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论著

Ferumoxide标记Flk1+CD31-CD34-人骨髓间充质干细胞及其在食蟹猴脑内移植示踪观察

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摘要 摘要：目的 探讨Ferumoxide-PLL标记Flk1+CD31-CD34-人骨髓间充质干细胞（hBMSC）的方法及其在食蟹猴脑实质内移植活体示踪的可行性。方法 采用Ferumoxide-PLL标记hBMSC，台盼蓝染色、普鲁士蓝染色和透射电镜扫描鉴定标记效率及细胞活力。体外磁共振成像（MRI）分别扫描标记和未标记细胞，计算T2*的弛豫时间和弛豫率（R2*）变化。通过立体定向手术将标记的hBMSC移植入食蟹猴右侧基底节区，采用MRI扫描活体示踪细胞。采用免疫组织化学、普鲁士蓝和HE染色对脑组织切片进行干细胞存活、分化及病理学研究。结果 Ferumoxide-PLL标记hBMSC效率为96%,普鲁士蓝染色、电镜可显示标记hBMSC细胞质内铁颗粒。1×106和5×105 两组Ferumoxide-PLL标记细胞的T2*的弛豫时间分别为68.86和79.88ms, 而未标记细胞分别为12.71和15.24 ms。标记细胞的R2*分别为78.68和65.61/s，分别是未标记细胞（14.52和12.52/s）的5.4和5.2倍。移植后3周MRI扫描T2WI仍可发现hBMSC呈明显的低信号。病理及免疫荧光结果显示hBMSCs在移植区大量存活，移植区有大量新生血管，但未见hBMSC向神经细胞分化。结论 Ferumoxide-PLL可高效标记hBMSC，能显著增加其MRI图像对比度。MRI可活体示踪干细胞。移植入食蟹猴脑内的hBMSC可大量存活并促进新生血管形成。

关键词 超顺磁性氧化铁；间充质干细胞；细胞移植；磁共振成像；食蟹猴

分类号

Ferumoxide Labeled Flk1+ CD31- CD34-Human Bone Marrow Mesenchymal Stem Cells and Its in vivo Tracing in the Brains of Macaca Fascicularis

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Abstract ABSTRACT:Objective To explore the method for labeling Flk1+ CD31- CD34- human bone marrow mesenchymal stem cells (hBMSCs) with ferumoxide-PLL and evaluate the feasibility of its tracing after transplantation into the brains of Macaca Fascicularis. Methods The hBMSCs were incubated with ferumoxide-PLL. Trypan blue staining, Prussian blue staining, and transmission electron microscope were performed to show intracellular iron, marking efficiency, and the vigor of the labeled cells. After the hBMSCs were transplanted into the brains of cynomolgus m*onkey*s by stereotaxis, magnetic resonance imaging (MRI) was performed to trace the cells in vivo. Cell survival and differentiation were studied with immunohistochemistry, Prussian blue staining, and HE staining. Results The marking efficiency of the ferumoxide-PLL was 96%. Iron particles were found intracytoplamic of the hBMSCs by Prussian blue staining and transmission electron microscopy. The relaxation rates of labeled cells in MRI were 4.4 and 4.2 times higher than those of the unlabeled cells. Hypointensity area was found by MRI three weeks after transplantation. Many hBMSCs and new vessels were found in the transplantation zone by pathological and immunofluorescence methods. Conclusions Ferumoxide-PLL can effectively label hBMSCs and thus increase its contrast in MRI results. The cells can survive in the brains of cynomolgus m*onkey*s. The labeled hBMSCs can be traced in vivo by MRI.

Key words superparamagnetic iron oxide；mesenchymal stem cell；cell transplantation；magnetic resonance imaging；macaca fascicularis

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