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论文

砷对大鼠生精细胞DNA损伤及XRCC1表达影响

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摘要:

目的 观察不同剂量三氧化二砷(As_2O_3)对成年大鼠生精细胞DNA损伤及其X射线修复交叉互补基因1(XRCC1)基因表达影响。方法 40只健康雄性SD大鼠随机分为4组,对照组、低、中、高剂量As_2O_3组(0.375、0.75、1.5 mg/kg),灌胃法连续给药16周处死大鼠,应用单细胞凝胶电泳试验检测大鼠生精细胞DNA损伤,免疫组化法检测大鼠生精细胞XRCC1蛋白表达。结果 对照组生精细胞平均尾长(1.04±0.61)μm,中、高剂量As_2O_3组可见部分细胞拖尾,平均尾长分别为(3.11±1.16)、(3.62±2.46)μm,明显长于对照组(P<0.01),细胞尾部DNA含量比及尾矩也明显增加(P<0.01);中、高剂量As_2O_3组XRCC1阳性细胞百分比分别为(11.13±7.06)%和(9.63±6.32)%,均较对照组的(15.49±8.23)%明显降低(P<0.05),XRCC1表达量随着染毒剂量增高而降低;DNA损伤与XRCC1表达呈负相关(r=-0.778,P<0.01)。结论 一定剂量As_2O_3可通过抑制生精细胞XRCC1表达,诱导大鼠生精细胞DNA损伤,产生雄性生殖毒性。

关键词: 三氧化二砷(As_2O_3) 生精细胞 X射线修复交叉互补基因1(XRCC1) DNA损伤

Effects of arsenic on DNA damage and XRCC1 gene expression in rat spermatogenic cells

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Abstract:

Objective To examine the effects of arsenic on DNA damage and its X-ray repair cross complementary protein 1(XRCC1)in the spermatogenic cells of rats.Methods Forty health male Sprague-Dawley(SD)rats were randomly divided into a control group and low,moderate,and high dose group.The rats in the four groups were gavaged with different concentrations of As_2O_3 solution(0,0.375,0.75,and 1.5 mg/kg) everyday,respectively.After 16 weeks of treatment,the rats were sacrificed by cervical dislocation and the testis tissue were sampled.XRCC1 protein expression was analyzed with immunohistochemistry and DNA damage was observed with single cell gel electrophoresis test (SCGE).Results The tail length of the cells averaged 1.04±0.61μm in the control group.The exposure to 0.75 and 1.5 mg/kg As_2O_3 resulted in a significant lengthening of the cell tails(3.11±1.16μm and 3.62±2.46μm,respectively, P<0.01)as well as an increased tail DNA% and tail moment of the cells(P<0.01).There was no significant difference between low dose group(16.08±9.87%)and control group(15.49±8.23%)in XRCC1 protein expression (P>0.05).XRCC1 expression in the moderate and high dose group(11.13±7.06% and 9.63±6.32%)was significantly greater than that in the control group(P<0.05).The XRCC1 protein expression of spermatogenic cells showed a dose-response relationship.The negative correlation between the DNA damage and XRCC1 expression of spermatogenic cells was significant(r=-0.778,P<0.001).Conclusion One of the mechanisms of male reproduction toxicity of As_2O_3 might be the inhibition of XRCC1 expression which induces DNA damage.

Keywords: As_2O_3 spermatogenic cell X-ray repair cross complementary gene 1 DNA damage

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