Quantification of γ-H2AX foci following α-particles and γ-rays in Jurkat cells.

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OBJECTIVES: Phosphorylation of histone H2AX occurs at sites flanking DNA double-strand breaks (DSBs) and can provide a measure of the number of DSBs within a cell. We investigated whether the mean intensity and the mean number of radiation-induced γ-H2AX foci per cell vary as a function of radiation quality and dose. Furthermore we investigated whether the mean intensity and/or the mean number of radiation-induced γ-H2AX foci is correlated with the induction of apoptosis.
MATERIALS AND METHODS: Jurkat cells were irradiated with different doses of either low linear energy transfer (LET) ^{137}Cs γ-rays or high LET ^{241}Am α-particles. The γ-H2AX foci were detected using immunocytochemistry and quantified by measuring the mean signal intensity of γ-H2AX foci per cell using flow cytometry and by counting the number of γ-H2AX foci with a fluorescence microscope. Apoptosis 24h after irradiation was detected via Annexin-V-FITC/ PI-assay.
RESULTS: The mean number of γ-H2AX foci per cell increase with dose for both radiation qualities and are fairly identical at 1 Gy. The mean intensity of γ-H2AX foci after α-irradiation is significantly increased when compared to γ-irradiation at the same radiation dose. α-particles induce more apoptosis than γ-rays at the same dose and at a similar mean number of radiation-induced γ-H2AX foci per cell.
CONCLUSION: The induction of apoptosis in jurkat cells as well as the mean signal intensity, but not the mean number, of γ-H2AX foci per cell depends on the LET.