

## Causes of appearance of scintigraphic hot areas on thyroid scintigraphy analyzed with clinical features and comparative ultrasonographic findings

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This study was done retrospectively to analyze the ultrasonographic (US) findings in thyroid scintigraphic hot areas (HA). Three-thousand, eight-hundred and thirty-nine consecutive patients who underwent  $^{99m}\text{Tc}$ -pertechnetate ( $n = 3435$ ) or  $^{123}\text{I}$  ( $n = 457$ ) scintigraphy were analyzed. HA were regarded as present when the tracer concentration was greater than the remaining thyroid tissue, or when hemilobar uptake was observed. High-resolution US examinations were performed with a real-time electronic linear scanner with a 7.5 or 10 MHz transducer. One hundred and four (2.7%) were found to be scintigraphic HA ( $n = 120$ ). US revealed a nodular lesion or well-demarcated thyroid tissue corresponding to the HA in 94 areas (78.4%, Category 1), an ill-defined region with different echogenicity in 13 areas (10.8%, Category 2), and no correlating lesion in 13 areas (10.8%, Category 3). These 104 patients included 43 with adenomatous goiter (59 areas), 33 with adenoma, 11 with Hashimoto's thyroiditis, 5 with primary thyroid cancer, 4 with euthyroid ophthalmic Graves' disease (EOG), 3 with hemilobar atrophy or hypogenesis, 2 with hemilobar agenesis, 2 with hypothyroidism with blocking-type TSH-receptor antibodies (TSHRAb), 1 with acute suppurative thyroiditis. Among the 59 adenomatous nodules and 33 adenomas, 51 (86.4%) and 32 (97.0%), respectively, belonged to Category 1. A solitary toxic nodule was significantly larger and occurs more often in older patients than in younger patients. On the other hand, all 17 patients with known autoimmune thyroid diseases including Hashimoto's thyroiditis, EOG and hypothyroidism with blocking TSHRAb belonged to Category 2 or 3. Possible underlying mechanisms are 1) hyperfunctioning tumors or nodules, 2) localized functioning thyroid tissue freed from autoimmune destruction, inflammation or tumor invasion, 3) congenital abnormality, 4) clusters of hyperactive follicular cells caused by long-term TSH and/or TSHRAb stimulation, 5) asymmetry, etc. Scintigraphic HA are observed in patients with various thyroid diseases and high-resolution US appears to be helpful clinically for the differential diagnosis of the above mentioned disorders.

**Key words:** thyroid scintigraphy, hot areas, ultrasonography