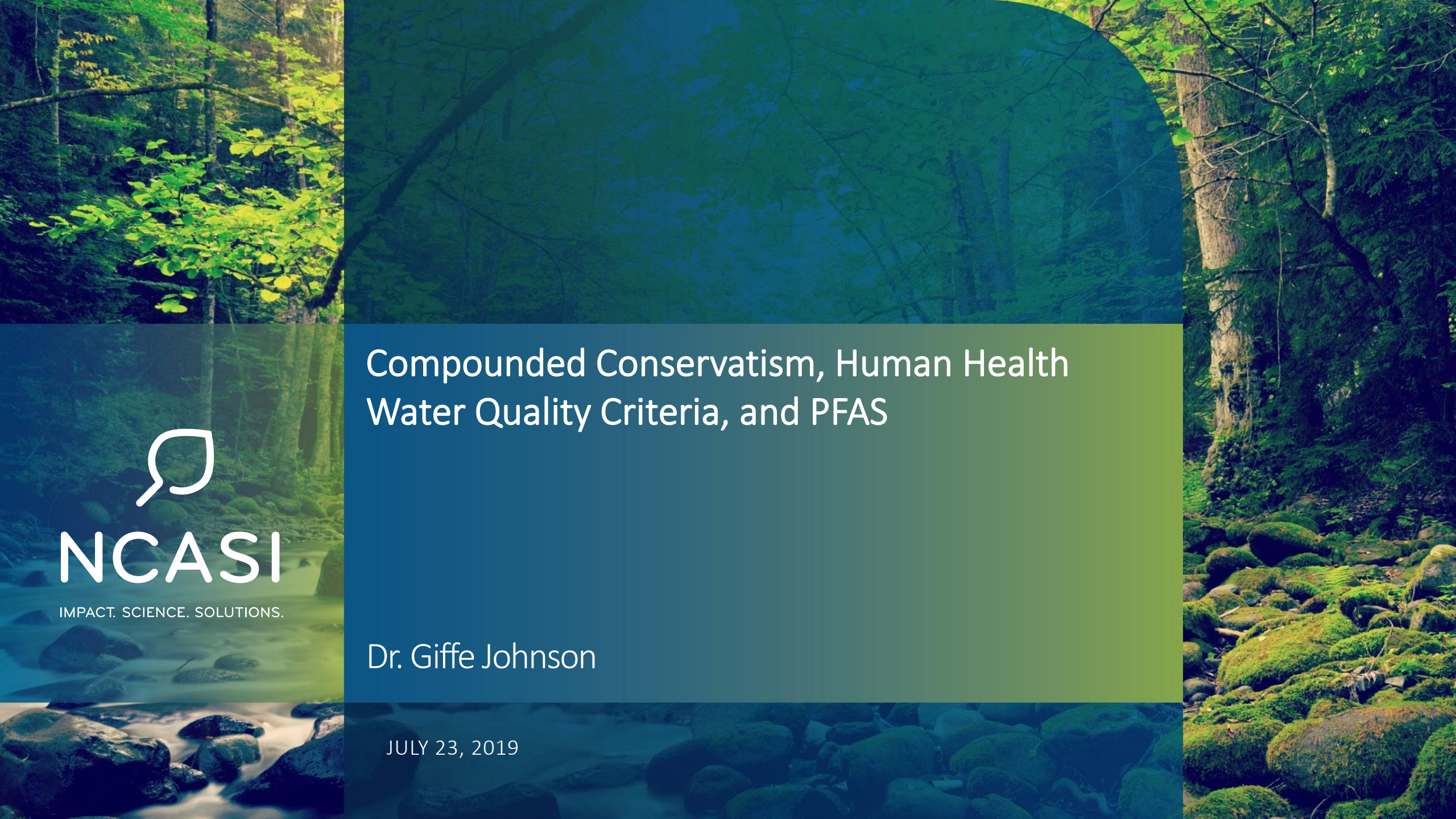

Compounded Conservatism, Human Health Water Quality Criteria, and PFAS

NCASI

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Dr. Giffe Johnson

JULY 23, 2019

NCASI
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Our mission is to help members cost-effectively meet their environmental and sustainability goals through basic and applied research, technical support, and education.

- formed 76 years ago
- develop and provide sound science used to enhance environmental protection programs in the forest products industry
- 60 scientists, chemists, engineers, toxicologists, biologists foresters, and others
- funded mostly by the forest products industry
- work collaboratively with state and federal agencies on matters of science that can inform environmental policy and regulation

Today's Goals

- Discuss the concept of compounded conservatism using Human Health Water Quality Criteria (HHWQC) as an example.
- Discuss the PFAS issue within the context of compounded conservatism and some unique characteristics of this environmental concern.

EPA's Guidance for Deriving Human Health Water Quality Criteria

Health Protection Target

- excess lifetime cancer risk, or
- hazard quotient (for non-carcinogens)

Substance Toxicity

- risk specific dose (carcinogens)

or

- reference dose (non-carcinogens)

Exposure Scenario

- body weight

AND

- drinking water intake

AND

- fish consumption rate

AND

- biological accumulation

AND

- water column concentration

AND

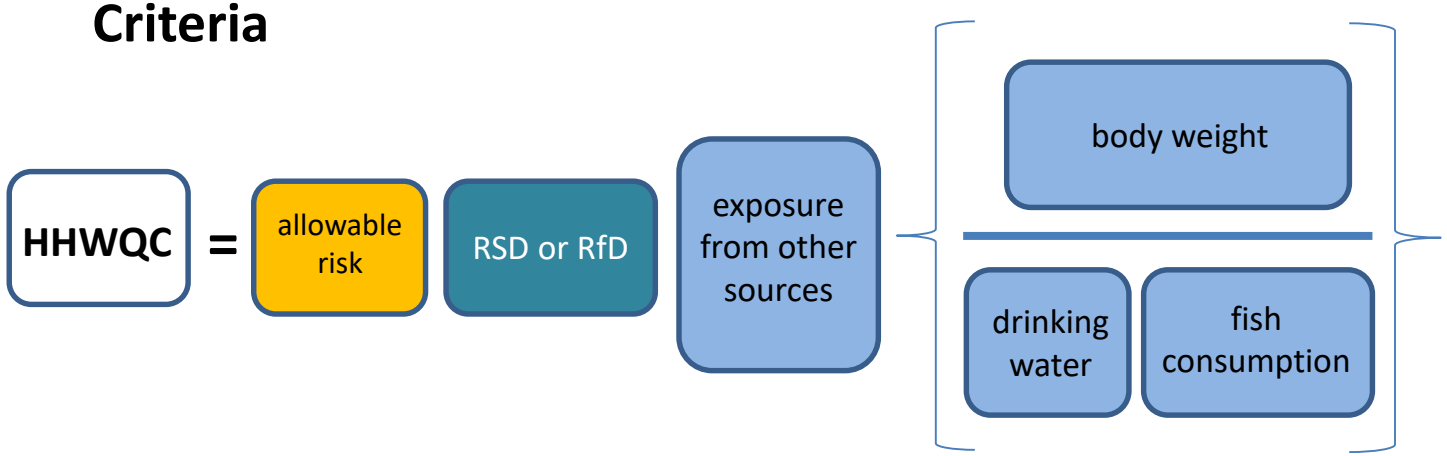
- cooking loss

AND

- duration of exposure

AND

- other exposures

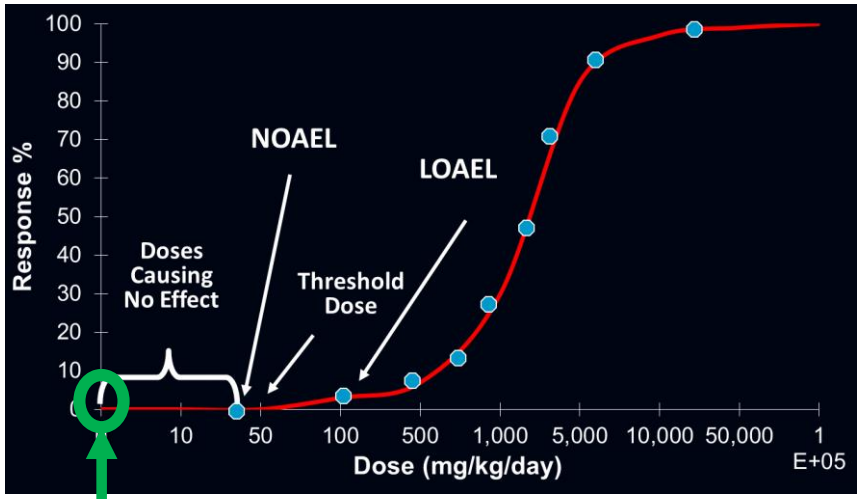


Differences between data-derived and theoretical risk

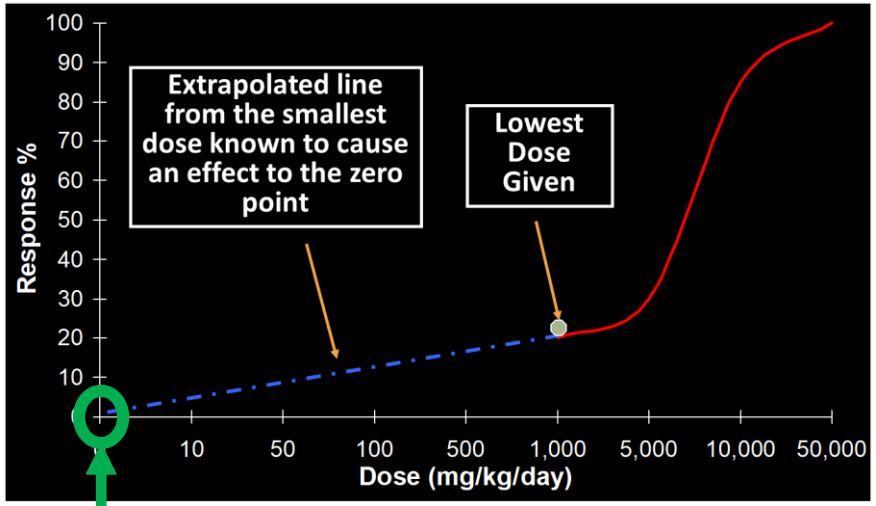
Substance Toxicity

Translation of studies to cancer and non-cancer effects.

Data-derived Risk (dose-response)



Theoretical Risk (dose-response)

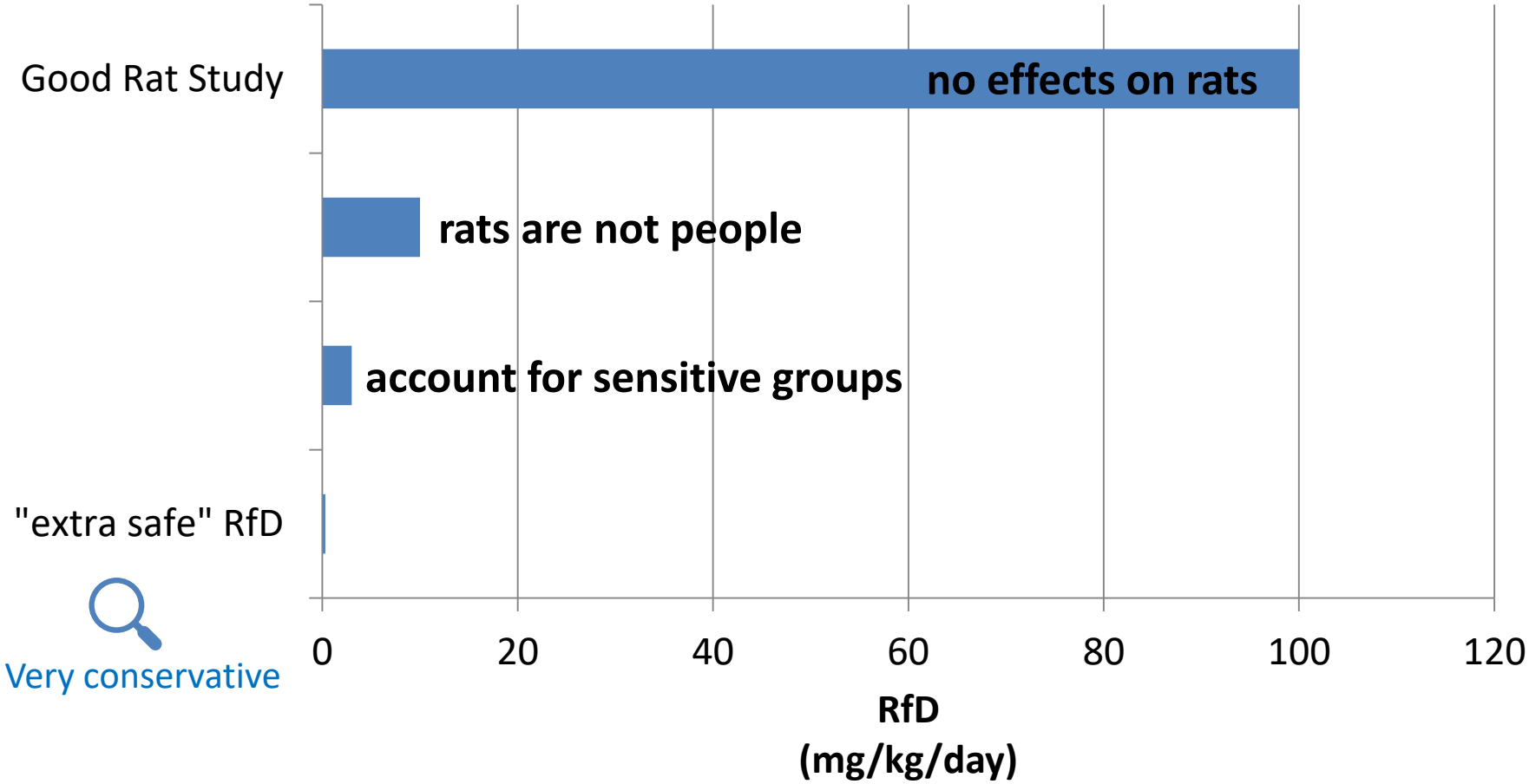


Areas relevant to 1 in 10^{-6} excess risk

Substance Toxicity Values are Conservative

Substance Toxicity

Translation of studies to non-cancer effects.

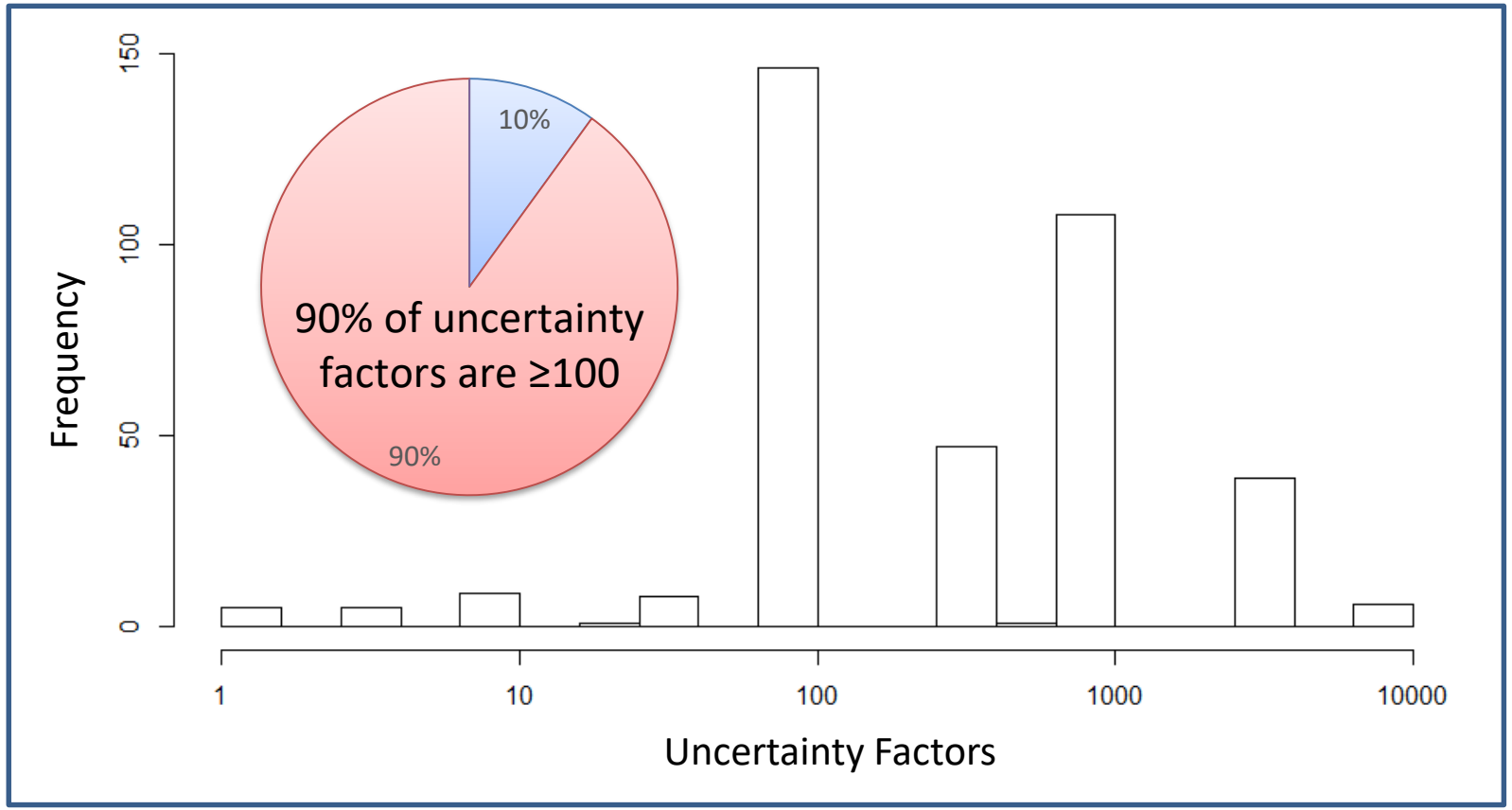


Very conservative

Substance Toxicity

Translation of studies to non-cancer effects.

Uncertainty Factors Among IRIS RfDs



HHWQC =

Health Protection Target

- excess lifetime cancer risk, or
- hazard quotient (for non-carcinogens)

Very conservative

Substance Toxicity

- risk specific dose (carcinogens)

or

- reference dose (non-carcinogens)

Very conservative

Exposure Scenario

- body weight

AND

- drinking water intake

AND

- fish consumption rate

AND

- biological accumulation

AND

- other exposures

Explicit

AND

- water column concentration

AND

- duration of exposure

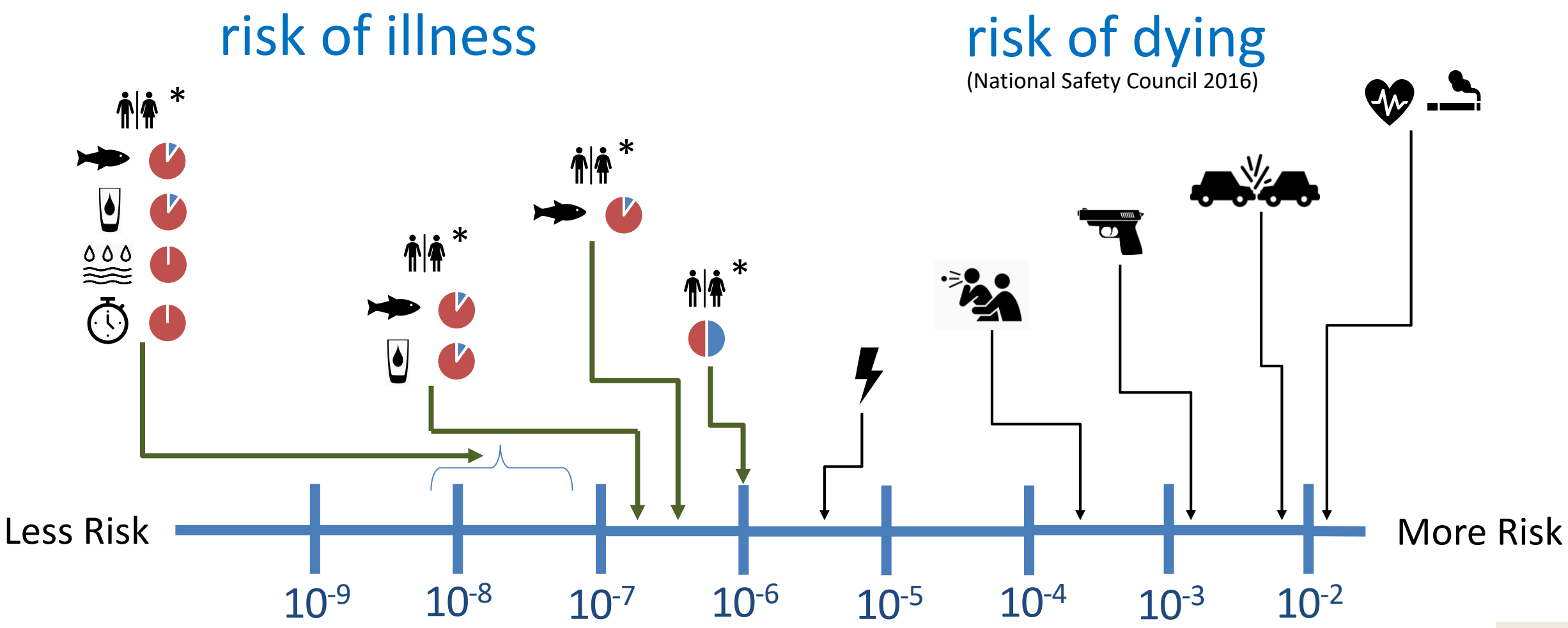
AND

- cooking loss

AND

- biological availability

Implicit



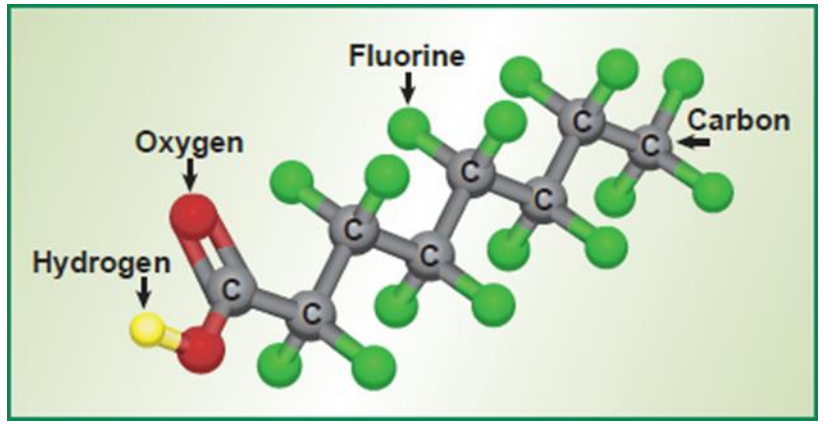
* does not include conservatism embedded in toxicity factors

Health Protection Target

Per- and Polyfluoroalkyl Substances (PFAS)

- PFAS are synthetic chemicals that have been used in the manufacture of products like grease-resistant paper, fast food containers/wrappers, microwave popcorn bags, pizza boxes, and candy wrappers.

- PFAS have properties that make them useful in a wide range of applications, including:
  - Teflon® coated pots and pans
  - Scotchguard® treated carpets and fabrics
  - Water resistant clothing such as Gore-Tex®
  - Cleaning products
  - Firefighting foams
  - Paints
  - Pesticides
  - Personal care products



Similar methods can lead to different conclusions!

- EPA Advisory Level
  - PFOA, PFOS 70 ppt
- ATSDR
  - 11 ppt, 7 ppt
- DOD
  - 380 ppt
- Health Canada
  - PFOA 200 ppt; PFOS 600 ppt

Factors that impact selection of protection levels

- Study selection of ‘point of departure’
  - Public comments have criticized the Draft ATSDR Tox Profile for PFAS regarding the quality and reproducibility of the study chosen for their point of departure that leads to an overestimation of risk
- Appropriate dose extrapolation from short term animal study to long term human exposure
  - Public comments have criticized the Draft ATSDR Tox Profile for PFAS regarding the inappropriate selection of a kinetic model that leads to an overestimation of risk
- Purpose and intent of the protection level
  - Cleanup level?
  - Enforceable standard?
  - The ATSDR MRL is a screening level and does not inform us as to the level at which health effects may occur

Regulation of PFAS as a class

On November 18, 2018, EPA released draft toxicity values for PFBS and GENX chemicals.

Even among compounds that closely resemble each other in structure, there may be several orders of magnitude difference in their toxicity.

Considering the diversity of structures and potential toxicities among the thousands of compounds in this class, regulating them as a class is not scientifically defensible.

Chemical	Chronic RfD (mg/kg-day)
PFBS	0.01*
GENX chemicals	0.00008*
PFOA	0.00002
PFOS	0.00002
	*indicates draft value

Questions or Follow-up Information

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