

## **Quantification of $\gamma$ -H2AX foci following $\gamma$ -rays and $\alpha$ -particles in Jurkat cells.**

Marcus Unverricht<sup>1</sup>, Ulrich Giesen<sup>2</sup>, Ralf Kriehuber<sup>1</sup>

<sup>1</sup> Radiation Biology Unit S-US, Department of Safety and Radiation Protection,  
Forschungszentrum Jülich, D- 52425 Juelich, Germany

<sup>2</sup> Physikalisch-Technische Bundesanstalt, D-38116 Braunschweig, Germany

**PURPOSE:** 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 measured by flow cytometry and the mean number of radiation-induced  $\gamma$ -H2AX foci vary as a function of radiation quality and dose. Furthermore we investigated the relation between the induction of apoptosis and radiation-induced  $\gamma$ -H2AX foci.

**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 intensity by flow cytometry and counting the number of  $\gamma$ -H2AX foci with a fluorescence microscope. Apoptosis 24h after irradiation was detected via Annexin-V-FITC/ PI-assay.

**RESULTS:** For both radiation qualities, the mean number of  $\gamma$ -H2AX foci is increased as a function of dose and was fairly similar at identical absorbed radiation dose. Apoptosis in Jurkat cells is more efficiently induced by  $\alpha$ -particles at similar mean numbers of  $\gamma$ -H2AX foci per cell. The mean  $\gamma$ -H2AX signal intensity of single nuclei is increased after exposure to  $\alpha$ -particles when compared to  $\gamma$ -irradiation at the same absorbed radiation dose.

**CONCLUSIONS:** The mean intensity of radiation-induced  $\gamma$ -H2AX foci is dependent on radiation quality in Jurkat cells.