Heavy Metal Bringing You Down!?
Low Birth Weight Associated With Toxic Metal Exposure

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Abstract

The toxic heavy metal cadmium (Cd) exists naturally within the earth’s crust. Humans can be exposed to Cd by eating and drinking contaminated food and water. Interestingly, Cd blood serum levels in women in Durham North Carolina are higher than the national average. Additionally, Cd levels in pregnant women from the same city are associated with low birth weight. Cadmium is also known to alter cytokine (immune related proteins) expression levels which may alter immune function, and could negatively impact the fetus and mother during pregnancy. An area of interest for our research group is the placenta, which is an organ that forms during pregnancy and functions as a barrier between the maternal blood and fetal blood. Additionally, the placenta facilitates nutrient (food) and gas exchange (oxygen and carbon dioxide) between the developing fetus and the mother. Cadmium is known to accumulate in the placenta, during pregnancy and has been associated with low birth weight, spontaneous abortion and fetal growth restriction. Preeclampsia is a disease of pregnancy that is associated with improper placenta development resulting in decreased nutrient and gas exchange between the mother and fetus. Some of the outcomes of preeclampsia can be maternal death, child death, pre-term child birth (early child birth), and low birth weight. The objects of these studies were to determine the relationship between placental Cd levels and cytokine protein levels in preeclampsia. Our findings suggest that Cd levels alter cytokine protein levels in preeclamptic placenta. Additionally, we identify in JEG-3 placental trophoblast cells that 2 µM Cd alters the gene expression levels of several cytokines that are associated with preeclampsia. Alterations of cytokine levels in preeclampsia may make the mother and fetus susceptible to complications associated with infections during pregnancy and may be related to improper placental development in diseases of pregnancy like preeclampsia.