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Blocking of DNA sites of specific recognition by hydrogen peroxide molecules in the process of ion beam therary

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After irradiation of cancer cells in the ion beam therapy method the concentration of hydrogen peroxide in the cell medium grows significantly. But the role of hydrogen peroxide molecules in ion beam therapy has not been determined yet. We assume that interaction of peroxide molecules with DNA atomic groups can block the genetic information of the cancer cell and lead to its neutralization. To understand the possibility of DNA deactivation in the cell, in the present study the formation of complexes of hydrogen peroxide with DNA specific recognition atomic groups is considered. Using atom-atom potential functions method and quantum-chemical approach, based on density functional theory, the spatial configurations and energy minima for the complexes of peroxide and water molecules with nucleic bases are studied. The obtained data allows us to formulate a new, different from the already known, mechanism of the ion irradiation action on living cells, that can be the key factor in the ion beam therapy treatment.

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