

## **Quantification of $\gamma$ -H2AX foci following $\alpha$ -particles and $\gamma$ -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  $\gamma$ -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  $\gamma$ -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)  $^{137}\text{Cs}$   $\gamma$ -rays or high LET  $^{241}\text{Am}$   $\alpha$ -particles. The  $\gamma$ -H2AX foci were detected using immunocytochemistry and quantified by measuring the mean signal intensity of  $\gamma$ -H2AX foci per cell using flow cytometry and by counting the number of  $\gamma$ -H2AX foci with a fluorescence microscope. Apoptosis 24h after irradiation was detected via Annexin-V-FITC/ PI-assay.

**RESULTS:** The mean number of  $\gamma$ -H2AX foci per cell increase with dose for both radiation qualities and are fairly identical at 1 Gy. The mean intensity of  $\gamma$ -H2AX foci after  $\alpha$ -irradiation is significantly increased when compared to  $\gamma$ -irradiation at the same radiation dose.  $\alpha$ -particles induce more apoptosis than  $\gamma$ -rays at the same dose and at a similar mean number of radiation-induced  $\gamma$ -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  $\gamma$ -H2AX foci per cell depends on the LET.