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Cerebrovascular mechanism of bisphenol A exposure in stroke ischemic events

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Abstract

Background: The endocrine-disrupting compound bisphenol A (BPA) is produced in large quantities all over the world and is found in epoxy resins and polycarbonate plastics, which are used to make baby bottles and food and drink storage containers [1]. Due to its androgenic and estrogenic qualities, BPA has been shown to accumulate in brain tissue and is thus linked to negative neurological and vascular outcomes, including strokes [2]. This type of brain injury significantly impairs blood vessels and arteries, especially the middle cerebral artery (MCA), which in turn impairs smooth muscle cells (SMC) viability. To maintain cerebral homeostasis and vascular integrity, SMC is essential in controlling vascular tone [3]. **Objective:** Thus, this study aims to investigate the mechanisms via which a 24-hour exposure to BPA modifies the contractile function of smooth muscle cells of the middle cerebral arteries (SMC-MCA) of rats. **Methods:** Therefore, explants were isolated from the MCA of Wistar rats and MTT assays were carried out to test the response to BPA in the SMC-MCA. Contractility tests by Planar Cell Surface Area were performed to analyse the vasoactive response of SMC-MCA in response to the contractile agent, noradrenaline, and the relaxing agent, sodium nitroprusside. Proteins and ion channel subunits expression implicated in the MCA vasoactive response were assessed by RT-qPCR. **Results:** The incubation concentration determined the genomic effects, which resulted in modifications to the contractile response by altering the expression of the sGC protein and the α subunit of BKCa 1.1. **Conclusions:** In summary, these findings suggest that BPA exposure modifies SMC-MCA's vascular homeostasis and may, thus, be connected to the development of ischemic stroke. This underscores the pressing need to comprehend this connection and the underlying pathways, necessitating additional research.

Keywords: bisphenol A; endocrine disrupting compound; stroke; ischemia; vasoreactivity

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