

Ottawa-Carleton Chemical and Environmental Toxicology Seminar Series



Exposure to polycyclic aromatic compounds (PACs) and trace elements impairs baculum bone health in a semi-aquatic furbearer; the North America River Otter (*Lontra canadensis*)

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Polycyclic aromatic compounds (PACs) are a group of chemicals with known mutagenic, carcinogenic and teratogenic properties. They are also potent endocrine disrupting compounds (EDCs). The impacts of PAC exposure on free-ranging wildlife is of considerable concern in regions of oil and gas extraction such as in the Athabasca Oil Sands Region (AOSR) of northern Alberta, Canada. River otters (*Lontra canadensis*) are sentinel species of aquatic ecosystem health. The baculum (penile bone) is an important part of the reproductive system in otters that ensures successful copulation. Mounting evidence in wildlife suggests that exposure to EDCs leading to impaired baculum bone health could lead to population declines. Although baculum health is critical to male reproductive success and is sensitive to exposure to EDCs, there is no information available regarding the impact of PAC exposures on measures of baculum health. River otter baculum were collected from carcasses obtained from the fur trade in the AOSR. Livers were dissected, homogenized and analyzed for PACs and trace elements. Baculum bones were cleaned, dried, and subjected to dimensional analysis, bone mineral density (BMD) and mechanical loading testing. Multivariate statistics were used to explore relationships between hepatic PAC and trace element residues and baculum bone health measures. Trace elements and select PACs exhibited both protective and deleterious effects on baculum bone health metrics. Highly alkylated four ring PACs exerted the

strongest negative effects on baculum bone material properties (ex: C4-Chrysene and C4-pyrene). The same compounds have been shown to exhibit strong anti-androgenic activities in other published literature. Few comparable studies exist related to contamination and adverse effects of PACs in wild terrestrial mammals. Baculum bone health metrics are useful endpoints when evaluating endocrine disrupting impacts of environmental pollutants such as PACs and heavy metals, especially in the context of exposures to complex environmental mixtures. Moreover, baculum health metrics may be an important tool to include in biomonitoring studies as to date, there are limited means to assess male reproductive performance in wildlife biomonitoring programs.

February 12, 2020 1:30pm

Coffee will be available at 1:00PM

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