[1]史孟婧,王健,但国蓉,等.缺氧对PC12细胞中miR-210的表达及对细胞线粒体功能的影响[J].第三军医大学学报,2014,36(10):979-982.

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缺氧对PC12细胞中miR-210的表达及对细胞线粒体

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Title: Effect of hypoxia on miR-210 expression and mitochondrial function in PC12 cells

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关键词: miR-210; 线粒体; 缺氧; PC12细胞; 基因表达

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摘要: 目的 研究缺氧环境下miR-210在PC12细胞中的表达、调控细胞应对缺氧的相关机制以及缺氧对线粒体功能的影响。 方法 PC12细胞在1% O_2、94% N_2、5% CO_2条件下进行缺氧培养，采用CCK-8检测缺氧暴露后细胞生存率的变化；用qRT-PCR方法检测PC12细胞中miR-210的表达水平；用Western blot检测线粒体相关蛋白ISCU1/2和COX10的表达情况；采用流式细胞仪测定缺氧暴露后PC12细胞线粒体膜电位的变化；利用高效液相色谱法（HPLC）测定细胞中ATP、ADP 和AMP的含量。 结果 缺氧暴露降低了PC12细胞存活率，缺氧24 h组和48 h组细胞存活率仅为（63.2±0.1）% 和（48.7±0.4）%,显著低于正常对照组(P<0.05)。利用罗丹明123和高效液相色谱法的检测结果表现出缺氧组较对照组线粒体膜电位下降，线粒体内ATP含量显著降低，而ADP、AMP含量显著升高。用qRT-PCR方法检测出在缺氧暴露后PC12细胞中miR-210的表达显著升高。Western blot结果提示ISCU1/2和COX10作为miR-210的靶基因，其表达显著降低(P<0.05)，与缺氧暴露存在着时间-效应关系。 结论 缺氧导致PC12细胞线粒体功能障碍，缺氧诱导的miR-210高表达对其靶基因线粒体相关蛋白ISCU1/2和COX10的调控可能是重要途径之一。

Abstract: Objective To determine the expression of miR-210 in PC12 cells exposed to hypoxia and the regulatory mechanisms of hypoxia on mitochondria function. Methods PC12 cells were cultured in hypoxic condition (94%

N_2, 5% CO_2, and 1% O_2) at 37 ℃. CCK-8 assay was carried out to analyze cell vitality. The expression of miR-210 was tested by qRT-PCR. Western blotting was used to detect the expression of mitochondrial proteins, iron-sulfur cluster assembly proteins (ISCU1/2) and cytochrome oxidase (COX10). Rhodamine 123-indicated mitochondrial membrane potential (MMP) was detected with flow cytometry. The concentrations of ATP, ADP and AMP in PC12 cells were measured by high performance liquid chromatography (HPLC). Results After hypoxia exposure for 24 h and 48 h, the viability of PC12 cells was decreased to (63.2±0.1)% and (48.7±0.4)% of normally cultured cells (P<0.05), respectively. The expression of miR-210 was up-regulated at 12, 24 and 48 h after hypoxia exposure. A sharp and transient increase of MMP at 12 h was followed by significant attenuation at 24 and 48 h. Cellular contents of ADP and AMP were increased while ATP level was declined. Western blot results showed the expression of ISCU1/2 and COX10, target genes of miR-210, was dramatically reduced after hypoxia challenge in an obvious time-effect relationship. Conclusion Hypoxia induces mitochondrial dysfunction in PC12 cells. The impact of hypoxia-upregulated miR-210 expression on its target genes, ISCU1/2 and COX10, may be one of the possible key pathways.

参考文献/REFERENCES:

史孟婧, 王健, 但国蓉, 等. 缺氧对PC12细胞中miR-210的表达及对细胞线粒体功能的影响[J].第三军医大学学报,2014,36(10):979-982.

相似文献/REFERENCES:

[1]李梦侠,王东,向德兵,等.电离辐射诱导骨肉瘤细胞DNA损伤修复蛋白APE1线粒体定位研究[J].第三军医大学学报,2007,29(15):1458.
LI Meng-xia,WANG Dong,XIANG De-bing,et al.Mitochondrial translocation of DNA damage and repair protein APE1 in human osteosarcoma cell after ionizing radiation[J].J Third Mil Med Univ,2007,29(10):1458.
[2]高文祥,黄缄,高钰琪,等.低氧调节大鼠骨骼肌线粒体呼吸链复合体非协同性表达[J].第三军医大学学报,2008,30(03):223.
GAO Wen-xiang,HUANG Jian,GAO Yu-qi,et al.Hypoxia induced non-concordant expression of gastrocnemius mitochondrial electron transport chain complexes in Wistar rats[J].J Third Mil Med Univ,2008,30(10):223.
[3]米娜,杨陟华,潘秀颉,等.卷烟烟气对细胞线粒体氧化损伤的研究[J].第三军医大学学报,2008,30(03):257.
MI Na,YANG Zhi-hua,PAN Xiu-jie,et al.Oxidative damage of cellular mitochondria by cigarette smoke[J].J Third Mil Med Univ,2008,30(10):257.
[4]黄河,肖颖彬,杨天德,等.二氮嗪预处理对大鼠缺血性损伤心肌线粒体功能的保护作用[J].第三军医大学学报,2008,30(09):807.
HUANG He,XIAO Ying-bin,YANG Tian-de,et al.Preconditioning with mitochondrial ATP-sensitive potassium channel opener, diazoxide, protects the myocardial mitochondial functions after ischemic injury in rats[J].J Third Mil Med Univ,2008,30(10):807.
[5]杨涌涛,陈康宁,贺伟峰,等.正常与脑缺血大鼠脑皮质线粒体的比较蛋白质组学研究[J].第三军医大学学报,2008,30(10):964.
YANG Yong-tao,CHEN Kang-ning,HE Wei-feng,et al.Comparative proteomic analysis on cerebral cortex mitochondria between ischemic and normal cerebral contex in rats[J].J Third Mil Med Univ,2008,30(10):964.
[6]何秀娟,许蜀闽,张涛,等.缺氧时肺动脉平滑肌细胞膜电位、细胞质及线粒体Ca2+的动态变化[J].第三军医大学学报,2007,29(15):1477.
HE Xiu-juan,XU Shu-min,ZHANG Tao,et al.Dynamic changes of membrane potentials, cytoplasmic and mitochondrial Ca2+ in cultured pulmonary artery smooth muscle cells exposed to hypoxia[J].J Third Mil Med Univ,2007,29(10):1477.
[7]潘峰,孙玮,路菊,等.高效液相色谱法检测大鼠脑线粒体的腺苷酸[J].第三军医大学学报,2006,28(24):2481.
[8]王通,曾耀英,何贤辉,等.阻断p38途径对地塞米松诱导的胸腺细胞凋亡的影响[J].第三军医大学学报,2006,28(16):1667.
[9]陈平,梁立平,杨杰.线粒体氧化应激及其在神经退行性疾病神经细胞凋亡中的作用[J].第三军医大学学报,2006,28(16):1726.
[10]邝勇,黄跃生.微管损伤与缺氧心肌细胞线粒体损害的关系研究[J].第三军医大学学报,2006,28(15):1547.

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