

ENDOCRINE DISRUPTION OF REAL LIFE MIXTURES OF POPS IN EXPERIMENTAL MODELS AND WILD FISH.

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Introduction: A variety of environmental pollutants have the potential to disrupt the endocrine systems of animals thereby inducing developmental and functional disorders in endocrine tissues and biological systems regulated by hormones. Adverse effects on reproduction, immune functions, behavior and endocrine signaling are reported in fish and mammals exposed to environmental persistent organic pollutants (POPs).

Aim: To study exposure levels and potential adverse effects of POPs in aquatic environments.

Material and Methods: Exposure levels and toxic potency of mixtures of POPs were assessed in experimental models (*in vitro*, *in vivo*) and field studies. Natural mixtures used were extracted from burbot (*Lota lota*) liver (fish liver oil).

Results: Extracts from the two lakes (Lake Mjøsa; polluted, Lake Losna; background levels) induced progesterone, testosterone and estradiol production in primary porcine theca and granulosa cells and in the human adrenal cell line H295R.

Zebrafish (*Danio rerio*) exposed to the extracts from the 2 lakes showed precocious puberty, skewed sex ratios, reduced hatching rates and suppression of follicle development as well as changes in gene expression associated with steroid hormone signaling and growth.

In wild burbot from Lake Mjøsa it was found increased prevalence of tuberculosis and parasite infection as well as diffuse pathological changes compared to Lake Losna. Furthermore, gene transcription analysis showed changes in genes associated with immune functions and endocrine signaling.

Conclusion: Endocrine disrupting potency of real life mixtures was documented in cell cultures. The same mixtures produced reproductive effects in zebrafish and affected genes associated with steroid hormones signaling and growth. In the wild fish exposed to the mixture with the highest levels of POPs it was observed adverse health effects and changes in genes involved in endocrine signaling suggesting association between changes in health status and endocrine disrupting mechanisms.