

**RISK ASSESSMENT CONTRIBUTIONS OF MITHE-RN PROJECTS: FOODS AND INGESTED PARTICLES
RESEARCH THEME**

Project ^b	APPLICATIONS TO RISK ASSESSMENT ^a			
	Direct Use	Support/Inferential Use	Confidence Building	General Comments
I1 – P. Rasmussen. Metals in urban residential air: refinement of measurement techniques	Urban indoor/outdoor air concentrations of metals and their ratios and <i>in vitro</i> bioaccessibility values	Characterization of aerosols employing personal monitors in terms of particle size and chemical speciation in relation to metal/metalloid air levels and bioaccessibilities. These findings have impact on the development of next generation personal exposure samplers for children or first responders.	<i>Scientific & Public:</i> Relative performance of current methods and protocols and their refinement; addressing inadvertent contamination issues has increased the validity of determining low ambient exposures to metals and metalloids.	The good publication record of the team ensures the availability to risk assessors of the results of this project. Particle size and chemical speciation can strongly influence bioaccessibility and bioavailability, and also uptake by cells and thus respiratory toxicity.
I2 – H. Jamieson et al. Arsenic speciation in dust from abandoned gold-mine tailings in Nova Scotia	Concentration and chemical speciation of arsenic in airborne dust and near-surface soil samples from historic gold mine tailings used for recreational activities such as all-terrain vehicle racing. Characterization of	Characterization of aerosols in terms of particle size and chemical speciation in relation to metal/metalloid concentrations and bioaccessibility of arsenic	<i>Scientific & Public:</i> Findings contributed to the decision to conduct a preliminary screening level Human Health Risk Assessment (HHRA) and the decision to post health warnings pending the findings of a full HHRA, and the cancellation of a 4X4 rally due to concerns	This project illustrates that evidence-based public-health decisions are possible, and the researchers are encouraged to extend this approach to other hot spots. Particle size and chemical speciation can strongly influence bioaccessibility and bioavailability of ingested or inhaled particles.

	particles that might be inhaled or ingested in relation to arsenic concentration and mineral form and their influence on bioaccessibility.		about potential exposure of the public.	
I3 – C. Jumarie. Pulmonary absorption of metals: influence of lung surfactants on bioavailability of inhaled metals	No direct input	The project will help to unravel the role of pulmonary surfactants in the uptake and/or clearance of metals (including metal mixtures) and if metals can impair surfactant production.	<i>Scientific:</i> The study results will improve our understanding of how metals are taken up <i>via</i> the respiratory route, and their toxicities at the cell level (including metal mixtures).	Lung surfactants are crucial to lung function and the killing/clearance of micro-organisms, particles and toxic substances. The study's relevance is enhanced by a possible focus on susceptible individuals (e.g., cystic fibrosis patients). Direct testing of particulates is recommended, especially those studied in other MITHE projects.
I4 – S.D. Siciliano. Gastric bioaccessibility of metals surrounding northern hotspots	Concentrations and bioaccessibilities of metals/metalloids in foods and mine tailings.	The human intestinal ecosystem (SHIME) simulator approach can yield knowledge about how food is broken down and the release of essential elements and contaminants for uptake.	<i>Scientific:</i> Provides support for weight-of-evidence arguments of Risk Assessment results.	Although it is unlikely that SHIME will become a reference method for bioaccessibility, it has the potential of building a complementary scientific knowledge base for this practical research activity.

<p>I5 – B.A. Hale. Bioaccessible and bioavailable cadmium, arsenic and nickel in foods and soils</p>	<p>Bioaccessibilities and bioavailabilities values for these elements in soils which are currently the subject of risk assessments. Verification/improvement of existing techniques.</p>	<p>The dependencies of these measures on chemical speciation and soil characteristics (pH, particle size distribution, organic content) will start building predictive capacity, as well as lead to mechanistic understanding of among-site variation in soil-element bioaccessibility..</p>	<p><i>Scientific & Public:</i> Comparison of 3 prominent bioaccessibility methods, including <i>in vivo</i> verification will enhance the scientific and public confidence in using bioaccessibilities and bioavailabilities in Risk Assessment. Building/participation in local (within MITHE) and international research networks promoting such efforts builds confidence and scientific momentum.</p>	<p>The participation in national and international bioaccessibility research networks is an important development in building a reliable science base for bioaccessibility and bioavailability.</p>
<p>I6 – Le C Arsenic speciation in the environment</p>	<p>Actual measurements of hand loadings of arsenic and chromium are useful in Risk Assessment oral-exposure models.</p>	<p>Speciation studies of arsenic and chromium in hand-washings and using biomarkers of overall exposure (urine and saliva) helps to verify exposure models used in Risk Assessment.</p>	<p><i>Scientific & Public:</i> An important spin-off of this project is the development of sophisticated and reliable analytical methods for use in determining exposures.</p>	<p>This work has direct applications in Risk Assessment and is of utmost importance to risk assessors, policy makers and public health advisors.</p>
<p>I7 – P. Ayotte. Relation between methylmercury exposure and serum paraoxanase activity in Cree and Inuit communities of</p>	<p>No direct input</p>	<p>Association of exposure with outcomes and measures related to health (e.g., damage to genes; inhibition of</p>	<p><i>Scientific & Public:</i> Provides verification of the effectiveness/validity levels of concern such as for blood mercury concentrations and of other</p>	<p>Population-based assessments of exposure and health-related outcomes provide content for weight-of-evidence arguments used in Risk Assessment.</p>

Northern Quebec.		critical enzymes linked to the prevention of arteriosclerosis; measures of the latter).	toxic metals/metalloids used in Risk Assessment.	
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- a. Please note the following usage of terms. Bioaccessibility: the fraction available for uptake; bioavailability, the actual fraction taken up.
- b. Project descriptions are available on the MITHE website under 'Research Activities'.