

Prenatal Exposure to Arsenic : Alterations to Gene Expression and DNA Damage in Newborns



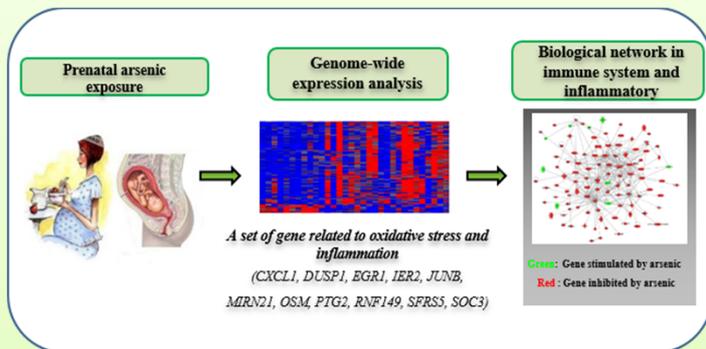
Arsenic

Arsenic (As) is a ubiquitous environmental pollutant and a known human carcinogen (Group 1, IARC 1987). The growing body of evidence indicates that arsenic exposure, especially during the prenatal stage and childhood, causes various adverse health effects, and an increased risk of cancer-related death in during early adulthood. In Thailand, one of the areas contaminated with arsenic is Ron Phibun district, Nakhon Sri Thammarat province. This area was the site of old tin mining for almost a century. Thus, it is of interest to study the effects of prenatal and early-life exposure to arsenic in newborns of exposed mothers and young children.



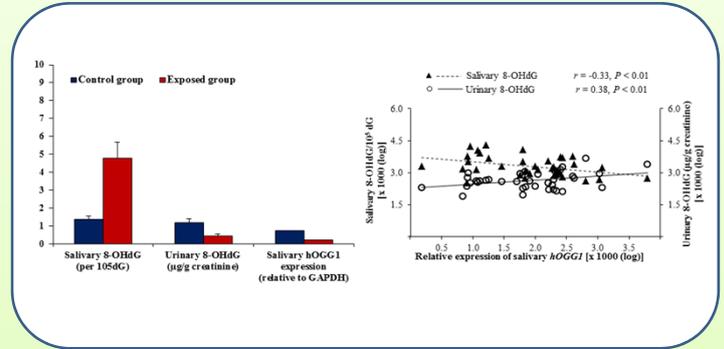
Health impacts of arsenic exposure : alterations of gene expression and DNA damage

In utero exposure to arsenic



➤ Newborns from mothers in the study area had elevated levels of arsenic in their hair and nails compared to non-exposed controls. This was also the first published study to show differential expression of 11 genes that were identified as promising markers for arsenic exposure. These genes are involved in apoptosis, cell signaling, inflammation, oxidative stress and stress responses.

Follow-up study in children (6-9 years)



➤ Decreased urinary 8-OHdG and low levels of hOGG1 expression in children continuously exposed to high levels of arsenic during fetal development and early childhood, indicating an increase in oxidative DNA damage and a decrease in DNA repair capacity.

Research Outcomes

- The study on differential expression of the 11 genes that were identified as promising markers for arsenic exposure was published in PLoS Genetics in 2007 and selected as one of the top fifteen research papers by the US National Institute of Environmental Health Science (NIEHS).
- This research project is currently being expanded into a neighboring country, Vietnam, through collaborations with the National Institute of Occupational and Environmental Health in Vietnam, Columbia University and the Massachusetts Institute of Technology (MIT) in the United States.