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

赖丽莎,陈俊伟,朱康顺,吴春,江新青,柏沙美,单鸿.携带人肝细胞生长因子的腺病毒转染人骨髓间充质干细胞及超顺磁性氧化铁标记细胞体外MR成像[J].中国医学影像技术,2013,29(8):1248~1252

携带人肝细胞生长因子的腺病毒转染人骨髓间充质干细胞及超顺磁性氧化铁标记细胞体外MR成像

Transfection of adenovirus carrying human hepatocyte growth factor in human mesenchymal stromal cells and MRI of cells labeled by superparamagnetic iron oxide in vitro

投稿时间： 2013-03-26 最后修改时间： 2013-05-08

DOI：

中文关键词：间充质干细胞 基因转染 肝细胞生长因子 超顺磁性氧化铁 磁共振成像

英文关键词：Mesenchymal stromal cells Transfection Hepatocyte growth factor Superparamagnetic iron oxide Magnetic resonance imaging

基金项目：国家自然科学基金(30770628、81070349);广东省自然科学基金面上项目(8151008901000066);广州市医药卫生科技项目(20131A011022)。

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中文摘要：

目的 评价携带人源化绿色荧光蛋白(hrGFP)-人肝细胞生长因子(hHGF)的腺病毒载体对人永生化骨髓间充质干细胞UE7T-13生物学特征的影响,并探讨对超顺磁性氧化铁(SPIO)标记细胞进行体外MR成像的可行性。 方法 构建和包装携带hrGFP-hHGF基因的腺病毒载体;以hrGFP-hHGF腺病毒转染UE7T-13细胞,检测细胞中hrGFP表达阳性率、hHGF mRNA及细胞上清液中hHGF水平;检测hrGFP-hHGF腺病毒对H_2O_2诱导细胞凋亡的影响。以SPIO标记UE7T-13细胞,检测标记后细胞内铁含量、细胞增殖及分化能力;对不同铁浓度SPIO标记的细胞行MRI。结果 成功构建hrGFP-hHGF腺病毒载体,将其转染UE7T-13细胞48 h后hrGFP阳性表达率达93.17%,hHGF mRNA表达提高3075.63倍,细胞上清液中hHGF水平显著升高,随后下降,于第14天仍高于hrGFP腺病毒转染细胞。hrGFP-hHGF腺病毒可抑制H_2O_2介导的细胞凋亡。SPIO标记后细胞铁染色阳性率达100%,细胞铁含量明显高于未标记细胞;SPIO标记不影响细胞增殖及分化能力;T2WI信号随标记铁浓度增高而降低。 结论 hrGFP-hHGF腺病毒载体可抑制H_2O_2介导的细胞凋亡;SPIO能高效标记细胞,不影响细胞增殖及分化能力,可用于细胞体外MR成像。

英文摘要：

Objective To evaluate the effect of adenovirus carrying human hepatocyte growth factor (hHGF) on human mesenchymal stem cells (hMSCs) UE7T-13, and to assess the feasibility of MRI of cells labeled by superparamagnetic iron oxide (SPIO) in vitro. **Methods** The adenovirus carrying hrGFP-hHGF gene were constructed and packed, and then were transfected into UE7T-13 cells. The positive expression rate of hrGFP and mRNA level of hHGF in the cells, the protein level of hHGF in the culture supernatants were measured after transfection. The effect of hrGFP-hHGF adenovirus on cell apoptosis induced by H_2O_2 was assessed. SPIO was used to label the cells. After labeling, Prussian blue phenanthroline spectrophotometric analysis method was performed to evaluate the iron concentration within the cells and the proliferation and differantiation of UE7T-13 was measured. MRI was performed after SPIO labeling with different concentrations of iron. **Results** hrGFP-hHGF adenovirus was constructed successfully. The positive rate of hrGFP was 93.17% and hHGF mRNA increased by 3075.63 folds in UE7T-13 cells 48 h after transfection of hrGFP-hHGF adenovirus. hHGF protein in the culture supernatants increased significantly 48 h after transfection of hrGFP-hHGF adenovirus and then reduced with time, but still higher than that in the culture supernatants of hrGFP adenovirus transfecting cells. On the 14th day after transfection, hrGFP-hHGF adenovirus inhibited the cell apoptosis induced by H_2O_2 obviously. In SPIO labeling cells, positive rate of iron in the cells achieved 100% and the iron concentration was significantly higher than that in non-labeled cell. SPIO had no impacts on the proliferation and differentiation of cells. In MRI for labeled cells, signal intensity of T2WI decreased with the increase of iron concentration. **Conclusion** hrGFP-hHGF adenovirus can inhibit the apoptosis of UE7T-13 cell induced by H_2O_2. SPIO can effectively label the UE7T-13 cells without impact on the proliferation and differentiation of cells, which can be used in MRI of cells in vitro.

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