

## **Quantification of $\gamma$ -H2AX foci after exposure to I-123-iododeoxyuridine in comparison to $\gamma$ - and $\alpha$ -irradiation**

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

<sup>1</sup>*Department of Safety and Radiation Protection, Forschungszentrum Jülich, D-52425 Jülich, Germany*

<sup>2</sup>*Physikalisch-Technische Bundesanstalt (PTB), Bundesallee 100, D-38116 Braunschweig, Germany*

**Introduction:** Phosphorylation of histone H2AX occurs at sites flanking DNA double-strand breaks (DSBs) and can provide an indirect measure for the number of DSBs within a cell. Recent publications suggest LET-dependent differences in the intensity and size of  $\gamma$ -H2AX foci. To determine whether  $\gamma$ -H2AX foci caused by DNA-associated Auger electron emitters (AEE) induce high-LET type  $\gamma$ -H2AX foci we investigated the mean intensity as well as the mean number of  $\gamma$ -H2AX foci after exposure to I-123, high- and low-LET radiation.

**Methods:** Human T-lymphoma Jurkat cells were either exposed to I-123-iododeoxyuridine (I-123-UdR; 2-200 kBq per 10E6 cells) for 20 h or irradiated with different doses of low-LET Cs-137  $\gamma$ -rays respectively high-LET Am-241  $\alpha$ -particles. The  $\gamma$ -H2AX foci were quantified by measuring the mean signal intensity using flow cytometry and by counting the number of  $\gamma$ -H2AX foci microscopically by eye. Co-localization experiments were performed with the DNA-repair associated protein 53BP1 employing confocal microscopy.

**Results:** The mean numbers of  $\gamma$ -H2AX foci per cell showed a much more pronounced increase after exposure to I-123 when compared to  $\gamma$ - and  $\alpha$ -irradiation. However, the mean intensity of  $\gamma$ -H2AX signals per cell nucleus, was very similar after I-123 and  $\alpha$ -particle exposure. The individual  $\gamma$ -H2AX foci induced by I-123 resemble  $\gamma$ -H2AX foci induced by  $\gamma$ -rays and appear to be smaller, more distinct and/or less intense stained than those after  $\alpha$ -irradiation. 53BP1 foci do not always co-localize with  $\gamma$ -H2AX foci.

**Conclusions:** The presumed complexity of the DNA-lesion caused by DNA-associated AEE is not reflected in the size and the intensity of  $\gamma$ -H2AX foci.

*Funded by Bundesministerium für Bildung und Forschung (BMBF), Project No.: 02NUK005A*