



### 恒磁场对Feridex-GFP 双标记BMSC 在损伤肝脏中定植的影响

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### Effect of Feridex-GFP double-labeled BMSC transplant on the damaged liver under the condition of constant magnetic field

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#### 摘要

目的: 评价体外恒磁场作用下, 双标记干细胞经外周静脉、门静脉、肝动脉移植在损伤肝脏中的定植率及治疗急性肝损伤的有效性。方法: 分离骨髓间充质干细胞(bone marrow mesenchymal stem cells, BMSCs), 经培养传代纯化、体外诱导, 分化为肝样细胞, 绿色荧光蛋白(green fluorescent protein, GFP)和非立磁(Feridex)体外双标记BMSCs, 不同途径移植双标记BMSCs至肝脏, 于移植后第1, 2, 3, 4周处死大鼠, 测定血清丙氨酸氨基转移酶(ALT)、门冬氨酸氨基转移酶(AST)、白蛋白(ALB)水平, 并取肝组织做苏木精-伊红染色(HE染色)、荧光显微镜下观察肝内GFP阳性率。结果: 双标记BMSCs通过尾静脉、门静脉、肝动脉3种途径及其外加恒磁场作用下, 移植后第4周均能定植于肝脏, 改善肝功能; 在远期疗效不变的前提下, 肝门静脉移植+恒磁场组、肝动脉移植+恒磁场组促进肝功能的早期恢复。结论: BMSCs移植可有效治疗急性肝损伤, 首选经门静脉+恒磁场、肝动脉+恒磁场途径, 次选外周静脉或外周静脉+恒磁场途径。

**关键词:** 骨髓间充质干细胞, 移植, Feridex-GFP双标记, 恒磁场, 定植

#### Abstract:

**Objective:** To evaluate the effect of the bone marrow mesenchymal stem cells (BMSCs) transplant through peripheral vein, portal vein and hepatic artery into liver under the condition of constant magnetic field and to analyze the therapeutic effect on liver function recovery.  
**Methods:** BMSCs were isolated, purified and induced to differentiate into liver-like cells, which were double labeled by Feridex-GFP. The double-labeled BMSCs were transplanted into liver through different ways including peripheral vein, portal vein and hepatic artery with or without constant magnetic field in vitro. The rats were sacrificed at the 1st, 2nd, 3rd and 4th week after the transplant. ALB, ALT, AST were tested. The liver tissue biopsy was collected. GFP-positive cells in liver were observed by fluorescence microscopy.  
**Results:** Double-labeled BMSCs could be transplanted into liver through all ways. GFP expression was found in liver in all groups at the 4th week and the liver functions were improved. Based on the long term efficacy, the liver functions recovered more rapidly in the portal vein + constant magnetic field group and the hepatic artery + constant magnetic field group.  
**Conclusion:** BMSCs transplantation can reduce acute liver damage. The first choice for BMSCs transplantation was via portal vein or hepatic artery under the condition of constant magnetic field. The second choice was via peripheral vein alone or under the condition of constant magnetic field.

**Key words:** bone marrow mesenchymal stem cells transplant Feridex-GFP double labeling constant magnetic field colonization

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