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恒磁场对培养的骨髓间充质干细胞成骨分化的影响到:

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Title: Effects of static magnetic field on osteogenesis of bone marrow mesenchymal stem cells

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关键词: [恒磁场](#); [骨髓间充质干细胞](#); [成骨分化](#); [信号通路](#)

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摘要: 目的 观察不同强度的恒磁场作用不同时间对体外培养的大鼠骨髓间充质干细胞(mesenchymal stem cells, MSCs) 向成骨细胞分化的影响及机制。 方法 密度梯度离心法分离大鼠骨髓单核细胞进行体外培养。以3~4代的MSCs为靶细胞, 对其进行诱导分化和施以恒磁场处理。磁场暴露强度分别为0、0.5、1.5、2、3 mT。以IFCC推荐法检测碱性磷酸酶(alkaline phosphatase, ALP) 活性表达; 茜素红染色观察钙结节的数量和大小; 放免法检测骨钙素(osteocalcin, OCN)和I型胶原的分泌; Western blot分析MAPK P38信号分子的磷酸化, 并探讨其特异性阻断剂对恒磁场调控MSCs成骨分化的影响。 结果 ①恒磁场明显促进I型胶原和ALP的活性表达, 增加OCN的分泌及钙结节的形成, 其中1.5~2 mT磁场强度促MSCs成骨分化作用最为明显; ②恒磁场促进磷酸化MAPK P38的表达; ③加入P38信号通路SB253580明显抑制恒磁场的促成骨效应。 结论 磁场促进MSCs成骨分化, 其机制与P38信号分子的激活有关。

Abstract: Objective To evaluate the effects of the static magnetic field (SMF) on bone marrow mesenchymal stem cells (MSCs) osteogenic differentiation and explore the possible mechanism. Methods Density gradient centrifugation-isolated rat bone marrow mononuclear cells were cultured *in vitro*. MSCs of the 3rd and 4th passages were chosen as target cells. After osteogenic induction, the MSCs

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were exposed to SMF at 0, 0.5, 1.5, 2 or 3 mT. The activity of alkaline phosphatase (ALP) was assayed with IFCC. The calcium nodes of MSCs were stained by alizarin red. The concentrations of osteocalcin (OCN) and type I collagen were measured by radioimmunoassay. Western blotting was used to detect the phosphorylation of MAPK P38. Specific P38 inhibitor SB253580 was added into the culture media of MSCs to investigate the role of P38 in this process. Results SMF, especially at 1.5 and 2 mT, increased the activity of ALP, the number of calcium nodes and the concentrations of OCN and type I collagen in MSCs. SMF activated MAPK P38 signaling molecule. Blocking the P38 signal pathway by SB253580 partially reversed the effects of SMF on osteogenic differentiation of MSCs. Conclusion SMF promotes the osteogenic differentiation of MSCs and the P38 MAPK pathway is involved in this process.

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