



Patient: **SAMPLE
PATIENT**

DOB:

Sex:

MRN:

4400 Comprehensive Thyroid Assessment - Serum

Methodology: Chemiluminescent, RIA

Comprehensive Thyroid Assessment

Central Regulation

Reference
Range

Reference
Range

Thyroid Stimulating
Hormone (TSH) **1.90** 0.40-2.50 microIU/mL

Free Thyroxine
(FT4) **0.80** 0.61-1.12 ng/dL

Peripheral Regulation

Reference
Range

Reference
Range

Free
Triiodothyronine
(FT3) **2.7** 2.5-3.9 pg/mL

Reverse T3
(RT3) **20.0** 9.0-35.0 ng/dL

Thyroid Antibodies

Reference
Range

Reference
Range

Anti-Thyroglobulin
Antibody (Anti-TG) **2.9** <4.0 IU/mL

Anti-Thyroid
Peroxidase
(Anti-TPO) **7** <9 IU/mL

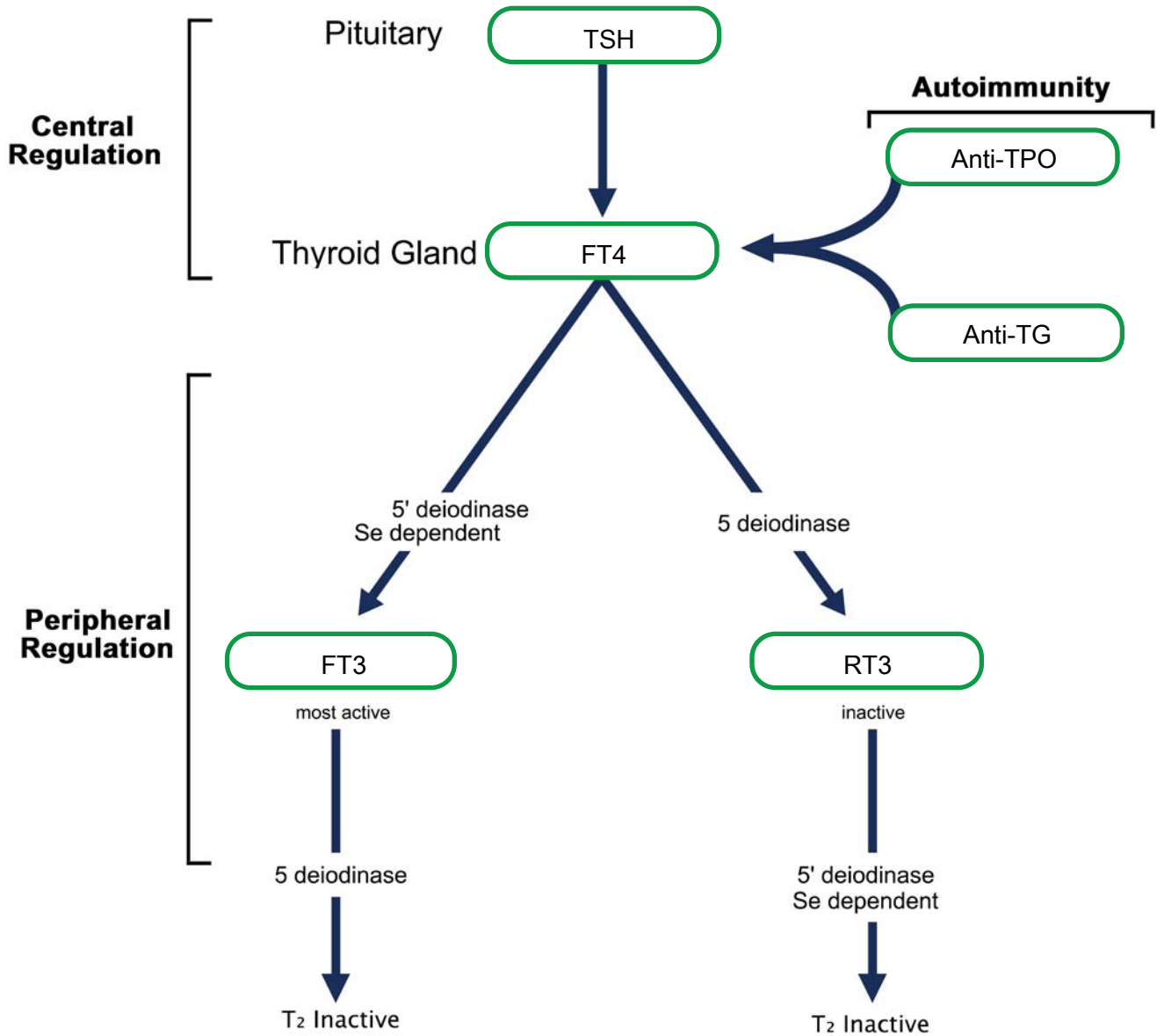
*The performance characteristics of all assays have been verified by Genova Diagnostics Inc. Assays are cleared by the U.S. Food and Drug Administration, unless otherwise noted with ♦.

Thyroid Metabolism Summary

Thyroid hormone production is centrally regulated (hypothalamus-pituitary-thyroid axis) but thyroxine (T4) from the thyroid gland is peripherally transformed in liver and kidney cells into T3 and reverse T3 (rT3). Ultimately, the site of action for thyroid hormones is at cell nuclei throughout the body, where T3 is five times as potent as T4, and rT3 is completely inert. Thyroid dysfunction may occur even when the hypothalamus-pituitary-thyroid axis is operating adequately. Problems with peripheral conversion (reflected by T3 and rT3 levels) and/or with immune system interference in the form of auto-antibodies (reflected by anti-thyroglobulin and anti-thyroidal peroxidase antibodies) may still affect thyroid hormone production or its action at the cellular level. Thus to achieve a comprehensive assessment of thyroid adequacy, central regulation, peripheral conversion, and auto-immune involvement must be thoroughly evaluated.



Thyroid Metabolism-At-A-Glance





Commentary

Commentary is provided to the practitioner for educational purposes, and should not be interpreted as diagnostic or as treatment recommendations. Diagnosis and treatment decisions are the practitioner's responsibility.

Thyroid hormones play an integral role in regulating the body's temperature and production of energy. In addition, thyroid hormones regulate protein synthesis and enzyme production at the cellular level. Thyroid hormone deficiencies may be suspected clinically whenever an insidious slowing of the metabolism is observed as might be the case with protracted fatigue, low energy, depression, mental asthenia, coldness or cold extremities, fluid retention, or diffuse hair loss. Conversely, thyroid hormone excess may be suspected when the opposite clinical picture is observed: excess energy, palpitations, anxiety, nervousness ("like I'm going to jump out of my skin"), short sleep, or feeling like "everything is moving too fast". Physically, such thyroid excess may present as heat intolerance, diarrhea, idiopathic weight loss without loss of appetite, fine tremor of the extremities, and in prolonged cases, exophthalmia.

Common Laboratory Patterns in Thyroidal Illness

	TSH	FT4	FT3	rT3	α -TPO	α -Tg
Early Hashimoto's	nl	nl	nl	nl	±	↑
Late Hashimoto's	↑	↓	↓	±	↑	±
Early Graves'	↓	nl	↑	±	↑	↑
Late Graves'	↓	↑	↑	↑	↑	±
Wilson's Syndrome, Low T3, or ESS	nl	nl	↓	↑	–	–
Early DeQuervain's	↓	↑	↑	±	–	–
Late DeQuervain's	↑	↓	↓	±	±	±
Plummer's Disease	↓	↑	↑↑	±	–	–

nl = normal

± = indeterminate

Laboratory Results

Thyroid-stimulating hormone (TSH) is measured to be within the reference range, suggesting balanced production of T4 and T3. In some individuals, high normal TSH, even in the presence of normal free T4, may be indicative of subclinical hypothyroidism. Although subclinical hypothyroidism is often asymptomatic, potential risks associated with the condition include progression to overt hypothyroidism, cardiovascular effects, hyperlipidemia, and neuropsychiatric effects.

The National Academy of Clinical Biochemistry (NACB) has published new thyroid testing guidelines, produced in collaboration with every major thyroid organization. NACB points out that 95% of normal euthyroid individuals have serum TSH values between 0.4 and 2.5 MicroIU/mL, suggesting that the current upper limit of the reference range is skewed by the inclusion of subjects with subclinical hypothyroidism and may be accordingly adjusted in the future. For hypothyroid patients being treated with levothyroxine (T4), NACB suggests a therapeutic target range for TSH of 0.5-2.0 MicroIU/mL.

For the rare night-time collection, it also should be noted that serum TSH levels exhibit a diurnal variation with the peak occurring during the night and the trough (about 50% of the peak value) occurring between 10 a.m. and 4 p.m.

Free T4 (FT4) is within the reference range. FT4 measures the biologically active fraction of total T4, the majority of which is bound by protein carriers in the serum, hence inactive.

The National Academy of Clinical Biochemistry (NACB) suggests a serum FT4 concentration in the upper third of



Commentary

the reference range as the therapeutic target for patients being treated with levothyroxine (T4) for hypothyroidism due to pituitary and/or hypothalamic dysfunction.

Free T3 (FT3) is measured to be within the reference range. FT3 measures the biologically active fraction of total T3, the majority of which is bound by protein carriers in the serum and is therefore inactive. T3 is 3-5 times as physiologically active as T4, and 80% of the circulating T3 is from the peripheral conversion of T4 predominately in liver and kidney.

Reverse T3 is measured to be within the reference range.

Levels of anti-thyroglobulin antibodies are within the reference range. Thyroglobulin (Tg) is a large glycoprotein synthesized in response to TSH stimulation. T4 and, to a limited extent, T3 are produced when tyrosine residues in Tg are iodinated and coupled together under the action of thyroid peroxidase (TPO). Subsequent proteolysis of Tg in cellular lysosomes allows for the release of T4 and T3 from the thyroid gland into the systemic circulation.

Levels of anti-thyroid peroxidase antibodies are within the reference range. Thyroid peroxidase is a heme-containing enzyme that is necessary for the oxidation of iodide ions and for using hydrogen peroxide for the incorporation of these iodide ions into the tyrosine residues of thyroglobulin.

Please note the reference ranges for Thyroid Stimulating Hormone (TSH), Free Thyroxine (FT4), Free Triiodothyronine (FT3), Anti-Thyroglobulin Antibody (Anti-TG), and Anti-Thyroid Peroxidase Antibody (Anti-TPO) have been updated.