NEPHROGENIC SYSTEMIC FIBROSIS AND OMNISCAN: PART 2.

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Gadolinium (Gd) based intravenous magnetic resonance imaging (MRI) contrast agents have recently been associated with a multisystemic fibrosing disorder. Transmetallation between the Gd of the contrast agent and the endogenously available copper (Cu) or zinc (Zn) cations is believed to play a role. This presentation examines the interaction of gadodiamide, the active ingredient in the contrast agent called Omniscan® (GE Healthcare), with copper (Cu) or zinc (Zn) cations. Nuclear magnetic resonance (NMR) relaxometry and UV-Vis absorption studies of mixtures of Omniscan and various metal ions were used to arrive at the following conclusions. Of the ions Zn^{+2}, Ca^{+2}, Mn^{+2}, Co^{+2}, Ni^{+2}, and Gd^{+3}, Cu^{+2} is unique in that two ions interact with one gadodiamide complex. An equilibrium between $2Cu^{+2}$ and gadodiamide is reached after ~30 min at 20°C. The 2:1 ratio is independent of the copper's counter ion, solution temperature, excess Gd^{+3}, and gadodiamide concentration. From these results, as well as λ_{max} values in the UV-Vis spectrum, we conclude that two Cu^{+2} are complexing with the diamide ligand at the two secondary amines on the diamide ligand and the Gd remains complexed to the other eight sites on the ligand.