

# Low Thyroid-Stimulating Hormone: What Is Next?



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## KEYWORDS

- Hyperthyroidism • Thyroid storm • Graves disease • Thyroiditis
- Thyroid-stimulating hormone (TSH) • Free thyroxine (FT4) • Antithyroid drugs (ATDs)

## KEY POINTS

- The most common causes of a low serum level of thyroid-stimulating hormone are excessive levothyroxine replacement, nonthyroidal illness, and subclinical hyperthyroidism.
- The most common cause of hyperthyroidism is Graves disease.
- Untreated thyrotoxicosis can result in weight loss, osteoporosis, atrial fibrillation, emboli, cardiovascular collapse, and death.

## INTRODUCTION

The appropriate screening test for thyroid dysfunction is serum thyroid-stimulating hormone (TSH) (**Box 1; Table 1**). A TSH within the normal range excludes primary thyroid disease.<sup>1</sup> Causes of low TSH include increased synthesis of thyroid hormone, excessive release of preformed thyroid hormones, or an endogenous or exogenous extrathyroidal source. Excessive thyroid hormone production may be caused by Graves disease, toxic multinodular goiter (TMG), or toxic adenoma (TA). Thyroiditis, which results in release of preformed thyroid hormone, may be painless or painful.

In the United States, the prevalence of hyperthyroidism is approximately 1.3%.<sup>2</sup> Classic symptoms of hyperthyroidism include heat intolerance, palpitations, anxiety, fatigue, weight loss, and irregular menses in women. Clinical findings include tremor, tachycardia, stare, lid lag, and warm, moist skin.<sup>3</sup> When caused by overproduction, treatment with antithyroid medications, radioactive iodine (RAI) ablation, and thyroidectomy are treatment options.<sup>4</sup>

## THYROID-STIMULATING HORMONE

The appropriate screening test for thyroid dysfunction is serum TSH. It has the highest sensitivity and specificity of any test used in the evaluation of hyperthyroidism.<sup>5</sup> A TSH within the normal range excludes primary thyroid disease.<sup>1</sup>

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Disclosure: None.

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Box 1
Causes of thyrotoxicosis based on radioactive iodine uptake
Normal or elevated uptake
Graves disease
Toxic adenoma
Toxic multinodular adenoma
Low or absent uptake
Painless thyroiditis
Postpartum
Amiodarone
Lithium
Interferon- $\alpha$
Interleukin-2
Subacute thyroiditis
Acute thyroiditis
Surreptitious intake/excessive replacement
Data from Bahn RS, Burch HB, Cooper DS, et al. Hyperthyroidism and other causes of thyrotoxicosis: management guidelines of the American Thyroid Association and American Association of Clinical Endocrinologists. Thyroid 2011;21:593–646.

Table 1				
Laboratory tests for hyperthyroidism				
Cause	TSH	FT4, T3	RAI Uptake/Scan	Other Helpful Tests
Graves disease	↓	↑↑	Homogenous, ↑ or N	TRAbs
SH	↓	N	Homogenous, ↑ or N if due to Graves disease; focal ↑ uptake if due to TA	TRAbs, ultrasound
TA	↓	N or ↑	Focal ↑ uptake; rest of gland may have ↓ uptake	Ultrasound
TMG	↓	N or ↑	Heterogeneous, N or ↑	Ultrasound or CT
Subacute thyroiditis	↓	↑	↓ uptake	ESR
Radiocontrast dye	↓	↑	↓↓ uptake	Urinary iodine excretion
Amiodarone	↓	↑	↓↓ uptake	Urinary iodine excretion
Surreptitious intake/excessive replacement	↓	↑	↓ uptake	Serum Tg
Secondary (pituitary or hypothalamic disorder)	↓, ↑, or N	↓		Pituitary hormones, pituitary MRI

Data from Castro RC, Gharib H. Thyroid disorders. In: Evidence-based endocrinology. 3rd edition. Philadelphia: Lippincott William and Wilkins; 2012.

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