Effects of bisphenol A and its analogue on the uterine contractility in immature and cyclic pigs

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Abstract

Statement of the Problem: Bisphenol A (BPA) is a substance occurring in many products. BPA has been shown to provoke many harmful effects on human health. The estrogenic activity of BPA may lead to reproductive disorders in both females and males. Currently BPA is gradually substituted by its analogues, whose effects have been poorly researched. Therefore, the aim of the study was to investigate the effect of bisphenol A and its selected analogue, bisphenol F (BPF), on the contractile activity of the uterine smooth muscles in immature and cyclic pigs. Material & Methods: Strips of the myometrium were exposed to BPA and BPF at concentrations of 10^{-13}-10^{-1} M. The smooth muscle contractility was determined with equipment for measuring isometric contractions. Findings: BPA caused significant decrease in the amplitude, frequency and tension in concentrations 10^{-3} - 10^{-1} M ($P < 0.001$) and 10^{-6} - 10^{-1} M ($P < 0.001$), 10^{-3} - 10^{-1} M ($P < 0.01$) and 10^{-8} - 10^{-1} M ($P < 0.01$), and 10^{-4} - 10^{-1} M ($P < 0.01$) and 10^{-4} - 10^{-1} M ($P < 0.01$) in the immature and cyclic group, respectively as compared to the pretreatment period. BPF caused decrease in the amplitude in both groups in concentrations 10^{-6} - 10^{-1} M ($P < 0.001$) and frequency in concentrations 10^{-5} - 10^{-1} M ($P < 0.001$) and 10^{-8} - 10^{-1} M ($P < 0.001$) in the immature and cyclic group, respectively and did not exert a significant impact on the tension. Conclusion: The obtained results indicate the influence of BPA and BPF on the contractile activity of the porcine uterine smooth muscles is dependent on hormonal status.

Image

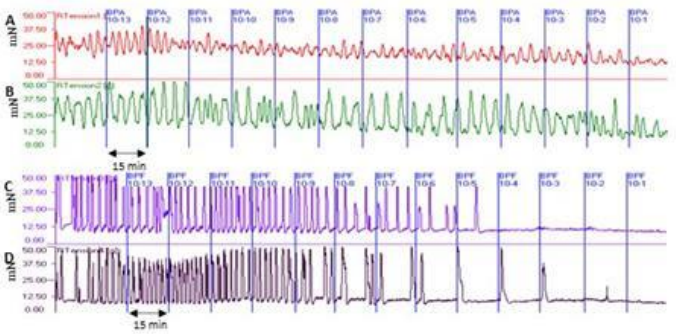


Figure 1: Representative diagrams showing contractile activity of the porcine myometrial strips collected from sexually immature; (A), 12-14 days of the estrous cycle; (B) after administration bisphenol A of concentration (BPA; 10^{-13} - 10^{-1} mol/L) and sexually immature; (C), 12-14 days of the estrous cycle; (D) after administration bisphenol F of concentration (BPAF; 10^{-13} - 10^{-1} mol/L)

Recent Publications

1. Huang YQ, Wong CK, Zheng JS, Bouwman H, Barra R, Wahlström B, Neretin L, Wong MH (2012) Bisphenol A (BPA) in China: a review of sources, environmental levels, and potential human health impacts. Environment International 42:91-99.
2. Laing LV, Viana J, Dempster EL, Trznadel M, Trunkfield LA, Uren Webster TM, van Aerle R, Paull GC, Wilson RJ, Mill J, Santos EM (2016) Bisphenol A causes reproductive toxicity, decreases dnmt1 transcription, and reduces global DNA methylation in breeding zebrafish (Danio rerio). Epigenetics 11:526-538.
3. Rochester JR (2013) Bisphenol A and human health: A review of the literature. Reproductive Toxicology 42:132-155.
4. Ruan T, Liang D, Song S, Song M, Wang H, Jiang G (2014) Evaluation of the in vitro estrogenicity of emerging bisphenol analogs and their respective estrogenic contributions in municipal sewage sludge in China. Chemosphere 124:150-155.
5. Song S, Song M, Zeng L, Wang T, Liu R, Ruan T, Jiang G (2014) Occurrence and profiles of bisphenol analogues in municipal sewage sludge in China. Environmental Pollution 186:14-19.



Biography

Aleksandra Zygmuntowicz is a PhD student at the Department of Pharmacology and Toxicology of the University of Warmia and Mazury in Olsztyn. The research topics include bisphenol A and its selected analogues. The scope of research results from the fact that there is no data in the literature regarding the effect of these substances on the contraction activity of the smooth uterine myometrium. As a research model, a domestic pig was chosen because the results of the research can be transferred to people.

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Notes/Comments: