

# Uncovering the role of cytokines during brain development

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## Abstract

Environmental toxins are unavoidable. They are in the food we eat, the water we drink, the air we breathe, and many household items we use every day. Largely invisible, most go undetected and are harmless if exposure is limited. However, growth in industrial manufacturing, fossil fuel consumption, and chemical intensive crop production has dramatically changed the scale and complexity of humans' exposure to environmental toxins. Especially, toxic exposures related to reproductive and developmental health primarily have been associated with infertility and miscarriage, obstetric outcomes such as preterm birth and low birth weight, neurodevelopmental delay such as autism and attention deficit hyperactivity disorder, and adult and childhood cancer. Despite the consistent connection between toxin exposure during pregnancy and brain development in the offspring, there is still limited understanding of the underlying biology mediating the effects of the maternal toxin exposure on the developing brain. Therefore, the long-term goal of my laboratory is to broadly study the cytokine-regulatory network in the developing brain and how cytokine receptor-positive neurons regulate brain development upon maternal toxin exposure during pregnancy, especially metal exposure. In order to do this, the first step is systematic characterization of the cytokine receptor existing in the developing brain. We will leverage CRISPR-based scRNA sequencing and immunohistochemistry, and sensory/motor behavioral examination in mice in order to understand the underlying mechanisms how induced cytokines during pregnancy affect fetal brain development. In the future, the results from this proposed work will be used to identify the underlying mechanisms of how metal exposure during pregnancy affect the fetal brain development through the collaboration with the lab of Dr. Aimin Chen.