Tracking the source of high Pb levels in children's blood

FRANCO MARCANTONIO[1], FELIPE BECKER[1], CONNOR WICHTERICH[1], SAUGATA DATTA[2], LESLIE CIZMAS[3], JAMES SURBER[4], KEVIN KENNEDY[5], ERIC BOWLES[5]

[1]Department of Geology and Geophysics, Texas A&M University, College Station, TX (marcantonio@tamu.edu)
[2]Department of Geological Sciences, University of Texas San Antonio, San Antonio, TX
[3]School of Public Health, Environmental and Occupational Health, Texas A&M University, College Station, TX
[4]Department of Geology, Kansas State University, Manhattan, KS
[5]Section of Toxicology and Environmental Health, Children's Mercy Kansas City, KS

Children are the most susceptible demographic that are affected by lead (Pb) poisoning. The aim of this project is to use Pb isotope ratios for apportioning the sources of Pb in the blood of children (ages 1-6) screened for high blood lead levels (>5 μg/dL) in the state of Kansas. We compare the Pb isotope ratios measured in the child's blood with those of the most likely sources of Pb in the child's home environment. Blood and home environment samples have been analyzed for total Pb concentration, and $^{206}Pb/^{204}Pb$, $^{207}Pb/^{204}Pb$, and $^{208}Pb/^{204}Pb$ ratios using multi-collector ICPMS. The environmental samples consist of drinking water, soils, paints, occupational sources (e.g., oil rig workers' uniforms, mechanics' clothes), indoor air filters, dust, and spices. By comparing the Pb isotope ratios of the home environment samples with those ratios in the blood samples, we attempt to discern the source of Pb most responsible for the high blood Pb level in these children. Each household, thus far, contains environmental samples with a large range in heterogeneous Pb isotope compositions. It is not always possible to directly link the blood Pb to the environmental sources collected. However, when a link could be made, it was found that the Pb isotope ratios of the child's blood was most similar to the ratios of both soil outside and dust inside the home.