

# Synthesis of $^{177}\text{Lu}$ -DOTA-TATE by Manual Method using Ammonium Acetate Buffer: Cost Effective PRRT with Efficient Labeling Yield

Naseer A\*, Adnan S\*, Zain K, Shazia F\*, Faheem M

<sup>1</sup>Department of Nuclear Medicine, Atomic Energy Cancer Hospital-Nuclear Medicine, Oncology and Radiotherapy Institute, Islamabad

## OBJECTIVE.

In order to reduce the financial burden, we utilized our locally available resources for the synthesis of desired therapeutic precursors with indigenously formulated diluents and buffers, without automatic synthesis module.

## METHODS

The carrier free, highly specific Lu-177HCl (0.04 M) was purchased from ITG, Germany and DOTA-TATE kit from Aspen, Australia. The buffers and diluents were produced indigenously at (Nuclear Medicine, Oncology & Radiotherapy Institute) NORI. In order to minimize the chance of metallic impurities and radioactivity loss, Lu-177 DOTA-TATE was synthesized using ammonium acetate buffer at pH 4-5. The synthesis method was standardized with 0.04M HCl and its pH was calibrated with 0.1 N NaOH. Radiochemical purity was checked using TLC-SG. The calibrated dose of  $200\pm 10\text{mCi}$  was injected to 11 known NET patients. The 4, 24, 36 and 72 hours SPECT/CT images were acquired using Dual head gamma camera.

## RESULTS

The radiochemical purity was found as 99.6% (labeled complex) and 0.4% (free Lu-177) (Fig. A). The planar and SPECT-CT images reveal good radio-ligand uptake in the lesions, in concordance with the lesion noted on Ga-68 DOTA-TOC-PET/CT. A cost benefit of 16.6% per patient was observed. A total of 22 cycles were given with more than 3 cycles administered to 3 patients (resulting in significant decrease in number of lesions).

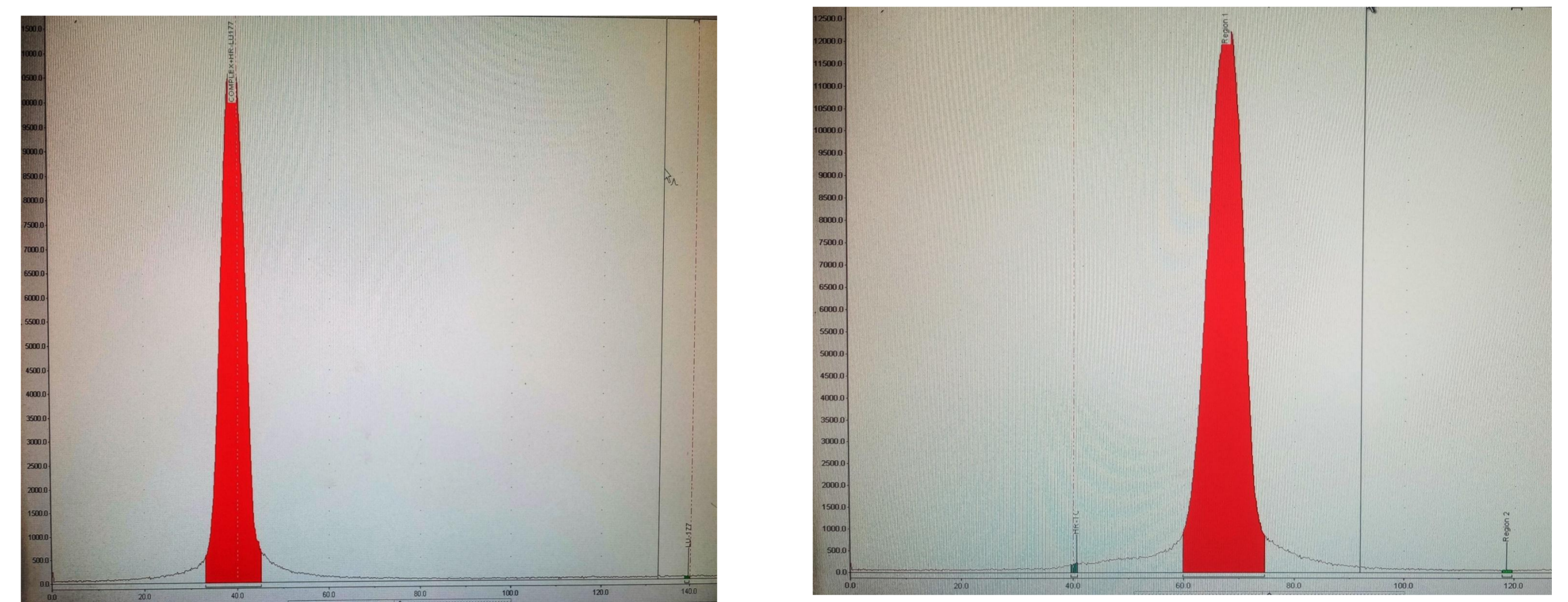


Fig. A: Radio labeling efficiency of Lu-177 DOTA-TATE and Ammonium Acetate (0.5 N),

### Strip 1 (Left side) using Sodium Citrate as mobile phase -1

Lu-177 DOTA-TATE was measured 99.6% at Rf. 0.0, while free Lu-177 at Rf. 0.9-1.0 as 0.4%.

### Strip-II (Right side) using Ammonium Acetate as mobile phase -2

Lu-177 DOTA-TATE was measured 99.4% at Rf. 0.8-0.9, while 0.6% free Lu-177 at Rf. 0.0.

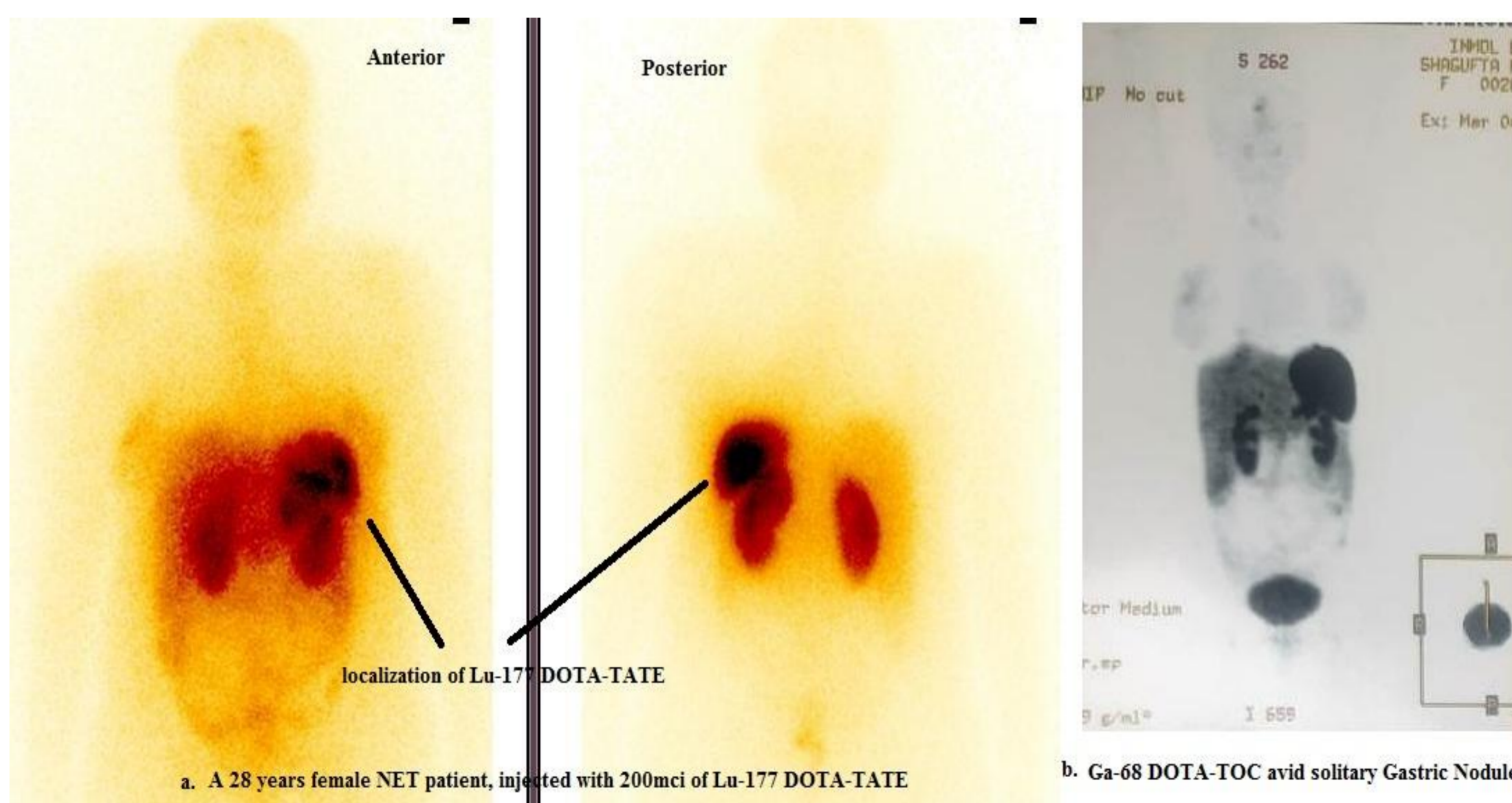


Fig. B. A 28 Years NET female patient, her 24hours SPECT/CT images reveal good radio-ligand uptake in the fundus (left side), along the lesser curvature of stomach, concordance with the lesion noted on Ga-68 DOTA-TOC-PET/CT (right side).

## CONCLUSIONS

It was concluded that using this altered labeling technique we can utilize the available resources for synthesis of Lu-177 DOTA-TATE without using automatic synthesizer and costly consumables. This greatly assisted in treatment planning at significantly lower cost.