[1]王源,杨举,张广斌,等.电磁辐射急性暴露对小鼠IL-12表达的影响及其机制[J].第三军医大学学报,2012,34(24):2459-2464.

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电磁辐射急性暴露对小鼠IL-12表达的影响及其机制

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Title: Electromagnetic radiation enhances IL-12 expression *in vivo* and *in vitro*

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摘要: 目的 观察电磁辐射对昆明种小鼠白细胞介素-12（IL-12）表达的影响并探讨其机制。 方法 使用平均功率密度为90 mW/cm^2 900 MHz电磁辐射对昆明种小鼠及原代培养的小鼠腹腔巨噬细胞（Mφ）进行急性辐照。辐照后，ELISA检测IL-12表达量、RT-PCR检测IL-12p40亚基mRNA表达水平、Western blot 检测Mφ细胞质IκB水平以及EMSA检测Mφ NF-κB转录活性的变化，观察吡咯烷二硫代氨基甲酸盐(pyrrolidinedithiocarbamate, PDTC)对电磁辐射影响IL-12表达的干预作用。 结果 急性辐照后第5天，小鼠脾脏组织IL-12p40 mRNA表达水平以及小鼠血清中IL-12p70含量达到峰值，增幅分别为9.32%、259.76%，与正常组相比差异有显著性（P<0.05），辐照后第11天恢复至正常水平。辐照后8 h，小鼠腹腔巨噬细胞（Mφ）细胞质中IκB-α含量降到最低，降幅为27.97%；辐照后12 h，小鼠腹腔巨噬细胞IL-12p40 mRNA表达水平及培养上清中IL-12p70含量达到峰值，与正常对照组相比有显著性差异（P<0.01）。急性辐照后，各时相点均出现明显的NF-κB-探针结合带，辐照后8 h最为显著，正常对照组则检测不出明显的结合带。PDTC能够抑制电磁辐射急性暴露导致的IL-12高表达，抑制率为（83.43±7.58）%。 结论 900 MHz电磁辐射急性暴露通过增加NF-κB活性，导致IL-12表达量增高。

Abstract: Objective To determine the expression of interleukin-12 (IL-12) in the cultured peritoneal macrophages (Mφ) and in mice after electromagnetic radiation. Methods Kunming mice and primarily cultured Mφ were radiated in 900 MHz electromagnetic field with an average power density of 90

mW/cm^2 for 20 and 10 min respectively. RT-PCR was used to detect the expression of IL-12p40 in the spleen and cultured Mφ at mRNA level. ELISA was employed to measure the levels of IL-12p70 in the serum and the M φ supernatant. Western blotting and EMSA was used to test IκB-α expression and transcriptional activity of NF-κB respectively in the cultured Mφ. The intervention effect of pyrrolidinedithiocarbamate (PDTC), a NF-κB specific inhibitor, on the change of IL-12 expression after electromagnetic radiation was also observed. Results In 5 d after radiation, the expression level of IL-12p40 mRNA and the content of IL-12p70 in the serum reached a peak with a increase of 9.32% and 259.76% respectively, significantly higher than those in normal control (P<0.05). The content of IL-12p70 and the expression of IL-12p40 mRNA in mice returned to normal level in 11 d after irradiation. The content of IκB-α in cultured Mφ was reduced to a minimum in 8 h after radiation with a drop of 27.97%, significant lower than that of normal group (P<0.01). In 12 h after acute radiation, the expression of IL-12p40 mRNA in cultured Mφ and the content of IL-12p70 in culture medium was increased reached a peak, significantly higher than those in the normal control group (P<0.01). After acute radiation, the NF-κ B-probe binding activity was increased, and reached to the strongest in 8 h after radiation. PDTC resulted in a decrease in enhanced IL-12 expression induced by electromagnetic radiation, with an inhibitory rate of (83.43±7.58)%. Conclusion Acute exposure to 900 MHz electromagnetic radiation increases the expression of IL-12 by up-regulating NF-κB activity.

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备注/Memo: -