

^{68}Ga - DOTATOC FOR THE DIAGNOSIS OF NET - TECHNICAL ISSUES (RADIOLABELING, QUALITY CONTROL, INJECTED DOSES)

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INTRODUCTION

- × Ga^{68} -DOTATOC is a radiopharmaceutical which is used for PET imaging of neuroendocrine tumors (NETs). DOTATOC is a somatostatine analog and through a chelator binds to the radioisotope Ga^{68} . Its introduction into clinical practice has improved the detectability of neuroendocrine tumors (NETs) in relation to the relevant SPECT imaging used.
- × The production of the radiopharmaceutical can proceed after the generator elution $^{68}\text{Ge}/^{68}\text{Ga}$ either by *in house* synthesis through an automated system or by cold kit labeling.

MATERIALS AND METHODS I

The production of ^{68}Ga from a $^{68}\text{Ge} / ^{68}\text{Ga}$ generator and the existence of a lyophilized Kit ensures its continuous availability and offers flexibility in the planning of the examinations, while the isotope can be used for the preparation of other radiopharmaceuticals (e.g. ^{68}Ga -PSMA) . The short half-life of ^{68}Ga , 68 min, leads to a short imaging protocol, reducing patient waiting and imaging time. The labeling procedure is as follows:

- × Detachment of slider vial solution
- × Ethanol swabs – drying
- × Suction with a syringe 1ml of buffer solution
- × Detachment of powder vial cap (I)
- × Ethanol swabs – drying
- × Placement in the vial aseptic needle with ventilation filter 0,2 μm
- × Elution needle connection to the generator output line $^{68}\text{Ge}/^{68}\text{Ga}$
- × Inserting a needle into the powder vial (I) through the rubber stopper
- × Generator elution
- × Disconnect the generator from vial (I)
- × Adding the buffer solution to the vial (I)
- × Ventilation filter removal
- × Placing the reaction vial in the heater at 95° for 7-10 minutes [no shaking / stirring required]
- × After boiling time, placing the vial in suitable shielding and waiting for 10 minutes at RT
- × Radiometry and product labeling
- × Aseptic sampling for QC (quality control)

MATERIALS AND METHODS II

Quality control

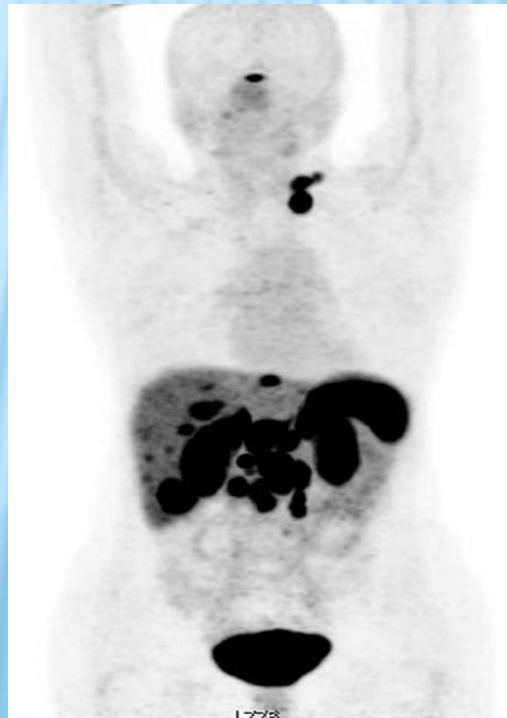
- × Visual inspection (clarity of the body, absence of particles)
- × pH metric control using strips acidic area indicators (3.2 – 3.8)
- × Chromatographic check (TLC). For thin layer chromatography two systems are used :
 1. Solid phase ITLC-SGI001,
mobile phase 77g solution CH₃COONH₄/ MeOH (50:50 v/v)
with Rf complex → 0.8 – 1.0 (front), Rf free Ga → 0.0 – 0.1 (spot), **Pass Rf free ≤ 3 %**
 2. Solid phase ITLC-SGI001,
mobile phase C₆H₅Nα₃O₇*2 H₂O solution 0.1 M (pH 5)
with Rf complex → 0.1 – 0.2 (spot) Rf free Ga → 0.9 – 1.0 (front), **Pass Rf free ≤ 2 %**
- × The chromatograms are grown in protected chambers, then the chromatograms are cut into two parts and measured at the well counter of the Captus 3000, in a measurement window for ⁶⁸Ga. We calculate the labeling percentage and then the formulation is released for administration.
- × No automated system is used for the administered dose and there is a variation according to its weight patient. For patients ≤ 75 Kg 230-250MBq are administered, while for patients ≥ 75 Kg 310-330MBq. After administration residues are measured and they have an average volume of 25 MBq.
- × Within the framework of QA (quality assurance) and the quality control of the Laboratory of our Hospital, an external quality control is performed from the Radiochemical Studies Laboratory, INRaSTES, NCSR “Demokritos”. Also includes high chromatography pressure test (HPLC).

RESULTS

- ✘ In our department 158 markings were made, at a rate of 98%. Quality control includes pH measurement and thin layer chromatography.
- ✘ External control, which certifies the correct procedure, also includes high chromatography pressure and is 99%.
- ✘ At the administered doses, the residues do not interfere with the proper conduct of the test. Failures were observed which were investigated and concern the operation of the heating system in terms of proper temperature, adding the right amount of buffer and delaying generator elution due to elution vial defect.
- ✘ Regarding the examination part, problems were presented due to the burden in the management of patients with delay more than 90 minutes on imaging and at a lower dose in overweight patients.

CONCLUSIONS I

Based on the experience of the Department of Nuclear Medicine, the labeling of SOMAKIT-TOC with ^{68}Ga is well delimited and leads to correct clinical results



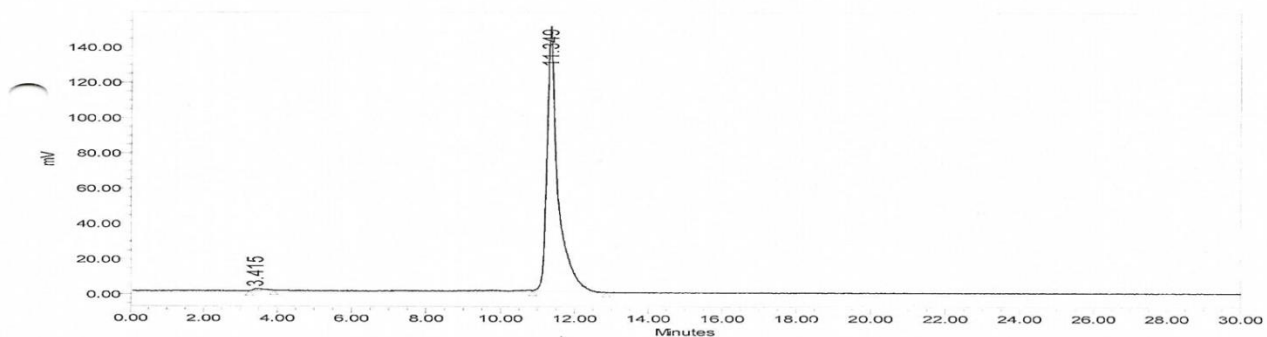
CONCLUSIONS II



Default Individual Report

SAMPLE INFORMATION

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Injection #:	1	Processing Method:	Default
Injection Volume:	10.00 ul	Channel Name:	SATIN
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Date Processed:	11/14/2018 4:24:16 PM EET		



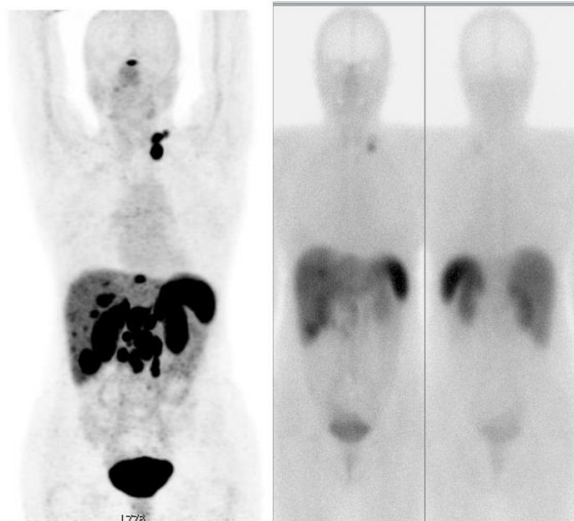
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Page: 1 of 1

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CONCLUSIONS III

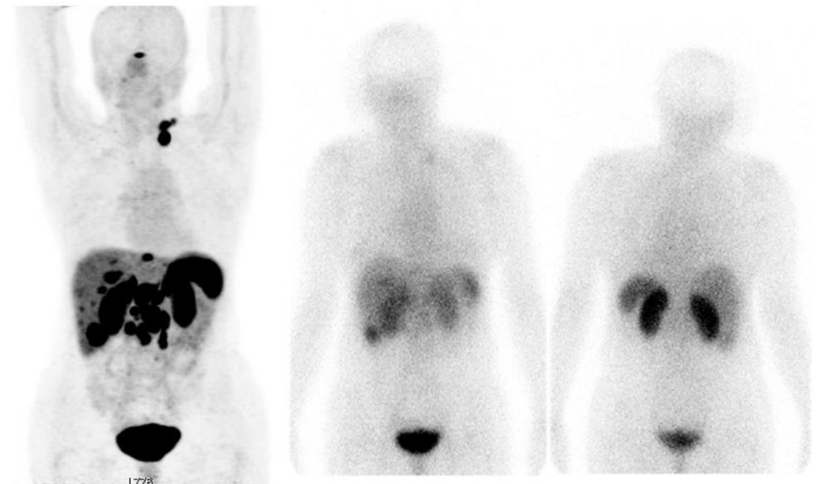
68Ga-DOTATOC vs Tectrotyd NET λεπτού εντέρου



⁶⁸Ga-DOTATOC 2018

^{99m}Tc-tectrotyd 3hrs post injection
2016

68Ga-DOTATOC vs Octreoscan NET λεπτού εντέρου



⁶⁸Ga-DOTATOC 2018

¹¹¹In-Octreoscan 4hrs p.i.
2017

References

1. Package insert of Tectrotyd.
2. Package insert of Octreoscan
3. Package insert of Somakit
4. European Pharmacopeia

CONCLUSIONS III

Sizes	Measurements
Preparations –Radiolabelings	158
Radiolabeling Percentage (Average)	98%
Radiolabeling Percentage (Average) [external control]	99%
Percentage of residues during reconstitution (Average)	6 MBq
Injected Doses a. ≤ 75 Kg b. ≥ 75 Kg	a. 230 - 250 MBq b. 310 - 330 MBq
Dose Residue (Average)	25 MBq
Failures	3 radiolabelings 1 patient imaging
Troubleshooting	<ul style="list-style-type: none"> - boiler temperature - addition of buffer - generator elution problems - examination delay - low dose administration

BIBLIOGRAPHY

1. EANM protocols for imaging of neuroendocrine tumors.
2. European Pharmacopeia
3. SPC of Somakit.
4. Παπαχρίστου Μ., Πριφτάκης Δ., Δατσέρης Ι., “⁶⁸Ga- DOTATOC για διάγνωση νευροενδοκρινικών όγκων – σύγκριση τεχνικών θεμάτων υφιστάμενων μεθόδων (ραδιοεπισημανση, ποιοτικός έλεγχος, χορηγούμενων δόσεων)”, e-poster Πανελλήνιο Ιατρικό Συνέδριο Μάϊος 2019, Αθήνα.