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X线照射泡球蚴原头节的体外实验研究

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X-ray Irradiation against *Echinococcus multilocularis* Protoscoleces *in vitro*

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摘要 目的 探讨X线对体外培养的泡球蚴原头节的杀伤作用。 方法 无菌采集子午沙鼠体内的泡球蚴中含原头节的囊液，将其加入RPMI 1640培养液中培养。原头节体外培养3 d后分装至培养瓶中，每组10瓶，每瓶约含10 000个原头节， 设空白对照组、 低剂量组（15 Gy和30 Gy）、 中剂量组（45 Gy和60 Gy）、 高剂量组（75 Gy和90 Gy）、 阿苯达唑组（2 500 ng/ml）、 45 Gy X线+2 500 ng/ml阿苯达唑组和75 Gy X线+2 500 ng/ml阿苯达唑组。X线照射剂量率为200 cGy/min，源皮距为100 cm。体外培养第4天开始照射，每组共照射3次，每次间隔1 d。首次照射后第1天开始每天取原头节培养液，0.1%伊红染色，光镜下计数每100个原头节中着色原头节数目，每组计算300个原头节的平均死亡率，直至实验组原头节全部死亡为止。同时光镜下观察经X线照射后原头节的变化。 结果 不同放射剂量组的原头节死亡率与空白对照组间的差异均有统计学意义（$P<0.05$）。阿苯达唑组原头节死亡率与放射线联合阿苯达唑组间的差异均有统计学意义（$P<0.05$）， 且显著高于空白对照组（$P<0.05$）。其中，X线联合阿苯达唑组与单用X线组原头节死亡率间的差异有统计学意义（$P<0.05$）。X线照射前原头节饱满、轮廓清晰、结构完整，X线照射后的原头节多呈外翻型，原头节顶突上的小钩排列紊乱，部分脱落，吸盘突起变形，结构塌陷，死亡。 结论 X线可在体外杀伤泡球蚴原头节。

关键词： 多房棘球蚴 原头节 X线 阿苯达唑 体外实验

Abstract： Objective To explore the effect of X-ray irradiation on *Echinococcus multilocularis* protoscoleces *in vitro*. Methods *Echinococcus multilocularis* protoscoleces were collected from cysts of infected *Meriones meridianus* and then cultured in RPMI 1640 medium. Protoscoleces were subpackaged into culture flasks at a density of about 104 per flask after culture for 3 days. Each group has 10 culture flasks. There were seven groups named as blank control group, low dose group （15 Gy and 30 Gy）, medium dose group （45 Gy and 60 Gy）, high dose group（75 Gy and 90 Gy）, albendazole group （2 500 ng/ml）, 45 Gy X-ray+2 500 ng/ml albendazole group, and 75 Gy X-ray +2 500 ng/ml albendazole group. Protoscoleces received three radiations on every other day with a source-skin distance of 100 cm and at a dose rate of 200 cGy/min after 3 days in culture. At each day after irradiation, protoscoleces were counted by light microscope with 0.1% eosin staining, and calculated mortality rate （per 100 protoscoleces） until all the parasites in experimental groups died. At the same time, the morphological changes of protoscoleces were observed. Results There were significant differences in protoscolex mortality between X-ray groups and blank control group（$P<0.05$）, between X-ray+albendazole groups and albendazole group（$P<0.05$）. Protoscolex mortality in albendazole group were higher than that of blank control group（$P<0.05$）. Significant difference were also found in protoscolex mortality between albendazole combined with radiation and radiation only（$P<0.05$）. Before radiation, protoscoleces was normal with complete structure. After radiation, the parasites were mostly valgus type protoscoleces with disordered rostellar hooks and deformed acetabulum， and finally died. Conclusion X-ray can kill *Echinococcus multilocularis* protoscoleces *in vitro*.

Keywords： *Echinococcus multilocularis* Protoscolex X ray Albendazole *In vitro*

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