

Bisphenols and the Female Mammalian Reproductive System

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Bisphenol A (BPA) is a valuable chemical for industrial, commercial, and household applications. However, concerns regarding its endocrine-disrupting effects prompted its replacement with BPA analogues such as Bisphenol S (BPS). BPS was identified as a safer alternative to BPA due to its excellent stability to high temperature, resistance to sunlight, and relatively low estrogenic properties. Although considered a safer alternative, BPS has a remarkably comparable chemical structure with BPA that may still render similar endocrine-disrupting potential as BPA. Also, BPS is yet to be tested for safety. Human exposure to BPS is now widespread as consumers assume that BPA-free products are safer than BPA-containing products. A thorough investigation of the health effects and potential toxicities of BPS is therefore necessary.

In this study, the reproductive effects of BPS will be assessed using female reproductive tissues of different mammalian models. Female reproductive tissues are susceptible to adverse impacts of endocrine-disrupting chemicals such as bisphenols as they are activated by estrogenic/androgenic signaling. Female reproductive tissues are also vulnerable to epigenetic shift in germ cells and can be altered by post-translational modifications of functional proteins. The exposure of reproductive tissues to toxicants, especially during the critical windows of development, can lead to harmful and irreversible effects on individual and population levels. The component studies in this proposed research will first examine BPS and BPA's effects on ovarian and uterine functions in mice. A second component study will evaluate BPS and BPA's role in disease establishment and progression through the use of human cell line. Lastly, the third component study will assess female reproductive tissues of stranded cetaceans to explore incidences of reproductive problems in the wild. Reproductive phenotypes in cetaceans will then be compared to phenotypes observed in mouse models exposed to bisphenols.

Knowledge and understanding of the effects and potential toxicities of bisphenols on the female mammalian reproductive system are important in establishing safe human exposure limits. Results from this study are also valuable for policymakers to make prudent decisions on how to use and manage these chemicals.