

# Development the new = radiopharmaceutical <sup>68</sup>Ga-DOTATATE in=20 IPEN-CNEN/SP.

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## Objectives

<sup>68</sup>Ga is a promising positron emission isotope to = radiolabel=20 DOTA-chelated compounds, especially somatostatin = derivatives.=20 The Directory of Radiopharmacy of IPEN-CNEN/SP = received a new=20 automated module for labelling peptides with <sup>68</sup>Ga, and = a=20 <sup>68</sup>Ge/<sup>68</sup>Ga generator to start the studies for the = preparation=20 of labelled peptides with GMP grade for clinical = application.=20 So, the aim of the present work was to develop the=20 somatostatin derivative DOTATATE labelled with <sup>68</sup>Ga = for=20 diagnosis of neuroendocrine tumours.

## Materials and Methods

The labeled peptide was prepared applying an = automated=20 system (Modular Lab-PharmTracer produced by Eckert = &=20 Ziegler-Germany) that elutes gallium-68 from a = <sup>68</sup>Ge/<sup>68</sup>Ga=20 generator (Obninsk-Russian) followed by the = complexation with=20 DOTATATE (piCHEM). For preliminary synthesis = procedures, a=20 solution containing 2.0 mL citrate buffer pH5 and 40 = =B5g of=20 peptide DOTATATE was prepared in a reaction vial. To = the same=20 vial, 3.0 mL of a mixture of acetone, hydrochloric = acid=20 suprapur and water was added, as described by the = equipment=20 manufacturer. The <sup>68</sup>Ge/<sup>68</sup>Ge generator with the inlet = connected=20 to the flask containing a solution of 0.1 mol.l<sup>-1</sup> HCl = was=20 attached to the system. To complete the preparation of = the=20 module a two vials containing a mixture of = ethanol/water (1:1)=20 and saline solution were placed at specific entries in = the=20 cassette. All reagents used were metal free. After = finishing=20 the preparation of the module a pressure test using = nitrogen=20 gas was performed before

starting the automated synthesis. The labelling yield was determined taking into account the activities measured in dose calibrator of filters for the separation of  $^{68}\text{Ga}$  and  $^{68}\text{Ga}$ -DOTATATE purification, waste vial and the final product. The half-life of  $^{68}\text{Ga}$  was determined using the dose calibrator CRC-Canberra model 35 performing measurements every 10 minutes until 68 minutes. Finally, the radiochemical purity of the preparation was determined by both thin layer chromatography (TLC) and high performance liquid chromatography (HPLC).

## Results

The results showed that the average yield was about 85.0% and the average value reported by the manufacturer is 84.86%. Average remaining activities in the cartridge, Sep-Pak and waste vial were 47 MBq, 35.3 MBq and 39.2 MBq, respectively. The half-life determined using dose calibrator was 68 minutes. The mean radiochemical purity of the  $^{68}\text{Ga}$ -DOTATATE preparations, determined by TLC was 98.0 ± 2.0% (n=3D4). The results of HPLC analysis showed the retention time the free  $^{68}\text{Ga}$  and  $^{68}\text{Ga}$ -DOTATATE with 13.76 and 1.61min, respectively and a radiochemical purity of 80%.

## Conclusions

The results showed a successful development of the new radiopharmaceutical,  $^{68}\text{Ga}$ -DOTATATE in Radiopharmacy Directory of IPEN-CNEN/SP. We expect a routine production of this new radiopharmaceutical for the diagnosis of neuroendocrine tumours for nuclear physicists of Brazil at earliest.