

# A Huge Metastatic Liver of a Neuroendocrin Tumor Explored by SPECT/CT with $^{99m}\text{Tc}$ -Tektrotyd: A Case Report

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## Abstract

**Background:** Colorectal neuroendocrine tumors are rare and have a heterogeneous clinical representation and variable prognosis. High grade neuroendocrine tumors (NETs) are characterized by destructive and aggressive growth, followed by rapid spread. For this purpose, SPECT/CT with  $^{99m}\text{Tc}$ -Tektrotyd is very useful for imaging and staging of NETs. **Case Report:** A 50-year-old man with a huge metastatic liver from an unknown neuroendocrine tumor (NET). SPECT/CT with  $^{99m}\text{Tc}$ -Tektrotyd was performed in this patient, it showed a huge metastatic hepatomegaly compressing neighboring organs with bone metastases, and also revealed the primary colon tumor. **Discussion and Conclusion:** In recent decades, the incidence and prevalence of neuroendocrine tumors (NETs), especially those of the colorectal segments, have been increasing.  $^{99m}\text{Tc}$ -EDDA/HYNIC-TOC (Tektrotyd) was introduced into the market and its use has been approved for scintigraphic imaging of patients with NETs and other SSTR-positive tumors. It provides in vivo metabolic data related to the over-expression of Somatostatin Receptors (SSTRs) and also predicts response to peptide receptor radionuclide therapy (PRRT).

## Keywords

Colonic Neuroendocrine Tumor, Liver Metastases, Bone Metastases, SPECT/CT,  $^{99m}\text{Tc}$ -Tektrotyd

## 1. Introduction

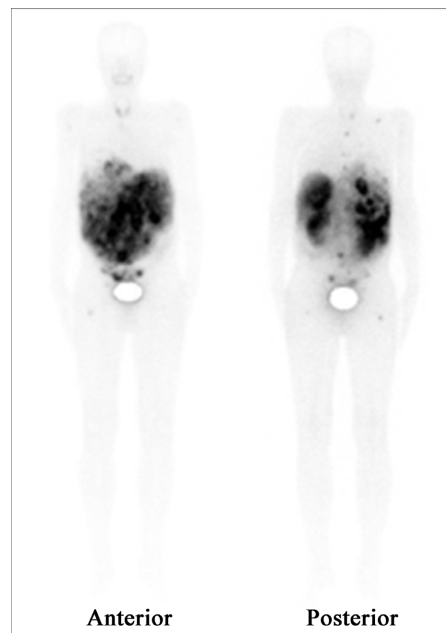
Colorectal neuroendocrine tumors are rare. They are most often non-functional, but have a heterogeneous clinical representation and variable prognosis depending

on their differentiation degree, proliferation index and disease extension [1]. In fact, high grade neuroendocrine tumors are characterized by a destructive and aggressive growth, followed by rapid spread; they are often accompanied by a significant tendency to metastasis [2]. Given the availability and low cost of  $^{99m}\text{Tc}$  agents, SPECT imaging using  $^{99m}\text{Tc}$ -labeled somatostatin analogs is still preferred in nuclear medicine centers, especially in developing countries.  $^{99m}\text{Tc}$ -Hynic-TOC, when introduced for NET imaging, showed very promising results in terms of image quality and labeling. It has been used routinely for the early diagnosis and staging of tumors expressing somatostatin receptors and has been shown to provide better detection of tumor lesions, compared to  $^{111}\text{In}$ -DTPA-Octreotide [3].

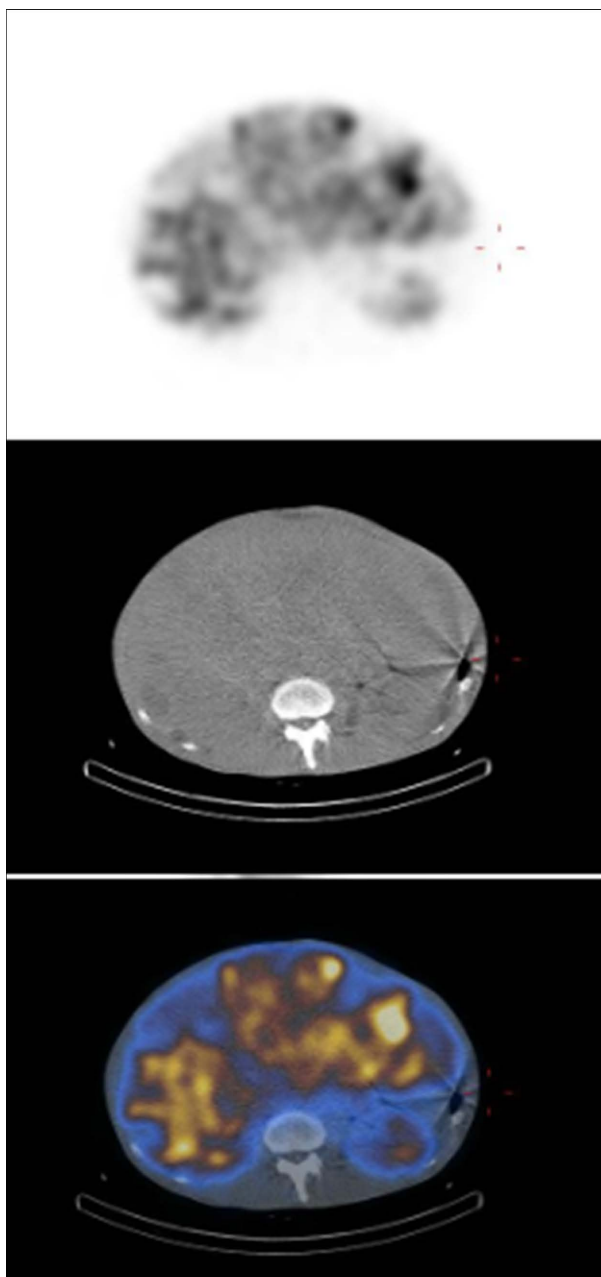
We report a case of intestinal NET found in the ascending colon, revealed by a huge metastatic liver and explored by  $^{99m}\text{Tc}$ -Tektrotyd scintigraphy.

## 2. Case Report

A 50-year-old man with a huge metastatic liver was found on contrast computed tomography, which biopsy and histology revealed a well differentiated neuroendocrin origin (Grade 2). The patient underwent three whole-body scans performed with two headed large field of view gamma camera equipped with LEHR collimator (GE infinia Hawkeye), acquired 15 min, 1 h and 3 h after intravenous injection of 740 MBq of  $^{99m}\text{Tc}$ -EDDA/HYNIC-TOC ( $^{99m}\text{Tc}$ -Tektrotyd), which showed intense, diffuse and heterogeneous uptake in the entire abdomen, with moderate uptake in the bone skeleton, particularly at the right shoulder, spine, chest and hips (Figure 1). Additional acquisition of the abdomen in SPECT-CT

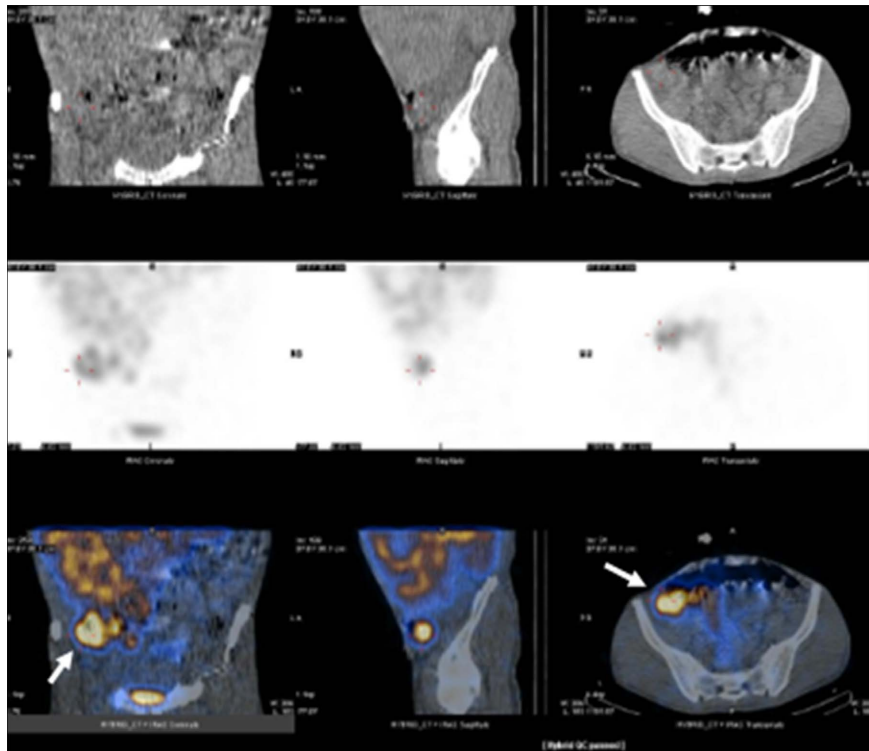


**Figure 1.**  $^{99m}\text{Tc}$ -Tektrotyd whole-body scan showing intense, diffuse and heterogeneous uptake in the liver area occupying the entire abdomen, with some bone metastases (low uptake) at the right shoulder, spine, chest and right hip.



**Figure 2.**  $^{99m}\text{Tc}$ -Tektrotyd scintigraphy in SPECT-CT mode showing in transverse plane a huge hepatomegaly compressing nearby organs with countless metastatic foci of intense uptake significant of SSTRs overexpression.

mode (Low dose CT) was made. It showed a huge hepatomegaly compressing neighboring organs, dotted with countless hypodense and hyper-fixing metastatic foci, and significant overexpression of Somatostatin Receptors (SSTRs) (**Figure 2**). The SPECT/CT imaging also revealed an uptake on a thickening of the right colon suggestive the primary tumor (**Figure 3**), which was confirmed by colonoscopy and histology. Given the extent and non-resectability of the metastases, the patient was put on SST analogs (Octreotide LAR), it has been evolving without progression for 8 months.



**Figure 3.**  $^{99m}\text{Tc}$ -Tektrotyd scintigraphy in SPECT-CT mode revealing an intense uptake on a thickening of the right colon (white arrow) suggesting the primary tumor, later confirmed by histology.

### 3. Discussion

Neuroendocrine tumors (NETs) are rare and increasingly prevalent with heterogeneous clinical behavior [4]. They are found predominantly in the gastrointestinal tract and account for only about 0.5% of all newly diagnosed cancers [5].

In recent decades, the incidence and prevalence of NETs, especially those of the large bowel, have been increasing (colon and rectal localizations account for 7.8% and 13.7% respectively), which is mostly explained by advances in classification and a better diagnostic approach [6] [7].

Patients with NETs often suffer from liver metastases causing significant morbidity and mortality. The excess hormone production, the multitude of hepatic lesions, and ultimate liver disease lend to the poorer prognosis. In fact, 46% - 93% of patients with NETs would have liver metastases at the time of diagnosis [8], as the case of our patient.

Fortunately, significant advances in novel imaging techniques, liver-directed therapies, and systemic treatment options have improved the multidisciplinary management of patients with metastatic forms [9] [10] [11].

The peculiarity of our clinical case comes not only from the enormous metastatic liver compressing the neighboring organs, but also from the association with other secondary bone localizations; and especially from the detection of the primary tumor hitherto unknown, in the ascending colon.

In fact, imaging has a vital role in locating the primary tumor, identifying the

location of metastasis site(s), and assessing the response to treatment. Nuclear medicine plays an important role in the detection and correct assessment of neoplastic functional status as it provides in vivo metabolic data related to the over-expression of Somatostatin Receptors (SSTRs) and also predicts response to peptide receptor radionuclide therapy (PRRT) [12]. Recently,  $^{99m}\text{Tc}$ -EDDA/HYNIC-TOC (Tektrotyd<sup>®</sup>) was introduced into the market and its use has been approved for imaging of patients with NETs and other SSTR-positive tumors.  $^{99m}\text{Tc}$ -EDDA/HYNIC-TOC could also represent a good alternative to  $^{68}\text{Ga}$ -DOTA-peptides in hospitals or centers where PET/CT or  $^{68}\text{Ge}/^{68}\text{Ga}$  generators are not available, as is the case in our department [13].

#### 4. Conclusion

NETs are heterogeneous tumors occurring with increasing frequency that commonly metastasize to the liver and sometimes elsewhere. Advances in diagnostic imaging have improved the staging of patients, commonly identifying multifocal hepatic and extrahepatic metastatic disease. For this purpose,  $^{99m}\text{Tc}$ -Tektrotyd provides information for somatostatin-receptor density and functional activity of pathological lesions, allowing better orientation of therapeutic strategies.

#### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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