Improving the brain delivery of gold nanoparticles by conjugation with an amphipathic peptide

Guerrero, Simon

Araya, Eyleen

Fiedler, Jenny L.

Arias, J. Ignacio

Adura, Carolina

Albericio, Fernando

Giralt, Ernest

Arias, Jose Luis

Fernndez, M. Soledad

Kogan, Marcelo J.

Background & Aims: Gold nanoparticles (GNPs) have promising applications for drug delivery as well as for the diagnosis and treatment of several pathologies, such as those related to the CNS. However, GNPs are retained in a number of organs, such as the liver and spleen. Owing to their negative charge and/or processes of opsonization, GNPs are retained by the reticuloendothelial system, thereby decreasing their delivery to the brain. It is therefore crucial to modify the nanoparticle surface in order to increase its lipophilicity and reduce its negative charge, thus achieving enhanced delivery to the brain. Results: In this article, we have shown that conjugation of 12 nm GNPs with the amphipathic peptide CLPFFD increases the in vivo penetration of these particles to the rat brain. The C(GNP)-LPFFD conjugates showed a smaller negative charge and a greater hydrophobic character than citrate-capped GNPs of the same size. We administered intraperitoneal injections of citrate GNPs and C(GN