ARSENIC AND INNATE IMMUNITY

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Arsenic Consortium
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Humans with chronic exposure to arsenic have impaired lung function, bronchiectasis and increased risk of respiratory infections.

Arsenic (2 and 10 ppb) enhances bacterial and viral infections in zebrafish (Kim, Maine)

Arsenic (100 ppb) reduces viral clearance of influenza A infection in mice and suppresses genes involved in the immune response in the lungs (Kozul-Horvath, Hamilton)

The effects of low, environmentally relevant levels of arsenic on the innate immune function of the lung in humans is unknown. What's the risk associated with low level exposure?

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INNATE IMMUNITY IN THE LUNG

MUCOCILIARY CLEARANCE OF BACTERIA


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A R S E N I C R E D U C E S  C F T R  P R O T E I N

Serum [iAs] is 0.1-10 pp in individuals drinking water containing 10-1,000 ppb.
Arsenic Suppresses Innate Immunity in the Lung
Reduces Mucociliary Clearance of Bacteria

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SIGNIFICANCE AND CLINICAL RELEVANCE

- Loss of CFTR-mediated chloride secretion by airway epithelial cells (and reduced ASL volume) reduces mucociliary clearance of pathogens.

- This effect of arsenic explains in part the clinical observation that arsenic increases respiratory infections.
Long-term Goals of Superfund Project

- Does arsenic reduce innate immunity in the lung by inhibiting the phagocytic removal of bacteria?

- Does arsenic enhance the development of antibiotic resistant bacteria in the lung?


- What levels of arsenic in water and food elicit clinically relevant changes in lung function in humans?
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