

## THE PROTECTIVE ROLE OF MELATONIN IN PORCINE OOCYTE MEIOTIC FAILURE CAUSED BY THE EXPOSURE TO BENZO(A)PYRENE

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### Introduction

Benzo(a)pyrene (BaP), a widespread environmental carcinogen found in particulate matter, 2.5 µm or less (PM2.5), has been shown to have toxicity at the level of the reproductive systems. Acute exposure to BaP has transient adverse effects on the follicle growth, ovulation and formation of corpora lutea, which results in transient infertility. However, the molecular mechanisms regarding how BaP influences the oocyte maturation and whether melatonin restores the BaP-induced meiotic failure has not yet been determined.

### Materials and Methods

Porcine oocytes were randomly assigned to control, BaP-exposed and melatonin-supplemented groups. Acquisition of oocyte meiotic competence was assessed using immunostaining, fluorescent intensity quantification and/or immunoblotting to analyse the cytoskeleton assembly, mitochondrial integrity, cortical granule dynamics, ovastacin distribution, ROS level and apoptotic rate. Fertilization ability of oocytes was examined by sperm binding assay and IVF.

### Results and Discussion

BaP exposure resulted in the porcine oocyte meiotic failure via impairing the meiotic apparatus, showing a prominently defective spindle assembly, actin dynamics and mitochondrion integrity. In addition, BaP exposure caused the abnormal distribution of cortical granules and ovastacin, which were consistent with the observation that fewer sperm bound to the zona pellucida surrounding the unfertilized BaP-exposed eggs, contributing to the fertilization failure. Conversely, melatonin supplementation recovered, at least partially, all the meiotic defects caused by BaP exposure through inhibiting the rise in ROS level and apoptotic rate.