

Effects of immunity system cell cycle distributions of mice irradiated at head by 80MeV/u $^{12}\text{C}^{+6}$ ions

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ABSTRACT After whole head irradiation (WHI) of mice with heavy ions, we study the changes of cycle distribution of bone marrow, spleen and peripheral lymphocyte cells, and the aim is to provide basic data for space radiation protection and object-oriented biological hadrontherapy (OOBHT). The heads of the BALB/c mice were irradiated with 0, 0.5, 1, 2, 4 or 10Gy by $^{12}\text{C}^{6+}$ ions (80MeV/u, 1 Gy/min) and then the cell cycle distributions were analyzed by flow cytometry. 36hours after irradiation, the G_1/G_0 phase cells of bone marrow were arrested significantly ($p < 0.05$) with the increase of irradiation dose, while the G_2/M phase cells were reduced markedly ($p < 0.05$). The S phase cells of spleen were reduced significantly ($p < 0.05$) with the increase of irradiation dose; 0.5Gy, 4Gy and 10Gy WHI groups showed evident arrest in G_1/G_0 phase ($p < 0.05$), but 1Gy and 2Gy WHI groups had no significant arrest ($p > 0.05$); the G_2/M phase of 0.5Gy WHI group was reduced markedly ($p < 0.01$), while the others showed obvious arrest ($p < 0.05$) in G_2/M phase. The G_2/M phase cells peripheral lymphocyte showed arrest significantly ($p < 0.05$) under the control. After WHI of mice with heavy ions, bone marrow, spleen and peripheral lymphocyte cell cycle distributions of mice had significant changes. The head is an important organ and this indicates that ionization radiation is also an indirect effect on bone marrow, spleen and peripheral lymphocyte cell cycle distributions. The results imply that the head should be protected chiefly in the space flight.