

研究论文

不同波段电磁辐射致大鼠睾丸支持细胞的损伤效应

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摘要:

为探讨不同波段电磁辐射对大鼠睾丸支持细胞(Sertoli细胞)损伤效应的异同, 将原代培养的Sertoli细胞经场强 $6 \times 10^4$  V/m的电磁脉冲(electromagnetic pulse, EMP)、平均功率密度为100 mW/cm<sup>2</sup>的S-波段高功率微波(S-band high power microwave, S-HPM)和X-波段高功率微波(X-band high power microwave, X-HPM)辐射。流式细胞仪结果显示3种波段电磁辐射后, Sertoli细胞的晚期凋亡和坏死率增加; MTT试验显示细胞代谢活性降低; 光镜观察发现胞浆的颗粒增多且空泡变性; 超微结构主要为线粒体肿胀、空化, 内质网扩张。三者比较: 总体呈EMP>X-HPM>S-HPM的趋势, 且辐射后1 h较重, 随时间延长损伤逐渐减轻。表明3种波段的电磁辐射均可致Sertoli细胞不同程度的损伤, 且超宽谱波段的EMP效果最明显, 微波波段则与频率呈正相关。

关键词: 电磁辐射 Sertoli细胞 效应

The Damaging Effects of Different Bands Electromagnetic Radiation on The Rat Sertoli Cells

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Abstract:

To investigate comparatively the damaging effects of EMP (electromagnetic pulse), S-HPM (S-band high power microwave) and X-HPM (X-band high power microwave) on rat Sertoli cells. Primary Sertoli cells were isolated from 3-wk-old Wistar rats, and exposed to EMP, S-HPM and X-HPM respectively. After radiation by the three bands electromagnetic radiation respectively, the number of late apoptotic and necrotic Sertoli cells was increased significantly in three groups examined by flow cytometry; The general metabolic activity of Sertoli cells in EMP group were decrease significantly after irradiation analyzed by MTT test; The total number of impaired Sertoli cells were increased significantly observed by light microscope. Granular degeneration and vacuolar degeneration were seen in the cytoplasm. Ultrastructural changes: mitochondria swelling and vacuolating, endoplasmic reticular various degree dilating (particularly in S-ER) and ribosome-scaling in R-ER and so on. Three bands of electromagnetic radiation could induce different injury effects in rat Sertoli cells. The degree of injury effects varied according to different microwaves. The rank as follows: EMP>X-HPM>S-HPM.

Keywords: Electromagnetic radiation Sertoli cells Effect

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