ICE test name: Child Low dose synacthen (base)

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 (tetracosactrin: Synacthen). The low-dose test is thought to be a more sensitive version of the standard dose Synacthen test, using a physiological rather than a pharmacological dose of Synacthen.

Indication
The low-dose test may be indicated in children who have a normal response to the standard dose Synacthen test, but a clinical history (e.g. chronic steroid therapy or symptoms, such as hypoglycaemia), suggestive of adrenocortical insufficiency. Use this low dose test for children who have been on inhaled or topical steroids, on corticosteroid treatment and when partial adrenal insufficiency is suspected.

Precautions
- The test is unreliable in patients taking the oral contraceptive pill.
- The dose of Synacthen involved in this test is very low. Great care must be taken with preparation and administration.

Side Effects
- Severe allergic reactions to Synacthen have been described, particularly in children with a history of allergic disorders, but are very rare. In children with prior known synacthen sensitivity, a repeat synacthen test is not advisable. In such cases, morning basal ACTH and cortisol levels can alternatively test for adrenal function.

Preparation
- The patient does not need to be fasted.
- This test can be performed at any time of day
- All glucocorticoid therapy (other than dexamethasone or betamethasone) interferes with the assay of cortisol. If the patient is on prednisolone therapy, this must be discontinued for 24 hours prior to the test. If the patient is on a supra-physiological dose of hydrocortisone, this should be reduced to a physiological level (6 micrograms/m²/day) prior to the test. Omit the dose the night before and on the morning of the test. If the paediatric endocrine consultant is very anxious about the degree of adrenal insufficiency then omit only the morning hydrocortisone dose. However, the patient should take their usual dose of corticosteroid as soon as the test is completed.

Protocol
1. Insert reliable cannula and rest patient for 30 minutes.
2. Prepare 1 microgram solution of Synacthen from 250 micrograms vial as follows:
   - Dilute 1 mL to 50 mL with normal saline giving 250 micrograms in 50 mL
   - Take 1 mL of above solution and dilute with 9 mL of saline giving 5 micrograms in 10 mL.
   - The diluted dose must be freshly prepared.
3. Take basal blood sample for cortisol (t = 0 min).
4. Administer 2 mL of above solution (1 microgram) to patient i.v.
5. Flush the line with 5 mL saline to ensure that the whole dose has been administered.
6. Take blood samples at + 20 min
   + 30 min
   + 40 min
   after Synacthen, for cortisol

Samples
Cortisol: 1 mL lithium heparin (orange top) or clotted blood (white top)

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

Interpretation

- A normal response is a peak cortisol level of $\geq 430$ nmol/L. Levels below 430 nmol/L indicate a degree of adrenal insufficiency.

- In patients on long-term glucocorticoids it is difficult to differentiate underlying adrenocortical disorders from the adrenal-suppressive effects of the treatment. A urine steroid profile may also be misleading after only 24 hours off hydrocortisone. The urine steroid lab at King’s College Hospital recommend changing the glucocorticoid to dexamethasone and stimulating with depot Synacthen for up to 5 days before sample collection, unless glucocorticoid treatment has been brief. Please discuss with the paediatric endocrine team and the laboratory.

References