

**Inhaled microplastics: an unrecognised health issue?**

***Dr Stephanie Wright, Mr Joseph Levermore and Prof Frank Kelly***

MRC Centre for Environment and Health, Department of Analytical, Environmental & Forensic Sciences, School of Population Health & Environmental Sciences, King's College London

Microscopic plastic particles – microplastics – are a complex class of heavily modified, synthetic organic particulates which contaminate a range of environments. Laboratory studies indicate they can negatively impact biota following exposure, primarily via oxidative stress and metabolic disruption. Recently, microplastics have been reported in atmospheric deposition, and indoor and outdoor air in major population centres. This has raised concern for public health due to the potential for exposure via inhalation. However, very little is known about airborne microplastics, including their concentrations; size distribution; chemical composition; and toxicity. It is therefore timely to reflect on the scope for microplastics to cause harm.

Focusing on an inhalation pathway, this talk will cover recent work on the detection of microplastics in complex matrices. Using Nile Red staining, bright field and fluorescence microscopy and Fourier-transform Infrared spectroscopy, we have quantified microplastics (>25 µm) in total atmospheric deposition sampled at an urban (50 m) site in London, UK. Ten times more fibrous microplastics were found than non-fibrous, equating to an average deposition rate of 706 fibrous microplastics/m<sup>2</sup>/d, with polyacrylonitrile being the predominant polymer type. We also present developments for an analytical protocol compatible with Raman microscopy and a pollen sampler, which has been validated to detect microplastics down to 2 µm in mock samples, and 2.5 µm in environmental particulate matter (PM). As global pressure to reduce road transport and fuel burning emissions increases, PM composition is likely to shift. In combination with a predicted increase in plastic use, especially in the textile sector (4%/year), the proportional concentration of airborne microplastics will become increasingly important. It is therefore timely to establish baseline knowledge of global airborne microplastic burdens and begin to understand what their plausible health hazards are.