Statements

Sub-statement on the potential risk(s) from exposure to microplastics: Inhalation route – Lay summary

1. In 2019, as part of horizon scanning, the Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT) identified the potential risks from microplastics as a topic it should consider to inform UK Food Standards Agency (FSA) discussions in this area (TOX/2019/08). Since then, several discussion papers have been presented to the COT and in 2021, the COT published an overarching statement on the potential risks from exposure to microplastics (COT Statement 2021/02).

2. The purpose of the COT's sub-statement on the inhalation of microplastics is to provide a high-level overview of the current state of knowledge, data gaps and research requirements with regards to this topic. This follows on from the sub-statement considering oral exposure to microplastics.

3. Micro- and nanoplastics are widespread and are either intentionally added to products or occur as a result of plastics being broken down into smaller sizes by natural processes such as wear, weathering and corrosion. There is no one agreed definition of microplastics, and so the COT has adopted a working definition: synthetic particles or heavily modified natural particles with a high polymer content and a diameter/length of 0.1 µm to 5 mm. Plastics smaller than this are classed as nanoplastics (1 nm to 0.1 µm). It should be noted that fibres from synthetic textiles are included in these definitions.

4. Road and tyre wear particles are chemically different to microplastics. These therefore fall outside the scope of the current statement and exposure to them will need separate consideration from microplastic exposure.

5. The majority of studies into microplastic inhalation are currently performed with pristine (newly manufactured) particles, and these are unlikely to be representative of those present in the environment where the particles may have been subjected to environmental degradation, which can result in fragmentation or contamination with additional pollutants that become attached to the microplastic particles. It is therefore important to take into account the variability of experimental samples, even when comparing the same polymer (chemical) type. Batch to batch variability may also occur and there are currently no standard reference materials that can be used for comparison.

6. The COT noted that there are limited data regarding the toxicokinetic fate of inhaled microplastics in mammalian species. No epidemiological or controlled dose studies in humans evaluating microplastics were identified.

7. The COT concluded that based on the available data a full risk assessment on the toxic effects of inhaled microplastics and nanoplastics could not be carried out. The Committee concurs with the conclusions reached by other authoritative bodies (WHO (2022), ECC and HC (2020), SAPEA (2019) and SAM (2019) that further research is required and this is described in greater detail in the COT Microplastics Overarching Statement 2021 (food.gov.uk).

8. The most significant data gaps are:

a. The lack of appropriate and harmonised methods for detection of micro and nanoplastics in tissues, including sample collection, and their systemic effects;

b. Understanding of the effects of different exposure scenarios (e.g. indoor and outdoor environments); and

c. How different pre-existing lung and other disease states may be involved in the effects from microplastics exposure.

9. The COT ranked the research priorities in order of importance for assessing potential toxicity of micro/nanoparticles in humans by inhalation and oral routes of exposure.

10. The COT highlighted that additional information will also be needed about exposure sources – which include indoor and outdoor air, dust and soil – before a risk assessment can be completed. The presence of microplastics in food and water needs to be put into perspective with other sources of microplastics such as atmospheric fallout. It will be necessary to explore the effects of the

range of particle types in different tissues *in vitro* (in the lab) and/or *in vivo* (in animals and humans). The range of particle types should also take account of emerging and novel plastic-based materials such as bioplastics.

11. The full COT sub-statement can be found on the COT website: Microplastic Inhalation Statement (food.gov.uk)

Lay Summary to COT Statement 2024/01

References

ECCC & HC. (2020) Science assessment of plastic pollution: Science assessment of plastic pollution - Canada.ca

SAM. (2019) Environmental and Health Risks of Microplastic Pollution: ec_rtd_sam-mnp-opinion_042019.pdf (europa.eu)

SAPEA. (2019) A scientific perspective on microplastics in nature and society: [PDF] A Scientific Perspective on Microplastics in Nature and Society | Semantic Scholar

WHO. (2022) Dietary and inhalation exposure to nano- and microplastic and potential implications for human health particles: 9789240054608-eng.pdf (who.int)