



PFAS Exposure Evaluations

Taylor Sullivan, Sue Manente, Stephanie White, Puneet Vij

Michigan Department of Health and Human Services

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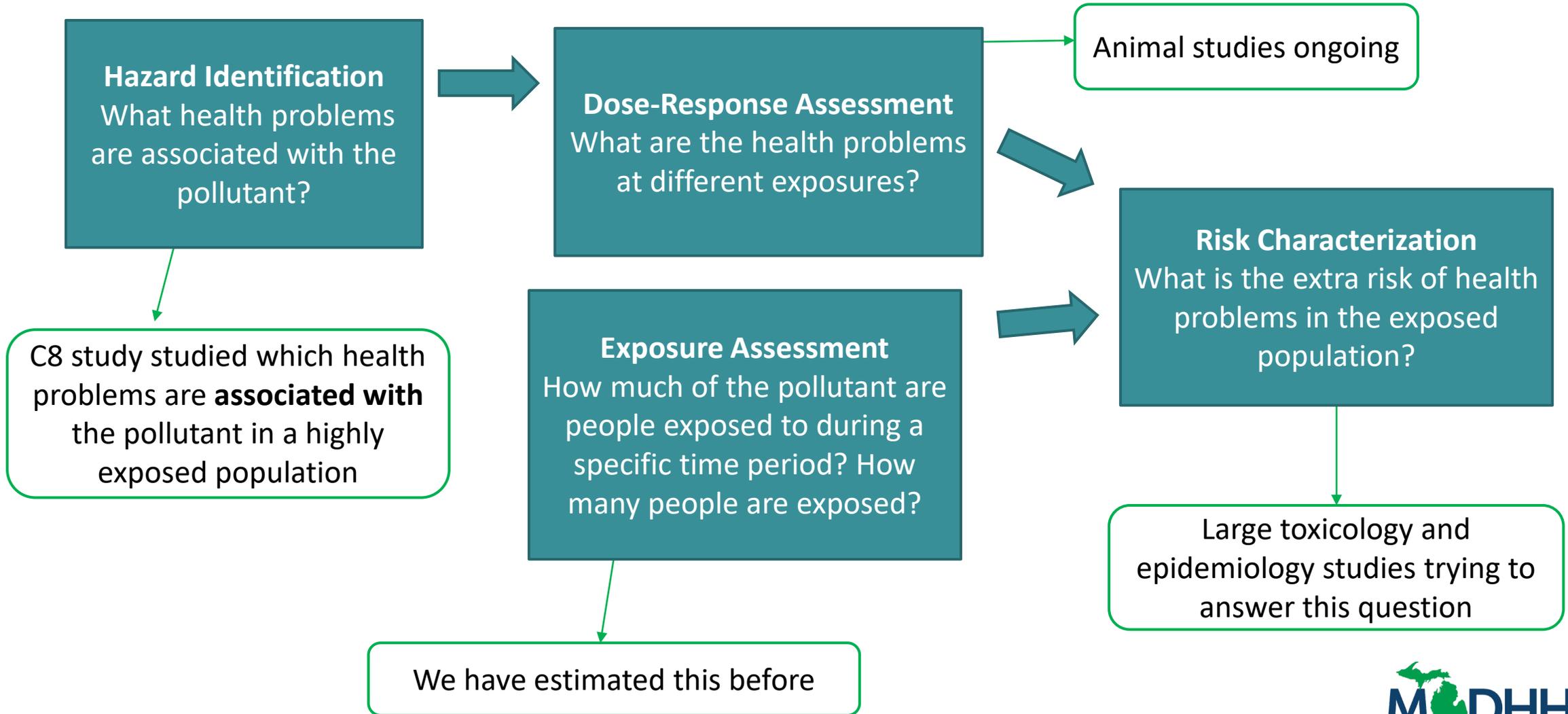
Outline

- Welcome
- Purpose of today's meeting
- Introductions
- Risk assessment overview
- Exposure assessment overview
- Exposure assessment examples
- Discussion

Purpose of Today's Meeting

- Provide an update of DHHS Oscoda-area planning activities
- Review types of different exposure assessments
- Discuss the relevance of exposure assessment to Oscoda experience
- Introduction to CAT planning

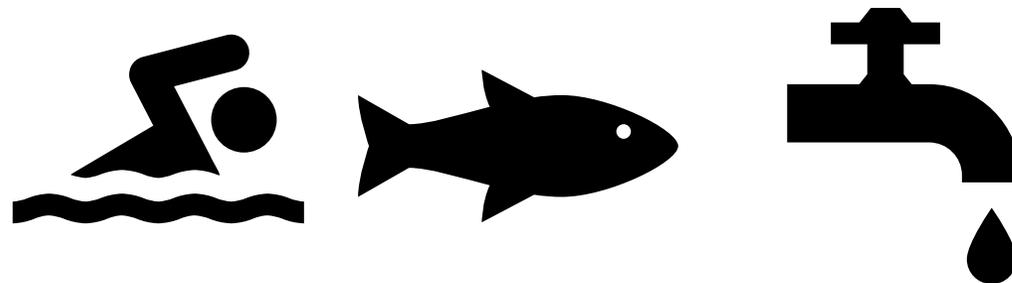
The 4 Step Risk Assessment Process



Exposure Assessment

An exposure assessment...

- Attempts to identify if exposure has occurred recently
- Attempts to identify types of exposures (e.g., eating fish, drinking water) that result in elevated levels of chemicals in blood or urine
- Does not link harmful health conditions to chemicals
- Could compare to national average



PFAS Exposure Study: Duke's Research in NC Piedmont

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STUDY GOALS

1 River Study



Understanding how PFAS in the Haw River affects PFAS in drinking water

2 Exposure Study



Looking at the relationship between PFAS levels in water and in blood in Pittsboro residents

3 Health Study



Investigating PFAS effects on birth outcomes

4 Animal Study



Using data from animal studies to explore the exposure and health effects of PFAS in drinking water

5 Policy Work



Engaging with decision makers on generating policy recommendations

PFAS Exposure Study: Duke's Research in NC Piedmont

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EXPOSURE STUDY

For this study goal, we are looking at the relationship between PFAS in drinking water and PFAS in blood.

We have recruited about 50 local Pittsboro residents to study this relationship. We will determine what the PFAS levels are in tap water and in blood. We are also looking at how these levels change over time, by doing repeat sampling. This will let us understand how changing levels in the Haw River and in the tap water may later change the blood levels.

We're also exploring how other factors (like sex or age) may impact the PFAS blood-water relationship.

**Sample
Collection
Process for
the Exposure
Study**



Informed consent,
go over study
details & eligibility



Blood sample,
collected by a
phlebotomist



Water sample,
collected from
the home



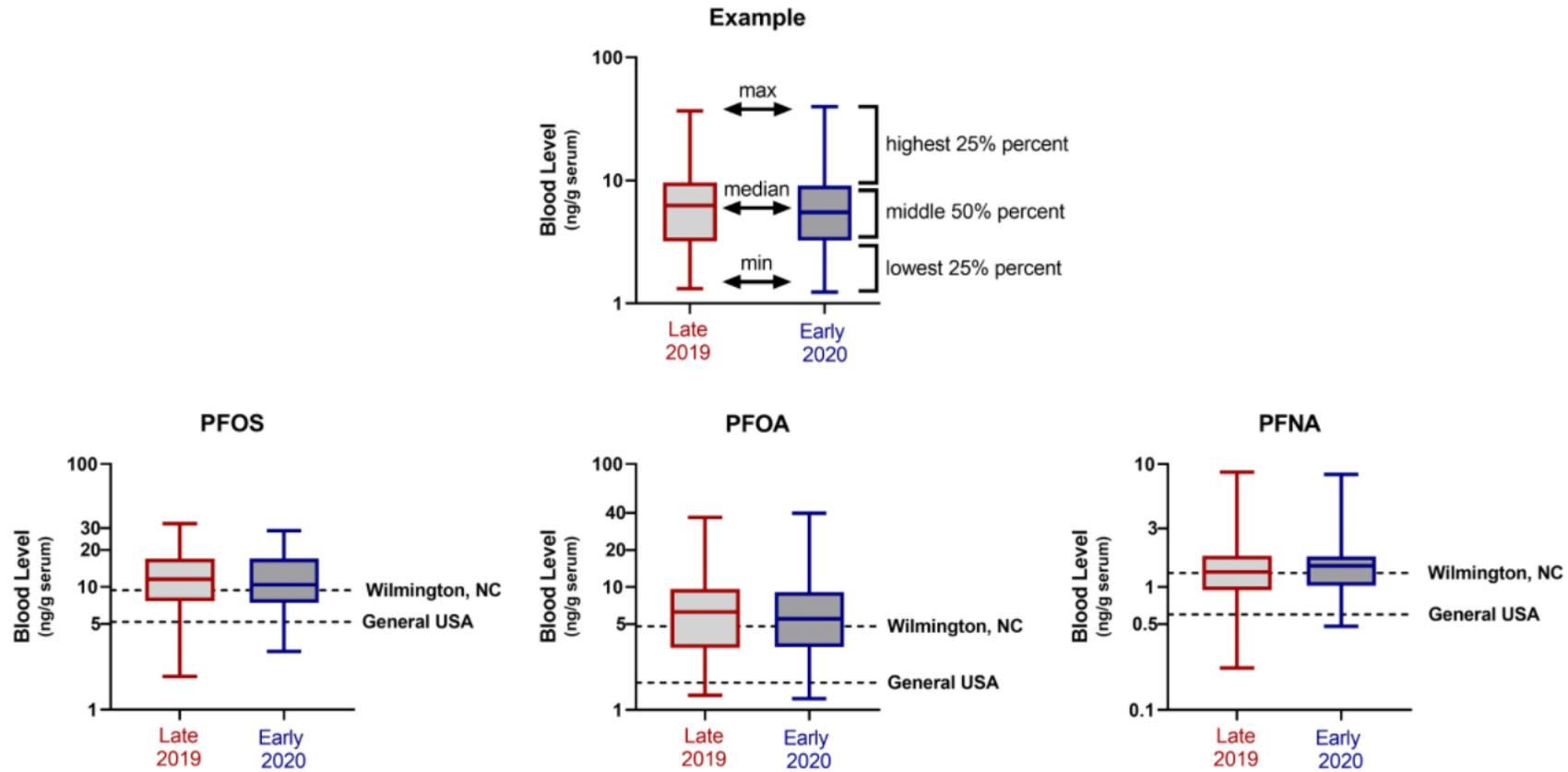
Survey,
on drinking
water habits

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the ENVIRONMENT

MDHHS
Michigan Department of Health & Human Services

PFAS Exposure Study: Duke's Research in NC Piedmont

PFAS ANALYTES MEASURED IN THE EXPOSURE STUDY



Pease Exposure Assessment

Pease Study

- In 2014, PFAS contamination from nearby Pease AFB was found in a public NH drinking water supply
- Exposure assessment done (this article)
 - Now: health study
- Blood samples and questionnaire (did not assess other relevant routes of PFAS exposure)
- Significant associations were observed between PFAS serum concentrations and age, time spent in the affected community, childcare attendance, and water consumption.



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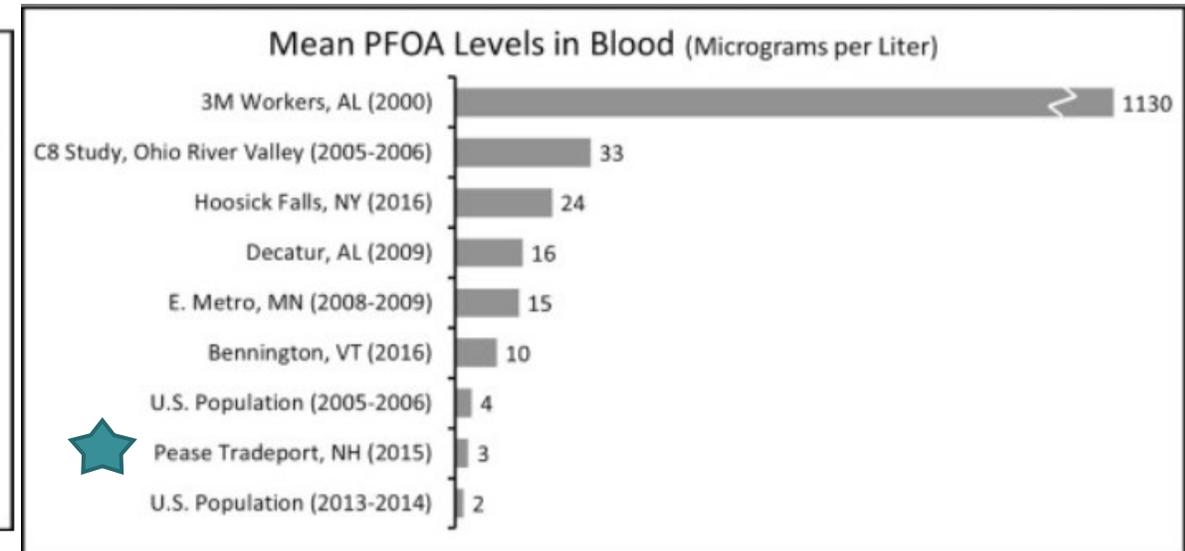
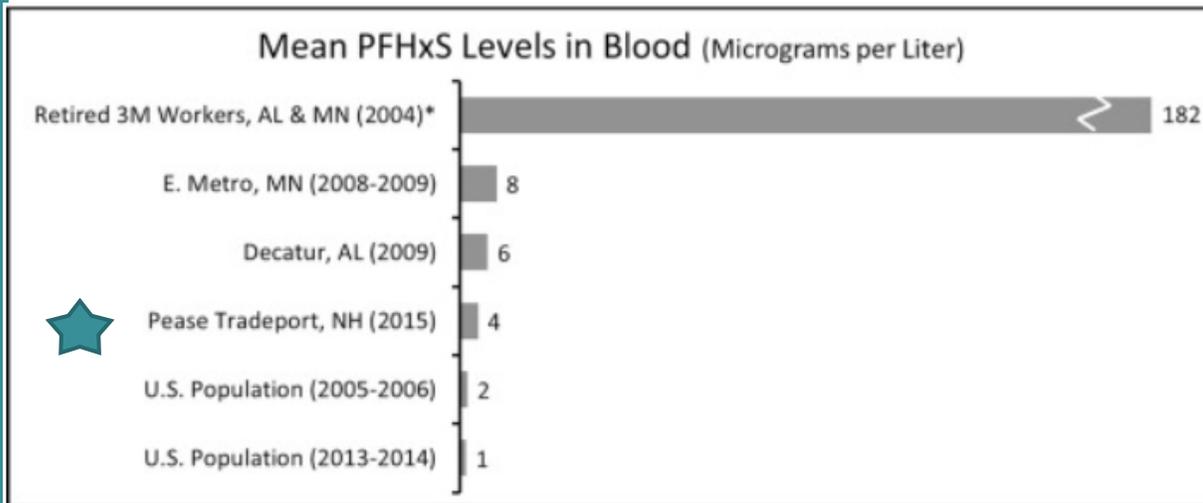
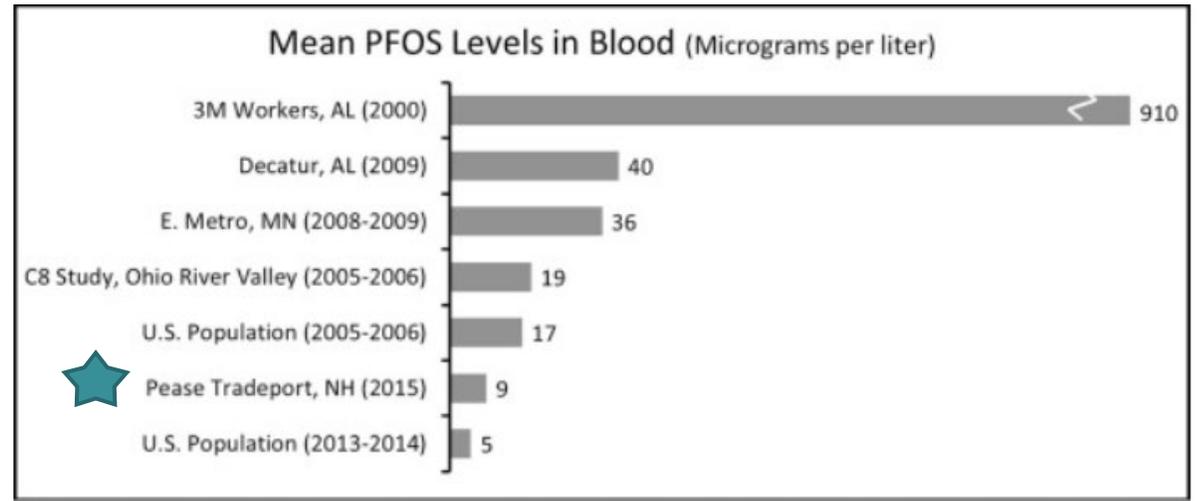


Per- and polyfluoroalkyl substance (PFAS) exposure assessment in a community exposed to contaminated drinking water, New Hampshire, 2015

Elizabeth R. Daly^a ✉, Benjamin P. Chan^a ✉, Elizabeth A. Talbot^{a, b}, Julianne Nassif^{a, 1}, Christine Bean^a, Steffany J. Cavallo^{a, 2}, Erin Metcalf^a, Karen Simone^{c, g}, Alan D. Woolf^{d, e, f}

Pease Study

- Blood PFOA, PFOS, and PFHxS levels higher than national population, but lower than other occupationally and environmentally exposed communities



Daly, E. R., Chan, B. P., Talbot, E. A., Nassif, J., Bean, C., Cavallo, S. J., ... & Woolf, A. D. (2018). Per-and polyfluoroalkyl substance (PFAS) exposure assessment in a community exposed to contaminated drinking water, New Hampshire, 2015. *International journal of hygiene and environmental health*, 221(3), 569-577.

North Kent County Exposure Assessment

North Kent County Exposure Assessment

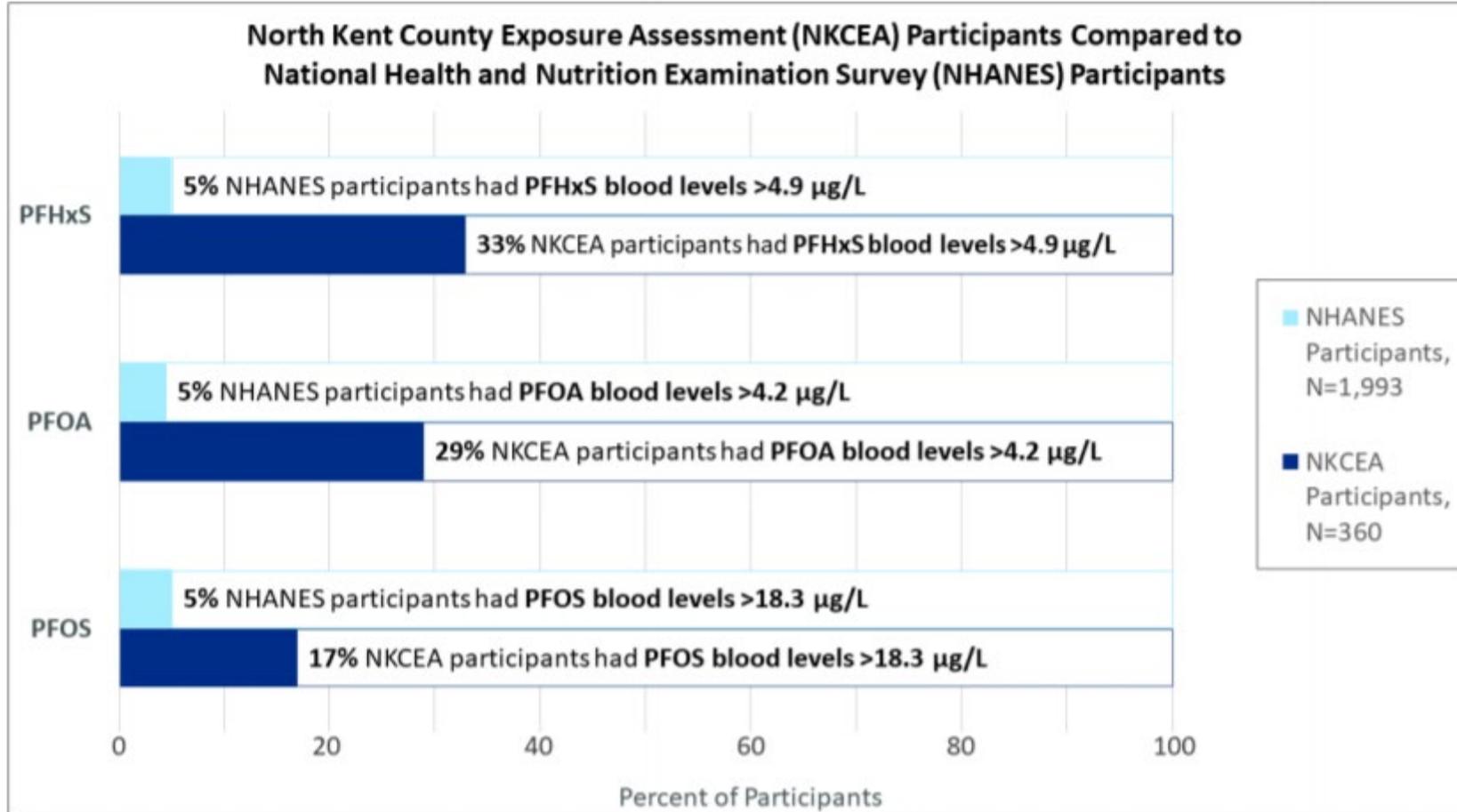
The objectives of the exposure assessment were to:

1. Determine the mean concentration of 30 PFAS in participants' serum.
2. Determine the mean concentration of 30 PFAS in participants' unfiltered private well water and filtered private well water (for those with drinking water filters).
3. Describe the data on individual characteristics that could affect PFAS exposure or elimination.
4. Compare concentrations of PFAS in participants' serum to those among participants in the National Health and Nutrition Examination Survey (NHANES), a national survey representative of PFAS concentrations in the U.S. general population.

North Kent County Exposure Assessment

| | |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------|
|  | 417 Households Invited to Participate |
|  | 14 Clinics Held |
|  | 432 Individuals Participated in a Clinic |
|  | 427 Blood Samples Collected |
|  | 183 Households had Water Samples Collected |

North Kent County Exposure Assessment



North Kent County Exposure Assessment

PFAS Blood Levels in Different Groups of People (µg/L)

| | PFOS Average* | PFOS Maximum | PFOA Average* | PFOA Maximum | PFHxS Average* | PFHxS Maximum |
|-----------------------------------------------------------------|---------------|--------------|---------------|--------------|----------------|---------------|
| Workers in PFAS industries¹ | 692 | 10,600 | 1,231 | 92,030 | 65 | 1,880 |
| Communities with contaminated drinking water² | 18 | 759 | 23 | 17,557 | 6 | 116 |
| NKCEA Study Participants³ | 6 | 3,173 | 2 | 433 | 2 | 884 |
| NHANES Participants⁴ | 5 | 110 | 2 | 20 | 1 | 23 |

[1] Studies of workers in PFAS industries measured PFAS among 1) workers in fluorochemical production and 2) firefighters.

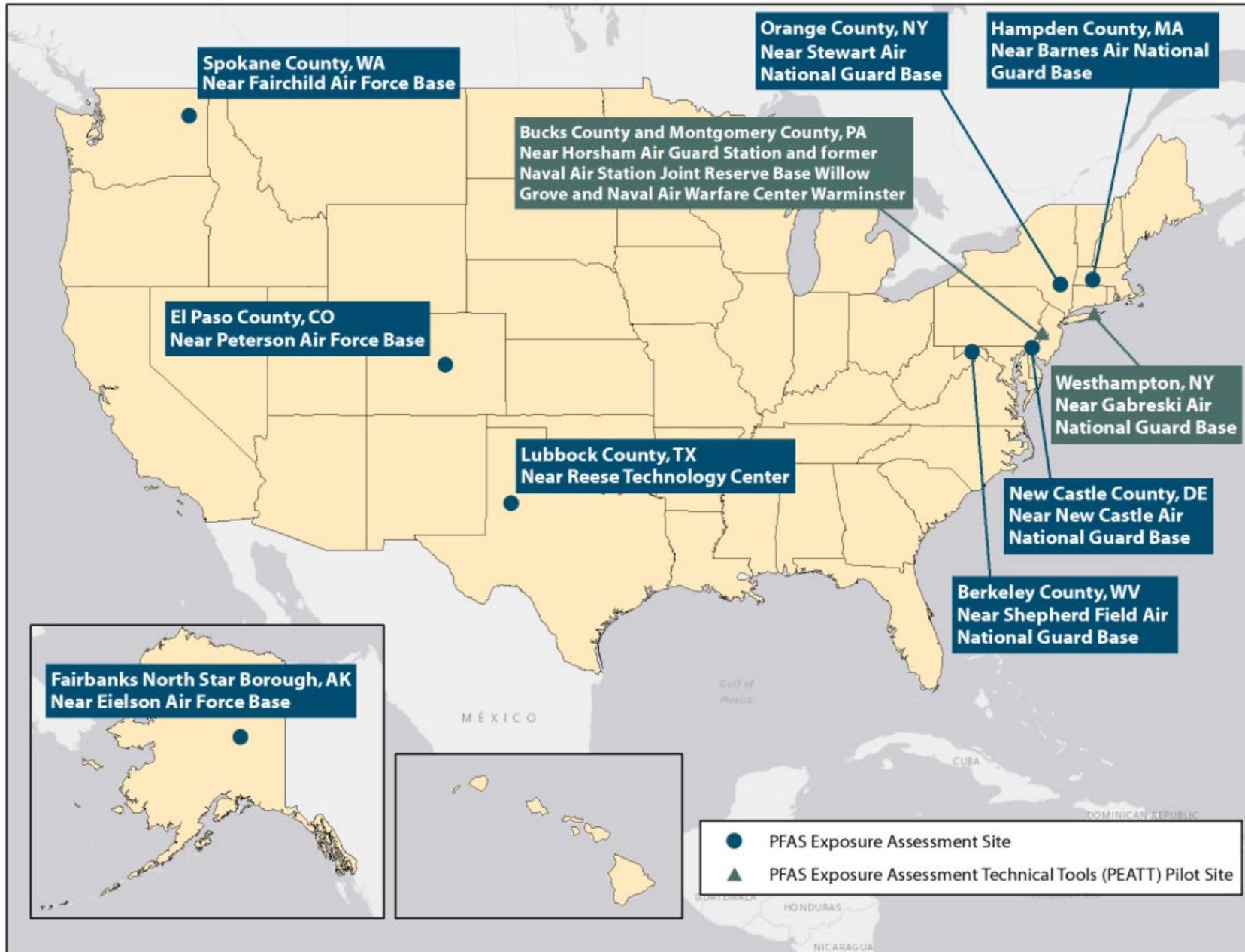
[2] Studies of other populations with PFAS in their drinking water include: Ohio River Valley (C8); Minnesota East Metro; New Hampshire PEAS; Bennington and North Bennington, Vermont; Hoosick Falls, New York; Ronneby, Sweden; and northern Alabama (Anniston).

[3] "NKCEA Study Participants" represents the 360 participants who were at least 12 years old and had a wide range of PFAS in drinking water wells.

[4] The geometric mean of 2015-2016 NHANES participants.

*Please see the full report for a description of how the averages are calculated.

ATSDR Ongoing Exposure Assessments



Summary

- Risk assessment overview
- Exposure assessment overview
- Exposure assessment examples
 - Pittsboro, NC
 - Portsmouth, NH
 - Kent County, MI
 - ...and more

Questions about exposure assessments?

Discussion

- Examples of how community advisors can help
 - Feedback on recruitment methods and documents
 - Suggest locations for study office
 - Feedback on survey questions (e.g., fishing and hunting habits)
 - Information sharing with other community members
- Your help is essential to create a successful study!

Discussion

- Purpose of the community advisory team
- Process for forming the CAT

Thank you!

Contact Information

- Taylor Sullivan (Project Epidemiologist)
 - Sullivant4@michigan.gov
 - 517-512-0197
- Puneet Vij (Project Toxicologist)
 - Vijp@michigan.gov
 - 517-582-4104
- Sue Manente (Project Community Engagement Specialist)
 - Manentes@michigan.gov
 - 517-281-6091
- Stephanie White (Project Health Educator)
 - WhiteS35@michigan.gov
 - 517-898-2477
- Mounica Nandula (Project Manager)
 - NandulaM@michigan.gov
 - 517-284-0246

Extra slides

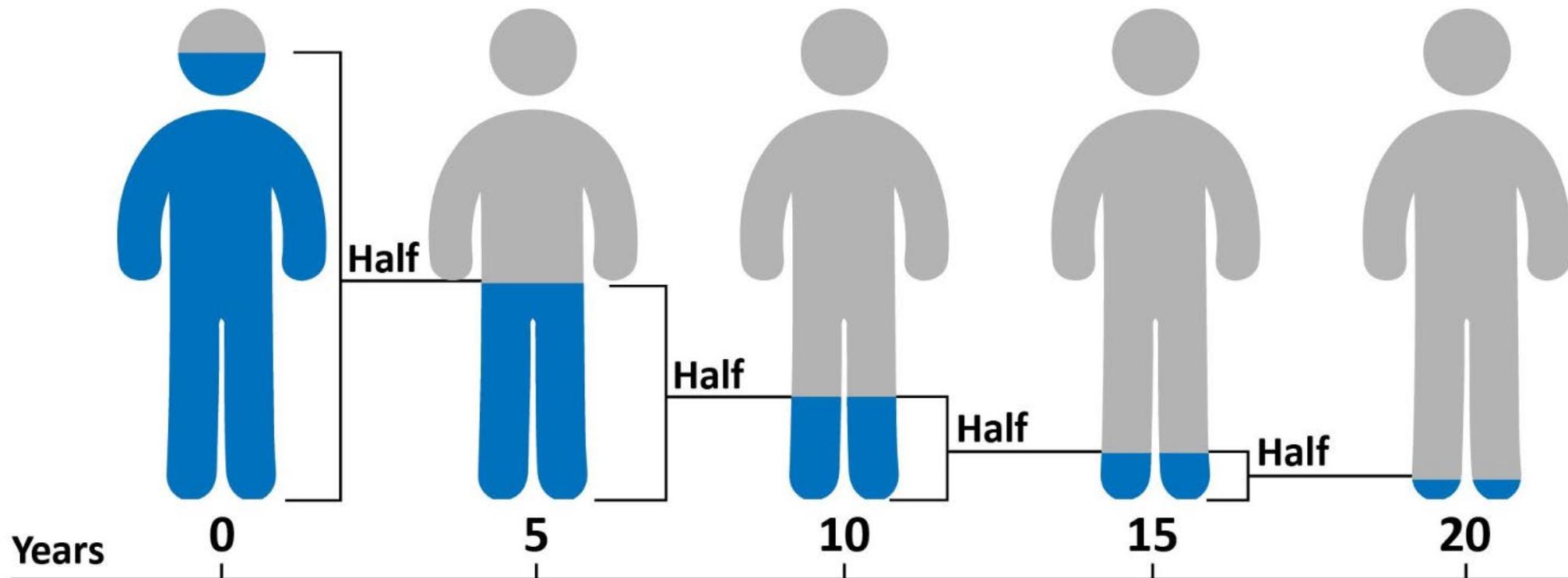
How can PFAS affect health?

Potential Associated Human Health Outcomes (PFOA and/or PFOS)

- Lowering a woman's chance of getting pregnant
- Increasing the chance of high blood pressure in pregnant women
- Increasing the chance of thyroid disease*
- Increasing cholesterol levels
- Changing immune response
- Increasing chance of cancer, especially kidney and testicular cancers

* PFOA only

PFAS and Half-Lives



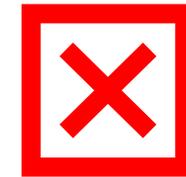
- When your exposure to a PFAS ends, the PFAS levels in your body begin to decline through normal bodily processes.
- The *half-life* of a chemical describes the time it takes for half of that chemical to leave your body.

Blood Testing



A blood test can tell you...

The amount of PFAS in your blood at the time it was drawn



A blood test can't tell you...

When you were exposed to PFAS

How much PFAS you were exposed to in the past

How you were exposed

If the PFAS in your blood has harmed your health or will harm you in the future

Approaches to Blood Testing by Public Health Agency

- Individual blood testing (no study done)
- Health study with blood testing
- Exposure assessment with blood testing

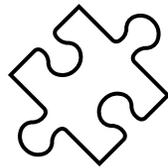
Individual Blood Testing

- Trained MDHHS staff taking blood, sending individuals results
- Would not recruit people to give blood (not a study)
- May not be representative of your community
 - Couldn't necessarily compare community's average blood PFAS level to national average

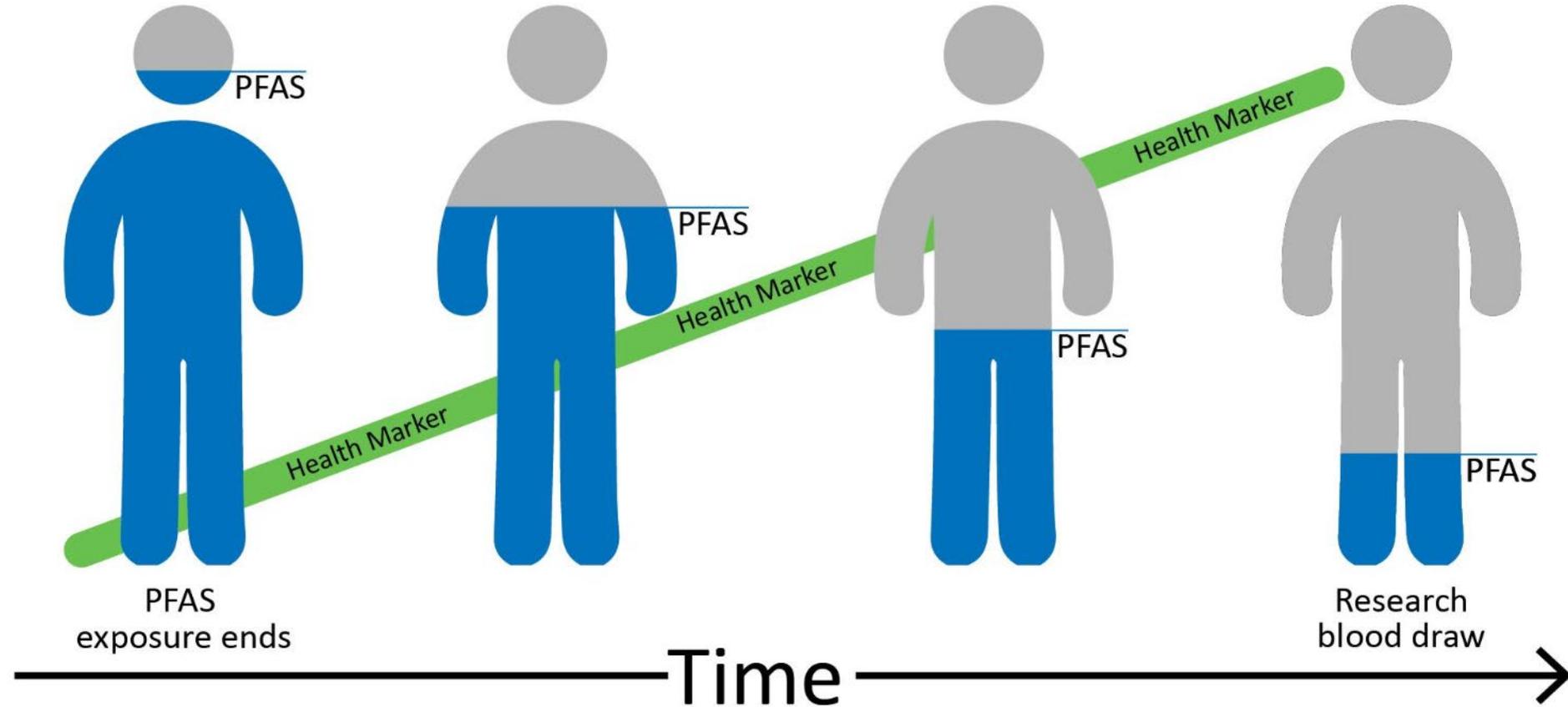
Blood Testing: Types of Studies

A health study...

- Needs a lot of study participants to be successful
- Looks for links between certain health conditions and PFAS exposures by collecting:
 - Measures of exposure
 - Measures of health
- Need **accurate** and **recent** exposure information for **all** study participants



Challenges of Health Studies



- If the *main source* of exposure ended many years ago, then we cannot accurately measure that exposure.
- If we cannot measure that exposure, we cannot test if that exposure is related to health.