June 6, 2022

Methods to Assess PFAS

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DEQ's Priority PFAS Group 1

- PFMOAA
- PMPA
- PFO2HxA
- PEPA
- PFO3OA

- These are PFAS that are specific to NC and the waterbodies sampled in the lower Cape Fear region.
- There is not much existing toxicity information for these PFAS.

Priority PFAS – Group 1

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PFAS Compound	Exposure Data	Toxicology References	Human Biomonitoring Studies
PFMOAA	DEQ, NCSU	3 (1–3)	2 (2,4,5)
PMPA	DEQ, NCSU	0	1 (7)
PF02HxA	DEQ, NCSU	0	2 (4,7)
PEPA	DEQ, NCSU	0	1 (7)
PFO3OA	DEQ, NCSU	0	2 (4,7)

Priority PFAS – Group 1

- How can we regulate PFAS that have no toxicity data?

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PFAS Data Extrapolation Methods

- "Grouping" PFAS is complicated and should be done using scientifically sound and defensible methods that utilize as much toxicological and biochemical data as possible.

- The SAB has heard from multiple researchers, states, and government agencies regarding methods to group and/or regulate PFAS compounds

- There are 2 that utilize much of the toxicological information available to extrapolate through data-heavy methods.

Cousins et al. 2020

PFAS Data Extrapolation Methods

1- Relative Potency Factor Approach - builds on the assumption that the combined toxicity of two or more substances can be calculated based on the concept of dose addition, whereby the substances have the same effect, but differ only in their toxic potencies.

2- Grouping by Adverse Effects/ Mechanism of Action - The most demanding grouping approach would be to only group PFAS that have the same adverse effects, modes and mechanisms of action, and toxicokinetics for risk assessment.

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Individual approaches*	PFAS grouped	Data requirements	Advantages	Limitations	Note
Relative potency factor approach	multiple PFAAs	toxicity (including potency), toxicokinetics	cumulative risk assessment approach that accounts for differences in toxicokinetics & toxic potencies	limited to increasing liver size and to PFAAs now, while other endpoint(s) may be more important; resource & data intensive	high throughput testing methods being explored for potential expansion of the scope
Grouping only PFAS with similar adverse effects, mode/mechanism of action and toxicokinetics	limited PFAAs	toxicity, modes/ mechanisms of action, toxicokinetics	cumulative risk assessment that is scientifically stringent	resource & data very intensive; variabilities of these properties across PFAS not well understood	

Cousins et al. 2020

PFAS Data Extrapolation Methods

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EPA's Center for Computational Toxicology and Exposure

1. Created a PFAS Screening Library
   - Identified 75 PFAS to conduct high-throughput toxicity testing
2. Conducted Bioactivity Profiling related to Molecular Structure
   - 142 PFAS screened in human liver cells
   - Examined new and known PFAS targets for activation
   - PFAS structural features were correlated with biological targets.

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A Chemical Category-Based Prioritization Approach for Selecting 75 Per- and Polyfluoroalkyl Substances (PFAS) for Tiered Toxicity and Toxicokinetic Testing

Grace Patlewicz,[1] Ann M. Richard,[1] Antony J. Williams,[1] Christopher M. Grulke,[1] Reeder Sams,[1] Jason Lambert,[2] Pamela D. Noyes,[3] Michael J. DeVito,[4] Ronald N. Hines,[5] Mark Strynar,[6] Annette Guiseppi-Elie,[6] and Russell S. Thomas[1]

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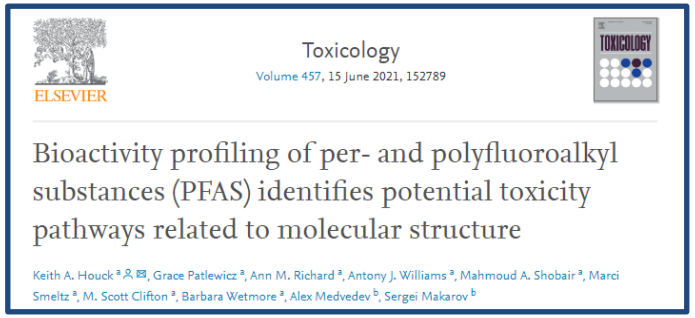

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Toxicology

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TOXICOLOGY

Bioactivity profiling of per- and polyfluoroalkyl substances (PFAS) identifies potential toxicity pathways related to molecular structure

Keith A. Houck [a], Grace Patlewicz [a], Ann M. Richard [a], Antony J. Williams [a], Mahmoud A. Shobair [a], Marci Smeltz [a], M. Scott Clifton [a], Barbara Wetmore [a], Alex Medvedev [b], Sergei Makarov [b]

Request to the Science Advisory Board

~~**1- Review the EPA's computational studies in detail.**~~

~~**- Is the method the EPA is using to extrapolate PFAS is appropriate for extrapolating for the Priority PFAS in NC?**~~

Request tabled until after potential presentation from the EPA

Thank you

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