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离子注入对微生物细胞的刻蚀与对DNA的损伤及修复 The Etching of Cells and Damage and Repair of DNA in Deinococcus radiodurans by N+Implantation

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摘要 以耐辐射异常球菌为试材，以E. coli 为对照，用显微扫描电镜和3H-TdR标记，研究了离子注入对微生物细胞的刻蚀与对DNA的损伤及其修复。结果表明，注入离子对细胞存在着刻蚀损伤；中性蔗糖梯度密度离心沉降分析证明，大剂量下离子注入可直接导致DNA损伤，并观察到在对应的存活率峰值注入剂量下，D. radiodurans修复损伤DNA的能力比E. coli 强，还证明了细胞经不同时间温育后，损伤的DNA分子得到了部分修复。

Abstract: The direct action of N+implantationin on D. radioduransand E. coliwas investigated by SEM, and their cells were labeled with 3H-TdR, which were implanted by 20keV N+after incubation 18hours, then the DNA of lysed cells was subjected to the neutral sucrose gradient(5%～20%) ultra-centrifugation sedimentation analysis. The results showed that N+implantation exerted direct action on two kinds of microorganisms; the momentum transfer and energy deposition of implantation ions produced the direct etching damage on cells, and repair DNA efficiency of D.radiodurans was higher than that of E. coli. Meanwhile, the damaged DNA incomplete repairing was observed. When incubation was continued up to 6 hours, the rejoined DNA molecules broke again. The repair of damaged DNA could be inhibited by 200μg/ml chloramphenicol. This suggested that DNA damage was serious by ion implantation and damaged DNA repair of cells need continuously synthesizing repair enzyme.

关键词 离子注入 耐辐射异常球菌 SEM观察 3H-TdR标记 DNA损伤与修复 Key words Ion implantation Deinococcus radiodurans SEM Radio-labeling Centrifugation of neutral sucrose gradient DNA damage and repair
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