In vitro and in vivo evaluation of superparamagnetic iron oxide nanoparticles coated by bisphosphonates: the effects of electrical charge and molecule length.

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Résumé en anglais	Physicochemical coating properties are often considered to be determining factors for *in vivo* characteristics of superparamagnetic iron oxide nanoparticles, used as contrast agent in Magnetic Resonance Imaging (MRI). To investigate the electrical charge (modified by zero, one or two ammonium groups) and the molecule length (3, 5 or 7 methylene chains) effects of bisphosphonate-type coatings, we assessed the complement activation, *in vivo* plasma and tissue relaxation time alterations of intravenously injected small iron oxide nanoparticles (<25 nm) on male healthy Wistar rats. The presence of ammonium groups induces a weak activation of the complement whatever the size and the concentration of particles, whereas hydroxyethylenebisphosphonate (HEBP)-coated particles are poor complement activators only at the lowest concentration. *In vivo*, HEBP-coated nanoparticles have the greatest prolonged relaxation time effects, despite their higher negative electrical charge, contrary to two ammonium bearing coatings. No significant differences were observed between mono-ammonium molecular coatings.
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