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论著

胚胎血管发育早期PDGF-BB对血管平滑肌细胞趋化的影响

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摘要 目的：
建立胚胎血管发育早期血管平滑肌细胞（VSMCs）趋化模型，并观察胚胎血管发育早期血小板源性生长因子-BB（PDGF-BB）对VSMCs趋化的影响。方法：采用转染平滑肌特异性蛋白SM22α启动子控制下表达增强型绿色荧光蛋白（GFP）报告基因载体的胚胎干细胞制备拟胚体，然后接种于under-agarose凝胶作为平滑肌细胞趋化模型。用慢速视频显微摄像技术观察拟胚体分化后表达GFP的VSMCs，分析比较不同浓度PDGF-BB对VSMCs分化和移行的影响。结果：在under-agarose凝胶中，拟胚体在无外源性生长因子存在的条件下可自发向心肌细胞、内皮细胞和VSMCs分化。拟胚体贴壁分化20 d时，对照组及4 种浓度PDGF-BB（5 μg/L、10 μg/L、20 μg/L、50 μg/L）组VSMCs的平均迁移速率分别为（94.07±23.80）μm/h、（118.08±31.63）μm/h、（173.53±24.58）μm/h、（380.74±39.56）μm/h和（335.62±32.16）μm/h，峰值浓度为20 μg/L。经浓度大于10 μg/L PDGF-BB处理后，VSMCs向PDGF-BB孔方向移行，对照组、低浓度PDGF-BB组VSMCs呈不规则性迁移。结论：该模型能够模拟胚胎血管发育早期全过程，可用于研究不同生长因子对VSMCs趋化的影响。外源性PDGF-BB能定向诱导胚胎血管发育早期VSMCs迁移，其定向趋化作用在一定浓度范围内呈量效关系。

关键词 胚胎干细胞； 血管； 平滑肌细胞； 趋化作用； 血小板源性生长因子

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Chemotactic effect of PDGF-BB on vascular smooth muscle cells during early embryonic vascular development

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Abstract

<FONT face=Verdana>AIM:To establish a chemotactic model for vascular smooth muscle cells (VSMCs) during early embryonic vascular development, and to observe the chemotactic effect of platelet derived growth factor-BB (PDGF-BB) on VSMCs during that time.
METHODS:A murine embryonic stem cell line expressing the enhanced green fluorescent protein (GFP) under the transcriptional control of the smooth-muscle-specific SM22α promoter was used to make embryoid bodies, then an embryoid body was plated into under-agarose gel as a chemotactic model for VSMCs. VSMCs expressing GFP after embryoid body differentiation were observed by time-lapse. The effects of various concentrations of PDGF-BB on VSMC differentiation and migration were analyzed and compared.
RESULTS:In the under-agarose gel, embryoid bodies spontaneously differentiated into myocardial cells, endothelial cells and VSMCs in the absence of exogenous growth factors. The mean migration velocities of VSMCs at day 20 after embryoid body attachment in control group and 5 μg/L, 10 μg/L, 20 μg/L, 50 μg/L PDGF-BB groups were (94.07±23.80) μm/h, (118.08±31.63) μm/h, (173.53±24.58) μm/h, (380.74±39.56) μm/h and (335.62±32.16) μm/h, respectively, with 20 μg/L as the peak concentration. VSMCs migrated randomly in control and 5 μg/L PDGF-BB group, but migrated toward PDGF-BB in 10 μg/L to 50 μg/L PDGF-BB groups. CONCLUSION:This model imitates the whole procedure of early embryonic vascular development and can be used to investigate chemotactic influences of different growth factors on VSMCs. Certain concentrations of exogenous PDGF-BB induce the migration of VSMCs in a concentration-dependent manner.</FONT>

Key words Embryonic stem cells Blood vessels Smooth muscle cells Chemotaxis Platelet-derived growth factor

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