

Division of Laboratory Medicine

Biochemistry

Free T4

Pseudonyms: free thyroxine, FT4,

Measurement of free T4, in combination with TSH is used to diagnose and monitor thyroid disorders. Thyroxine, secreted by the thyroid gland mostly circulates bound to serum proteins (75% thyroxine binding globulin, 15% pre-albumin and 10% albumin). A small proportion (0.03 %) is unbound and biologically active: free T4.

General information

Collection container:

Adults – serum (with gel separator, 4.9mL Sarstedt brown top).

Paediatrics – lithium heparin plasma (1.2mL Sarstedt orange top tube).

Type and volume of sample: 1mL of whole blood

Specimen transport/special precautions: The tubes should be thoroughly mixed before transport to the lab. Samples should not be taken from patients receiving therapy with high biotin doses (i.e. > 5 mg/day) until at least 8 hours following the last biotin administration.

Laboratory information

Method principle:

Electrochemiluminescence immunoassay (competitive)

Biological Reference Range or cut off

<1 month 15-34 pmol/L

>1 month 9 - 24 pmol/L

Turnaround times: Same day

Clinical information

Factors known to significantly affect the results: Drugs or non-thyroidal illness significantly affecting binding protein concentrations may alter the result. Results can be misleading in patients with Familial Dysalbuminaemic Hyperthyroxinaemia.

Autoantibodies to thyroid hormones can interfere in the assay. Please contact the duty biochemist if interference is suspected.

Clinical decision points:

In primary hypothyroidism free T4 is low and TSH is elevated (>10 mU/L).

Division of Laboratory Medicine

Biochemistry

A TSH concentration of 5-10 mU/L with a normal free T4 indicates compensated (subclinical) hypothyroidism. A repeat after 3 months is recommended. If the repeat TSH is >10 mU/L then treatment is indicated. If the repeat TSH <10 mU/L then retest annually.

A low free T4 in conjunction with a normal-low TSH may indicate hypopituitarism (or non-thyroidal illness). Appropriate additional pituitary hormone testing may be indicated. Thyroxine treatment should not be initiated until adequate cortisol production is established.

Patients with hyperthyroidism have high free T4 concentrations and suppressed TSH (<0.1 mU/L).

When monitoring levothyroxine treatment, serum TSH is only accurate once a steady-state is reached, which takes four to six weeks after starting or adjusting the dose. The treatment target is for TSH concentrations in the lower half of reference range and free T4 within the reference range.

(Last updated April 2018)