

Apoptosis and inflammation induced by exposure radiation on the whole blood

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In this study, we were interested in the effects on the immune system and the cytokine network induced by the ionizing radiations (X rays) at the low debit dose (0,005 Gy/s) from low to high doses, by focusing on the apoptosis of mononuclear cells 24 hours after the irradiation. Parallely, the levels of 10 cytokines in the plasma 4 hours after irradiation were monitored by using the Luminex technology. The cell counting by flow cytometry revealed a significant decrease of the living cells and increase of the apoptotic cells in comparison with the controls at high dose of irradiation. The measurement of the apoptosis involving the Bcl-2 shows a significant increase of the apoptotic cells at all doses. The same results were found with the caspase-3 experiments at most of the doses. The results from the double staining by AnnexinV/Propidium Iodide show that necrosis was higher than the apoptosis, like in the case of the radiotherapy for the tumour treatment. Concerning the cytokine experiments, the levels of pro-inflammatory cytokines, IL-2, IL-5, IL-6, IFN-gamma and TNF alpha were higher at high doses than in the controls but not significantly, except for IL-1 beta. In parallel, the levels of the anti-inflammatory cytokine, the levels of IL-10 were higher for the doses of 2, 15 and 20 Gy than the control. These modifications on the cytokine network might not involve the decrease of the cytokine, but rather the selective alterations of the specific cytokine functions. In conclusion, these results suggest that the ionizing radiations increase the apoptosis on the lymphocytes, in high doses in comparison with the control and that there are the selective alterations for some cytokine levels. This work is supported by a Belspo contract (BL/52/C43) and an ESA-Belspo contract (CO-90-2141).