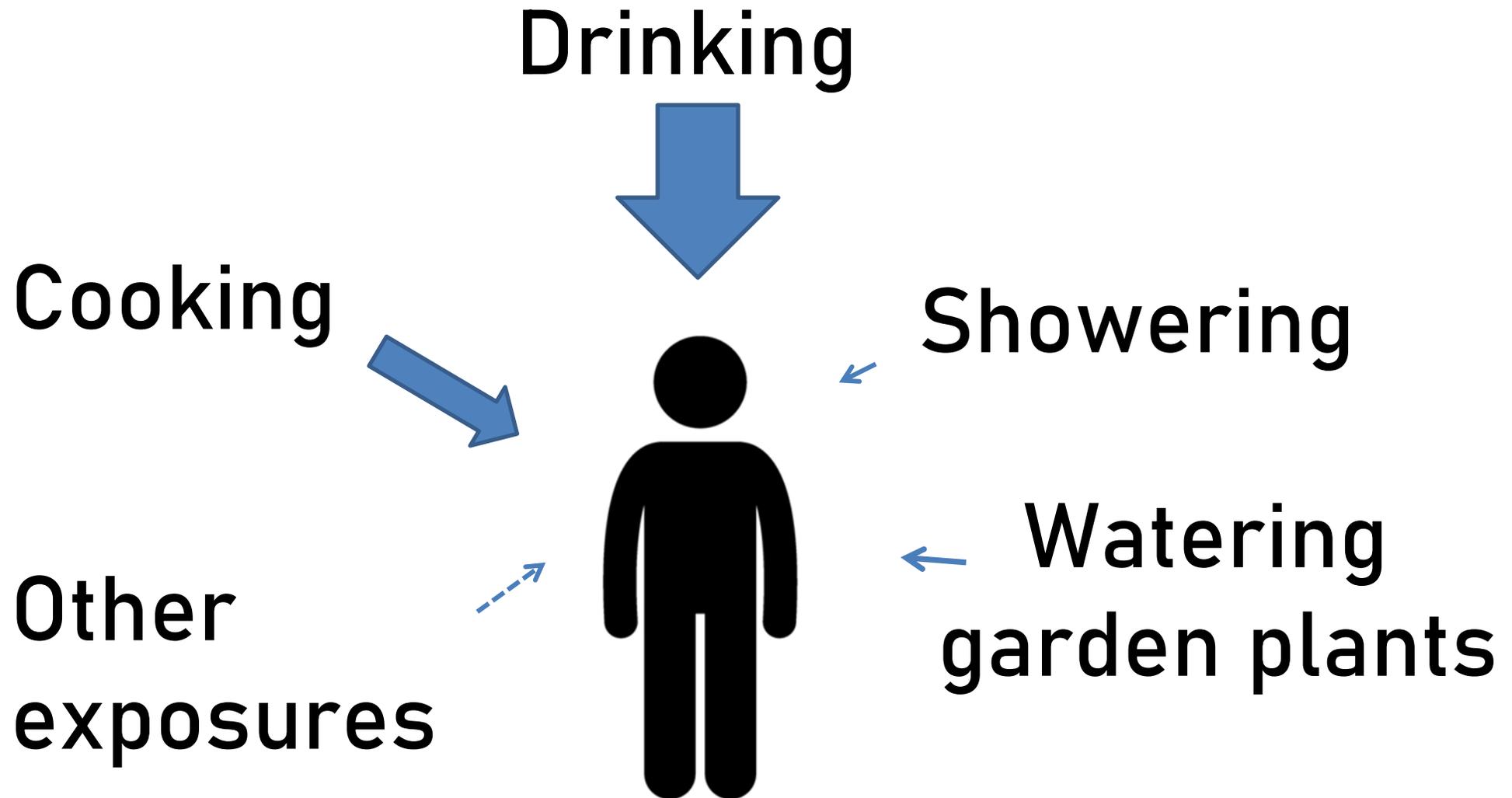




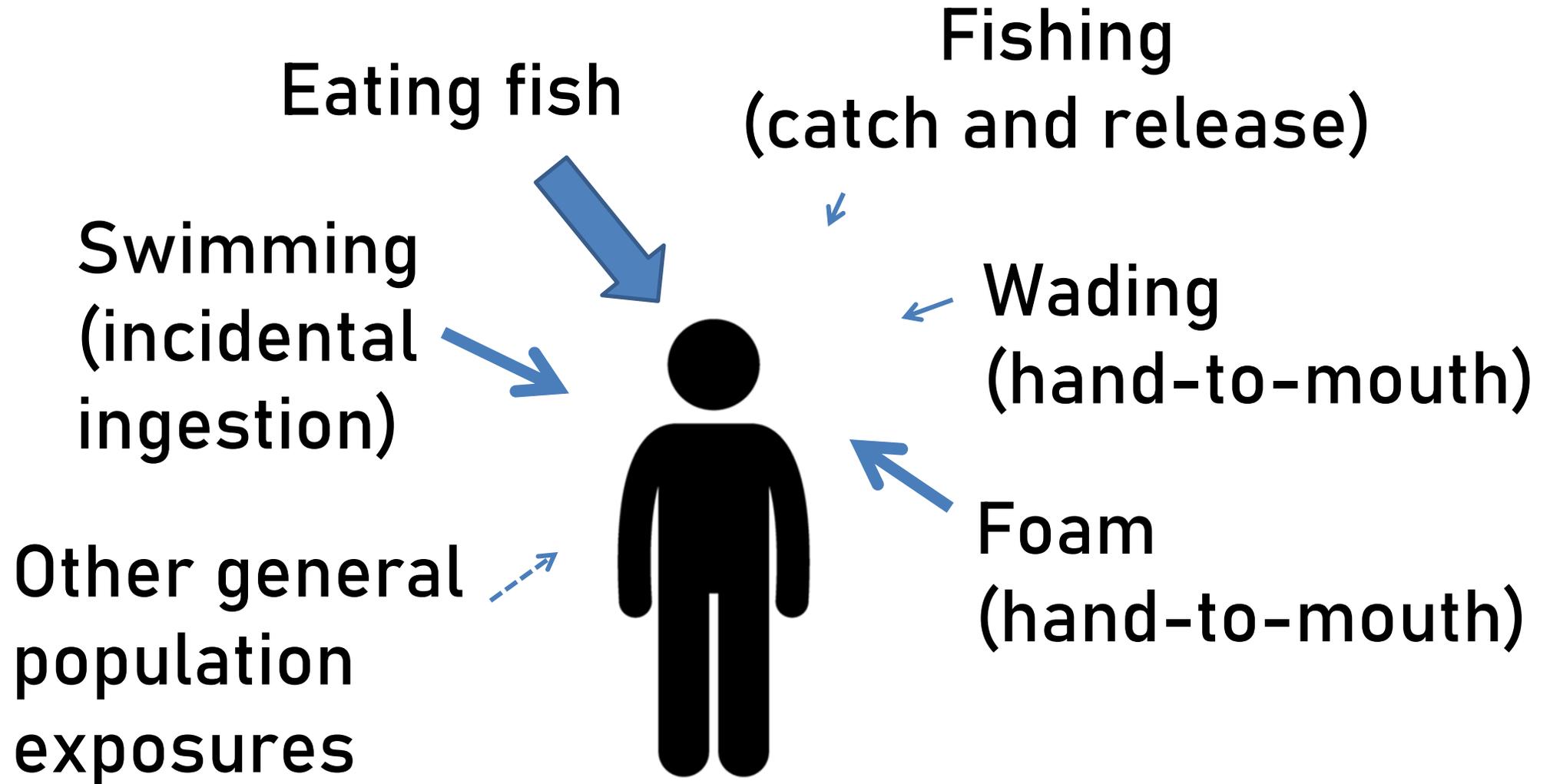
We can ingest PFAS in **food**,
dust, and **drinking water**.



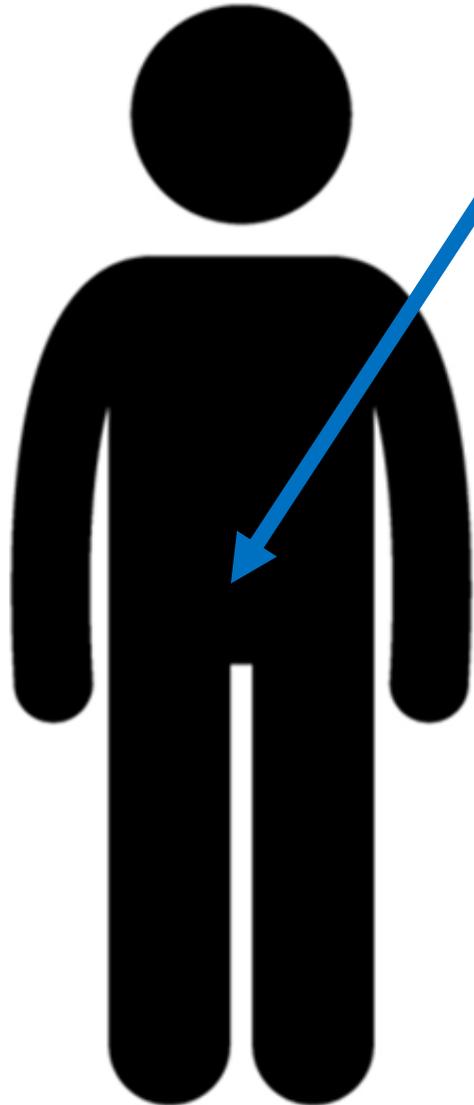
Contaminated Potable Water



Contaminated Surface Water



How do PFAS leave our bodies?



Slowly through:

Urine

Feces

Menstruation, breastmilk, cord blood (females)

Why so slowly?

Absorbed and reabsorbed instead of metabolized

Persistent (long half-lives)

Limiting Local PFAS Exposures Can Help Decrease Health Risk

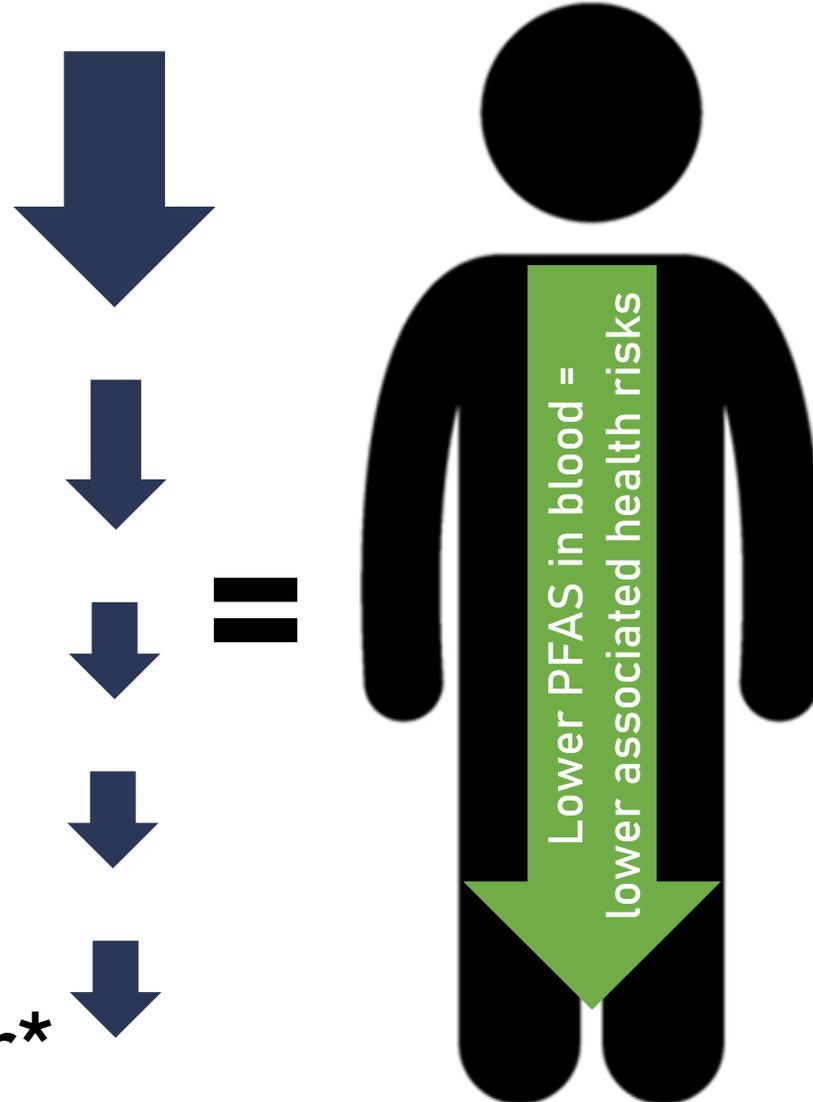
Avoid drinking contaminated tap water*

Avoid making foods that take up a lot of tap water*

Follow fish consumption advisories

Avoid exposure to foam

Avoid watering home garden crops with tap water*



Outline

PFAS Overview

Exposure Pathways

Risk Assessment Tools

Groundwater Standards

Hazard Index (HI)

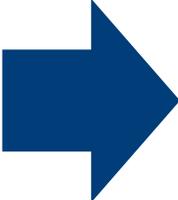
Fish Consumption

Advisories



The process for developing groundwater standards is specified in statute.

Groundwater Standards Process

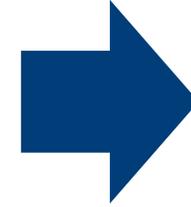
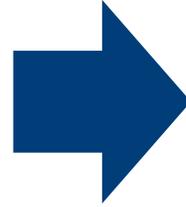
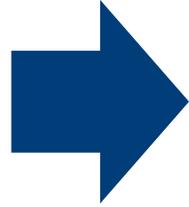


Agencies identify substances that are or may be in groundwater.

DNR requests DHS review of substances that may impact public health.

DHS develops recommended standards.

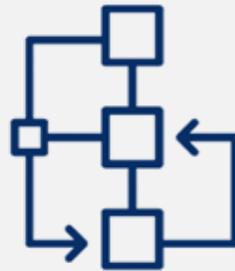
DNR proposes rules.



DHS develops recommended standards.



Gather relevant scientific information.



Select the appropriate standards.



Document findings.



Share findings.

Recommended Groundwater Standards

PF ₆ OA = 20*†	PFNA = 30	PFUnA = 3,000
PF ₆ OS = 20*†	PFH _x S = 40	PFBA = 10,000
FOSA = 20*	GenX = 300	PFTeA = 10,000
NEtFOSA = 20*	PFDA = 300	PFH _x A = 150,000
NEtFOSAA = 20*	PFDoA = 500	PFODA = 400,000
NEtFOSE = 20*	DONA = 3,000	PFBS = 450,000

*DHS recommends a combined standard of 20 ng/L for PF₆OA, PF₆OS, FOSA, NEtFOSA, NEtFOSAA, and NEtFOSE. All units in parts per trillion (ppt)

Outline

PFAS Overview

Exposure Pathways

Risk Assessment Tools

Groundwater Standards

Hazard Index (HI)

Fish Consumption

Advisories



Hazard Index: Cumulative Risk Assessment

PFAS with DHS Recommended Standards	
FOSA	PFNA
NEtFOSA	PFDA
NEtFOSAA	PFUnA
NEtFOSE	PFBS
PFOA	PFHxS
PFOS	PFDoA
PFTeA	HFPO-DA; GenX*
PFBA	PFODA
PFHxA	DONA

All had reproductive and/or developmental health effects in animal studies



**Level of PFAS 1 in
drinking water**



**Health guideline
for PFAS 1**

= Hazard Quotient

10 ppt
PFOS

$$\frac{\text{10 ppt PFOS}}{\text{20 ppt}} = 0.5$$

20 ppt



**Level of PFAS 1 in
drinking water**

**Level of PFAS 2 in
drinking water**

$$\frac{\text{Level of PFAS 1 in drinking water}}{\text{Health guideline for PFAS 1}} + \frac{\text{Level of PFAS 2 in drinking water}}{\text{Health guideline for PFAS 2}} + \dots = \text{Hazard Index}$$



**Health guideline
for PFAS 1**

**Health guideline
for PFAS 2**

**Hazard
Index**

10 ppt
PFOS

30 ppt
PFHxS

————— + —————

= **Hazard
Index**

20 ppt

40 ppt

0.50
+ 0.75
= 1.25

Outline

PFAS Overview

Exposure Pathways

Risk Assessment Tools

Groundwater Standards

Hazard Index (HI)

Fish Consumption

Advisories



DHS and DNR issue fish consumption advisories when the level of PFOS in fish is high.



A woman with brown hair tied back, wearing a grey button-down shirt and a brown apron, is cooking in a kitchen. She is focused on a black frying pan on a stove, where a piece of salmon is being cooked alongside several cherry tomatoes and fresh green herbs. She is using a small glass bottle to add liquid to the pan. The kitchen background shows white cabinets and a stainless steel range hood.

Advice is typically issued as how many fish meals a person should eat in a month, week, or year.

Summary

Everyone has some PFAS exposure

Main exposure pathway differs by community

Main assessment tools:

- Groundwater Standards

- Hazard Index (HI)

- Fish Consumption Advisories



Thanks!



WISCONSIN DEPARTMENT
of HEALTH SERVICES

Nathan Kloczko, MPH

nathan.kloczko@dhs.wisconsin.gov

608.267.3227

