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PRELIMINARY IN-VITRO STUDY OF 223Ra IMPACT ON SELECTED TISSUE AND TUMOR CELL LINES

Targeted alpha-particle therapy (TAT) is very rapidly evolving field of radionuclide therapy. Nevertheless, there are some severe issues that need to be addressed to enable TAT to be a leading modality in radionuclide therapy. The nuclear recoil effect that causes the daughter nuclei release from the original radiopharmaceuticals is critical for alpha emitters [1-2]. Moreover, targeting and proper dosimetry is still an issue [3]. Therefore, it is very important to understand the dosimetry both on cellular and subcellular level.

The first step of each dosimetric study is the determination of survival curves. For our preliminary study we used Ra-223 as a model alpha-emitting nuclide. Selected cell lines were V79 (Chinese hamster lung fibroblasts), DU145 (human adenocarcinoma cell line) and U87 (human primary glioblastoma cell line) obtained from American Type Culture Collection (ATCC). All cells were cultured in humidified atmosphere under standard conditions (37 ℃, 5 % CO2). Chines hamster cell line (V79) was cultured in Dulbecco's Modified Eagle's Medium (Sigma-Aldrich, Germany) supplemented with 10% of Fetal Bovine Serum South America Origin (Biosera, France) and 1% of Penicillin-Streptomycin (Biosera, France)). Human adenocarcinoma cell line (DU145) and human glioblastoma cell line (U87) were cultured in Eagle's minimum essential medium (Sigma-Aldrich, Germany) supplemented with 10% of Fetal Bovine Serum of South America Origin (Biosera, France), 1% of Penicillin-Streptomycin (Biosera, France)), 1 % of L-glutamine (Sigma-Aldrich, Germany), 1 % of Non-essential amino acids (Sigma-Aldrich, Germany) and 1 % of pyruvate (Sigma-Aldrich, Germany). All cell lines have been cultivated in the presence of Ra-223 for 24 hours after the monolayer of the cells was created. After the cultivation with Ra-223, the clonogenic survival test was performed and survival curves for all cell lines were constructed.

All obtained survival curves correspond to the linearly quadratic model. Sensitivity of both human carcinoma cell lines (adenocarcinoma and glioblastoma cell line) to Ra-223 treatment is higher than the sensitivity of Chinese hamster cell line. Preliminary results indicates higher radiosensitivity of DU145 and U87 against V79 cells. The achieved results enabled further progress in enhancing the dosimetric knowledge.

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