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Development of a suite of novel in vitro assays for screening epigenetic modifiers

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Endocrine disrupting chemicals (EDCs), which have now become widespread in the environment, can disrupt hormonal balance, resulting in reproductive impairments, malformation and growth retardation even at very low concentrations. Recent mammalian studies further indicated that certain EDCs may cause epigenetic changes, leading to transgenerational effects, despite the offspring have never been exposed to these chemicals during their lifespan.

This study attempts to develop a suite of in vitro bioassays for screening a new, important class of pollutants that can cause epigenetic modifications and transgenerational effects. GC-1 (a mouse spermatogonia cell line) and SKOV3 (a human ovarian cancer cell line) were exposed to 7 EDCs with different chemical structures (BDE-47, BPA, EE2, TDCPP, DHP, DEHP and 4-NP) that prevail in the environment, followed by transcriptomic, gene ontology and pathway analysis. Our results showed that these EDCs can alter biological pathways relevant to epigenetic changes and reproductive impairments including chromatin modification, RNA and DNA processing, cell cycle, cell differentiation, apoptosis, steroidogenesis and DNA repair. The toxicological significance and applicability of this bioassay in screening epigenetic modifiers will be discussed.