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The effects of Bisphenol A on the Zebrafish embryo

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Endocrine disruptors are compounds that mimic hormones found in the endocrine system and, in doing so, alter the physiology of living organisms by affecting this regulatory system. Bisphenol A, a monomer used in polycarbonate plastics that is at the center of international controversy, is thought to act as an endocrine disruptor. Its application in shatterproof dishware is especially hazardous, due to the widespread use of polycarbonate plastics in the production of cups for infants and toddlers. This age group is especially prone to the acute effects of endocrine disruptors due to a weaker feedback regulatory system than in adults. Thus, my project focuses on the action of Bisphenol A in the developing organism, specifically, the zebrafish (Danio rerio) embryo. My previous work has shown that BPA treatment caused a 50-75% reduction in heart rate, a transient effect that is fully reversed upon its removal from the culture medium. Other symptoms of BPA treatment included cardiac edemas, muscular malformation, depigmentation, slow response time, and retardation of swim bladder inflation; all reported symptoms of other endocrine disruptors. Other previous experiments have also shown that this effect (in zebrafish) is not due to estrogen agonism and may be caused by a yet uninvestigated mechanism. To determine the chemical specificity required for heart rate reduction, I investigated several structural analogs of BPA. These experiments showed that while IDP and BPAF cause a similar (or more gravid) effect, BPS shows no activity in reducing heart rate. Since underlying cellular irregularities could cause the heart rate reduction seen with BPA treatment, I also used Immunohistochemical techniques on transgenic fish to study any defects in the developing vascular endothelium. My results illustrate that vascular endothelial development is not affected due to BPA treatment and does not cause the heart rate reduction seen in BPA treated fish.