

## (The) Effect of Naphthenic Acids and Oil Sands Process Water on the Immune Gene Expression of Mice.

Erick García García, Jonathan Pun, and Miodrag Belosevic, University of Alberta

Oil Sands Processed Water (OSPW) has been found to be toxic to various animal species. Naphthenic acids (NAs) constitute a large fraction of the organic fraction of OSPW, and are believed to be its major toxic component. The possible effects of purified NAs or OSPW on the immune response of vertebrates have not been investigated. We have analyzed the expression of 20 immune genes by real time PCR in mice, after acute and subchronic exposures to NAs and to the organic fraction of OSPW. This 20-gene panel contains genes involved in the regulation of hematopoiesis and inflammation (growth factors and chemokines), genes coding for important cytokine receptors, and genes involved in the regulation of the immune response against virus and intracellular pathogens (Th1 genes), and against extracellular pathogens (Th2 genes). We observed alterations in immune gene expression in mice exposed to commercial NAs for two weeks. We observed reduced expression of Th1 genes and chemokines in the liver after one week of exposure, followed by a restoration to normal values by the second week. We also observed increased expression of cytokine receptors in the liver by the second week of exposure. Th1 genes in the spleen were down-regulated after 1 week of exposure, and returned to the basal levels by the second week. Some Th2 cytokines in the spleen were up-regulated after two weeks of exposure to NAs, as were growth factors, chemokines and cytokine receptors in the spleen. Alterations of normal immune functioning could have a great impact on the ability of animals to cope with infections. These results help to establish a base-line of commercial NAs immunotoxicity, against which the toxicity of the organic fraction of OSPW (containing NAs and other contaminants) can be compared.

### Erick García García , Ph.D..

Erick García García obtained a Ph.D. by the National Autonomous University of Mexico in 2007, working on human immunity. I worked previously as a postdoctoral fellow from 2007 to 2008, working on aquatic and terrestrial invertebrate immunity. He joined Dr. Miodrag Belosevic's lab in June 2009 to work on the effects of oil sands processed water contaminants on vertebrate immunity and has published 10 scientific articles, and 4 book chapters.