

论著

溴化乙啶致染色体畸变作用的AFM分析

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摘要 目的: 研究杂环类有机化合物溴化乙啶(EB)的生物致突性,为研究由EB及其它杂环类有机化合物诱导的生物体的癌变机制提供新的视角和数据。方法: 利用原子力显微镜(AFM)的高空间分辨率从可视化的角度在3个层次即DNA、染色体及胚胎干细胞(ESCs)分析了EB对它们形态结构的影响。结果: 经EB作用前后DNA的平均高度降低了0.5 nm,染色体臂由着丝点处断裂,细胞膜表面的分子聚集形成团状及环状结构,与大剂量EB作用后的细胞团已死亡并崩塌成网状形态。结论: EB具有强烈的生物毒性,能明显破坏DNA及染色体的表面结构,且能破坏ESCs的形态结构并导致其死亡。EB可同时从基因水平和细胞水平对细胞或生物体产生损伤及形态结构畸变。

关键词 [溴化乙啶](#) [DNA](#) [染色体畸变](#) [胚胎干细胞](#) [显微镜检查,原子力](#)

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Analysis of chromosome aberration due to ethidium bromide using AFM

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Abstract

AIM: To study chromosome aberration due to ethidium bromide (EB), a heterocyclic organic compound and an organic fluorescence dye commonly used in biochemical experiment, and to help further understanding the molecular mechanism of tumor or cancer induced by EB and other heterocyclic organic compounds. METHODS: The toxicity action of EB was evaluated from three aspects including DNA, chromosome and embryo stem cells (ESCs) using atomic force microscopy (AFM), and thereinto, the morphology structural difference of ESCs treated with two EB doses was also valuated. RESULTS: The morphological structures of DNA, chromosome and ESCs were dramatically damaged. The average height of DNA decreased 0.5 nm; chromosomal arms were ruptured from centromere location; molecules of cellular membrane congregated and loop-like structure formed, and ES cell masses were collapsed and became dead after large EB doses treatment and mesh-like morphological structure was discernable. CONCLUSION: The toxicity action of EB is strong and destroys the surface structure of DNA and chromosome. EB induces structural aberration of ES cellular membrane and cell death. The results indicate that the action of EB is externalized at gene level and cell level, which is important to study the carcinogenicity of EB.

Key words [Ethidium bromide](#) [DNA](#) [Chromosome aberrations](#) [Embryonic stem cells](#) [Microscopy](#) [atomic force](#)

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