

## TSH Releasing Hormone Test - Full Clinical Guideline

Reference no.: CHISCG22

**THIS TEST IS ONLY TO BE PERFORMED FOLLOWING DISCUSSION WITH A  
CONSULTANT BIOCHEMIST OR ENDOCRINOLOGIST**

### 1. Introduction

TSH releasing hormone (TRH) is a modified tripeptide (pyroglutamyl-histidyl-proline amide), which acts to stimulate both the synthesis and release of TSH from the anterior pituitary gland. It is synthesised in the hypothalamus and transported to the pituitary via the hypothalamic-hypophyseal portal system.

Bolus intravenous administration of TRH in the normal subject leads to a sharp rise in serum TSH concentration, peak levels being reached at about 20 minutes. Exaggerated responses are seen in primary hypothyroidism, while in hyperthyroidism the response is suppressed.

In hypothyroidism due to hypothalamic-pituitary disease, the response is often abnormal.

### 2. Guideline

#### INDICATIONS

Before the introduction of sensitive TSH methods, the TRH test was in common use to confirm the diagnosis of hyperthyroidism. Its use is now restricted to the differential diagnosis of TSHoma and thyroid hormone resistance (high TSH and high thyroxine in both cases).

#### CONTRAINDICATIONS

Allergy to TRH (rare).

The TRH test should not be carried out in pregnant women.

#### SIDE EFFECTS

Side effects are generally minor and include a transient desire to micturate, a metallic taste in the mouth and transient nausea. Rarely, rises in blood pressure and arrhythmias have been noted.

#### PREPARATION

##### Planning

Patients should not have taken thyroxine or triiodothyronine for 3 weeks prior to the test.

The test can be carried out at any time, as an outpatient procedure.

##### Patient

There are no special requirements for the patient, fasting is unnecessary.

##### Equipment

- TRH 200 micrograms (TRH Cambridge (Proterelin) 200 micrograms per vial is obtainable from Pharmacy).
- 3 SST (yellow top) blood tubes.

**PROCEDURE**

The TRH test procedure is described in the table below. Samples must be clearly labelled with patient name, date and time, eg. 09:30.

0 minutes	Take a blood sample, minimum volume 5 mL, into a SST (yellow top) tube for FT <sub>4</sub> and TSH
0 minutes	Inject 200 micrograms of TRH as a single bolus intravenous injection
20 minutes	Take a blood sample, minimum volume 5 mL, into a SST (yellow top) tube for TSH
60 minutes	Take a blood sample, minimum volume 5 mL, into a SST (yellow top) tube for TSH

Send all three samples together with one completed Chemical Pathology form, stating that this is a TRH test to the Chemical Pathology Department.

**INTERPRETATION**

TSH levels in normal subjects rise by at least 2 mIU/L to greater than 3.4 mIU/L, and maximal level occurs at 20 minutes with a subsequent fall at 60 minutes.

A high basal level of TSH (>5 mIU/L), with an exaggerated response to TRH (20 minute TSH >22 mIU/L), is seen in primary hypothyroidism.

In hypothalamic and pituitary disease, responses are variable and may be normal, impaired or delayed (ie. 60 minute level is higher than 20 minute level). A delayed response with maximal TSH seen at 60 minutes may be seen in hypothalamic dysfunction but is not a reliable indicator of this.

The TSH response is flat in most cases of TSHoma whereas in thyroid hormone resistance the TSH response is brisk.

TSH response to TRH may be reduced in patients receiving suppressive doses of glucocorticoids or dopamine agonists e.g. L-DOPA, bromocriptine and fluoxetine. The TSH response may be enhanced by dopamine antagonists e.g. metoclopramide, oestrogens and theophylline and sertraline.

**ASSAYING LABORATORY**

Pathology at the Royal Derby Hospital

**TURNAROUND TIME**

24hr

**NOTES**

This test is frequently combined with insulin stress test (in which case patient is fasted) and GnRH tests.

### 3. References

Brucker-Davis F, Ildfield EH, Skarulis MC, Doppman JL, Weintraub BD. Thyrotropin-secreting pituitary tumors: diagnostic criteria, thyroid hormone sensitivity and treatment outcome in 25 patients followed at the National Institutes of Health. *J Clin Endocrinol Metab* 1999; 84: 476 – 486.

Ormston, Garry, Cryer, Besser, Hall. Thyrotrophin-releasing hormone as a thyroid function test. *Lancet*; 1971; **ii**: 10.

Hall, Ormston, Besser, Cryer, McKendrich. The thyrotrophin-releasing hormone test in diseases of the pituitary and hypothalamus. *Lancet*; 1972; **i**: 759.

See also data sheet for TRH - Cambridge.

### 4. Documentation Controls

Development of Guideline	Helen Seddon, Clinical Scientist Consultant Endocrinologist (Roger Stanworth)
Consultation with:	Departments of Biochemistry and Endocrinology
Approved By:	Endocrinology/Biochemistry MDT meeting – 23/11/22 Division of Cancer, Diagnostics & Clinical Support – 24/01/23
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Key Contact:	Consultant Healthcare Scientist (Julia Forsyth) Helen Seddon, Clinical Scientist