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论著

小檗碱对大鼠骨髓间质干细胞成脂分化的抑制作用

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摘要 **目的** 探讨小檗碱对大鼠骨髓间质干细胞成脂分化的影响及其机制。**方法** 经分离纯化的大鼠骨髓间质干细胞，分为正常对照组，成脂分化诱导液（AIM）模型组及AIM+小檗碱0.1，0.3，1和3 μmol·L^{-1}组。倒置显微镜下观察细胞的形态特征，油红O染色检测脂肪细胞，以对硝基苯磷酸为底物检测碱性磷酸酶（ALP）活性，MTT法检测细胞存活率，RT-PCR检测过氧化物酶体增殖物激活受体γ（PPARγ），脂肪酸结合蛋白（aP2）和CCAAT增强子结合蛋白α（C/EBPα） mRNA表达。**结果** 与正常对照组比较，AIM模型组细胞形成的脂肪细胞明显增加（*P*<0.01），ALP活性明显降低（*P*<0.01），PPARγ，aP2和C/EBPα mRNA表达明显增高（*P*<0.01）。与AIM组比较，AIM+小檗碱显著抑制骨髓间质干细胞成脂分化，小檗碱0.1，0.3，1和3 μmol·L^{-1}显著升高ALP活性，分别增加26%，54%，81%和122%；小檗碱3 μmol·L^{-1}显著下调PPARγ mRNA（0.91±0.10 *vs* 1.34±0.06），（*P*<0.01），aP2 mRNA（1.05±0.10 *vs* 1.53±0.09）（*P*<0.01）和C/EBPαmRNA表达（1.24±0.06 *vs* 1.54±0.09）（*P*<0.01）。小檗碱对骨髓间质干细胞增殖无显著影响。**结论** 小檗碱能够抑制骨髓间质干细胞成脂分化，该作用可能与其下调PPARγ mRNA，aP2 mRNA和C/EBPα mRNA表达有关。

关键词 间质干细胞 脂细胞 骨质疏松 小檗碱 细胞分化

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Inhibitory effect of berberine on differentiation of rat bone marrow mesenchymal stem cells to adipocytes

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Abstract

OBJECTIVE To investigate the effect of berberine on differentiation of rat bone marrow mesenchymal stem cells (MSCs) to adipocytes and its mechanism. **METHODS** Rat MSCs were isolated and cultured, adipocytic differentiation was induced with adipogenesis- inducing medium (AIM). Cells were assigned into 6 groups: normal control, AIM group, AIM+berberine 0.1, 0.3, 1 and 3 μmol·L^{-1} groups, respectively. Morphology characteristics of mesenchymal stem cells were observed under an inverted microscope and adipocyte levels were analyzed by oil O staining. Alkaline phosphatase (ALP) activity was detected using *p*-nitrophenyl phosphate as a substrate. The cell survival was determined by MTT assay. Expressions of peroxisome proliferator activated receptor γ (PPARγ), fatty acid binding protein (aP2) and CCAAT enhancer-binding protein α (C/EBPα) mRNA were detected by semiquantitative RT- PCR. **RESULTS** Compared with normal control group, MSCs adipogenic differentiation, PPARγ, aP2 and C/EBPα mRNA expression significantly increased in AIM group (*P*<0.01), ALP activity in AIM group significantly decreased (*P*<0.01). Compared with AIM group, berberine inhibited MSCs adipogenic differentiation (*P*<0.01) and berberine 0.1, 0.3, 1 and 3 μmol·L^{-1} increased ALP activity by 26%, 54%, 81% and 122%, respectively. Berberine 3 μmol·L^{-1} significantly downregulated PPARγ expression (0.91±0.10 *vs* 1.34±0.06) (*P*<0.01), aP2 (1.05±0.10 *vs* 1.53±0.09) (*P*<0.01) and C/EBPα mRNA (1.24±0.06 *vs* 1.54±0.09) (*P*<0.01). Berberine had no effect on proliferation of MSCs. **CONCLUSION** Berberine inhibits differentiation of MSCs into adipocytes, which might be closely related to the downregulation of PPARγ, aP2 and C/EBPα mRNA.

Key words mesenchymal stem cell adipocyte osteoporosis berberine cell differentiation

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