中国医学影像技术
CHINESE JOURNAL OF MEDICAL IMAGING TECHNOLOGY

龚明福,杨华,张松,邹利光,张冬,舒通胜.PEG-thiol修饰对金磁微粒胶体稳定性和抗吞噬能力的影响[J].中国医学影像技术,2013,29(7):1053~1057

PEG-thiol修饰对金磁微粒胶体稳定性和抗吞噬能力的影响

Impact of PEG-thiol modification on the colloidal stability and anti-phagocytic capacity of GoldMag nanoparticles

投稿时间： 2012-10-06 最后修改时间： 2013-05-20

DOI:

中文关键词: 金磁微粒 巯基聚乙二醇 悬浮稳定性 抗吞噬能力 磁共振成像

英文关键词:GoldMag PEG-thiol Suspension stability Anti-phagocytic capacity Magnetic resonance imaging

基金项目:国家自然科学基金面上项目(81071197);国家"十二五"科技支撑计划课题项目子课题(2012BAI23B08-4)。

作者	单位	E-mail
龚明福	第三军医大学新桥医院放射科, 重庆 400037	
杨华	第三军医大学新桥医院放射科, 重庆 400037	
张松	第三军医大学新桥医院放射科, 重庆 400037	
邹利光	第三军医大学新桥医院放射科, 重庆 400037	zoulg@tmmu.edu.cn
张冬	第三军医大学新桥医院放射科, 重庆 400037	
舒通胜	第三军医大学新桥医院放射科, 重庆 400037	

中文摘要:

目的 探讨PEG-thiol修饰对GoldMag的磁学性能、体外悬浮稳定性和抗吞噬能力的影响。方法 用PEG-thiol对GoldMag进行表面修饰,采用MR FSE序列T2W、GRE序列T2*W和T2 mapping分别检测PEG-GoldMag和GoldMag的磁学性能;以Zeta电位仪检测两种纳米粒溶液的Zeta电位,紫外-可见光分光光度计检测两种纳米粒溶液不同时间点的吸光度,评估其悬浮稳定性。分别用两种纳米粒对小鼠单核巨噬细胞RAW 264.7进行体外标记,以普鲁士蓝染色检测两种纳米粒的细胞标记率,ICP-OES检测两种不同纳米粒标记的RAW 264.7细胞的细胞内铁含量,评估PEG修饰对GoldMag纳米粒体外抗吞噬能力的影响。结果 GoldMag和PEG-GoldMag溶液的Zeta电位分别为-18.3 mV和-39.5 mV。室温下静置100 min后,GoldMag和PEG-GoldMag溶液的相对吸光度分别为50%和88.5%;静置200 min后两种溶液的相对吸光度分别为17%~18%和80%。两种纳米粒均能标记RAW 264.7细胞,GoldMag和PEG-GoldMag对RAW 264.7细胞的标记率分别为(85.3±2.1)%和(23.6±1.3)%。 GoldMag和PEG-GoldMag标记的RAW 264.7细胞的铁含量分别为(21.6±2.3)pg/细胞和(8.7±1.2)pg/细胞。在T2WI、T2*WI和T2 mapping三种图像上,各浓度下PEG-GoldMag和GoldMag纳米粒凝胶的信号强度和T2值差异无统计学意义(P>0.05)。结论 PEG-thiol修饰能显著改善GoldMag的悬浮稳定性和抗吞噬清除能力,且对其磁学性能无明显影响。

英文摘要:

Objective To investigate the impact of PEG-thiol modification on the magnetic property, colloidal stability and anti-phagocytic capacity of GoldMag nanoparticles in vitro. **Methods** GoldMag nanoparticles were modified using PEG-thiol, and the magnetic property of PEG-GoldMag and GodlMag were tested with FSE sequence T2WI, GRE sequence T2*WI and T2 mapping. Zeta potential of the two nanoparticle solutions were tested with Zeta potential instrument, while the absorbance was tested with UV-visible spectrophotometer at different time points. Mouse monocyte-macrophage RAW 264.7 was labeled with GoldMag and PEG-GoldMag and stained with Prussian blue buffer in order to calculate the labeling rate. Intracellular iron content of the RAW 264.7 labeled with two different nanoparticles was measured with ICP-OES to assess the influence of PEG-thiol modification on anti-phagocytic capacity of GoldMag. **Results** The Zeta potential of GoldMag and PEG-GoldMag solution was -18.3 mV and -39.5 mV, respectively. After standing at room temperature for 100 min, the relative absorbance of GoldMag and PEG-GoldMag solution was 50% and 88.5%, respectively. When standing for 200 min, the relative absorbance of the two nanoparticle solutions dropped to 17%-18% and 80%, respectively. Prussian blue staining showed that both the two kinds of nanoparticles could label RAW 264.7 cells, and the label rate of GoldMag and PEG-GoldMag was (85.3±2.1)% and (23.6±1.3)%, respectively. The intracellular iron content of RAW 264.7 cells labeled with GoldMag and PEG-GoldMag was (21.6±2.3)pg/cell and (8.7±1.2)pg/cell, respectively. On T2WI, GRE T2*WI and T2 mapping, the differences of signal intensity and T2 relaxation time between PEG-GoldMag and GoldMag nanoparticle solutions at various concentrations were not statistically significant (all P>0.05). **Conclusion** PEG-thiol modification can significantly improve the suspension stability and anti-phagocytic clearance capacity of GoldMag nanoparticles in vitro without obvious alteration of magnetic properties.

查看全文 查看/发表评论 下载PDF阅读器