ICE Test Name: Please request tests separately Child Glucagon: GH (-30m) Thyrotropin Stimulation (base), Child GnRH Stimulation (base)

**Principle**
Simultaneous administration of GH stimulants and hypothalamic releasing hormones GnRH and TRH does not alter the hormonal response from that seen during a specific single provocation test. When multiple pituitary hormone deficiencies are suspected, it is practical and economical to carry out as many combined tests as possible.

**Indication**
- Investigation of known/suspected multiple pituitary hormone disease

**Precautions**
- The GnRH test cannot be performed if the child has been primed with sex steroid to stimulate GH response
- The test should not be performed on a patient with phaeochromocytoma or insulinoma as it may provoke an attack.
- The test should not be carried out following starvation of >48 hours or in the presence of a glycogen storage diseases. The inability to mobilise glycogen may result in hypoglycaemia.
- The test should not be carried out in patients with severe hypocortisolaemia (9.00am level <100 nmol/L)
- Thyroid function must be normal as thyroxine deficiency may reduce the GH and cortisol response.

**Side Effects**
- Glucagon can commonly result in nausea and abdominal pain (30%) and patients may rarely vomit.
- In children with suspected hypopituitarism prolonged fasting may induce hypoglycaemia. Blood glucose should be checked by POCT in these patients whenever a sample is taken.
- Asthmatic patients should be carefully monitored
- TRH administration can give patients the desire to urinate. It is therefore advisable to ask older children to empty their bladder before commencing the test.

**Preparation**
- Patients should have water only for 8 hours prior to the test.

**Protocol**
1. Insert an indwelling 22 gauge, blue cannula and take a blood sample for growth hormone and U&E (t = -30). Cannulation may cause growth hormone to rise; therefore the patient should rest for 30 min before the test is commenced.
2. Take blood samples for growth hormone, cortisol, prolactin, TSH, fT4, LH, FSH, testosterone (boys) or oestradiol (girls; BASAL, t = 0). Check the patient’s blood glucose level using a meter.
3. **Infusions and Injections**
   **Glucagon**
   Glucagon is administered i.m. using a dose of 30 µg/kg of body weight up to a maximum of 1 mg.

   **Thyrotrophin Releasing Hormone**
   TRH 5 micrograms/kg (to a maximum of 200 micrograms) injected slowly i.v. over 2 min.

   **Gonadotrophin Releasing Hormone**
   Give a bolus of GnRH i.v. in a dose of 100 micrograms. Children <1 year should be given a dose of 2.5 micrograms/kg.
<table>
<thead>
<tr>
<th>Time (min) post infusions</th>
<th>Blood sample</th>
<th>Glucagon</th>
<th>TRH</th>
<th>GnRH</th>
<th>Synacthen</th>
<th>Extra Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>-30</td>
<td>2 mL Clotted</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 mL LiHep</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1mL EDTA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>4 x2 mL Clotted</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>U&amp;E</td>
</tr>
<tr>
<td>20</td>
<td>2 mL Clotted</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>2 mL Clotted</td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>60</td>
<td>2 x 2 mL Clotted</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>90</td>
<td>2 mL Clotted</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>120</td>
<td>2 mL Clotted</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>150</td>
<td>2 mL Clotted</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>180</td>
<td>2 mL Clotted</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Samples**

**Hormones**

- 2 mL (minimum) clotted blood (white top)

**U&E**

- 1 mL lithium heparin blood (orange top)

**Record actual sample collection times on the printed barcodes. SEND ALL SAMPLES TO THE LABORATORY TOGETHER**

Only one clotted blood is required for each of the times except for the baseline samples, and at 60 min when 2 samples are required. It is, however, essential that each sample has a full 2 mL to ensure that there is sufficient blood volume for all tests.

One Biochemistry request form is needed for each hormone measured. Please indicate the time of the sample on both the specimen tube and the request form.

**Interpretation**

As for individual stimulation tests.

**References**