



PFAS and microplastics

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Depackaging Stakeholder Group
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1. What are the human health impacts of PFAS?
2. What are the most common pathways of plastic introduction to humans?
3. What are the particle shapes and/or sizes that represent the highest risk of being incorporated into human bodies?

PFAS

| US EPA

The oral toxicity values for PFAS are published by the US EPA.

Definition of Reference Dose (RfD): An estimate, with uncertainty spanning perhaps an order of magnitude, of a daily oral exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime

Based on a dose from animal studies (sometimes epidemiological studies)

- Dose with either no adverse health effects, lowest dose with effects, or a modelled dose.

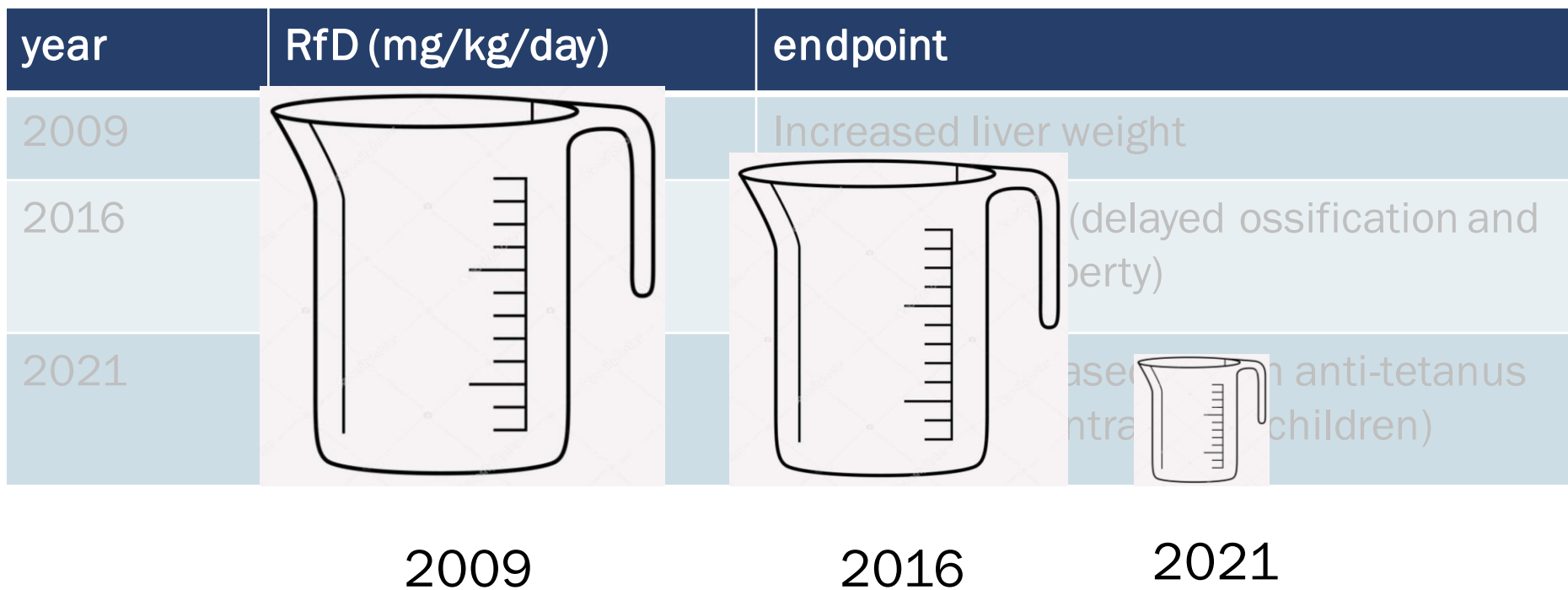
Dose is divided by uncertainty factors

- Examples: Interspecies, Intraspecies, subchronic to chronic, database uncertainty

The US EPA RfDs for PFOA have decreased over time.

year	RfD (mg/kg/day)	endpoint
2009	2×10^{-4}	Increased liver weight
2016	2×10^{-5}	Developmental (delayed ossification and accelerated puberty)
2021	1.5×10^{-9}	Immune (decreased serum anti-tetanus antibody concentration in children)

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2021: Candidate endpoints also include developmental, liver, serum lipid, endocrine and reproductive effects.

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2021: PFOA is considered *Likely to Be Carcinogenic to Humans*. (i.e. PFOA is considered a more potent carcinogen than in 2016)

microplastics

[Dietary and inhalation exposure to nano- and microplastic particles and potential implications for human health \(who.int\)](#)

There is no consensus on the definition of nano- and microplastic particles in relation to human health.

Nano

Micro



> 1 nm

< 5 mm

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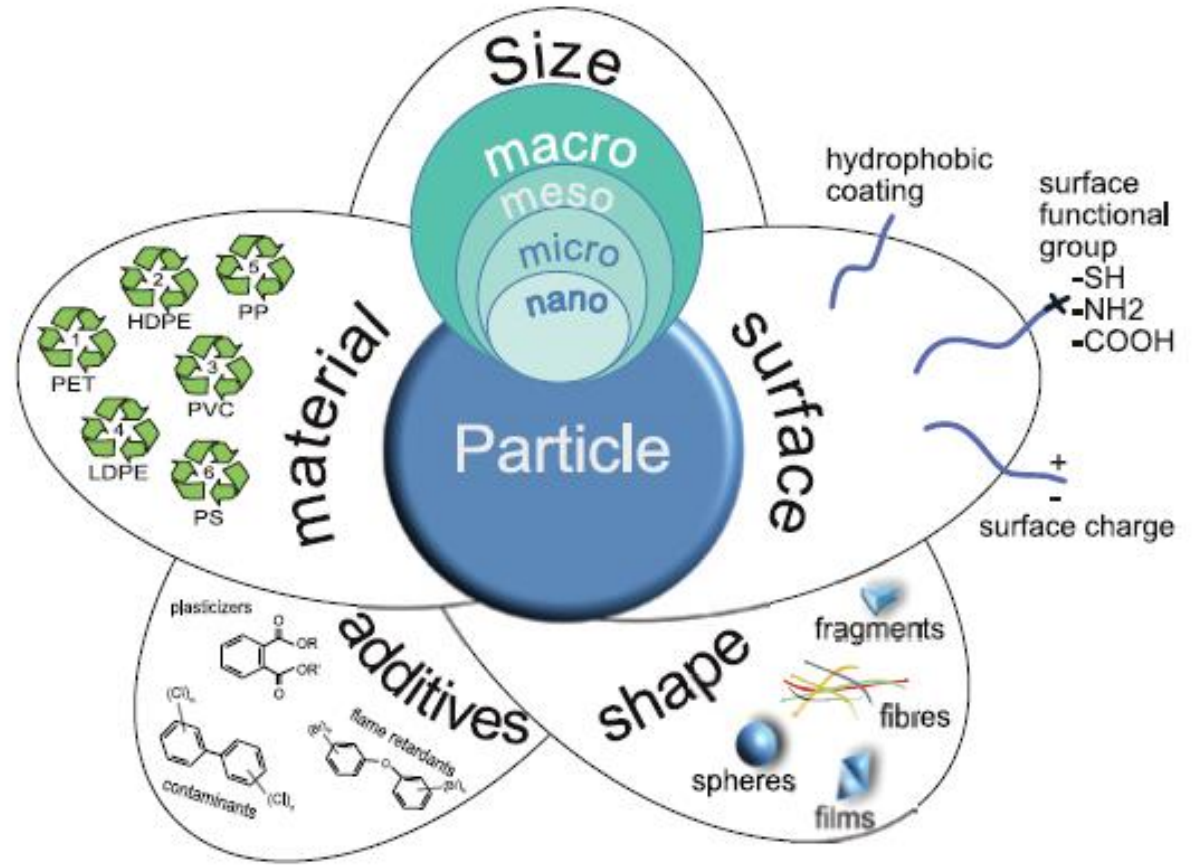
Nano

Micro



Most relevant to human health

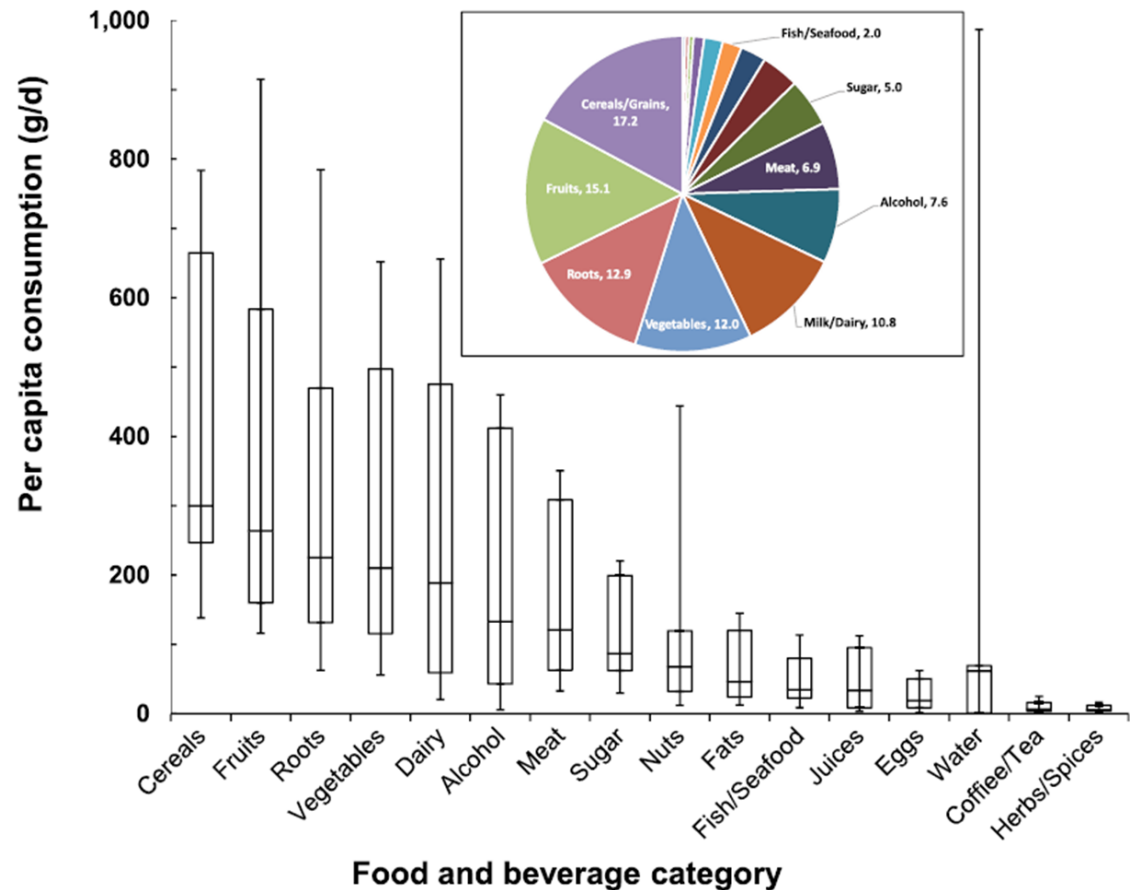
Fig. 1 Attributes of NMP to be considered in assessing both exposure and hazard



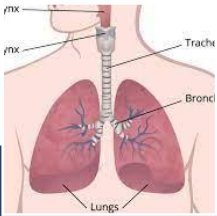
There are no comprehensive studies of NMPs in the diet.

MPs found in seafood / fish, salt, beer, honey, milk, rice, sugar, seaweed.

Methods are needed for analysis of MPs in additional foods.

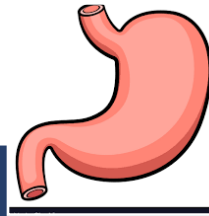


Inhalation and dietary are the routes of exposure to NMP.



Inhalation

Physical damage to lungs



Ingestion

Limited hazard characterization

Potential impacts on immune system, liver, energy metabolism, reproduction



Questions?

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