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Baby teeth measure link between heavy metal, hyperactivity in UC Irvine study

Tooth Biomarker Could Help Identify Role of Toxic Manganese in Neurological Disorders

Irvine, Calif., June 25, 2001

Baby teeth may hold the key to a better understanding of the link between toxic exposure to manganese and other heavy metals and certain neurological disorders such as attention deficit hyperactive disorder (ADHD), UC Irvine researchers have found.

In a pilot study published in this month's *Environmental Research*, a team of UCI scientists led by Jonathon Ericson, professor of environmental analysis and design in UCI's [School of Social Ecology](#), examined teeth shed by three 6-year-old boys to determine levels of manganese exposure over time. Much like growth rings in a tree, the enamel provides a continuous record of exposure during the prenatal and newborn period.

"Our findings, while preliminary, demonstrate for the first time that manganese can be measured in tooth enamel," Ericson said. "With a biological indicator, or biomarker, to determine the history of manganese exposure, we can identify critical windows of exposure and, eventually, a cause-and-effect relationship between manganese and neurological problems such as ADHD."

Ericson's colleagues in the study are social ecology graduate researchers Amber Rinderknecht and Elisabeth Gonzalez; Dr. Francis Crinella, professor of pediatrics in the UCI [College of Medicine](#); and Michael Kleinman, adjunct professor in UCI's Department of Community and Environmental Medicine.

"Infants and fetuses are at particular risk from exposure to manganese," Crinella said. "Manganese is an essential human nutrient in appropriate amounts, but toxic at higher levels."

Because they have not yet developed the ability to metabolize it as adults do, infants exposed to manganese accumulate it in blood, bone and soft tissue, including the brain. Since the 1970s, in studies led by Dr. Louis Gottschalk, UCI professor emeritus of psychiatry and human behavior, at UCI and elsewhere, high concentrations of manganese have been associated with neurological disorders such as hyperactivity in children and Parkinson's disease in adults, as well as lowered threshold for aggression and violence and compromised respiratory and reproductive processes.

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