

## Evaluation of the potential of $^{99m}\text{Tc}$ -PEI-MP for diagnosis and follow-up, in a comparative study using in vivo models of bladder cancer and osteosarcoma

S. M. Ferreira<sup>1</sup>, A. M. Abrantes<sup>2</sup>, M. Laranjo<sup>2</sup>, L. F. Metello<sup>3</sup>, I. Dormehl<sup>4</sup>, M. F. Botelho<sup>2</sup>

<sup>1</sup>Biophysics Unit, CIMAGO, FMUC & School of Sciences, UMinho & Nuclear Medicine Dept., ESTSP.IPP, Coimbra & Braga & Porto, PORTUGAL

<sup>2</sup>Biophysics Unit, IBILI & CIMAGO, FMUC, Coimbra, PORTUGAL

<sup>3</sup>Nuclear Medicine Dept., ESTSP.IPP & IsoPor SA, Porto, PORTUGAL

<sup>4</sup>Dept. of Internal Medicine, University of Pretoria, Pretoria, PORTUGAL.

**Introduction:** The aim of this study was to evaluate in vivo the efficacy of  $^{99m}\text{Tc}$ -PEI-MP (polyethyleneiminomethyl phosphonic acid) for diagnosis of bladder cancer and osteosarcoma.

**Material and Methods:** Radiochemical purity of  $^{99m}\text{Tc}$ -PEI-MP was achieved using ascending microchromatography. Studies were performed using six groups of Balb/c nu/nu mice: two normal, two with bladder carcinoma xenotransplants and two with osteosarcoma xenotransplants, all injected with  $\text{Na}^{99m}\text{TcO}_4$  and  $^{99m}\text{Tc}$ -PEI-MP. Dynamic and static images were acquired during 2 and 4 hours after i.v. radiopharmaceuticals administration. Mice were euthanized immediately after the completion of the respective imaging sections and organ samples were weighted and counted in a well-counter to obtain percentage injected activity per gram of organ.

**Results:** The biodistribution results obtained with  $^{99m}\text{Tc}$ -PEI-MP showed that the excretion occurs primarily through the renal system. Tumor/muscle ratio of  $^{99m}\text{Tc}$ -PEI-MP was  $>1$  for both types of cancer (ranging between 1.4-3.0). Tumor/bladder, tumor/liver, tumor/lung and tumor/bone ratios of  $^{99m}\text{Tc}$ -PEI-MP were consistently  $<1$

for both types of cancer, respectively ranging between 0.06-0.42 (bladder), 0.18-0.84 (liver), 0.19-0.65 (lung) and 0.14-0.20 (bone). The biodistribution results obtained with  $\text{Na}^{99\text{m}}\text{TcO}_4$  demonstrated the normal expectable biodistribution.

**Conclusions:** Although biodistribution demonstrated a high uptake by bladder and bone tumors, it was also high for bone, liver and lung. Therefore, for distant metastasis search  $^{99\text{m}}\text{Tc-PEI-MP}$  is not useful. However, considering the high tumor/muscle ratio,  $^{99\text{m}}\text{Tc-PEI-MP}$  could be eventually considered useful for muscular metastasis detection.

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