A comparative study on the cyto- and genotoxicity of the Auger electron emitter I-123- and I-125 *in-vitro*

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The Auger effect is not yet fully understood in respect to the deposited energy as well as to the dose rate. Therefore, we studied the Auger electron emitter (AEE) I-123 and I-125 which are characterized by a different half-life (13.2 h vs. 59.4 d) and by different average numbers of Auger electrons emitted per decay (ratio I-123/I-125 ~ 1:2). The biological response in mammalian cells labelled with various activity concentrations of 5-(123)iodine-2'-deoxyuridine (I-123-UdR) and (5-(125)iodine-2'-deoxyuridine (I-125-UdR) was thoroughly investigated to further elucidate the biological effectiveness of these particular electron emitters.

SCL-II cells were synchronized in G1-cell cycle phase, subsequently labelled with I-123- respectively I-125-UdR and the cellular uptake and DNA incorporation of I-UdR was determined. Chromatin damage was quantified by the alkaline Comet assay, apoptosis induction assessed by the Annexin V/PI assay employing flow cytometry and micronucleus formation was quantified using the Cytochalasin-B micronucleus assay at various times post-labelling. Cs-137 γ-rays served as reference radiation.

I-125-UdR caused pronounced apoptosis when compared to !-123-UdR. Micronucleus induction and chromatin damage was very similar for both radionuclides. Both AEE caused a pronounced and long-lasting G2/M cell cycle arrest. On average one decay of I-125 every 120 seconds in the DNA of a single cell is sufficient to induce a permanent G2/M cell cycle arrest in SCL-II cells.

Albeit of a lower dose rate, I-125-UdR is more cytotoxic in comparison with I-123-UdR.

Funded by Bundesministerium für Umwelt, Natur und Reaktorsicherheit (BMU), Bundesamt für Strahlenschutz; Project No.: 3608S03002