**Presentation Type:**
Oral preferred

**Track:**
Plastics (micro- or nano-)

**Session:**Microplastics in the Environment and Risk Assessment: A One-Health Perspective

**Abstract Title:**A Potential Vector Into the Food Web: Factors Affecting the Adsorption of Three Microcystin Analogues Onto Six Virgin and Aged Microplastics

**Authors:**D. S. Moura, C. J. Pestana, C. Moffat, Robert Gordon University; N. Gkoulemani, J. Hui, J. T. S. Irvine, University of St Andrews; C. Edwards, L. A. Lawton, Robert Gordon University

**Abstract:**

Water quality is an increasing global environmental concern. An indicator of poor water quality is the presence of cyanobacterial blooms. The hepatotoxin group, microcystins (MC), is the most common group of cyanotoxins reported in freshwater. There are over 200 variants which are detected as a mixture in the environment. Other pollutants including microplastics are also commonly detected in aquatic systems. There is an increasingly recognised concern that microplastics can act as a vector for micropollutants when they co-exist in the same environment and that they potentially enter the food web. This study evaluated a mixture of three microcystins (MC-LR, -LW, and -LF, 1 µg mL-1 each) with six virgin and aged microplastic types using those plastics most commonly reported in the freshwater environment. Particles of polypropylene (PP), polyethylene terephthalate (PET), polystyrene (PS), polyamide (PA), polyethylene (PE), and polyvinyl chloride (PVC) with average particle sizes of 5-45 µm were acquired commercially and artificially aged using the Suntest XLS+ in the laboratory. The virgin and aged microplastics were characterised using Fourier transform infrared spectroscopy, particle size analysis, scanning electron microscope, differential scanning calorimetry, X-ray diffraction, N2 adsorption-desorption surface area analysis, and the zeta potential measurement. The effect of aging microplastics on the adsorption of different microcystin variants was evaluated. This study demonstrated that the aging of the microplastics, the plastic type and the nature of the microcystin are the key factors affecting the adsorption of microcystin on microplastics. The virgin particles of PP, PS, PVC, and PE adsorbed all microcystin variants, whereas virgin PET only adsorbed MC-LW (20%). No adsorption was observed by virgin PA. Among the virgin particles, PP showed the greatest adsorption of the variants, adsorbing from 80% (MC-LR) to 100% (MC-LW/LF). On the other hand, all microcystin variants adsorbed on all aged microplastics, including PA. The largest concentration adsorbed onto virgin and aged microplastics was observed for the more hydrophobic variants, MC-LW, followed by -LF, and finally MC-LR. The results indicate that both virgin and aged microplastics can act as a vector for microcystins in the aquatic environment, with possible implications when they enter the food chain.