

Effectiveness of NaFeEDTA and FeSO₄ on Inhibiting Lead Absorption

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Synopsis:

Chronic lead intoxication of populations is almost always a process due to ingestion of lead from contaminated water and very diverse foods. Lead can also be absorbed from air and from exposure of skin to the metal. Contamination of soils and their products are difficult to control, especially where they are close to mining operations, recycling batteries and where irrigation is done with contaminated waters. Old paint has lead and lead soldered pipes are also common in old houses. Lead also comes from different manufactured products. In brief, it is very difficult to decontaminate the environment from lead so that its ingestion is drastically diminished from many populated areas. Consequently, one way of alleviating this problem is to reduce its absorption. Lead absorption is enhanced in iron deficiency and correcting this deficiency reduces lead absorption. Iron deficiency is common in infants and toddlers as well as in women of reproductive age, pregnant or not. High lead maternal levels can cause "lead intoxication" in the fetus and in breast fed infants. Lead is particularly damaging to brain development in early ages, even though there is evidence that it affects cognition at all ages and possibly accelerates mental degeneration in the elderly.

Hypotheses: 1- The oral administration of NaFeEDTA favors the reduction of body lead burden in populations exposed to elevated lead intakes through: a) decreased absorption of lead as a consequence of improved iron status in the presence of iron deficiency, as will also be the case for FeSO₄, and b) chelation of lead in the intestinal lumen independent of iron status because this compound liberates the iron and most of the EDTA remains in the intestinal lumen and can chelate the lead making it unabsorbable

Hypotheses: 2- Due to the absorption of EDTA, that is estimated at about 5% of that orally administered, increased urinary excretion of body lead will occur.

Experimental design: 60 adult men and postmenopausal women will be recruited for this double-blind, randomized 45 day clinical trial. All subjects will enter either a group receiving FeSO₄ or NaFeEDTA or placebo, each group consisting of 20 subjects. Lead absorption in each person in each group will be measured by enrichment of natural abundant ²⁰⁴Pb, a stable lead isotope, under two conditions: mixed with iron in water in a fasting state and mixed with food. Later, subjects will be asked to take the iron salts or the placebo (blindly) as food fortificants for 4 weeks and then lead burden will be determined as well as lead urinary excretion (expected to increase with the intake of NaFeEDTA).