THE EFFECT OF INTRACELLULAR REDOX CONDITION ON RADIOSENSITIZATION BY OXYGEN IN THE X-IRRADIATED *ESCHERICHIA COLI* B/r

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It is well known that oxygen enhances the sensitivity of cellular response to X-irradiation. It seems correct to assume that the enhancement of radiosensitivity by oxygen correlates with the redox state in cells. In the present study, the effects of the redox state on radiosensitization by oxygen in X-irradiated *E. coli* B/r were examined. Low reducing state of the cells (i. e., highly oxidizing state) was achieved by adding diamide to the cell suspension at a final concentration of 1mM. Highly reducing state of the cells (i. e., low oxidizing state) was obtained by adding sulphydryl compound (cysteamine) to the cell suspension at a final concentration of 50mM. From the relationship between the surviving fractions of the cells obtained in the presence or absence of oxygen and X-ray irradiation doses, it was observed that the degree of the enhancement by oxygen tended to increase with increasing the concentration of intracellular reducing compound. The radical reaction kinetics, which involved the competitive reaction between oxygen and intracellular oxidizing compounds with radiation-induced DNA damage, was adopted to explain why the enhancement of radiosensitization by oxygen depended on the intracellular concentration of the oxidizing (or reducing) compounds. The kinetic data showed that the amount of oxygen which could react with DNA damage was relatively low under the low reducing condition, while it increased with increasing the concentration of the reducing compounds. It was suggested that the degree of radiosensitization by oxygen was closely related to the relative amount of oxidizing compounds which reacted with DNA damage.