Competitive Influence of Phosphorus and Calcium on Pb In-vitro Bioavailability. (S11-scheckel101231-Poster)

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Abstract:

The bioavailability of a metal is heavily related to the speciation of the particular metal. Further, the complexity of examining metal bioavailability is compounded by the presence of competitive ions. Thus, equally contaminated soils with varying concentrations of competitive elements such as Ca or P may possess differing metal bioavailability values. In this study, we employed the simplified in-vitro extraction procedure to examine the relative bioavailability of Pb as influenced by the absence and presence of P or Ca from sand and soil substrate matrixes at varying Pb concentrations, Pb minerals, and solution pH. Calcium effectively competes with bioaccessible Pb to reduce Pb absorption into the body and may slow release of Pb from solid phases. Phosphorus can potentially complex available Pb in a precipitate form as pyromorphite, which is quite insoluble and biologically inert. The results of this work exemplify the complexity of relating total soil Pb to bioavailable Pb, particularly in natural systems with abundant competitive ions. There is much work to be done to successfully correlate in-vitro extraction methods to in-vivo animal surrogate studies that may ultimately lead to a better understanding of human bioavailability constraints.

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Presentation Information:

Presentation Date: Monday, November 11, 2002
Presentation Time: 1:30-3:30 pm
Poster Board Number: 1413

Keywords:
Simplified In-vitro Procedure, Bioavailability, Lead (Pb), Competition