

REPRODUCTIVE AND DEVELOPMENTAL IMPAIRMENT BY ENVIRONMENTAL CONTAMINANTS

Hamid R Habibi

University of Calgary, Calgary, Alberta, Canada

A number of contaminants of emerging concern with hormone-like activities have been shown to disrupt normal reproduction by affecting components of brain-pituitary and gonadal axis. Our field studies demonstrated the presence of a number of pollutants in rivers located in Southern Alberta, Canada with hormone-like activity causing significant female bias. Significant changes were observed in fish caught down stream of certain municipalities along the Oldman River correlating with high levels of vitellogenin expression in male fish. These observations suggested severe endocrine disruption of gonadal development likely due to presence of compounds with estrogen-like activity. To investigate the effects of chemicals, we performed controlled laboratory experiments in which fish in aquaria were exposed to the same concentrations of a selected number of chemicals detected in the river system, individually and as mixtures. The main focus of the present study was to investigate the mechanisms by which these compounds disrupt reproduction, using cellular, molecular, transcriptomics and metabolomics approach. The results demonstrate significant dysregulation of metabolism following exposure to low concentrations of contaminants. Microarray analysis, identified new cellular response and biological endpoints, and provides information on mechanism-based cell and tissue response affecting energy cycle and reproduction. In addition, we observed changes in neurostem cell development associated with hyperactivity following exposure to low environmentally relevant concentration of contaminants. The results demonstrate that contaminants exert significantly different effects as a mixture, compared to individual compounds in the liver, ovary, testis and brain. Together with our previous field data, the present results provide a framework for better understanding of ecological consequences of exposure to contaminants, and resulting reproductive abnormalities seen in fish and other vertebrates.

habibi@ucalgary.ca