

The critical parameters of Ga-68 labelling of POLATOM's PSMA-11 kit.

Tuesday, 29 October 2019 21:30 (15 minutes)

Introduction. Development of the universal radiopharmaceutical kit, which would contain the active ingredient, i.e. PSMA-11 (nazwę chemiczną tutaj), and excipients allowing its efficient radiolabeling with ^{68}Ga eluate regardless the type of $^{68}\text{Ge}/^{68}\text{Ga}$ generator used, remains a challenge. The aim of the study was to determine the critical quality parameters of our earlier y developed kit for ^{68}Ga labelling of PSMA-11 and the investigation of limitations in the radiolabelling conditions.

Methods. The study was performed using sterile and endotoxin free dry kits, which have been developed in our lab, each containing 20 μg of PSMA-11 and 60 mg of sodium acetate. To investigate the labelling conditions (pH, radioactivity, volume) the kits were labelled with ^{68}Ga eluted from the different $^{68}\text{Ge}/^{68}\text{Ga}$ generators (manufactured by ITG, Eckert&Ziegler and IRE) in volumes ranging from 1 to 5 ml and radioactivity from 200 MBq up to 1.2 GBq. The labelling yield and radiochemical purity were checked by HPLC (Kinetex C18 150mm; A: 0.1%TFA/ H_2O , B: 0.1%TFA/CAN, 5-50% B in 10 min) and TLC (ITLC SG; 10% $\text{NH}_4\text{OAc}/\text{MeOH}$ 50/50 v/v). In the second part of study the influence of potential metallic impurities originating in the $^{68}\text{Ge}/^{68}\text{Ga}$ generator eluate or other reagents were tested by spiking the labelling mixture with the Zn(II), Cu(II), Fe(III), Al(III), Ti(IV), Ge(IV) and Sn(IV) ions. The formation of the PSMA-11 metal complexes was confirmed by HPLC-MS. The stability of the kits was studied in lowered temperature (2-8°C), room temperature (25°C) and in transport conditions (at 35°C for two weeks). In the stability study, the main parameters controlled were the radiochemical purity of the labelled PSMA-11 and the radiolabelling yield after using low and high volumes of the eluate.

Results and discussion. It was observed that 20 μg of PSMA-11 in the kit is sufficient to obtain high radiolabelling yield (>99%) even if high radioactivity of ^{68}Ga eluate (> 1GBq) was used. Also, the varying volume of the radiolabeling does not affect the radiochemical yield. The most critical parameter of labelling is the pH, which should be maintained < 5. In the pH range of 4.5-5.0 the labelling yields were >98% or between 95 and 98%, depending on the batch, and the type of $^{68}\text{Ge}/^{68}\text{Ga}$ generator. These differences in the labelling yields could be attributed to the presence of metallic impurities in the eluates. The collected stability data indicated that manufactured kits are very stable during storage at 25°C as well as at elevated temperature (up to 35°C).

Primary authors: Mr MAURIN, Michal (National Centre for Nuclear Research, Radioisotope Centre POLATOM); Mr GARNUSZEK, Piotr (National Centre for Nuclear Research, Radioisotope Centre POLATOM); Mr RADZIK, Marcin (National Centre for Nuclear Research, Radioisotope Centre POLATOM); Dr MIKOŁAJCZAK, Renata (National Centre for Nuclear Research, Radioisotope Centre POLATOM)

Presenter: Mr MAURIN, Michal (National Centre for Nuclear Research, Radioisotope Centre POLATOM)