

交叉学科

X射线诱导的HeLa细胞旁效应中ROS和NO关系研究

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收稿日期 修回日期 网络版发布日期 接受日期

摘要

活性氧(ROS)和一氧化氮(NO)是辐射诱导的旁效应信号通路中的两个重要信号分子。实验研究了这两种信号分子在HeLa细胞旁效应信号通路中的关系。通过微核实验,发现X射线辐照过的HeLa细胞及其旁观者细胞微核形成明显增加,而二甲亚砜(DMSO)预处理显著抑制了微核形成。另外还发现,接受条件培养基的旁观者细胞的增殖速率增加,而DMSO预处理产生条件培养基的受辐照细胞则使旁观者细胞的增殖速率降低。以上的结果从不同角度证实了HeLa细胞存在X射线诱导的旁效应,且其可以被DMSO预处理所抑制。Western blotting和DAF-FM-DA荧光探针检测分别显示出辐照后细胞的诱导型一氧化氮合酶(iNOS)和NO水平均升高,而DMSO预处理则降低其水平。因此,可以推测X射线诱导的HeLa旁效应当中ROS是NO的上游信号。

Accumulating evidence indicates that irradiated cells can release signals which induce a series of biological responses in non-exposed cells. This is known as irradiation-induced bystander effects. Both reactive oxygen species(ROS) and nitric oxide(NO) play important roles in bystander effects. In this study, we determined the relationship of ROS and NO in the signaling pathway of bystander effects. HeLa cells were treated with or without dimethyl sulfoxide(DMSO) before X-ray irradiation, and micronuclei formation as well as cell proliferation rate was detected in both irradiated and bystander cells. In addition, we also detected inducible nitric oxide synthase(iNOS) expression and NO level in irradiated cells using Western blotting and DAF-FM-DA fluorescent probe, respectively. Our results showed that micronuclei were induced in irradiated and bystander cells while DMSO treatment significantly suppressed the formation of micronuclei in both of them. We also found that when cells were irradiated their proliferation rate was suppressed while DMSO treatment eliminated this inhibition effect. In contrast, the cells received conditioned medium from irradiated cells proliferated more quickly than the cells received medium from non irradiated cells while DMSO treatment reduced the difference. Finally, we found that irradiated cells had higher level of iNOS and NO compared to non irradiated controls, whereas DMSO treatment decreased their levels. These results suggest that ROS is the upstream signal of NO in X-ray induced bystander effects in HeLa cells.

关键词 [旁效应](#); [活性氧](#); [一氧化氮](#); [诱导型一氧化氮合酶](#); [X射线](#)

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