Plastics in Seafood: Human Health Concern Regarding Microplastics in Aquatic Environment

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Microplastics are tiny pieces of plastic that measure less than 5 millimeters in length. They can be divided into two main categories: primary microplastics and secondary microplastics. Primary microplastics are designed to be minor, such as microbeads found in personal care products like facial scrubs and toothpaste. Secondary microplastics are created from more oversized plastic items that have broken down over time due to weathering, exposure to UV light, and physical abrasion. These particles can come from various sources, including plastic products that have broken down over time and microbeads in personal care products such as toothpaste and exfoliants. Unfortunately, microplastics are increasingly found in seafood, which can negatively impact human health and marine ecosystems. Much is still unknown about the potential long-term effects of microplastics on human and environmental health, and research is ongoing to understand these impacts better. Efforts are being made to reduce the amount of plastic waste that enters the environment, such as through plastic bag bans and increased recycling programs. However, further action is needed to address this complex issue.

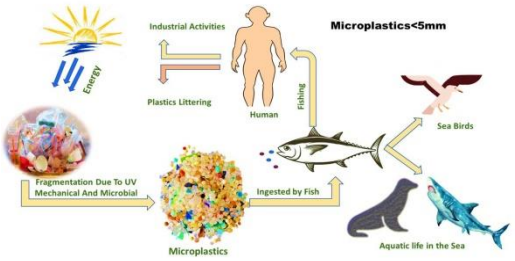

Figure 1: Breakdown and Conversion of Micro plastics

Seafood refers to a wide variety of edible aquatic animals and plants harvested from the oceans and adjacent areas. Some common examples of seafood include fish (such as rupchanda, loita, poa, hilsa, tuna, cod, haddock, trout, sardines, etc), shellfish (including shrimp, prawns, crab, lobster, oysters, clams, mussels, and scallops), cephalopods (such as squid, octopus, and cuttlefish), seaweed and other sea vegetables (including nori, dulse,

wakame, and kelp). Seafood is a rich source of protein, omega-3 fatty acids, vitamins, and minerals and is an essential part of many cuisines worldwide. However, it is important to be aware of issues such as overfishing, pollutant contamination, and sustainability when consuming seafood. Seafood can become contaminated with microplastics in several ways. For example, marine animals may ingest microplastics when they mistake them for food. These microplastics can then accumulate in the animals' tissues, potentially exposing humans who consume the seafood to the harmful chemicals released from the plastic particles.

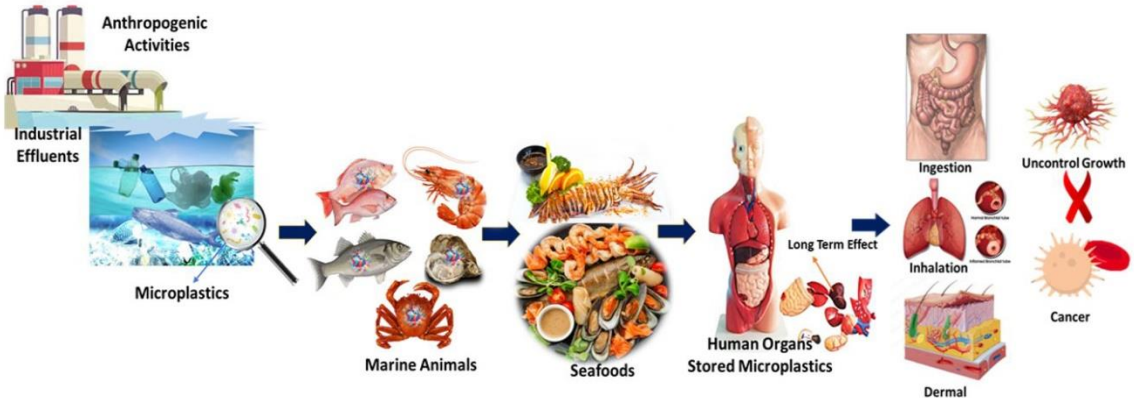

Figure 2: Accumulation Routes of Micro plastics on Human health

Seafood can become contaminated with microplastics from a variety of sources, including plastic waste (such as discarded packaging, fishing nets, and other debris, can break down over time and release microplastics into the ocean), sewage and wastewater, microplastics from personal care products and other consumer goods can enter the wastewater system and be released into rivers and oceans through sewage outfalls and runoff. Microplastics can be transported over long distances through the air and deposited in marine environments. Even fishing gear (such as nets, lines, and traps) can also contribute to the release of microplastics into the ocean. Aquaculture operations can generate microplastics through the use of plastic nets and other equipment. These sources of microplastics in seafood highlight the importance of reducing plastic waste and improving waste management practices to prevent further contamination of the environment. Additionally, efforts are needed to understand the potential risks of microplastics to human health and to develop strategies to mitigate these risks.

The adverse effects of consuming microplastic-contaminated fish for humans are not yet fully understood, but there are some concerns that scientists and researchers have raised. Microplastics ingestion via seafood could accumulate in the human body over time and potentially cause health problems. Studies have shown that microplastics can penetrate the gut lining and enter the bloodstream, and there is concern that these particles could cause inflammation, tissue damage, or other adverse effects. Microplastics can absorb and concentrate toxic chemicals from the environment also, such as persistent organic pollutants (POPs) and heavy metals. If humans ingest these chemicals via seafood, they could cause health problems. Actually, microplastics are a relatively new area of research, and there is still much unknown about their long-term effects on human health. Chronic exposure to microplastics through seafood could have unexpected or unknown health effects that have not yet been identified. More research is needed to fully understand the potential risks of consuming microplastic-contaminated seafood. However, it is clear that reducing plastic pollution and improving waste

management practices is an essential step in protecting both marine ecosystems and human health.

Fish and other aquatic organisms can suffer from the effects of microplastics in a number of ways. Small aquatic organisms, such as plankton, and filter-feeders, such as mussels, clams, and oysters, can ingest microplastics along with their food. Microplastics in their digestive systems can cause blockages or physical damage to their internal organs, reducing their feeding efficiency and leading to malnutrition or starvation. Microplastics can absorb and concentrate toxic chemicals from the surrounding water, such as Persistent Organic Pollutants (POPs) and heavy metals. When aquatic organisms consume microplastics, they can be exposed to these chemicals, negatively affecting their health, growth, and reproduction. Microplastics can also cause physical damage to the gills, eyes, and other organs of fish and other aquatic organisms, impairing their ability to swim, feed, or avoid predators. Some studies suggest that microplastics can cause behavioral changes in aquatic organisms, such as altered feeding behavior, reduced activity levels, and increased vulnerability to predation. The effects of microplastics on aquatic organisms can have ripple effects throughout the food web, potentially leading to ecosystem-wide impacts. For example, if a predator consumes a contaminated prey item, it can be exposed to the same toxic chemicals and physical damage as the prey. Additionally, if contaminated prey is less able to feed and reproduce, this can lead to population decline and the loss of an important food source for predators.

Several measures can be taken to control microplastic pollution in seafood. Sustainable fishing practices can help maintain healthy fish populations and reduce stress on the marine environment. This can include measures such as limiting the amount of fishing allowed in a particular area, using gear that minimizes bycatch and avoids damaging the seafloor, and implementing seasonal fishing restrictions. Improving waste management practices can prevent microplastics from entering the environment in the first place. This can be achieved through better recycling and disposal of plastic waste and by reducing the amount of plastic waste generated in the first place. Wastewater treatment facilities can be upgraded to better capture and remove microplastics from wastewater before it is released into the environment. Consumers can help to reduce the demand for single-use plastics by making more sustainable choices, such as using reusable bags, water bottles, and food containers. Raising awareness of the issue of microplastic pollution and the importance of reducing plastic waste can also help to promote behavioral change and drive demand for more sustainable products and practices. Finally, technological advancement is important to capture and remove microplastics from the environment, such as microplastic filters for washing machines and devices that can be installed on stormwater drains to capture microplastics before they enter waterways. A combination of these measures will be needed to control microplastic pollution in seafood effectively. It will require action from governments, industry, and individuals to reduce plastic use and improve waste management practices to prevent further pollution and protect marine ecosystems and human health.

Plastic pollution is a major environmental problem that significantly impacts marine ecosystems and human health. One of the most concerning aspects of plastic pollution is the presence of microplastics in seafood. Fish and other aquatic organisms can ingest these tiny plastic particles, ultimately ending up on our plates. The sources of microplastics in

seafood are varied, including plastic waste such as plastic litter and microfibers from clothing. Microplastics can adversely affect aquatic organisms' health, causing physical damage, toxicity, and behavioral changes. These can have ripple effects throughout the food web, leading to ecosystem-wide impacts. Strategies are needed to control microplastic pollution in seafood, including reducing plastic use, improving waste management practices, developing alternatives to plastic, cleaning up existing plastic waste, and regulating microplastics. In addition, sustainable fishing practices, consumer awareness and education, and emerging technologies can help to reduce the number of microplastics from fishing gear and land-based sources in seafood and protect the health of marine ecosystems and human populations.

Overall, addressing the issue of microplastic pollution in seafood will require a concerted effort from governments, industry, and individuals to reduce plastic use and improve waste management practices to prevent further pollution and protect the health of our oceans and the food we eat.

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