

***In vitro* evaluation of the new radiotracer  $^{99m}\text{Tc}$ -HYNIC-PSMA for prostate cancer diagnosis**

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**Introduction:** Prostate cancer is the second commonly occurring malignancy in men. The selection of an effective therapy form depends on the proper assessment of the disease progression. The prostate-specific membrane antigen (PSMA) is becoming increasingly recognized as a viable target for imaging and therapy of prostate and other types of cancer.

As it is important to fully characterize the properties of radiolabelled compounds before *in vivo* studies, the aim of this work was to evaluate the *in vitro* biological activity of new developed PSMA inhibitor -  $^{99m}\text{Tc}$ -HYNIC-PSMA-potential tracer for SPECT diagnosis of prostate cancer.

**Method:** Saturation binding assay was performed to determine specificity of binding, dissociation constant (Kd) and maximal concentration of receptors on the cell surface (Bmax). HYNIC-PSMA inhibitor was labelled with  $^{99m}\text{Tc}$ . The binding of  $^{99m}\text{Tc}$ -HYNIC-PSMA was evaluated by carrying out the studies using the cell membranes isolated from LNCaP cells. The non-specific binding was determined using membranes isolated from PC3 cells known not to express PSMA. IC50 values of the tested compounds were determined by competitive binding assay on LNCaP cell membranes using  $^{131}\text{I}$ -MIP1095 radioligand

with known high affinity to PSMA (IC50=0.3). As a reference substance, PSMA11 was used.

**Results:**  $^{99m}\text{Tc}$ -PSMA-T4 showed high specific affinity to PSMA, which represented 99% of total binding. The Kd value determined from the specific binding of the tested radioligand was 5.47 nM and the Bmax was 9533 pmol/mg. The IC50 value of HYNIC-PSMA was assessed at the level of 79.5 and it was 10 times lower than value obtained for PSMA11.

**Conclusion:** High specific binding of  $^{99m}\text{Tc}$ -HYNIC-PSMA to the PSMA suggests its huge potential for prostate cancer diagnosis. Comparison of the affinities of  $^{99m}\text{Tc}$ -HYNIC-PSMA and  $^{68}\text{Ga}$ -PSMA11 points out that despite SPECT technique has a lower spatial resolution than PET,  $^{99m}\text{Tc}$ -HYNIC-PSMA can be a useful alternative in diagnosis and staging of prostate cancer.

**Speaker Biography**

Monika Orzelowska graduated in Biotechnology from the Faculty of Biology and Biotechnology in Maria-Curie Skłodowska University in Lublin, Poland. She obtained a master's degree in 2014. In August 2015, she started work in R&D Department at National Centre for Nuclear Research, Radioisotope Centre POLATOM.

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