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[^{68}Ga]Ga-DOTA-TATE in diagnosis of MEN syndrome

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Multiple endocrine neoplasia (MEN) syndromes are inherited, autosomal dominant genetic disorders that affect the endocrine system. There are several types of MEN syndromes, and each type may cause different conditions or cancers. The diagnosis of MEN is multistage and includes biochemical, hormonal, and several imaging tests.

A 40-year-old man with a history of muscle weakness for 18 months and nephrolithiasis had multiple infiltrative lesions in the bone and a lesion in the pancreas suspected to be a neuroendocrine tumour (NET) on computed tomography (CT) scan. Hypercalcaemic breakthrough in the course of hyperparathyroidism was also diagnosed, and MEN syndrome was suspected.

As a first step, scintigraphy with 99m technetium-sestamibi single-photon emission computed tomography/computed tomography ([^{99m}Tc]Tc-MIBI SPECT/CT) (Fig. 1A) was performed, which revealed typical prolongated focal radiotracer retention in 4 soft-tissue lesions, 3 in typical location and the other in mediastinum near the aortic arch, identified as hyperactive parathyroid glands (Fig. 1B, C). Additionally, areas of diffused, slightly increased tracer uptake were also observed in multiple osteolytic bone lesions with soft tissue components, identified as brown tumours, typical for hyperparathyroidism (Fig. 1D) [1].

Due to the suspicion of NET, gallium 68-tetraazacyclododecane-tetraacetic acid-octreotate positron emis-

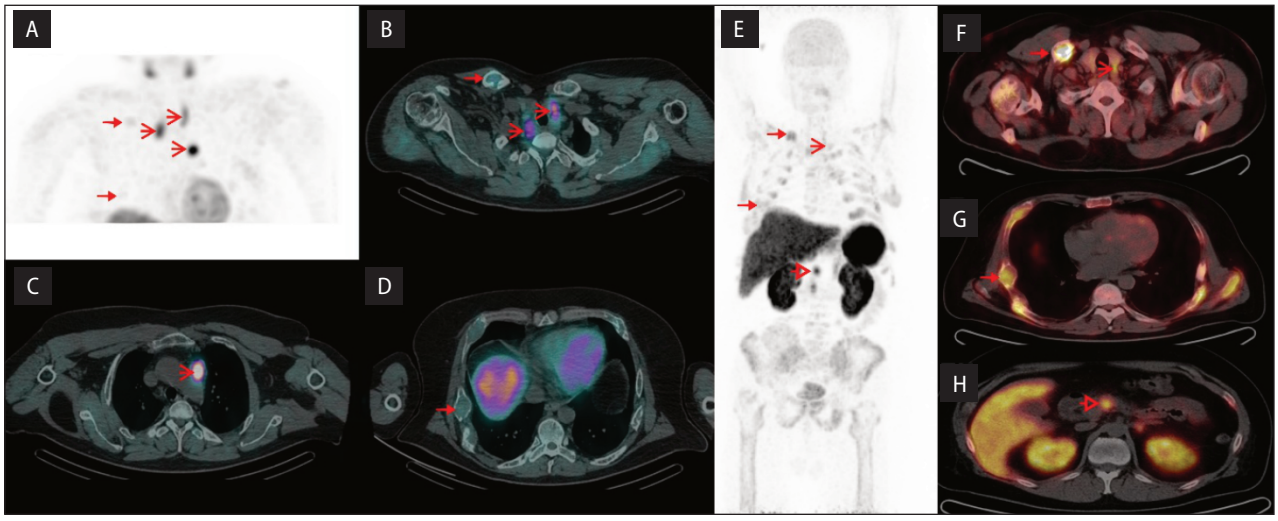

Figure 1. *99m technetium-sestamibi single-photon emission computed tomography/computed tomography ([^{99m}Tc]Tc-MIBI SPECT/CT) — scintigraphy.* **A.** *Maximum intensive projection (MIP);* **B.**, **C.**, **D.** *Fusion SPECT/CT. Gallium 68-tetraazacyclododecane-tetraacetic acid-octreotate positron emission tomography computed tomography ([68Ga]Ga-DOTA-TATE PET/CT);* **E.** *MIP;* **F.**, **G.**, **H.** *Fusion PET/CT*

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sion tomography computed tomography ([^{68}Ga]Ga-DOTA-TATE PET/CT) (Fig. 1E) was performed, which showed increased somatostatin receptor expression in the body of the pancreas [maximum standardised uptake value (SUVmax) 16.9] and the duodenum (SUVmax 11.7) (Fig. 1H). Increased radiotracer accumulation was also present in parathyroids (SUVmax up to 6.1) (Fig. 1F) and brown tumours (SUVmax up to 9.7) (Fig. 1G) previously visible in [^{99m}Tc]Tc-MIBI scintigraphy. Abnormally low tracer accumulation in the pituitary was also noted (SUVmax 4.0), and the possibility of hormonal suppression was suggested, which was confirmed after additional endocrine blood tests.

Considering that the lesions involved the parathyroid glands and gastro-entero-pancreatic neuroendocrine tissues, MEN syndrome 1 or 4 was established [2]. The lack of focal changes in the anterior lobe of the pituitary gland along with radiological and humoral suppression of this gland function may be related to excessive secretion of somatostatin in the NET located in the duodenum [2].

The findings demonstrate the importance of [^{68}Ga]Ga-DOTA-TATE PET/CT as a diagnostic tool in the diagnosis of patients with MEN syndromes.

Conflict of interests
The authors have no conflicts of interest to disclose.

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Author contributions
All authors contributed intellectually to the work, participated in the work to the extent that he or she can defend the contents, read the manuscript before its submission for publication, and declared no conflict of interest.

Ethics statement
All procedures performed in this study involving human participant were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. For this type of study, formal consent is not required.

References

1. Pai M, Park C, Kim BS, et al. Multiple Brown Tumors in Parathyroid Carcinoma Mimicking Metastatic Bone Disease. Clin Nucl Med. 1997; 22(10): 691–694, doi: 10.1097/00003072-199710000-00006.
2. Thakker RV. Multiple endocrine neoplasia type 1 (MEN1) and type 4 (MEN4). Mol Cell Endocrinol. 2014; 386(1-2): 2–15, doi: 10.1016/j.mce.2013.08.002, indexed in Pubmed: 23933118.
3. Fink G. Neuroendocrine regulation of pituitary function: general principles. In: Conn PM, Freeman ME. ed. Neuroendocrinology in physiology and medicine. Humana Press, Totowa, NJ 2000: 107–133.