Flowcytometrical analysis of radiation-induced γ-H2AX foci

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PURPOSE: Phosphorylation of histone H2AX (γ-H2AX) occurs at sites flanking DNA double-strand breaks (DSBs) and can provide a measure of the number of DSBs within a cell (γ-H2AX-assay). We investigated whether the mean intensity and the mean number of radiation-induced γ-H2AX foci vary as a function of radiation quality and dose.
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 (primary antibody Anti-phospho-Histone H2AX(Ser139) mouse IgG, secondary antibody FITC goat anti-mouse IgG) and quantified by counting the number of γ-H2AX foci employing fluorescence microscopy and by measuring the mean signal intensity in single cell nuclei by flow cytometry.
RESULTS: The mean number of γ-H2AX foci is increased in a dose dependent manner for both radiation qualities and are broadly similar at identical absorbed radiation dose for both investigated radiation qualities. The mean γ-H2AX signal intensity of single nuclei is increased after alpha-irradiation when compared to γ-irradiation at the same absorbed radiation dose.
CONCLUSIONS: α-particle induced γ-H2AX foci show higher signal intensities compared to γ-ray-induced γ-H2AX foci. The mean intensity of radiation-induced γ-H2AX foci is dependent on radiation quality in Jurkat cells.