

Interesting Images

Upregulation of Somatostatin Receptor Expression in Lactating Breast Shown in ^{99m}Tc -HYNIC-TOC Scintigraphy

Mengyao Jia , Jie Feng and Yaping Luo 

Department of Nuclear Medicine, State Key Laboratory of Common Mechanism Research for Major Diseases, Chinese Academy of Medical Sciences and Peking Union Medical College Hospital, Beijing 100730, China

* Correspondence: luoyaping@live.com; Tel.: +86-10-69154716

Abstract

A 31-year-old female patient with a 4-year history of multiple endocrine neoplasia type 1 (MEN1) presented with abdominal pain and weight loss that she had been experiencing over the past 6 months. Somatostatin receptor (SSTR) scintigraphy using ^{99m}Tc -HYNIC-TOC revealed increased uptake in the known pancreatic neuroendocrine tumor as well as diffuse increased uptake in bilateral lactating breasts. This case highlights physiological upregulation of somatostatin receptor expression in a lactating breast.

Keywords: somatostatin receptor; ^{99m}Tc -HYNIC-TOC; lactation; breast scan abnormal

Case reports have demonstrated increased radiotracer uptake in lactating breasts for various agents, including ^{99m}Tc -pertechnetate [1], radioiodine [2], ^{18}F -FDG [3], ^{99m}Tc -MIBI [4], ^{99m}Tc -TF, ^{123}I -BMIPP [5], ^{18}F -FCH [6], ^{11}C -Methionine [7], and ^{99m}Tc / ^{68}Ga -FAPI [8,9]. The increased radioactivity in the lactating breast is possibly due to upregulation of the sodium-iodide symporter, hypermetabolic status and energy expenditure during milk production, or hyperplasia of breast and fibro-glandular tissue; the latter two mechanisms may also partially explain our case, whereas the most important and direct mechanism is likely hormone-receptor-mediated uptake. Breast uptake of ^{68}Ga -DOTA-TATE (SSTR2-selective) in nursing women has been previously reported [10,11], suggesting physiological upregulation of SSTR expression in lactating breasts. The present case, in which ^{99m}Tc -HYNIC-TOC (targeting SSTR2/5) was used, provides further evidence supporting this phenomenon. This not only addresses the gap in identifying physiological artifacts with a SPECT tracer but also verifies the universality of SSTR expression in lactating breast tissue. Prior work established low and heterogeneous SSTR2 expression in normal breast tissue, a finding that greatly underpins these imaging observations [12]. Of note, the SSTR2 subtype, as the principal mediator of somatostatin effects, is overexpressed at a higher level in breast cancer [13,14]; therefore, increased breast uptake in SSTR imaging should increase the possibility of breast cancer, along with inflammatory conditions like mastitis, benign proliferative, or other entities featuring mechanisms overlapping with those of lactation. The present case illustrates that a lactating breast may also exhibit increased radioactivity in SSTR imaging, and thus physiological uptake during lactation should be included in the differential diagnosis when diffuse breast uptake is encountered in SSTR imaging, especially in lactating female patients.



Academic Editor: Ki Mun Kang

Received: 19 June 2026

Revised: 7 July 2026

Accepted: 16 July 2026

Published: 18 July 2026

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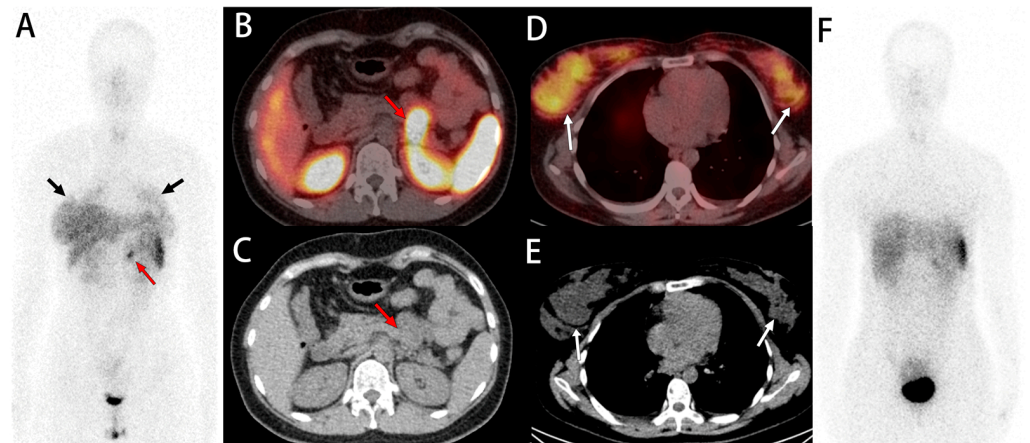


Figure 1. Panels (A–E) show images with ^{99m}Tc -HYNIC-TOC obtained recently, while Panel (F) shows an image acquired 3 years ago with a comparable imaging protocol, injected activity, and acquisition parameters. A 31-year-old female patient with a 4-year history of multiple endocrine neoplasia type 1 (MEN1) presented with parathyroid adenoma and multifocal neuroendocrine tumors (NETs) involving the gall bladder, gastric body, and pancreas. All lesions were surgically resected except for the asymptomatic pancreatic tumor. She complained of abdominal pain and weight loss over the past 6 months and was referred for somatostatin receptor (SSTR) scintigraphy using ^{99m}Tc -HYNIC-TOC to monitor the NET lesions. As shown in the anterior planar image obtained 4 h post-injection (A), a nodular focal lesion with increased uptake was noted in the left upper quadrant of the abdomen (A, red arrow), which was further confirmed via SPECT/CT to be a pancreatic tumor located in the body of the pancreas (B,C, red arrow). Additionally, diffuse increased uptake in the bilateral thoracic region, protruding beyond the thoracic contour with right-sided predominance, can be observed in the planar image (A, black arrows). SPECT/CT images of the chest confirmed that this radioactivity was attributable to the asymmetrical diffuse uptake in bilateral breasts (D,E, white arrows). Further history-taking revealed that the patient had been lactating for the past 7 months, suggesting overexpression of SSTR in lactating breasts. The ^{99m}Tc -HYNIC-TOC scintigraphy that was performed 3 years earlier (F) showed no abnormal uptake in the breast.

Author Contributions: Conceptualization Y.L.; investigation, M.J. and Y.L.; writing—original draft preparation, M.J. and J.F. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by the National High Level Hospital Clinical Research Funding (2025-PUMCH-C-024), CAMS Innovation Fund for Medical Sciences (CIFMS, 2024-I2M-C&T-B-034), and Peking Union Medical College Hospital Talent Cultivation Program (Category C, UBJ10707).

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Review Board of Peking Union Medical College Hospital (Project Number, K11350; Review Acceptance Number, K26C3100; date of approval, 16 July 2026). This manuscript is a single-case imaging report based on clinical images acquired during routine patient care, involving no additional patient intervention or data analysis. The report was drafted during the ethics review process; the final manuscript was compiled after official approval was obtained. Patient privacy was strictly protected throughout.

Informed Consent Statement: Written informed consent was obtained from the patient to publish this paper.

Data Availability Statement: The original contributions presented in this study are included in the article. Further inquiries can be directed to the corresponding author.

Conflicts of Interest: The authors declare no conflicts of interest.

References

1. Chew, C.G.; Sotiropoulos, P. Uptake of Tc-99m pertechnetate by lactating breasts during a thyroid scan in a postpartum patient. *Clin. Nucl. Med.* **2003**, *28*, 441–442. [[CrossRef](#)] [[PubMed](#)]
2. Bakheet, S.M.; Hammami, M.M. Patterns of radioiodine uptake by the lactating breast. *Eur. J. Nucl. Med.* **1994**, *21*, 604–608. [[CrossRef](#)] [[PubMed](#)]
3. Yasuda, S.; Fujii, H.; Takahashi, W.; Takagi, S.; Ide, M.; Shohtsu, A. Lactating breast exhibiting high F-18 FDG uptake. *Clin. Nucl. Med.* **1998**, *23*, 767–768. [[CrossRef](#)] [[PubMed](#)]
4. Malhotra, G.; Phadke, M.S.; Rakshit, S.; Bagul, S.D.; Verma, P.; Asopa, R.V. Unilateral Breast Uptake of 99mTc-MIBI in a Lactating Woman During Myocardial Perfusion Imaging. *Clin. Nucl. Med.* **2022**, *47*, e6–e8. [[CrossRef](#)] [[PubMed](#)]
5. Thet Thet, L.; Takeda, T.; Wu, J.; Fumikura, Y.; Iida, K.; Yamaguchi, I.; Itai, Y. Diffuse and marked breast uptake of both 123I-BMIPP and 99mTc-TF by myocardial scintigraphy. *Ann. Nucl. Med.* **2000**, *14*, 315–318. [[CrossRef](#)] [[PubMed](#)]
6. Alabed, Y.Z.; Ansari, H.A. 18F-Fluorocholine Uptake in Unilateral Breast Related to Breastfeeding in Patient With Primary Hyperparathyroidism. *Clin. Nucl. Med.* **2026**, *51*, e61–e62. [[CrossRef](#)] [[PubMed](#)]
7. Michler, E.; Hilliger, S.; Kopka, K.; Kotzerke, J. 11C-Methionine Uptake in the Lactating Human Breast. *Clin. Nucl. Med.* **2022**, *47*, e66–e67. [[CrossRef](#)] [[PubMed](#)]
8. Hadad, B.; Aryana, K.; Kamali, H.; Askari, E. 99mTc-HYNIC-FAPI-46 SPECT/CT Uptake in Lactating Breasts. *Clin. Nucl. Med.* **2024**, *49*, e184–e185. [[CrossRef](#)] [[PubMed](#)]
9. Dendl, K.; Koerber, S.A.; Adeberg, S.; Röhrich, M.; Kratochwil, C.; Haberkorn, U.; Giesel, F.L. Physiological FAP-activation in a postpartum woman observed in oncological FAPI-PET/CT. *Eur. J. Nucl. Med. Mol. Imaging* **2021**, *48*, 2059–2061. [[CrossRef](#)] [[PubMed](#)]
10. Forwood, N.J.; Kanthan, G.L.; Bailey, D.L.; Chan, D.L.; Schembri, G.P. 68Ga-DOTATATE Breast Uptake and Expression in Breast Milk. *Clin. Nucl. Med.* **2016**, *41*, 654–655. [[CrossRef](#)] [[PubMed](#)]
11. Aksoy, S.Y.; Vatankulu, B.; Akgün, E.; Halaç, M.; Kabasakal, L.; Sonmezoglu, K. Breast Uptake of Ga-68 DOTA-TATE in a Nursing Woman with Net Diagnosis. *Gazi Med. J.* **2016**, *27*, 176–177. [[CrossRef](#)]
12. Kagna, O.; Pirmisashvili, N.; Tshori, S.; Freedman, N.; Israel, O.; Krausz, Y. Neuroendocrine Tumor Imaging With 68Ga-DOTA-NOC: Physiologic and Benign Variants. *Am. J. Roentgenol.* **2014**, *203*, 1317–1323. [[CrossRef](#)] [[PubMed](#)]
13. Ulaner, G.A.; VanderMolen, L.A.; Li, G.; Ferreira, D. Dotatate PET/CT and 225Ac-Dotatate Therapy for Somatostatin Receptor-expressing Metastatic Breast Cancer. *Radiology* **2024**, *312*, e233408. [[CrossRef](#)] [[PubMed](#)]
14. Nazar, A.K.; Basu, S. Radiolabeled Somatostatin Analogs for Cancer Imaging. *Semin. Nucl. Med.* **2024**, *54*, 914–940. [[CrossRef](#)] [[PubMed](#)]

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