

Elevated Umbilical Cord Blood Lead Levels: A Novel Environmental Link to Placenta Accreta Spectrum Pathogenesis

Pebri Warita Pulungan, Johny Marpaung, Muara Panusunan Lubis • Department of Obstetrics & Gynecology, Faculty of Medicine University of Sumatera Utara, Maternal-Fetal Medicine Division University of Sumatera Utara

36th World Congress on Ultrasound in Obstetrics and Gynecology

BACKGROUND & RATIONALE

While the placenta accreta spectrum (PAS) is conventionally linked to uterine scars, this study identifies significantly elevated cord blood lead levels, revealing a novel environmental pathomechanism beyond purely mechanical risk factors. Heavy metals such as lead (Pb), cadmium (Cd), and mercury (Hg) cross the placental barrier, potentially triggering **epigenetic alterations** and **localized oxidative stress** that disrupt normal trophoblastic remodeling.

STUDY OBJECTIVES

To compare the concentrations of **lead (Pb)**, **cadmium (Cd)**, and **mercury (Hg)** in the umbilical cord blood of pregnant women with PAS versus non-accreta controls.

To describe key **maternal and obstetric characteristics** within both groups to help shift the etiological paradigm of PAS

Hypothesis: There is a significant difference in the concentrations of heavy metals—**specifically cadmium (Cd), lead (Pb), and mercury (Hg)**—in the umbilical cord blood of pregnant women diagnosed with Placenta Accreta Spectrum (PAS) compared to those with non-accreta placentas

METHOD AND DESIGN

Prospective case-control study conducted across tertiary referral centers.

Enrolled via consecutive sampling PAS cases (n = 25) matched with healthy control previous cesarean non accreta (n = 25).

Assay: Umbilical cord blood Pb, Cd and Hg levels quantified via AAS and ICP-MS (µg/dL)

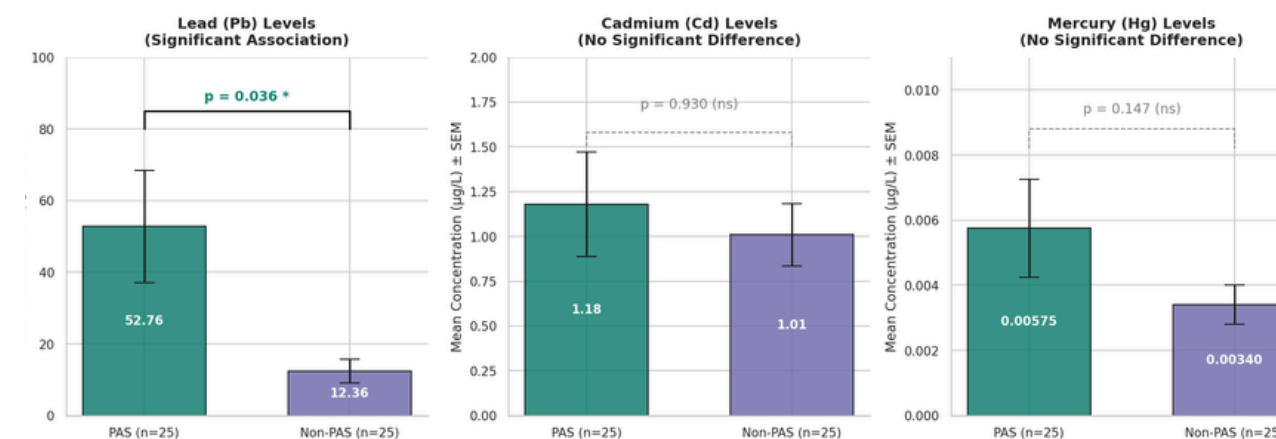
Statistical comparisons were performed using the non-parametric Mann-Whitney U test

PRIMARY CLINICAL METRICS

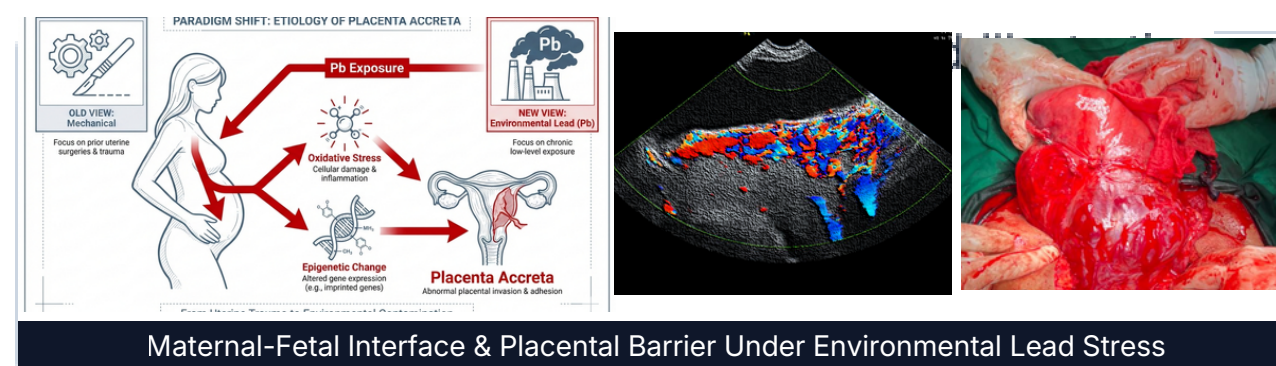
4.3 X
Higher Cord Pb in PAS vs Controls

$p < 0.001$
Statistically Significant Correlation

UMBILICAL CORD PB & HISTOPATHOLOGY



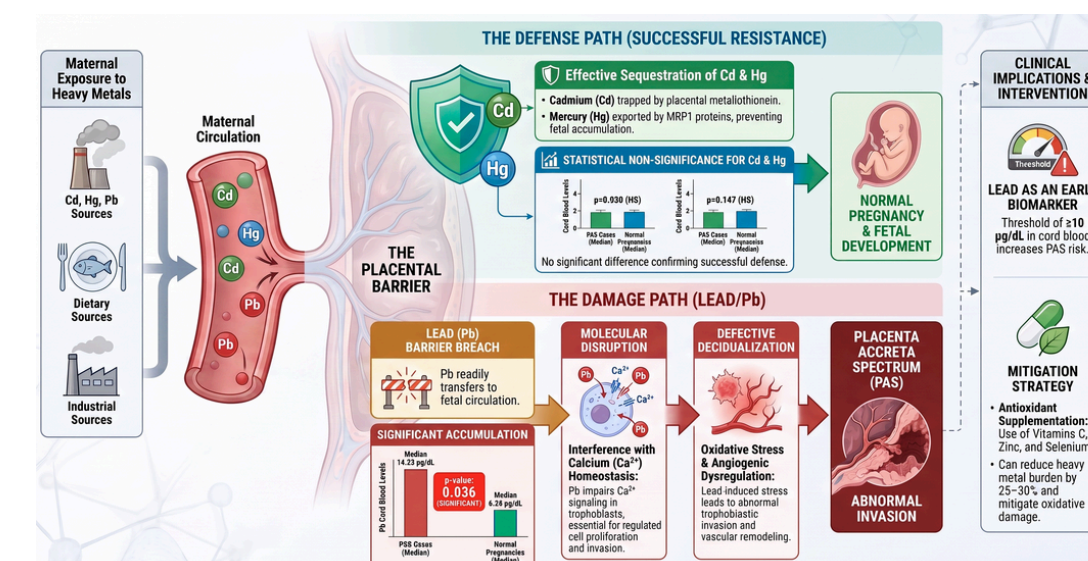
Source: Pulungan et al. (Manuscript) | RSUP Haji Adam Malik & RS Prof. Chairuddin P. Lubis, Medan, Indonesia



Key Scientific Discovery

Umbilical cord blood lead concentration directly correlates with the severity of myometrial invasion, representing an independent environmental modifier in PAS pathogenesis.

PROPOSED MOLECULAR MECHANISM



CLINICAL & DIAGNOSTIC VALUE

Combining first-trimester environmental lead exposure screening with standard Doppler ultrasound may improve early risk stratification for morbidly adherent placenta, especially in high-risk patients.

CONCLUSION

Lead toxicity is a novel non-surgical environmental factor linked to PAS development.

Cord blood Pb levels provide crucial insight into environmental impacts on maternal-fetal health.

Advocates for public health monitoring and environmental intervention during prenatal care.

Response : pebripulungan@usu.ac.id

Poster Code : isuog2026.2cc0a6b