

Study finds differences in umbilical cord blood metal levels between urban and rural newborns

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New findings from a team of Marshall University Joan C. Edwards School of Medicine researchers reveal urban and rural differences in prenatal exposure to essential and toxic elements.

The team's findings were published Nov. 22 in *The Journal of Toxicology and Environmental Health*.

The research team of Jesse N. Cottrell, M.D., D'Andrea S. Thomas, M.S., Brenda L. Mitchell, M.D., Jason E. Childress, M.D., Diane M. Dawley, M.D., Lawrence E. Harbrecht, M.D., David C. Jude, M.D., and Monica A. Valentovic, Ph.D., conducted a comparative, cross-sectional study on 172 pregnant women—79 who were considered rural and 93 considered urban as determined by U.S. Census Rural-Urban Commuting Area Codes. Umbilical cord blood was collected at the time of delivery and analyzed for 20 inorganic elements.

The study found significant differences between urban and rural samples for two elements. Copper and molybdenum were higher in urban samples. No marked differences between groups occurred for arsenic, barium, cadmium, calcium, cobalt, lead, lithium, magnesium, manganese, mercury, selenium, strontium or zinc. All samples were devoid of platinum, silver, thallium or uranium. Self-reported tobacco use was 25% and 26.9% in the rural and urban groups respectively. Nicotine product exposure was confirmed by measuring cotinine, a

stable metabolite of nicotine. Nicotine usage was associated with higher levels of lead, manganese and copper levels compared to non-smokers.

"The fetus and placenta are particularly vulnerable to toxins due to the immaturity of the blood-brain barrier and diminished biotransformation [enzymatic activity](#)," said Valentovic, the study's principal investigator.

"Excess or inadequate levels of inorganic ions may induce significant acute and long-term irreversible dysfunction in humans. Further analysis is needed to determine if there is a link between neonatal outcomes and [prenatal exposure](#) to these elements."

More information: Jesse N. Cottrell et al, Rural and urban differences in prenatal exposure to essential and toxic elements, *Journal of Toxicology and Environmental Health, Part A* (2018). [DOI: 10.1080/15287394.2018.1547890](#)

Provided by Marshall University Joan C. Edwards School of Medicine

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