

辐射诱发的染色体畸变与细胞活存之间关系的初步研究

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摘要 鉴于细胞繁殖能力的破坏是电离辐射导致活细胞功能变化的重要指标,所以在辐射生物学领域中,人们一直重视细胞活存曲线的研究。细胞失去活存力即“细胞死亡”,而辐射的致死效应则使繁殖能力丧失。微生物由于能够产生相同的细胞集落,所以长期来是进行这一研究的良好对象。随着哺乳类细胞活存计数技术的发展(它比细菌晚约80年),人们也开始以这些细胞进行类似的研究[6]。可是,从细胞遗传学的角度探讨细胞的活存,迄今极少引起人们的注意[1,7]。我们在辐射诱发的人淋巴细胞染色体畸变的研究中,对此作了初步的探讨,如把不含有显著染色体畸变的细胞作为活存部分对剂量作图,那末由此得到的“活存曲线”类似于一般的细胞活存曲线。现将结果报道如下。

关键词

分类号

A PRELIMINARY STUDY. ON THE RELATIONSHIPS BETWEEN RADIATION—INDUCED CHROMOSOMAL ABERRATIONS AND CELL SURVIVAL.

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Abstract

In view of the fact that a cell-survival curve is an important approach evaluating the radiation sensitivity of the cells, we try to study indirectly the relationships between the cell fraction without unstable aberrations and radiation dose by human peripheral blood lymphocyte irradiation in vitro. The preliminary results obtained were as follows:

1. According to basic principles of cytogenetics, it is assumed that the cells without unstable aberrations (dicentrics and centric rings) may be survived through the normal division. Then the curves obtained by plotting log cell-survival fraction (S) against radiation dose, are similar in shape to those conventional cell-survival curves. Obviously it consists of two parts that the “shoulder region” is always preceded by a region of exponential survival.
2. The reason that in the cell-survival curves two regions appeared was taken into account. The “shoulder” to survival curves were attributable to the fact that most of the primary lesions induced by irradiation could be repaired under lower doses. The studies on dose-response kinetics showed that for low LET radiation more increasing the dose used, the contributions of square complement of the doses are more predominant, and it might be reason leads to an exponential region of curves.
3. “Do” its the dose required to reduce surviving fraction f to $f e^{-1}$ for an exponential region. The values for X-rays and y-rays are 1.477 rad and 1706 rad respectively. “llq” is quasi-threshold dose to which the final exponential region extrapolates on the 100% survival axis. The values are 157 rad and 179 rad respectively. All this seems that comparing with Ir-rays only less dose of X-rays are enough to reduce survival fraction of proliferative cells.

Key words

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扩展功能

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