

Assessment of the radioprotective effect of curcumin

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Curcumin is a polyphenol component in the natural spice Curcuma longa. It is well known that curcumin possesses antioxidant, anti-inflammatory, immunostimulating, and anti-carcinogenic activities.



Aim

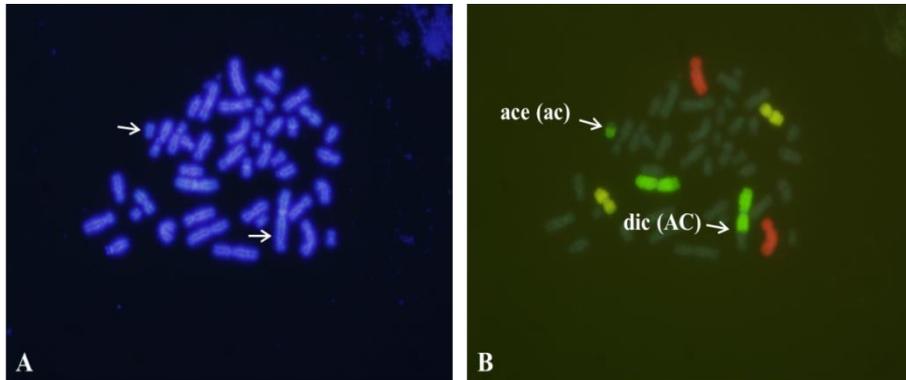
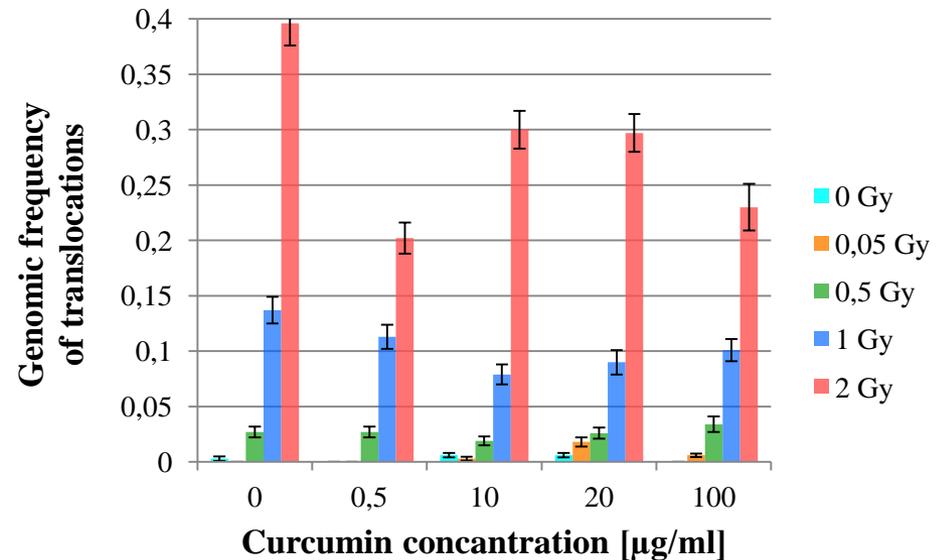
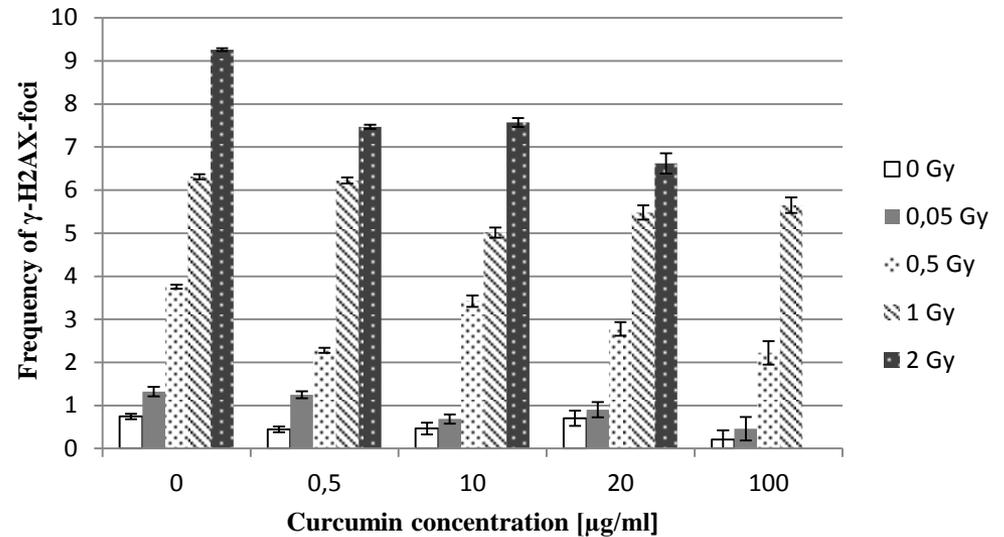
Our aim was to evaluate the clastogenic or radioprotective effect of curcumin in non-cancer cells against radiation-induced chromosome aberrations. On the other hand, we assessed the secretory levels of radiation-induced inflammatory cytokines from lymphocytes pre-treated with curcumin.

Methods

Human peripheral blood samples were pre-treated with different concentrations of curcumin (0.5 µg/ml; 10 µg/ml; 20 µg/ml and 100 µg/ml) and were exposed to ⁶⁰Co γ-rays using various irradiation doses (0.05 Gy; 0.5 Gy; 1 Gy and 2 Gy). Both γ H2AX/53BP1 foci assay and FISH analysis were used to evaluate the frequency of DNA double-strand breaks (DSBs). The extracellular protein levels of inflammatory cytokines Interleukin-6 (IL-6), Interleukin-8 (IL-8), Interleukin-10 (IL-10), Tumor Necrosis Factor α (TNFα), and Monocyte Chemoattractant Protein-1 (MCP-1) were measured using specific ELISA kits.

Results

All curcumin pre-treated samples exhibited significantly lower γ -H2AX/53BP1 foci appearance and reduced translocations frequency in irradiated compared to untreated samples. At 1 Gy irradiation and 10 $\mu\text{g}/\text{ml}$ curcumin, the reduction of total translocations frequency was 42%. At samples treated with 2 Gy irradiation and 0.5 $\mu\text{g}/\text{ml}$ curcumin, translocations frequency declined almost twofold compared to non-treated cells. In samples treated with 10, 20, and 100 $\mu\text{g}/\text{ml}$ curcumin we observed a dose-independent decrease in the secretory levels of proinflammatory cytokine IL-8.



Conclusion

This in vitro study showed that curcumin reduces both γ -H2AX/53BP1 foci and DNA translocations occurrence in peripheral blood lymphocytes, after γ -irradiation. There was no dose-dependent change in the secretory levels of cytokines IL-6, IL-10, MCP-1, and TNF- α 24 hours after irradiation. Interestingly the secretory levels of cytokine IL-8 in curcumin-treated cells decreased independent from dose. Based on this preliminary scientific data, curcumin exhibits a protective effect on normal human lymphocytes from γ -irradiation, but more research is needed to better understand this dependence.

References

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