Comet Assay analysis of DNA strand breaks in human cells after exposure to the DNA-incorporated Auger Electron Emitter Iodine-125

Marcus Unverricht-Yeboah, Kathrin Holtmann, Ralf Kriehuber

Department of Safety and Radiation Protection, Forschungszentrum Jülich, D-52425 Jülich, Germany

Corresponding author's email: m.unverricht@fz-juelich.de

Ionizing radiation (IR) causes various types of DNA damages e.g. single strand breaks (SSB) and double strand breaks (DSB), whereby the SSB/DSB ratio is shifted towards the DSB with increasing LET. For the DNA-incorporated Auger electron emitter Iodine-125 a SSB/DSB ratio of 5.4:1 is calculated based on computer simulations (Pomplun et al. 1996). In the presented work the SSB/DSB ratio induced by Iodine-125 was experimentally determined and compared to external homogenous γ-irradiation.

SCL-II cells were labeled with I-125-iododeoxyuridine (I-125-UdR) and subsequently frozen for decay accumulation. Accordingly, external γ-irradiation (Cs-137 source) experiments were also performed in frozen cells. After exposure cells were thawed and used for the neutral or alkaline Comet Assay to quantify DSB or DSB & SSB, respectively. To avoid dose calculation for DNA-associated Iodine-125 the γ-H2AX assay was used in order to allow the comparison of the Comet Assay data between both investigated radiation qualities.

Preliminary results show a lower SSB/DSB ratio induced by I-125-UdR when compared to external low-LET γ-radiation comparable to the calculated values of Pomplun et al. (1996). This indicates that DNA-incorporated Iodine-125 induces a high-LET type DNA damage pattern.

Funded by Bundesministerium für Bildung und Forschung (BMBF), Grant 02NUK043A

Reference:

Pomplun, E.; Terrissol, M.; Demonchy, M. (1996): Modelling of Initial Events and Chemical Behaviour of Species Induced in DNA Units by Auger Electrons from 125I, 123I and Carbon. Acta Oncologica 35(7): 857–862