GENETRACK Diagnostics

Thyroid Stimulating Hormone (TSH)

WHAT IS THYROID STIMULATING HORMONE (TSH)?

Thyroid stimulating hormone (TSH) is a hormone produced in the pituitary gland in both males and females. It signals the thyroid gland to produce another hormone called thyroxine (T4), which is converted to triiodothyronine (T3). T3 is an active hormone that stimulates metabolism (1). TSH is released in a pulsatile manner, resulting in variations in serum concentrations throughout each day (2).

NORMAL TSH LEVELS

Healthy adults typically have TSH levels within a reference range of 0.3 - 5 mIU/L (3 - 6), although optimal levels may differ when trying to conceive and during pregnancy. Children normally have higher TSH levels than adults, with reference ranges of 1.3 to 19 mIU/L at birth, 0.6-10IU/L at 10 weeks, 0.4-7.0 mIU/L at 14 months, and gradually decreasing to adult levels throughout childhood (4). TSH levels may fluctuate due to stress, diet, medications, childbirth, and menopause. There is also limited evidence that TSH levels can increase slightly during menstruation (7).

ABNORMAL TSH LEVELS

TSH variations influence thyroid hormone levels, and are measured as part of thyroid function tests. Elevated TSH in conjunction with elevated T4 can occur due to tumors of the pituitary or thyroid hormone resistance. Low T4 in conjunction with either high TSH or low TSH is primary hypothyroidism or secondary hypothyroidism, respectively. Low TSH + high T4 is diagnostic for primary hyperthyroidism (Graves disease) (1).

HYPERTHYROIDISM

Hyperthyroidism is the excess production of thyroid hormones. The symptoms can include a fast heart rate, high blood pressure, excess sweating, shaky hands, anxiety, and weight loss. Fertility can also be affected with females at increased likelihood of infrequent periods, and low sperm counts in males. In older people, the signs may be less obvious, with symptoms that include weakness, confusion, and depression. In rare instances, a dangerous thyroid storm can occur, when there is a sudden increase in thyroid hormones usually due to an infection, heart attack, stroke, or extreme stress. Thyroid storms must be promptly treated (1).

The most common causes of hyperthyroidism are Graves' disease (an autoimmune disorder), thyroid inflammation due to viral infections or other diseases, nodules on the thyroid, and certain medications (1).

Medication, radioactive iodine, or surgical removal of the thyroid gland are effective treatments for hyperthyroidism (5).

HYPOTHYROIDISM

Hypothyroidism is the low production of thyroid hormones, slowing down body functions. It is most common in older women. The symptoms can include weight gain, fatigue, puffy eyes and face, dry hair and skin, constipation, slower heart rate, constantly feeling cold, confusion, and depression (1, 7). Hypothyroidism is also associated with reduced fertility, increased miscarriage risk, premature birth, and infant death (8).

Treatment options for hypothyroidism include daily medications (e.g. levothyroxine), natural thyroxine hormone extracts, and reduced consumption of substances that affect levothyroxine absorption (e.g. fiber, soy, iron) (5).

TSH AND METABOLIC SYNDROME

Research has shown that individuals who have TSH levels in the upper normal range (2.5 – 5 mU/L, subclinical hyperthyroidism) have an increased risk of obesity, high triglycerides, and metabolic syndrome (9, 10). Type 2 diabetics with high-normal TSH levels are also at increased risk of diabetic complications (11).

In addition, hypothyroidism (low thyroid hormones) also increases the risk of metabolic health complications, illustrating how important it is to maintain thyroid hormones within a healthy range. Research has shown an association between hypothyroidism and BMI, blood pressure, blood sugar, cholesterol, and triglycerides (12).

TEST PROCEDURE

Correct specimen collection and handling is required for optimal assay performance.

This test requires a blood sample from a finger prick. All supplies for sample collection are provided in this kit. First wash and dry hands. Warm hands aid in blood collection. Clean the finger prick site with the alcohol swab and allow to air dry. Use the provided lancet to puncture the skin in one quick, continuous and deliberate stroke. Wipe away the first drop of blood (as it may be contaminated with tissue fluid or skin debris). Massage finger to increase blood flow at the puncture site and hold in a position that gravity facilitates the collection of blood on the fingertip. Transfer the blood to the blood collection card or blood collection tube (microtainer).

Avoid squeezing or 'milking' the finger excessively. If blood flow stops, perform a second skin puncture on another finger, if more blood is required.

Dispose of all sharps safely and return sample to the laboratory in the provided prepaid return shipping envelope.

Upon receipt at the laboratory, the blood sample is analyzed by the fully automated Alinity i TSH chemiluminescent microparticle immunoassay on the Alinity ci series analyzer. This assay measures TSH levels by binding to monoclonal anti-β TSH coated microparticles. The amount of TSH in the blood sample is measured in relative light units by a chemiluminescent reaction.

TEST INTERPRETATION

This assay will provide accurate TSH values for the tested specimen. This value is to be used in conjunction with other clinical and laboratory information for analyses of thyroid function.

DISCLAIMERS/LIMITATIONS

Certain medications (e.g., corticosteroids), stress, food intake, recent X-ray with iodine dye, and recent tests using radioactive materials can affect TSH results.

These results should be interpreted in conjunction with other laboratory and clinical information.

Assay interference may occur in specimens from individuals routinely exposed to animals or to animal serum products. Additional clinical or diagnostic information may be required for these specimens.

Additional testing is recommended if TSH results are inconsistent with clinical evidence.

False results may occur in specimens from individuals that have received preparations of mouse monoclonal antibodies for diagnosis or therapy. Additional clinical or diagnostic information may be required for these specimens.

Correct specimen collection and handling is required for optimal assay performance. The assay is unaffected (≤ 10% interference) by hemoglobin (500 mg/dL), bilirubin (20 mg/dL), triglycerides (3000 mg/dL), and protein (12 g/dL).

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