

Infant toenails reveal in utero exposure to low-level arsenic, study finds

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Infant toenails are a reliable way to estimate arsenic exposure before birth, a Dartmouth College study shows.

The findings appear in the *Journal of Exposure Science & Environmental Epidemiology*.

A growing body of evidence suggests that in utero and early-life exposure to [arsenic](#) may have detrimental effects on children, even at the low to moderate levels common in the United States and elsewhere. The fetus starts to develop toenails during the first trimester, making them an accurate measure of exposure to arsenic during the entire gestation. Prior studies that used infant toenails as a biomarker of in utero exposure were conducted in highly exposed populations.

But in a sample of 170 mother–infant pairs from New Hampshire, the researchers determined infant exposure to relatively low arsenic in utero by evaluating infant toenails as a biomarker using plasma mass spectrometry.

The results show that a doubling of maternal postpartum toenail arsenic concentration was associated with a 54 percent increase in infant toenail arsenic concentration as compared with 20 percent for a doubling of maternal urine arsenic concentration. Also, a doubling of maternal toenail and urine arsenic concentrations was associated with a 68 percent increase in infant toenail arsenic concentration. A similar correlation between infant and maternal postpartum toenail concentrations was

observed in a group of 130 mother–infant pairs from Rhode Island.

"In utero [exposure](#) to arsenic occurs through maternal drinking water and dietary sources, and infant toenails appear to be a reliable biomarker for estimating [arsenic exposure](#) during the critical window of gestation," says senior author Professor Margaret Karagas.

Provided by Dartmouth College

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