ease and provides new options for characterizing tissue and studying perfusion.

Development of Superparamagnetic Particles Dispersions Basic Materials of Markers for Molecular Imaging

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Superparamagnetic systems are likely to play a major role in the context of molecular imaging. Their quality control is however difficult. Nuclear Magnetic Relaxation Dispersion (NMRD) profiles of suspensions of superparamagnetic particles provide physical information about the magnetic nanocrystals, namely their average radius r, their specific magnetization M_s, their anisotropy energy Ea and the extent of their clustering.

Relaxometric results can be combined with those obtained by magnetometry, which gives crystal radius and specific magnetization, and by PCS which reports on the particle hydrodynamic size.

Colloidal nanomagnets coated with dextran were synthesized by a reaction carried out in a mini mixing chamber. Reaction parameters like temperature and flow rates were carefully controlled.

NMRD profiles confirmed the reproducibility of the syntheses. The effects of the reaction parameters like iron concentration, $[Fe^{2+}]/[Fe^{3+}]$ ratio, dextran concentration and dextran molecular weight were investigated.

Several features of the reaction were observed:

i) the amount of particles containing more than one crystal per particle increases when the concentration of dextran decreases, and,
ii) the crystal radius increases with the $[Fe^{2+}]/[Fe^{3+}]$ ratio. The evolution of size and magnetization determined by relaxometry agrees with the one observed by magnetometry.

We have also evaluated the effects of the binding of molecular vectors (peptides, proteins or small molecules like biotine or folate), on the magnetic and relaxometric properties of the grafted superparamagnetic moeities.

Proton relaxometry has proved to be a rapid and comprehensive method allowing for the control of the quality of magnetic colloids.

Ferucarbotran-enhanced perfusion MR imaging of the liver in patients with hypervascular hepatocellular carcinomas

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PURPOSE:

The purpose of this study is to determine the utility of ferucarbotran-enhanced perfusion MRI of the liver in the diagnosis of hepatocellular carcinoma (HCC).

METHODS:

Twenty-four hypervascular HCCs, detected by CT during hepatic arteriography or intravenous dynamic CT, in 18 patients (14 males and 4 females, mean age: 68 years) were enrolled in this study. T2*-weighted perfusion MRI was obtained contrast-enhanced single shot gradient recalled echo plannar sequences MR imaging (EPI). MRI unit used was a 1.5T system (Magnetom Sonata, Siemens, Erlangen, Germany), and a four-element phased-array RF coil was used for signal reception. Bolus track perfusion weighted imaging was performed with 19 slices, TE = 20 msec, time resolution 1.1 seconds, SL = 5mm, matrix = 256 * 256, FOV = 35cm, parallel acquisition technique (PAT) = mSENSE, PAT factor = 2. Imaging was started 5 sec after administration of 0.8 μmol/kg of ferucarbotran at an injection rate of 5 ml/sec, and 30 images were obtained every 1.1 sec for 33 sec. Results: Two lesions were not identified with ferucarbotran-enhanced perfusion study by the image distortion. Twenty-two of 24 (92%) tumors were decreased in signal intensity in the arterial perfusion phase. In the portal venous phase, 13 of 22 lesions (59%) were high intensity, 5 (23%) were iso intensity, and 4 (18%) were low intensity. On ferucarbotran enhanced T2WI 10 minutes after the bolus injection, 19 of 22 (86%) were high intensity and remaining three (14%) were low intensity. In 19 nodules showing high intensity on ferucarbotran enhanced T2WI 10 minutes after the