Abstract

Long-term exposure of humans to xenobiotics increases the risk of the onset of various diseases. Numerous studies have investigated the effects of long-term low-dose exposure regimen to individual xenobiotics on the redox profile of various organisms. However, the approach of the present study according to which the effects of long-term low-dose exposure regimen to mixtures of xenobiotics on redox profile need to be examined is pioneering. This study approached the so-called real-life risk simulation . Thus, the aim of the study was to evaluate the effect of a mixture of xenobiotics that was administered long-term in doses much lower than NOAEL on rats. For this purpose, 40 rats were exposed for 18 months to a mixture of 13 chemicals (carbaryl, dimethoate, glyphosate, methomyl, methyl parathion, triadimefon, aspartame, sodium benzoate, calcium disodium ethylene diamine tetra-acetate, ethylparaben, butylparaben, bisphenol A, and acacia gum) in 3 dose levels (low, medium high). At 6, 12 and 18 months, several redox biomarkers were measured in blood, while at 18 months both in blood and the rat tissues. According to the results, the exposure for 6 and 12 months to all 3 doses and for 18 months to low and medium dose induced useful physiological adaptations enhancing the antioxidant arsenal of the animals. In contrast, exposure to the high dose of the mixture for 18 months caused a significant disruption in the redox equilibrium of blood and tissues inducing oxidative stress. The adoption of similar approaches will strongly contribute to the assessment of anthropogenic and environmental risks in our modern world and will drive regulatory authorities and organizations to the re-evaluation of safety assessment testing and establishing future safety norms both for hazard and risk assessment.