BISPHENOL A AFFECTS AMELOGENESIS BY MODULATING ENAMEL KEY GENE EXPRESSION
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INTRODUCTION

Bisphenol A (BPA) is a widespread Endocrine Disrupting Chemical (EDC) commonly used by plastic industries as the base compound of polycarbonates and epoxy resins. The consequence of this omnipresence is that more than 95% of the world population contains BPA (ng/ml) in biological fluids raising the question of its activity and potential health adverse effects. Anecdotally, Molar Incisor Hypomineralization (MIH), a recently described enamel pathology affecting 15 to 18% of 6-9 years old children, is increasing concomitantly with EDC related pathologies. Our previous data show that BPA impacts amelogenesis and enamel mineralization and generates similar enamel defects as those described for MIH. The resulting irreversible enamel defects may provide an easily accessible marker for reporting early EDC exposure in humans (1,2).

AIM OF THE STUDY

The aim of the present study was to identify BPA target genes involved in amelogenesis in order to decipher the mechanism of action of low-dose BPA in enamel hypomineralization.

MATERIALS AND METHODS

In vivo, Wistar rats bred in BPA- and phthalate-free conditions were exposed continuously to low-dose BPA (5 ug/kg/day) from the first day of fetal life (E11) to 65 days after birth (P65). RNAs from microdissected dental epithelia were submitted to microarray analysis. In vitro, analyses were carried out on the rat ameloblast cell line HAT7 treated by 10^-9 M BPA.

RESULTS

Among 19329 RNAs, only 19 RNA levels were significantly modulated (more than 1.5-fold) by BPA. As 75% of exposed rats were responsive to BPA (1), it was justified to select the 41 genes modulated more than 1.5-fold after exposure to BPA even if not significantly. Among these genes, amelogenin and enamelin coding for specific enamel matrix proteins were ones of the highest genes up-regulated, 1.87-fold and 1.51-fold respectively. SLC26A4 which encodes an anion exchanger involved in mineralization process also appeared as a target gene. SLC26A4 could be involved in pH regulation by secreting bicarbonates to neutralize protons released into the enamel space during crystal growth (3). SLC5A8 and SLC4A44 are also solute carriers which expression was induced by BPA 1.51- and 1.75-fold respectively. However, they are 2- and 10-fold less expressed than SLC26A4.

CONCLUSION

In conclusion, we report that BPA impacts ameloblast differentiation and enamel synthesis through modifications of enamel key gene expression. Despite the small number of BPA target genes specifically expressed in ameloblasts, factors that transmit BPA effects are ubiquitous and involved in general pathophysiology. Thus, these data help to understand how enamel defects may be used as early marker of exposure to EDCs that act as BPA.

REFERENCES