Breast Cancer UK comments submitted to ECHA on their public consultation on the Annex XV restriction proposal for the placing on the market of intentionally-added microplastics in consumer and professional products

The European Chemicals Agency launched an open consultation on its Annex XV restriction proposal for placing intentionally added microplastic particles in consumer or professional products of any kind. Breast Cancer UK submitted written comments on this consultation document, focusing on the effects on human health.

Submitted to ECHA on May 20th 2019

Breast Cancer UK is a charity which aims to prevent breast cancer by promoting a healthy lifestyle and reducing public exposure to carcinogenic and other hazardous chemicals in the environment. In particular we are concerned about the potential role of exposures to environmental chemicals in increasing breast cancer risk. We consider microplastics to be potentially harmful to human health and the environment. We believe their presence in the environment may increase breast cancer risk, due to the potential for these particles to release harmful additives and to accumulate and release other substances of concern.

We welcome ECHA's Annex XV proposal to restrict intentionally added microplastics in consumer and professional products and are grateful for the opportunity to respond to the proposal. Breast Cancer UK supports restricting the use of intentionally added microplastic particles in products of any kind.

We are especially concerned about chemical "additives" present in microplastics (e.g. plasticisers and compounds used in manufacture such as bisphenols), and the potential for microplastics to act as "vectors" for environmental pollutants; these substances may be transferred to marine and other organisms, following ingestion of microplastics (1, 2). Marine species include those regularly consumed by humans, such as mussels and oysters, as well as endangered species such as humpback dolphins (3). Studies have found common persistent organic pollutants can be up to 10 million times higher in plastic pellets than in sea water (4). As well as being potentially detrimental to the health of marine organisms and birds, microplastics and associated environmental pollutants have the potential to be passed up the food chain. A recent review by the European Commission's Joint Research Centre (5) highlights the presence of micro and nano-plastics in animals and food products and concludes "There is a growing concern about the impact of human activities on the whole life chain, and there is a legitimate concern that the smaller plastic fraction, through bioaccumulation and trophic transfer, may ultimately contaminate the human population".

Many chemical additives that leach from microplastics, such as bisphenols, heavy metals and phthalates, are endocrine disrupting chemicals (EDCs), which can affect the function of the hormone system. In particular EDCs which act as oestrogen mimics are associated with increased breast cancer risk (6). Endocrine disrupting chemicals may exert their effects at very low doses, and it is becoming increasingly apparent that environmental exposures to mixtures of such chemicals may be especially harmful (7).

Studies have shown microplastics may enhance toxicity (as well as bioaccumulation) of heavy metals in fish. For example, the presence of microplastics enhanced the toxicity and bioaccumulation of

cadmium in zebrafish (8), causing oxidative damage and inflammation. Environmental exposure to cadmium (which is an EDC), is a risk factor for breast cancer (9).

Intentionally added microplastics can be released into the environment (typically via wastewater), during product use, potentially contributing to environmental litter and leading to concerns that use may pose a risk to the environment and/or human health. Recent studies show that microplastics are not removed fully from wastewater treatment plants (WWTPs). The activated sludge process (the most common type of sewage treatment used globally) has a retention capacity of up to around 98-99% (10, 11), with most of the microplastics remaining within the activated sludge solids. Despite this, WWTPs remain point sources for microplastics (and nanoplastics) discharge, due to the high volume of effluent that is released constantly.

Microplastics may have a negative impact on the activated sludge treatment process itself; a study found respiration of activated sludge flocs was acutely inhibited by the presence of polystyrene nanoplastics (12), due to a change in composition of the extracellular polymeric substance (EPS) that surrounds activated sludge microorganisms and is integral to floc formation. Such changes will affect sludge settling and reduced respiration will affect the ability of activated sludge microorganisms to biodegrade pollutants. Another concern is the presence of microplastics (containing environmental pollutants) in the activated sludge solids that are removed and used commonly as land fertiliser (following appropriate treatment). One study which examined the fate of polyethylene microbeads from cosmetics using a laboratory scale bioreactor run to simulate an activated sludge WWTP found approximately half the microbeads were captured in the activated sludge (13). Other studies (cited above) suggest that most of the microplastics that enter an activated sludge WWTP will end up in the excess sludge solids.

Reducing significantly microlitter pollution in marine, freshwater and terrestrial environments should be a priority, given the potential harm this type of pollution causes. Although we appreciate microplastics may also arise from degradation of macroplastics, a ban on the use of added microplastics in products of any type would be one step towards reducing environmental pollution.

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