

# Simultaneous hot and cold thyroid nodules: Which is malignant?

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## *Clinical Image*

### **Simultaneous hot and cold thyroid nodules: Which is malignant?**

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**Key words:** autonomous functioning thyroid nodule, toxic multinodular goiter, hyperthyroidism, thyroid papillary cancer

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### **Key Clinical Message**

Physicians should be aware of the risk of malignancy in patients with toxic multinodular goiter. Radionuclide scan cannot be used to predict the malignant potential of thyroid nodules. Comprehensive evaluation of imaging studies is needed.

### **Case Description**

A 53-year-old woman, treated with 10 mg of thiamazole for postoperative recurrence of hyperthyroidism, was referred to our department for further investigation of neck goiter (**Figure A**). The patient had normal thyroid function (free T3: 2.64 pg/mL, free T4: 0.80 ng/dL, and TSH: 3.73 U/mL) and tested negative for TSH receptor antibodies (TRAb). However, the serum thyroglobulin level was elevated (982 ng/mL). Echocardiography and computed tomography revealed multiple nodules in the thyroid glands (maximum nodule diameter: 30 mm). Tc-99m scintigraphy showed a hot nodule in the left lobe that was consistent with a functional nodule, in addition to cold nodules (**Figure B**). Pathological examination after subtotal thyroidectomy revealed right papillary carcinoma and a left adenomatous nodule.

Toxic multinodular goiter (TMNG) refers to typically benign nodules in the thyroid gland that autonomously secrete excessive amounts of thyroid hormones and is one of the primary causes of hyperthyroidism or thyrotoxicosis. Up to 15% patients with nodules have neoplastic changes<sup>1</sup>. TMNG may be characterized by a mixture of functional and nonfunctional adenomas. A radionuclide scan is useful for identifying the functional status of these nodules. Hot nodules are hyperfunctioning nodules, while cold nodules indicate defects in the secretory function. Coincidental carcinomas with TMNG have been rarely reported, whereas a recent study revealed that hot and cold nodules have the same risk of malignancy<sup>2</sup>. Therefore, diagnosis should not be based solely on radionuclide images. Physicians should recognize that the most surefire treatment of MTNG is surgical excursion and consider the possibility of malignancy by comprehensive evaluation of imaging studies.

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## Authors' Contribution

YO: contributed to the clinical management of the patients, wrote the first draft, and managed all the submission process. YN, DO, TI, RH, and FO contributed to the clinical management of the patient and revised the manuscript.

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**Figure Legends**Thyroid enlargement and bilateral multiple nodules were observed (**A**). A hot nodule in the left lobe was pathologically diagnosed as adenomatous goiter, whereas a right cold nodule was pathologically diagnosed as papillary cancer (**B**).

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