Association of prenatal vitamins and metals with epigenetic aging at birth and in childhood

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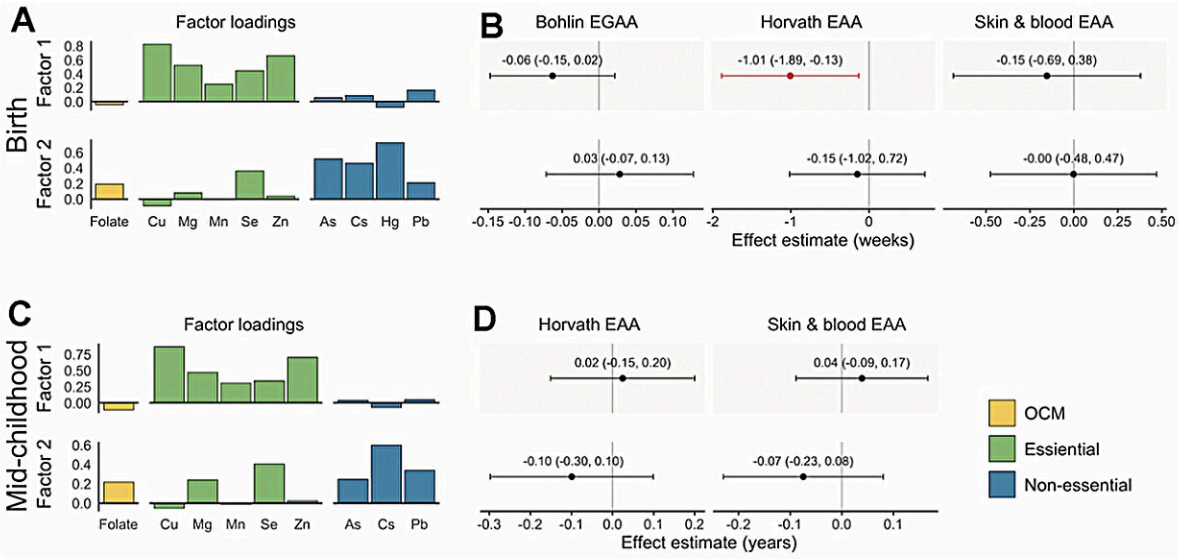

Factor loadings and associations with epigenetic gestational age acceleration (EGAA) and epigenetic age acceleration (EAA) at birth and in mid-childhood. Credit: *Aging* (2024). DOI: 10.18632/aging.205602

A new research paper titled "Associations of prenatal one-carbon metabolism nutrients and metals with epigenetic aging biomarkers at birth and in childhood in a US cohort" has been published in *Aging*.

Epigenetic gestational age acceleration (EGAA) at birth and epigenetic age acceleration (EAA) in childhood may be biomarkers of the intrauterine environment. In this new study, researchers from Stanford University School of Medicine, Harvard Medical School, Harvard T.H. Chan School of Public Health, Columbia University, and Icahn School of Medicine at Mount Sinai investigated the extent to which first-trimester folate, B12, 5 essential and 7 non-essential metals in maternal circulation are associated with EGAA and EAA in early life.

The researchers write, "[...] we hypothesized that OCM [one-carbon metabolism] nutrients and essential metals would be positively associated with EGAA and non-essential metals would be negatively associated with EGAA. We also investigated nonlinear associations and associations with mixtures of micronutrients and metals."

Bohlin EGAA and Horvath pan-tissue and skin and blood EAA were calculated using DNA methylation measured in cord blood (N=351) and mid-childhood blood (N=326; median age = 7.7 years) in the Project Viva pre-birth cohort. A one standard-deviation increase in individual essential metals (copper, manganese, and zinc) was associated with 0.94-1.2 weeks lower Horvath EAA at birth, and patterns of exposures identified by exploratory factor analysis suggested that a common source of essential metals was associated with Horvath EAA.

The researchers also observed evidence of nonlinear associations of zinc with Bohlin EGAA, magnesium and lead with Horvath EAA, and cesium with skin and blood EAA at birth. Overall, associations at birth did not

persist in mid-childhood; however, arsenic was associated with greater EAA at birth and in childhood.

"Prenatal metals, including essential metals and arsenic, are associated with epigenetic aging in early life, which might be associated with future health," the researchers conclude.

More information: Anne K. Bozack et al, Associations of prenatal one-carbon metabolism nutrients and metals with epigenetic aging biomarkers at birth and in childhood in a US cohort, *Aging* (2024). DOI: 10.18632/aging.205602

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