

Interpretation of serum TSH and free T₄ concentrations

High serum TSH concentration	
Serum free T ₄ concentration	Possible interpretations
high serum free T ₄ concentration	possible laboratory error secondary hyperthyroidism (TSH-secreting pituitary adenoma) [NB1] thyroid hormone resistance [NB1] intermittent poor adherence to levothyroxine
normal serum free T ₄ concentration	subclinical primary hypothyroidism (also called mild thyroid failure) recent severe nonthyroidal illness
low serum free T ₄ concentration	overt primary hypothyroidism recent severe nonthyroidal illness antithyroid overtreatment
Normal serum TSH concentration	
Serum free T ₄ concentration	Possible interpretations
high serum free T ₄ concentration	possible laboratory error secondary hyperthyroidism (TSH-secreting pituitary adenoma) [NB1] thyroid hormone resistance [NB1] sampling within 6 hours of levothyroxine dose
normal serum free T ₄ concentration	normal thyroid function
low serum free T ₄ concentration	secondary hypothyroidism (pituitary cause) or tertiary hypothyroidism (hypothalamic cause) severe nonthyroidal illness use of drugs that affect serum free T ₄ concentration antithyroid overtreatment
Low serum TSH concentration	
Serum free T ₄ concentration	Possible interpretations
high serum free T ₄ concentration	overt primary hyperthyroidism [NB2] [NB3] levothyroxine overtreatment
normal serum free T ₄ concentration	subclinical primary hyperthyroidism [NB3] levothyroxine overtreatment nonthyroidal illness treated secondary hypothyroidism (pituitary cause) or tertiary hypothyroidism (hypothalamic cause) recently started antithyroid drug
low serum free T ₄ concentration	secondary hypothyroidism (pituitary cause) or tertiary hypothyroidism (hypothalamic cause) severe nonthyroidal illness

T₄ = thyroxine; TSH = thyroid stimulating hormone

NB1: Secondary hyperthyroidism and thyroid hormone resistance are rare. Contact the laboratory for confirmation of test results; laboratory error can distort results in up to 5% of tests.

NB2: TSH is usually suppressed (serum concentration less than 0.05 milliunits/L, and at least less than 0.1 milliunits/L), rather than just low (serum concentration between the lower limit of the normal range and 0.1 milliunits/L).

NB3: Primary hyperthyroidism includes Graves disease, toxic multinodular goitre and toxic adenoma.