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function at the early stage after combined radiation-burn injury. **Methods:** Adult male Wistar rats were randomized into four groups: 1) Normal control group (NCG); 2) Combined radiation-burn injury group (CRBIG); 3) Prevention group (PG); 4) treatment group (TG). The effects of exogenous calcium of various concentration on myocardial mitochondrial respiratory function were determined at the 1st, 12th, 24th and 48th hour after the injury in all the groups. **Results:** Exogenous calcium of low concentration (10μmol/L) exerted significant stimulative effects on myocardial mitochondrial respiratory function of the rats in NCG but did not do the same on that in CRBIG, PG and TG. However, exogenous calcium of high concentration (50μmol/L) inhibited the myocardial mitochondrial respiratory function of rats in CG, PG and TG and completely uncoupled the oxidative phosphorylation of myocardial mitochondria in CRBIG, which could be markedly released with 187.5μmol/L Verapamil. **Conclusion:** The reduced myocardial mitochondrial tolerance in the rats inflicted with combined radiation-burn injury can be enhanced by the prophylactic or therapeutic administration of verapamil.

Key words mitochondrion; heart; combined radiation-burn injury; calcium; mitochondrial respiratory function; rat

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放烧复合伤对小鼠骨髓基质细胞动力学及其粘附功能

博士生论文摘要

The effects of combined radiation-burn injury on the dynamics and adhesion capacity of bone marrow stromal cells in mice

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关于放烧复合伤致造血功能障碍的研究,以往主要侧重于造血实质细胞损伤的观察,而对造血实质细胞赖以生存的造血微环境在放烧复合伤致造血功能障碍中的作用及其机理的研究很少。为此,本课题从以下3方面进行研究。第一部分:通过检测5 Gy放射损伤、15% Ⅲ度体表面积烧伤和放烧复合伤小鼠在伤后不同时间和不同培养时间的骨髓基质细胞集落形成能力、光镜和电镜下的形态学、细胞周期和骨髓基质细胞内DNA含量等指标的变化,探讨放烧复合伤后骨髓基质细胞从量变到质变的特点和规律;第二部分:分别应用斑点杂交和原位杂交技术检测伤后骨髓基质细胞VCAM-1 mRNA的表达并结合流式细胞仪测定各损伤组骨髓基质细胞VCAM-1 Fn Lm和Col Ⅳ的表达情况,探讨放烧复合伤造血微环境损伤的分子基础;第三部分:检测骨髓基质细胞贴壁层对骨髓有核细胞的粘附率;分别或联合应用VCAM-1 Fn Lm和Col Ⅳ等单抗,观察其对骨髓有核细胞粘附的阻断作用和对骨髓基质细胞支持粒单系造血祖细胞(CFU-GM)形成能力的影响,探讨放烧复合伤造血微环境的造血调控机理。主要实验结果:① 放烧复合伤对骨髓基质细胞损伤具有以伤后3 d~7 d最重的时效特征和放射损伤>放烧复合伤>烧伤的特点;② 放烧复合伤对造血微环境的损伤具有持续较久和恢复缓慢的特点;③ 放烧复合伤导致骨髓基质细胞的形态学发生了病理性改变。④ 放烧复合伤后,反映基质细胞增殖状态的G_2+M期细胞比例和骨髓基质细胞DNA含量发生改变,表明放烧复合伤导致骨髓基质细胞的损伤是具有其物质基础的;⑤ 骨髓基质细胞层对正常骨髓有核细胞粘附能力和支持粒单系造血祖细胞生长的粘附实验和粘附阻断的实验结果表明,放烧复合伤后骨髓基质细胞的粘附结构发生了量和质的改变,提示放烧复合伤对骨髓基质细胞粘附功能的损伤可能是放烧复合伤造血功能障碍发生的重要机理之一;骨髓基质细胞表达的VCAM-1和纤维连接蛋白对造血干、祖细胞的粘附具有重要作用,进一步深化了放烧复合伤骨髓基质细胞在复合伤造血调控障碍中的作用及其机理的认识。

关键词 辐射损伤;灼伤;放烧复合伤;骨髓;造血微环境;基质细胞;细胞粘附分子;造血调控;小鼠

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