

Effects of a chelating agent DTPA on excretion of heavy metal ions in healthy volunteers.

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Decorporation therapy is the only effective method for reducing the radiation-dose to persons accidentally and internally contaminated with radionuclides. The diethylenetriamine pentaacetic acid (DTPA) is thought to be a chelating agent most effective for mobilizing transportable forms of transuranium ions such as plutonium (Pu) and americium (Am). Two forms of DTPA are recommended for therapeutic use; trisodium-calcium and -zinc salts DTPA (referred as CaDTPA and ZnDTPA, respectively). The aim of this study was to evaluate the safety of DTPA and also to study the effects on chelation of metals in healthy volunteers. One gram of CaDTPA in 100 ml of physiological saline was intravenously administered to thirteen volunteers for five successive days and 1g of ZnDTPA was given to eleven volunteers. No side effects were observed or reported by the volunteer. A time-dependent decrease in the level of serum alkaline phosphatase (ALP) was observed in the CaDTPA group, which was parallel to the decreased concentration of serum zinc resulted from the effective chelation. This decreased level of the enzyme returned to normal after the protocol was completed. Both treatment regimens increased the excretion of cadmium, manganese, and lead; CaDTPA was more effective. CaDTPA also chelated mercury and magnesium but ZnDTPA failed. These results suggest that intravenous administration of DTPA is safe. We conclude that CaDTPA is more effective in removing the heavy metals than ZnDTPA. DTPA may be useful for acute heavy metal poisoning as well as internal contamination with radionuclides. Further studies for inhalation of CaDTPA in a nebulizer and combination regimen of Ca and ZnDTPA are now in progress.