

Rachel Bauer,¹ Courtney Carignan,² Andrew Patterson,³ Thep Phomsopa,³ Eric Redman,³ Heather Stapleton,⁴ Christopher Higgins⁵

¹Department of Pharmacology and Toxicology

²Food Science and Human Nutrition, Michigan State University

³Eurofins Environment Testing America

⁴Nicholas School of the Environment, Duke University

⁵Department of Civil & Environmental Engineering, Colorado School of Mines

RESULTS:

Table 1. Correlation coefficients, slope factors and geometric means (ng/mL) for PFASs detected above 50%.

Compound Group & Name	Spearman Correlations*			Slope Factors			Geometric Mean* For This Study Population		
	Serum & Venous VAMS	Serum & Capillary VAMS	Venous VAMS & Capillary VAMS	Serum: Venous VAMS	Serum: Capillary VAMS	Venous VAMS: Capillary VAMS	Serum	Venous VAMS	Capillary VAMS
Perfluoroalkyl carboxylic acids (PFCAs)									
Total PFOA	0.99	0.99	0.99	1.75	1.90	1.08	7.08	4.41	3.81
Linear PFOA	0.99	0.99	0.99	1.72	1.88	1.08	7.07	4.41	3.80
PFNA	0.91	0.95	0.96	1.77	1.99	1.07	0.51	0.34	0.29
Perfluoroalkyl sulfonic acids (PFASs)									
PFHxS	0.93	0.97	0.98	1.77	1.77	0.99	3.05	1.79	1.61
PFHpS	0.96	0.97	0.94	1.78	1.78	0.98	0.52	0.34	0.32
Total PFOS	0.97	0.98	0.99	1.57	1.78	1.13	11.84	7.39	6.22
Linear PFOS	0.96	0.98	0.99	1.58	1.90	1.19	8.14	4.98	4.23
Branched PFOS	0.97	0.99	0.97	1.53	1.60	1.04	3.24	1.99	1.76
Perfluoroalkyl sulfonamides									
NMeFOSAA	0.98	0.98	0.98	1.15	1.54	1.23	0.15	0.12	0.11

*Spearman correlations were statistically significant (p<0.05) for all comparisons. Geometric means were statistically different between each sample type (p<0.05).

Figure 2. Approximate 2:1 ratio for serum to whole blood VAMS.

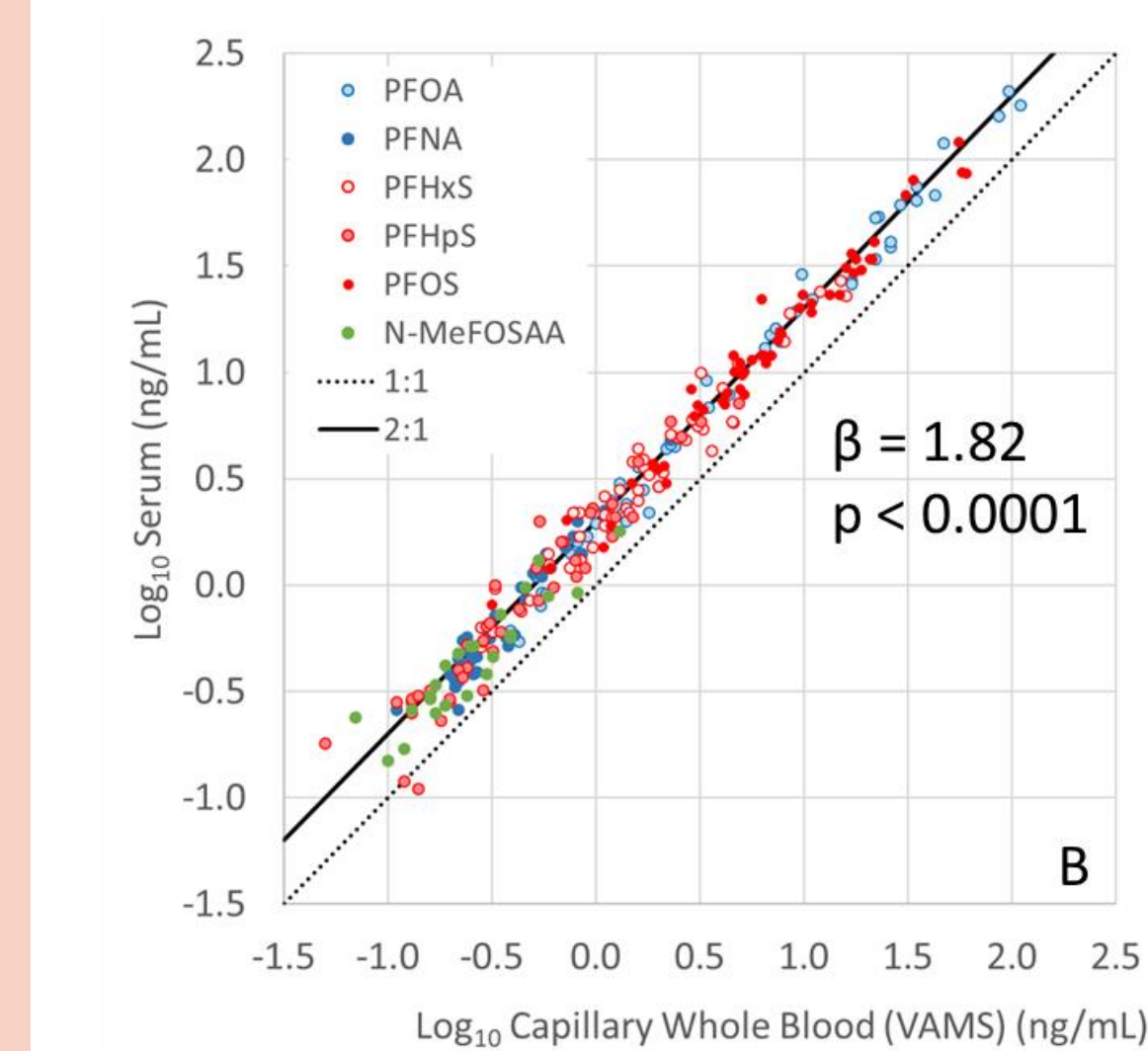
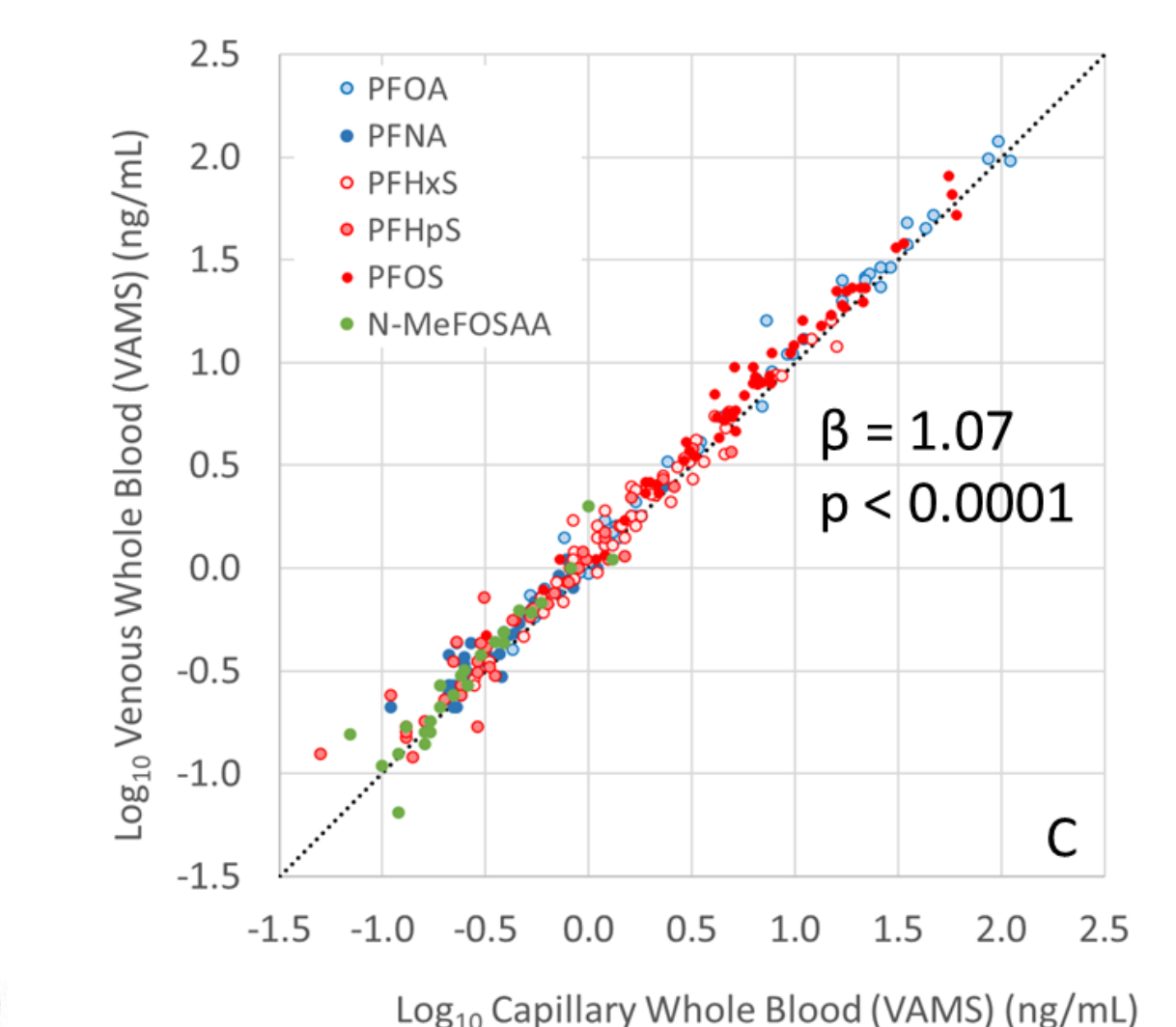


Figure 3. Approximate 1:1 ratio for whole blood VAMS (venous vs. capillary).



Conclusions: These findings indicate that VAMS can be a useful self-collection tool for assessing PFAS blood levels among highly exposed individuals.

References:

- Hu, X. C.; Andrews, D. Q.; Lindstrom, A. B.; Bruton, T. A.; Schaidt, L. A.; Grandjean, P.; Lohmann, R.; Carignan, C. C.; Blum, A.; Balan, S. A.; Higgins, C. P.; Sunderland, E. M., Detection of poly- and perfluoroalkyl substances (PFASs) in U.S. drinking water linked to industrial sites, military fire training areas, and wastewater treatment plants. *Environ. Sci. Technol. Lett.* 2016, 3 (10), 344-350. DOI: 10.1021/acs.estlett.6b00260.
- Koponen, J.; Rudge, J.; Kushon, S.; Kiviranta, H. Novel volumetric adsorptive microsampling technique for determination of perfluorinated compounds in blood. *Anal. Biochem.* 2018, 545, 49-53. DOI: 10.1016/j.jab.2018.01.015.
- Michigan PFAS Action Response Team. (2019, March 8). Parchment / Cooper Township Drinking Water Response. <https://www.michigan.gov/pfasresponse/drinking-water/statewide-survey/parchment>
- Protti, M.; Mandrioli, R.; Mercolini, L. Tutorial: Volumetric adsorptive microsampling (VAMS). *Analytica Chimica Acta* 2019, 1046, 32-47. DOI: 10.1016/j.jaca.2018.09.004.

Acknowledgements:

Thanks to Eurofins Environment West Sacramento, Dr. James Rudge, Dr. Sarah Choyke, Shonda Kruse, Ankita Bhattacharya, and all the study participants. This study was funded in part by Assistance Agreement No. R839482 awarded by the U.S. Environmental Protection Agency (EPA). CC is additionally funded by the National Institute of Environmental Health Sciences (R01ES028311) and USDA National Institute of Food and Agriculture (Hatch project MICL02565). This poster has not been formally reviewed by these agencies, the views expressed in this poster are solely those of the authors and do not necessarily reflect those of the agencies and the agencies do not endorse any products or commercial services mentioned.

A Self-Collection Blood Test for PFASs: Comparing Volumetric Micro-Samplers with a Traditional Serum Approach



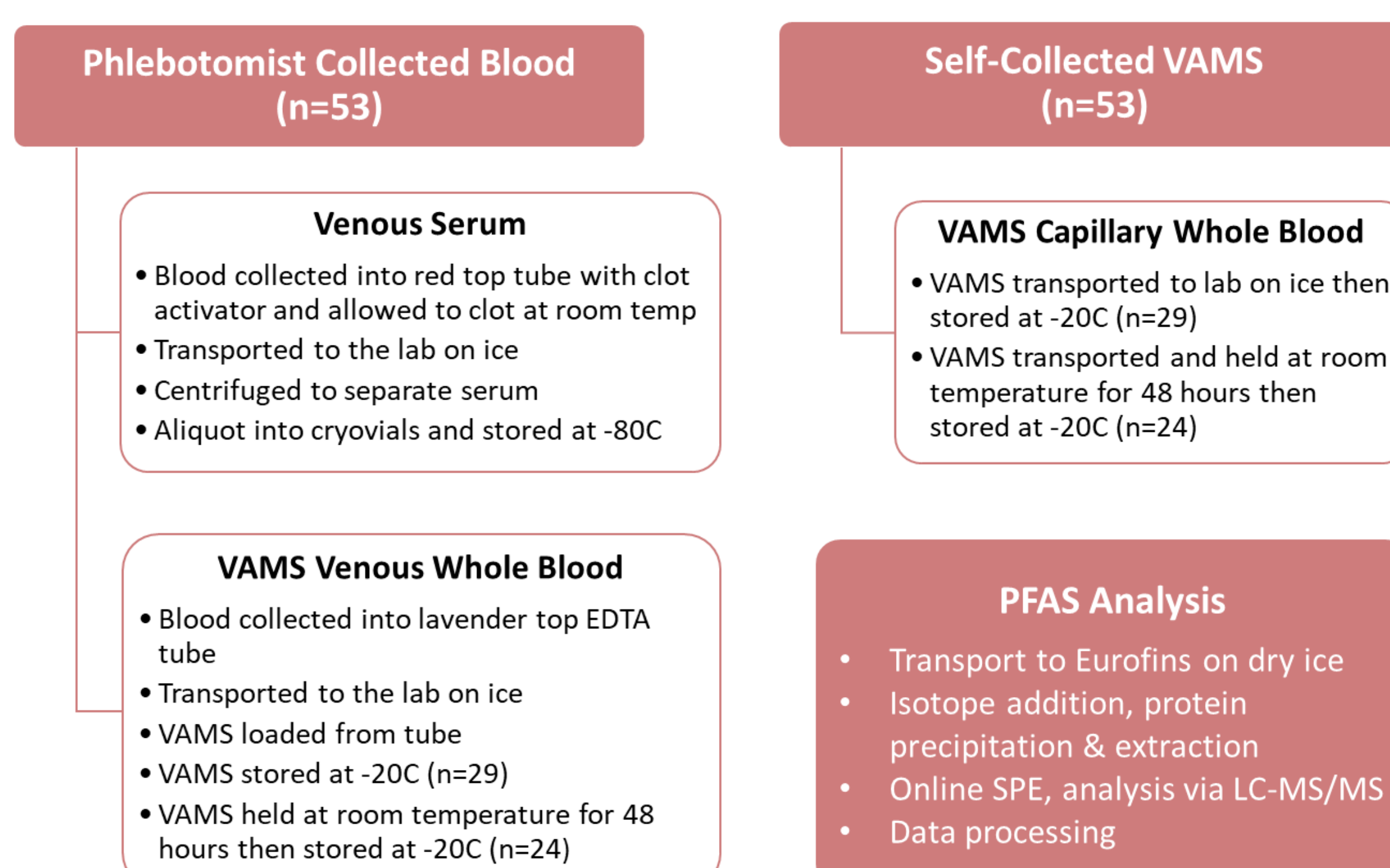
PRESENTER:
Rachel Bauer
Carignan Lab

BACKGROUND: Poly- and perfluoroalkyl substances (PFASs) are a group of persistent man-made chemicals known for their water and stain repellent properties, and are found in many textiles, materials, and paper products. They are present in many drinking water sources worldwide and have been shown to be toxic to human health. Serum is a useful biomonitoring tool for many persistent organic pollutants, including PFASs. However, obtaining venous blood samples for testing can be difficult and costly.

OBJECTIVE: Compare PFAS exposure measured by self-collection of blood using volumetric absorptive micro-samplers (VAMS) to the venous serum approach.

METHODS: Participants living in a community with prior PFAS drinking water contamination were visited at their home where blood samples were collected by a phlebotomist using a venous blood draw as well as participant self-collection using VAMS.

Figure 1. Overview of sample collection and analysis.



Testing a New Self-Collection Tool for Assessing Elevated Exposure to PFASs

