A Novel Study on Behavioral and Reproductive Consequences of Embryonic Exposure to BPA and BPS in the C. elegans Model

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Increasing reports about the toxic effects of bisphenol A (BPA), a neuroendocrine-disrupting chemical primarily found in polycarbonate plastic bottles, have led the plastics industry to replace BPA with a similar compound known as bisphenol S (BPS). With emergent exposure to BPS, concerns have been raised about the lack of research on its toxicity. Using the nematode Caenorhabditis elegans (C. elegans) as a model organism, this novel study investigates the effects of BPA, and more importantly, BPS, on the nervous and reproductive systems. Worms were exposed to physiologically relevant doses of BPA and BPS ranging from 1-500 μM for 3-5 hours during embryogenesis. To assess impacts of these chemicals on a form of non-associative learning and behavior, habituation assays were conducted. Qualitative analysis of the number of eggs laid and embryonic viability was used to evaluate reproductive defects. The developing embryo was found to be vulnerable to both behavioral and reproductive impairments following chemical exposure. Compared to controls, habituation rates were 34% slower in BPA-exposed worms, and up to 42% slower in BPS-exposed worms, suggesting interference with dopaminergic neurons and their synapses. Likewise, BPS-exposed worms displayed brood sizes decreased by 51% and high embryonic lethality rates of up to 43%. This study exposes the potentially new role that BPS may play in the development of reproductive and learning disorders in humans, such as miscarriages, infertility, and ADHD. Considering that BPS is being used as a substitute in BPA-free products, it underscores the importance of further study in determining the overall safety of its usage in consumer products.

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