SS 06 CV-09 11:00 English

Magnetic resonance angiography with extremely small-sized iron oxide nanoparticles (ESION) at 3T MRI: animal research

Yeo Goon Kim, Whal Lee, Young Ho So, Eun-Ah Park, Jin Wook Chung, Jae Hyung Park
Seoul National University Hospital, Korea.
selenenuevo@gmail.com

PURPOSE: We developed extremely small-sized iron oxide nanoparticle (ESION) of 4 nm size. ESION shows both T1 and T2 contrast effect. The purpose of this animal study was to show the feasibility of MR angiography using ESION by comparison to gadolinium based contrast agent (Gd-DOTA).
MATERIALS AND METHODS: Six New Zealand white rabbits with average weight of 3 kg were used in this study. MR angiography with Gd-DOTA and MR angiography with ESION were performed with 1 week interval in 6 rabbits. All MR angiography were performed in 3T MRI with identical MR parameters. Contrast materials were injected via ear vein with rate of 0.5 ml/sec. The amount of contrast material was 15.7 mgGd/kg (0.1 mmol/kg) of Gd-DOTA or 5.2 mgFe/kg (0.1 mmol/kg) of ESION. Images were acquired immediately after contrast media injection with bolus tracking initiation and 1, 5, 10 minutes delay. The signal intensity was measured at the left ventricle cavity and the aortic arch. The R1, R2 values of each contrast material were calculated from T1, T2 map images of contrast media phantoms at 1.5 T and 3T.
RESULTS: On MR angiography with ESION, the signal intensity at first-pass phase was comparable to Gd-DOTA. As time passed, Gd-DOTA washed out faster than ESION. With Gd-DOTA, the mean signal intensity was 198, 73, 54, 50 in the left ventricle cavity and 180, 73, 66, 62 in the aortic arch at first pass, 1, 5, 10 minutes, respectively. With ESION, the mean signal intensity was 212, 147, 137, 136 in left ventricle cavity and 161, 123, 117, 110 at first pass, 1, 5, 10 minutes, respectively. The R2/R1 ratio of Gad-DOTA phantom and ESION phantom was 1.12, 1.85 at 1.5T and 1.18, 3.17 at 3T.
CONCLUSION: ESION showed comparable signal intensity to Gd-DOTA in first-pass MR angiography on 3T. ESION showed characteristics of intravascular agent, maintaining intravascular contrast at 10 minutes delayed phase.