(99m)Tc-MIBI Uptake in a Thyroid Adenoma with Diffuse Adipose Metaplasia

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Abstract A 71-year-old female underwent a (99m)Tc-MIBI scan to characterize a cold nodule (30 mm) of the left thyroid lobe. The nodule showed diffuse uptake and retention of the radiotracer. After resection, histological examination demonstrated a microfollicular adenoma with diffuse white adipose metaplasia. Although mitochondria in brown adipose tissue have been widely studied, we have only a limited understanding of the relevance of mitochondria in

white adipose tissue. Active mitochondria are present in white adipocytes, and this may account for the MIBI uptake, mimicking a hyperproliferation pattern, in our patient

Keywords Tc MIBI · Thyroid · Adenoma · Adipocyte · Metaplasia

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Fig. 1 Thyroid MIBI scintigraphy in a 71-year-old female with a cold nodule in the left thyroid lobe. Images were acquired 15 min after intravenous injection of 185 MBq of $(99\text{m})\text{TcO}_4$ and 20 min/2 h after

injection of 370 MBq in $(99\text{m})\text{Tc}$ -MIBI scans. Planar images show a cold nodular lesion in the left lobe (lower pole) (a) with intense MIBI uptake at 20 min (b) and retention at 120 min (c) after injection

Fig. 2 Histological examination shows microfollicular adenoma with diffuse adipose metaplasia, i.e., about 50 % of thyroid follicles have been replaced by fatty tissue (a, b). Immunohistochemistry (c) was performed to highlight the thyroglobulin and confirm the presence of thyroid tissue. Several changes in the glandular structure such as fibrosis, hemorrhage and infarction can frequently be observed, while adipose metaplasia, characterized by lesions containing fat, are a rarity and hardly associated with differentiated thyroid cancer [1]. Many studies

have investigated the diagnostic performance of MIBI scans in the evaluation of cold thyroid nodules, showing good sensitivity and very high specificity in detecting malignancies [2]. Few cases of adipose metaplasia in thyroid nodules are described [3–6], and this is the first case reported in the literature with a related MIBI imaging. MIBI uptake seems to be explained by the presence of active mitochondria in white adipocytes as well as brown adipose tissue [6]

Fig. 3 Ultrasonography showing thyroid goiter with a predominant basal left nodule (maximum axial diameter 39 mm). No evidence of pathological adenopathy in the cervical area

Compliance with Ethical Standards

Conflict of Interest Gaetano Paone, Luca Mazzucchelli, Peloni Giuseppe, Fabrizio Fasolini and Luca Giovanella declare that they have no conflict of interest.

Ethical Statement The study was approved by an institutional review board or equivalent and has been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

References

1. Himmetoglu C, Yamak S, Tezel GG. Diffuse fatty infiltration in amyloid goiter. *Pathol Int*. 2007;57:449–53.
2. Treglia G, Caldarella C, Saggiorato E, et al. Diagnostic performance of (99m)Tc-MIBI scan in predicting the malignancy of thyroid nodules: a meta-analysis. *Endocrine*. 2013;44:70–8.
3. Mathew M, Garg S. A thyroid nodule with adipose metaplasia in a nodular goitre: a case report. *Indian J Pathol Microbiol*. 2007;50:369–70.
4. Gnepp DR, Ogorzalek JM, Heffess CS. Fat-containing lesions of the thyroid gland. *Am J Surg Pathol*. 1989;13:605–12.
5. Kim KH, Seo HS, Lee YH, et al. Study of intrathyroid fat-containing lesions using CT imaging with literature review. *Neuroradiology*. 2013;55:1405–11.
6. De Pauw A, Tejerina S, Raes M, et al. Mitochondrial (dys)function in adipocyte (de)differentiation and systemic metabolic alterations. *Am J Pathol*. 2009;175:927–39.