3PC-025

IMPLEMENTATION OF FULLY AUTOMATIZED IN-HOUSE SYNTHESIS OF THERAPEUTIC RADIOPHARMACEUTICAL [^{177}LU]LU-DOTA-TOC

Aljoša Stanković[1,2], Zvezdana Rajkovača [1,2]

[1]University clinical centre of the Republic of Srpska, Clinical department of nuclear medicine and thyroid gland disease, Bosnia and Herzegovina
[2]Faculty of Medicine, University of Banja Luka, Bosnia and Herzegovina
aljosa.stankovic@kc-bl.com

Background and Importance

- [^{177}Lu]Lu-DOTA-TOC is a beta particle-emitting radiopharmaceutical indicated for the peptide receptor radiotherapy of advanced neuroendocrine tumours (NET)
- The substance is characterized by affinity to somatostatine receptors, which are overexpressed in NET patients
- Synthesis can be performed inside **special designed isolators, manually or automatically using synthesizer** and represents a challenge for every department of nuclear medicine

Aim and Objectives

- The aim was to **implement automatized in-house synthesis** of [^{177}Lu]Lu-DOTA-TOC to improve NET patient management

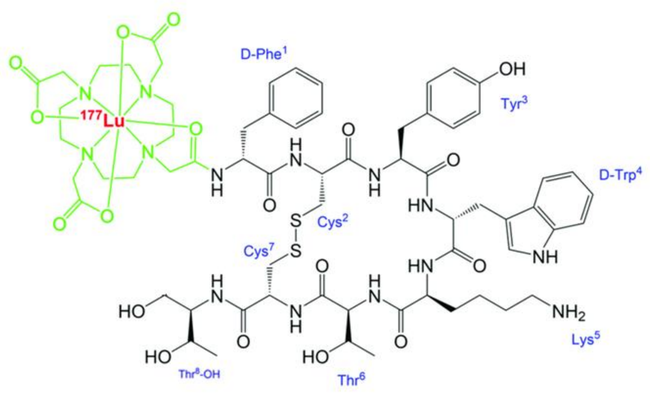


Figure 1. Structure of [^{177}Lu]Lu-DOTA-TOC

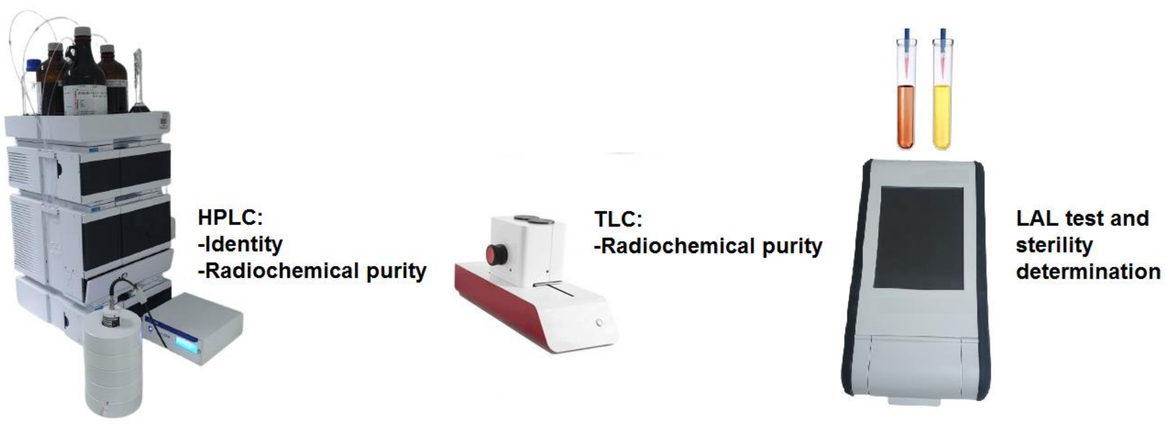
Materials and Methods

SYNTHESIS

- For radiolabelling a **fully automated cassette-based synthesizer** was used
- Complexation reaction was performed in ascorbate buffer and with thermal heating of 115 µg DOTA-TOC and 8.0-8.4 GBq of $^{177}LuCl_3$ solution.
- Drug substance was eluted through sterile filter into the product vial.
- Saline was added to dilute the solution.

QUALITY CONTROL

- Radiochemical purity determined by radio-HPLC and TLC
- TLC system: 0.1 M citrate buffer pH 5.5 and 1 M ammonium acetate /methanol 1:1 as mobile phases and ITLC-SG strips
- Confirmation of identity by UV HPLC using a non-radioactive standard.
- Sterility and endotoxine tests in accordance with European Pharmacopoeia
- Automated filter integrity test performed on the final sterile filter



Results

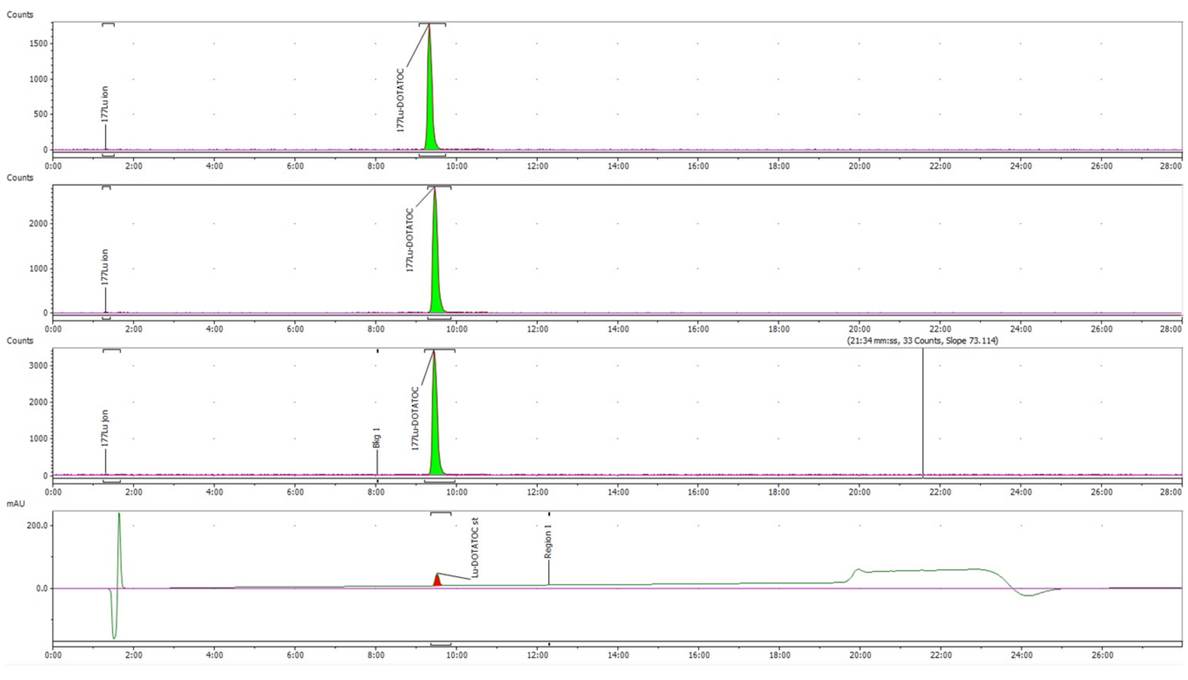


Figure 2. Confirmation of [^{177}Lu]Lu-DOTA-TOC identity by HPLC

Synthesis time	36 ± 2 min
Labeling time	33 ± 0.5 min
Typical production yield	90 ± 5%
Residual activity on the cassette	≤ 5 % of the starting activity

Table 1. Performance of [^{177}Lu]Lu-DOTA-TOC labelling process

Parameter	Results of the validation batches (n=3)	Specification
Application volume	19 mL	18-20 mL
Final activity	7.55 ± 0.15 GBq	7.4 GBq ± 10%
Radiochemical purity	99.2 ± 0.5%	≥ 95%
$^{177}LuCl_3$ impurity	0.38 ± 0.28 %	≤ 1%
^{177}Lu-colloid impurity	0.33 ± 0.11	≤ 1%
Filter integrity test	Conform	Passed
Endotoxin	Conform	≤ 8 EU/mL
Sterility	Conform	Sterile

Table 2. Validation batches data

Conclusion and Relevance

- The automatized synthesis of [^{177}Lu]Lu-DOTA-TOC **was successfully implemented**
- The reproducibility and the cost of this in-house synthesis give an opportunity to increase the access of the patients with NET to this innovative therapeutic radiopharmaceutical in the Balkan region

eahp european association of hospital pharmacists

29th EAHP Congress, March 12-14, Copenhagen, Denmark