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Kinetics of repair of double-stranded DNA breaks under the influence of photon radiation

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The key damage to the cell that determines its fate is double-strand breaks (DSB) of DNA, the incorrect repair of which leads to chromosomal aberrations that can be fatal for the cell [1]. Therefore, understanding the mechanisms of induction and kinetics of DSBs DNA repair is important for predicting the radiation-induced response to radiation therapy and the survival of cells that have been exposed to ionizing radiation.

This work is devoted to mathematical modeling of the process of DSBs repair after exposure to rare ionizing radiation with different characteristics. Mathematical modeling of several stages of the cellular response to irradiation of Chinese hamster V79 cells with X-ray radiation and human carcinoma cells with gamma radiation, such as induction and repair of DSBs DNA, kinetics of formation of improperly prepared double-stranded DNA breaks and formation of chromosomal aberrations, was carried out [2].

A comparative analysis of model data with experimental data obtained by the method of premature chromosome condensation showed that for X-rays and for gamma rays, the kinetics of DSBs repair is the same in mammalian and human cells and obeys the same law. The number of DSBs and chromosomal aberrations is directly proportional to the radiation dose and the phase of the cell cycle.

1. Goodhead D. T. Initial events in the cellular effects of ionizing radiations: clustered damage in DNA // International journal of radiation biology 65, №1, 1994. P. 7-17.
2. McMahon S. J., Prise K. M. A mechanistic DNA repair and survival model (Medras): applications to intrinsic radiosensitivity, relative biological effectiveness and dose-rate // Frontiers in oncology. –2021. P. 2319.
3. Nasonova, E. Gudowska-Nowak, S. Ritter, G. Kraft E. Analysis of Ar-ion and X-rayinduced chromatin breakage and repair in V79 plateau-phase cells by the premature chromosome condensation technique // International journal of radiation biology 77, №1, 2001. P. 59-70.emphasized text

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