



Synthesis, Characterization and MRI Application of Cobalt-Zinc Ferrite Nanoparticles Coated with DMSA: An In-vivo Study

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Abstract

The aim of this study was to synthesize and characterize the dimercaptosuccinic acid (DMSA) cobalt–zinc (Co–Zn) ferrite magnetic nanoparticles (NPs) and their efficiency as a contrast agent in in vivo MR imaging of rat liver. Co–Zn ferrite NPs were synthesized by the thermal decomposition method and stabilized by DMSA. The NPs were characterized by different analyses to study their physical and magnetic properties and were injected into 6 adult male rats. Liver MRI was performed to measure the signal intensity at different times. The average nanoparticle size was estimated at about 8 ± 1 nm using transmission electron microscopy (TEM). The r_2 and r_2^* relaxivity of these particles were obtained at 32.85 and 168.96 mmol $L^{-1} s^{-1}$, respectively, using an agarose phantom imaged by MRI. In the in vivo condition, injection of SNPs (2.5 mg Fe/kg) showed negative contrast in a way that for T_2 and T_2^* weighted the maximum contrast enhancement was 58.46 and 77.13%, respectively. Regarding our results, the synthesized Co–Zn ferrite NPs stabilized by DMSA are appropriate agents for increasing the contrast in both T_2 and T_2^* weighted based on MR imaging in rat liver.

1 Introduction

Magnetic resonance imaging (MRI) has been a powerful technology as a diagnostic method for in vivo assessment of diseases with high resolution [1]. Enhancing the tissue contrast of the images obtained from this technique by adding extrinsic agents has become the necessary process for lots of patients. Magnetic NPs are widely used as

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