

# OFFICIAL ABSTRACT and CERTIFICATION

## Assessing the Pathological Effect of Maternal Malnourishment and Fetuin-B on Placental Tissues

Asha Rath

Yorktown High School, Yorktown Heights NY, United States

Low birth weight (LBW), which is a result of maternal undernutrition (MUN), is a prevalent issue with an estimated 16% of babies born LBW worldwide. LBW babies that were born as a result of MUN exhibited a decrease in kidney formation. The protein fetuin-B was found to inhibit kidney formation in the LBW fetus after it crossed the placenta, but fetuin-B ' s effects on the MUN placenta and placenta cells (trophoblasts) were unknown. Immunohistochemistry (IHC), immunocytochemistry (ICC), and Western blot were done to identify the specific effects of fetuin-B on the placenta and trophoblasts. Murine placentas and human trophoblasts were used. IHC found increased levels of fetuin-B and oxidative stress in the MUN model. Oxidative stress damages cells through compounds called reactive oxygen species. This suggests that elevated levels of fetuin-B lead to placental stress. ICC found that elevated trophoblast fetuin-B increased oxidative stress, decreased proliferation, increased inflammation, and increased apoptosis. This shows that fetuin-B negatively influenced trophoblast function and health. Western blot results confirmed ICC results that there was no significant increase in nitrosative stress. Nitrosative stress is similar to oxidative stress, but the compounds involved are of a nitrogen lineage. Together, these results demonstrate that fetuin-B negatively impacts placental and trophoblast health by inducing oxidative stress, not nitrosative stress. Future research can focus on treating the negative effects of fetuin-B using antioxidants in order to decrease oxidative stress. This would have applications in the world by identifying the antioxidants that can inhibit the negative effects of fetuin-B--induced oxidative stress.

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