A POSSIBLE NEW MOLECULE FOR DIAGNOSIS AND FOLLOW UP OF BLADDER CANCER: THE RADIOLABELED POLYMER $^{99m}$Tc-PEI-MP

Tavares-Silva E$^{1,2}$, Ferreira S$^{3,4}$, Abrantes AM$^{1,5}$, Brito A$^1$, Laranjo M$^1$, Metello L$^4$, Zeevart J$^6$, Louw W$^6$, Dormehl I$^7$, Botelho MF$^{1,5}$

$^1$Biophysics Unit, Institute for Biomedical Research on Light and Image, Faculty of Medicine, University of Coimbra, Coimbra, Portugal

$^2$Urology and Transplantation Department, Coimbra Hospital and University Centre, Coimbra, Portugal

$^3$School of Sciences, University of Minho, Braga, Portugal

$^4$Nuclear Medicine Course, High Institute of Allied Health Technologies of Porto’s Polytechnic Institute, Porto, Portugal

$^5$Centre of Investigation on Environment, Genetics and Oncobiology, Faculty of Medicine, University of Coimbra, Coimbra, Portugal

$^6$Radiochemistry Department, NECSA, Pretoria, South Africa

$^7$Department of Internal Medicine, University of Pretoria, South Africa

**Introduction:** The polymer PEI-MP (polyethyleneimine, functionalised with methylphosphonate groups) was initially synthesized for palliative therapy of bone metastases after convenient radiolabelling. However, in biodistribution studies performed with this polymer radiolabelled with different radionuclides, was obvious a higher uptake by the bladder wall, that might demonstrate a certain selectivity to bladder cells, and so, to bladder cancer cells. The aim of this study was to evaluate the efficacy of PEI-MP radiolabeled with $^{99m}$Tc for imaging diagnosis and follow up of bladder cancer.

**Material and Methods:** Because PEI-MP should act as a carrier with high selectivity to bladder cancer cells and not to induce any arm, it was analysed the cytotoxicity in bladder carcinoma cell line (CRL-1472) using the MTT test and flow cytometry. The radiochemical purity of $^{99m}$Tc-PEI-MP was achieved using ascending microchromatography. Then, cellular uptake studies were performed using $^{99m}$Tc-PEI-MP and Na$^{99m}$TcO$_4$ as control. Cell samples were collected during four hours, centrifuged to separate supernatant and pellet. Subsequently, the
radioactivity of each portion was counted to determine percentage of uptake. The in vivo studies were performed using four groups of Balb/c nu/nu mice: two normal groups injected with Na$^{99m}$TcO$_4$ and $^{99m}$Tc-PEI-MP and two with bladder carcinoma xenotransplants injected with the same complexes. Radiopharmaceuticals were administered by an intravenous injection in the tail vein (22-37MBq), with the animal anesthetized and previously placed on a gamma camera detector. Subsequently, were acquired dynamic and static images for 2 and 4 hours, and mice were euthanized and organ samples where weighted and counted in a well-counter to obtain percentage injected activity per gram of organ (%ID/g).

Results: The MTT assay and flow cytometry tests showed that PEI-MP is not cytotoxic. The radiochemical purity of $^{99m}$Tc-PEI-MP was $\geq 85\%$. The uptake studies demonstrated that the uptake was higher for $^{99m}$Tc-PEI-MP in relation to their control. Biodistribution with $^{99m}$Tc-PEI-MP showed that the excretion of this complex occurs primarily through the renal system. The tumour/muscle ratio was superior to 1,2.

Conclusions: $^{99m}$Tc-PEI-MP seems to be optimal for diagnosis and follow up.

Keywords: PEI-MP, Bladder cancer, Noninvasive diagnosis.

It has been decided that it would not be shown the entire version of this document.

To obtain more informations:

www.nucmedonline.net

cursomedicinanuclear@gmail.com