

Man of War on Pollution: Bringing Awareness to the Effect of Plastic Pollution on Human Health

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Abstract

As we interact with nature, our environment responds by adapting to the reality we create. Many of these adaptations affect our physical health. For example, in the ocean sea turtles often mistake discard plastic grocery bags for their food source, the jellyfish. Sea turtle populations affect our food supply by maintaining ocean environments affecting seafood we eat. In addition to this, microplastics from these bags into the ocean can enter the food we eat, causing us to ingest them. This piece is crocheted from recycled grocery bags to bring awareness to this issue affecting both our environment and us.

Introduction

The adverse impact of pollution on human health is a critical and urgent issue. The repercussions of plastic pollution in our environment are multifaceted and often go unnoticed. "Man of War on Pollution" aims to bring the issue of plastic pollution to the forefront via an artistic statement piece to serve as a catalyst, drawing attention, and thus awareness to the issue at hand. This poster aims to discuss more in more detail some of the specific ways in which plastic pollution affects human health.

Methods

To make the Jellyfish, I used several dozen bags, all repurposed from the homes of classmates and myself. To create the "yarn" from the bags, I folded the bags in half lengthwise until the bags were a couple inches wide. Next, I cut the folded bags into inch-wide strips, cutting off the handles and bottoms. The handles and bottoms were set aside to be used as stuffing for the top of the jellyfish. I unfolded the strips, creating loops, which I linked together to create a cohesive piece of "yarn." Then I used a size K 10.5 crochet hook. The upper portion of the jellyfish was crocheted using a mixture of half-double crochet and double crochet stitches. The tentacles were created with double crochet stitches and strips of the plastic bags. No portions of bags were wasted in the process of making this piece.



Image 1 (above): Jellyfish crocheted out of plastic bags.



Image 2 (below): Sea Turtle eating a plastic bag in the ocean via iStock

Discussion

Neurologic Effects:

- Multiple studies have shown micro- and nanoplastics in fish brain tissue with evidence they can traverse the blood-brain barrier. Additional literature supports blood-brain barrier permeability for polystyrene nanoparticles in vivo and internalization into neuronal cells in vitro, with the potential for systemic uptake and accumulation of micro- and nanoplastics in the human brain. (1)

Endocrine Effects:

- Thyroid Disrupting Chemicals (TDCs) enter the human body through the GI tract, interfering with T4 and T3 biochemical pathways, thus adversely affecting thyroid hormone production. These TDCs also circulate in the blood, forming complexes with thyroid hormone proteins, then reach the brain to bind with thyroid hormone receptors, leading to disruptions in thyroid health. (2)

Carcinogenic Effects

- Vinyl chloride is an instructive model for studying carcinogenesis in the plastics industry, offering insights into molecular biology. The molecular epidemiology of carcinogenesis in those exposed has paved the way for cancer prevention and treatment, with potential applications to other carcinogenic exposures sharing similar molecular pathophysiology. (3)

References

- Prüst M, Meijer J, Westerink RHS. The plastic brain: neurotoxicity of micro- and nanoplastics. Part Fibre Toxicol. 2020 Jun 8;17(1):24. doi: 10.1186/s12989-020-00358-y. PMID: 32513186; PMCID: PMC7282048.
- Ullah S, Ahmad S, Guo X, Ullah S, Ullah S, Nabi G, Wanghe K. A review of the endocrine disrupting effects of micro and nano plastic and their associated chemicals in mammals. Front Endocrinol (Lausanne). 2023 Jan 16;13:1084236. doi: 10.3389/fendo.2022.1084236. PMID: 36726457; PMCID: PMC9885170.
- Brandt-Rauf PW, Li Y, Long C, Monaco R, Kovvalli G, Marion MJ. Plastics and carcinogenesis: The example of vinyl chloride. J Carcinog. 2012;11:5. doi: 10.4103/1477-3163.93700. Epub 2012 Mar 12. PMID: 22529741; PMCID: PMC3327051.

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