

## **PITUITARY FUNCTION TEST PROTOCOL (IST, TRH, LHRH)**

### **INTRODUCTION**

The Insulin Stress Test is used to assess the ability of the anterior pituitary to secrete growth hormone and indirectly ACTH, in response to the stress of hypoglycaemia. As serum cortisol is measured, the whole hypothalamic-pituitary-adrenal cortex axis is tested. Thyrotrophin-Releasing Hormone (TRH) and LH/FSH-RH can be administered with insulin to provide a single test assessing anterior pituitary reserve.

### **CONTRAINDICATIONS AND SIDE EFFECTS**

The test is potentially dangerous and should be done under direct medical supervision. It should NOT be performed in the following patients:

1. Age > 60 years.
2. This test should not be performed on children outside a specialist paediatric endocrine unit
3. Ischaemic heart disease
4. Epilepsy
5. Severe panhypopituitarism, hypoadrenalism (0900 cortisol < 100 nmol/L)

It is advisable that all patients with suspected primary or secondary hypoadrenalism or on glucocorticoids have a SYNACTHEN test performed first to ensure adequate adrenal response. Hypothyroidism impairs the GH and cortisol response but corticosteroid replacement should be done before thyroxine is given. Glucose for intravenous administration should be immediately available in case severe hypoglycaemia develops. At the end of the test the patient should be given something to eat. If it is necessary to administer glucose during the test **continue with blood sampling**; the stress will have been adequate.

### **PATIENT PREPARATION**

Hydrocortisone, cortisone and prednisolone interfere with cortisol assay. If necessary the patient should be transferred to alternative medication (eg. dexamethasone) 7 days prior to the test.

Patient should fast overnight (at least 10 hours) and the test performed in the morning.

### **PROTOCOL**

Please use the separate pro-forma to record samples taken and timing.

1. After an overnight fast, insert indwelling intravenous cannula and wait at least **30 minutes** for hormone levels to return to basal levels.
2. Take basal blood samples according to sample pro-forma.
3. Inject soluble insulin intravenously (for dosage guidelines see box). If required, inject 100ug of LHRH and 200ug TRH intravenously immediately after insulin – **note times on sample pro-forma**.
4. Continue to take samples as per pro-forma (20, 45, 60, 90 and 120 minutes).

If symptoms of hypoglycaemia occur at other times, additional sample(s) for glucose only should be taken: this is important in cases of suspected growth hormone deficiency.

**Insulin Dosage:** Insulin sensitivity will vary endocrine status of the patient and care should be taken in selecting the correct dose. Guidelines on insulin dosage are as follows:

- Probably normal patients – 0.15 units/kg body weight.
- Suspected hypopituitary patients (the most sensitive) 0.10 units/kg.
- Suspected Cushings or Acromegaly (the most resistant) up to 0.3 units/kg.

### **CRITERIA FOR ADEQUATE HYPOGLYCAEMIA**

The blood glucose level must fall to less than 2.2 mmol/l, preferably with clinical signs of hypoglycaemia (N.B. glucose meters are unreliable for detecting hypoglycaemia). If after 60 mins adequate hypoglycaemia has not been obtained, collect the 60 min blood to complete LHRH and TRH tests. The iv dose of insulin can be repeated and the procedure recommenced (ie. collect SST and fluoride samples at 20, 45, 60, 90 and 120 mins post repeat dose). In this case please complete a separate sample proforma

### **NORMAL RESPONSES**

**ITT:** It is necessary for the plasma glucose to fall to less than 2.2 mmol/l for this test to be valid. There should be a marked rise in cortisol and growth hormone levels with the different responses peaking at 20-90 minutes. The base-line cortisol level should be 140-640 nmol/l with an increase of a least 170 nmol/l to a peak value of 540-785 nmol/l. Base-line growth hormone levels should be less than 4.2 ug/L (10 mU/L) with an increase to a peak value between 8.3-30 ug/L (20-70 mU/L)

**TRH:** The base-line level of serum TSH should be less than 7 mU/l, followed by a rise of greater than 2 mU/l to a peak less than 25 mU/l at 20 minutes in response to TRH, and then a return towards base-line value at 60 minutes.

**LHRH:** In adults, serum LH shows at least a 2- to 4-fold increase, with a maximum value being at 20 minutes. Serum FSH shows a 2- to 3-fold increase, also with maximum value at 20 minutes. In children, the FSH response may exceed the LH response.

The degree of the various responses varies widely and reference range limits (particularly for peak responses) should not be regarded too rigidly.

All the responses must be considered together and viewed carefully in the light of the whole clinical context of the patient before final conclusions are drawn as to the assessment of hypothalamic-anterior pituitary reserve function.

***Please note: All ITT/LHRH/TRH tests must be accompanied by a completed sample pro-forma.***

### **CONTACTS**

Biochemistry                      Biochemist                      x 3025 / 3038 / 3029