Standard Synacthen test for Congenital Adrenal Hyperplasia (CAH)


Indication

This is performed for the investigation of adrenal insufficiency and congenital adrenal hyperplasia (CAH) in children and adults.

Contraindication

The Synacthen test gives unreliable results within 2 weeks of pituitary surgery.

Principle

Adrenal glucocorticoid secretion is controlled by adrenocorticotropic hormone (ACTH) released by the anterior pituitary. This test evaluates the ability of the adrenal cortex to produce cortisol after stimulation by synthetic ACTH (tetracosactide: Synacthen ®). In subjects with enzyme deficiency in the steroid synthetic pathway, cortisol may, or may not, be adequately secreted. However, there is excessive secretion of the precursor steroids before the defective enzyme. The commonest form of CAH is due to deficiency of 21-hydroxylase and in these subjects increased secretion of 17 OH-progesterone can be detected.

Side effects

There are rare reports of hypersensitivity reactions to 'Synacthen' particularly in children with history of allergic disorders. See position statement from the Society for Endocrinology about the Use of Synacthen in Patients with a History of Asthma

Preparation

There are no dietary restrictions for this test. This test should be performed in the morning as diurnal variations in 17 OH-progesterone have not been established in CAH.

Hydrocortisone should be omitted on the morning of the test. Prednisolone should be stopped 24 hours before the Synacthen test, and recommenced after (unless instructed to the contrary).

Requirements

- 2 plain tubes and EDTA for ACTH (sent on ice)
- 250 microgram Synacthen (1 vial)
- The dose for children is 36 micrograms/kg body weight up to a maximum of 250 micrograms

Procedure

<table>
<thead>
<tr>
<th>Time</th>
<th>Action</th>
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<tbody>
<tr>
<td>0900</td>
<td>Take 3 mL blood for cortisol, 17OHP and ACTH inject Synacthen IV</td>
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<tr>
<td>0930</td>
<td>Take further sample for cortisol &amp; 17OHP</td>
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Interpretation

- A normal cortisol response would be indicated by a rise in the cortisol concentration of the 30 min sample to greater than 600 nmol/L.
- There are marked variations in 17 OH-progesterone throughout the menstrual cycle and "normal" values cannot exclude non-classical CAH. Heterozygotes for 21 OH-deficiency should have post-ACTH values of 17 OH-progesterone > 35 nmol/L (guide value). There is an overlap with normals and this test is not diagnostic.
- Homozygotes for non-classical CAH may have normal baseline values for 17 OH-progesterone but will have exaggerated responses to ACTH of > 60 nmol/L (guide value).
- Adult individuals with the rarer forms of late-onset CAH eg 3 beta hydroxylase or 11 hydroxylase have normal 17OH-progesterone responses to ACTH.
- In children, and depending on the clinical context, a lower peak cortisol level (500 to 550 nmol/L) is occasionally acceptable. Please discuss any suboptimal results with the paediatric endocrinology department
References: see website link above