

Low Dose Dexamethasone Suppression Test

Test Name: CHILD LOW DOSE DEXAMETHASONE SUPPRESSION TEST

Principle

Cushing's syndrome comprises a large group of signs and symptoms which are the result of prolonged exposure to inappropriately high levels of glucocorticoids. In normal subjects the administration of a supra-physiological dose of glucocorticoid results in suppression of ACTH and cortisol secretion. In endogenous Cushing's syndrome of any cause, there is a failure of this suppression when a low dose of the synthetic glucocorticoid dexamethasone is given. The low dose dexamethasone suppression test has been reported to have a sensitivity and specificity of 94% when used to differentiate paediatric patients with Cushing's syndrome from normal individuals. This 48-hour 2 mg/day low dose protocol has improved specificity compared to the overnight test.

Indication

- To diagnose Cushing's syndrome

Precautions

- False positive results may be obtained following the use of drugs that accelerate dexamethasone metabolism including phenobarbital, phenytoin, carbamazepine, rifampin, rifapentine, ethosuximide, diltiazem or cimetidine. If possible, these should be stopped a few weeks prior to the test.
- Drugs that increase cortisol binding globulin (CBG) may also falsely elevate cortisol results including oestrogens.
- Dexamethasone clearance maybe reduced in patients with liver and/ or renal failure.
- Dexamethasone should be used cautiously in a child with diabetes mellitus with meticulous measurements of blood glucose during the period of the test.
- The child should not be on exogenous glucocorticoids during the test including steroid creams, inhalers and eye drops.

Side Effects

- There is no significant effect of short-term dexamethasone use.

Preparation

- None required.

Protocol

ACTH samples should be sent IMMEDIATELY to laboratory on ice for centrifugation and freezing

1. **Day 1** - Take blood samples for cortisol and plasma ACTH at 0900h and 2400h
2. **Days 2 and 3** - Starting at 0900h administer dexamethasone every 6 hours (i.e., 1500, 2100, 0300h) as follows:
 - a. ***If the patient weighs more than 40 kg, use a dose of 0.5 mg dexamethasone***
 - b. ***If the patient weighs less than 40 kg, adjust the dose to 30 micrograms/kg/day (divided into 4 daily doses)***

All doses must be adhered to for the test to be valid.

3. **Day 4** - Take blood samples for serum cortisol and plasma ACTH at 0900h, 6 hr after the last dose of dexamethasone.

Time Points:

Day	Time (h)	Procedure	Sample
1	0900	-	Blood for Cortisol/ ACTH
	2400	-	Blood for Cortisol/ ACTH
2	0900	0.5 mg Oral Dexamethasone	-
	1500	0.5 mg Oral Dexamethasone	-
	2100	0.5 mg Oral Dexamethasone	-
3	0300	0.5 mg Oral Dexamethasone	-
	0900	0.5 mg Oral Dexamethasone	-
	1500	0.5 mg Oral Dexamethasone	-
	2100	0.5 mg Oral Dexamethasone	-
4	0300	0.5 mg Oral Dexamethasone	-
	0900	-	Blood for Cortisol/ ACTH

Samples

ACTH 1.8 mL EDTA tube (pink top)

Send IMMEDIATELY to laboratory on ice for centrifugation and freezing

Cortisol 1.2 mL lithium heparin (orange top) or clotted blood (white top)

Interpretation

- If the cortisol result on day 3 is <50 nmol/L, the patient has shown appropriate suppression and Cushing's syndrome can be ruled out.
- Patients with Cushing's syndrome, from whatever cause, lose the normal negative feedback control by circulating glucocorticoids on ACTH release and thus exhibit detectable plasma ACTH and cortisol concentrations after dexamethasone administration.
- In patients who fail to suppress, a pre-test ACTH level of <5 ng/L is highly suggestive of an adrenal cause of Cushing's syndrome.
- Cortisol suppression >30% following the low dose dexamethasone suppression test correlates well with the response in the high dose dexamethasone suppression test and is therefore suggestive of Cushing's disease.

References

1. Nieman L.K., Beverly M.K.B., Findling J.W., Newell-Price J., Savage M.O., Stewart P.M. and Montori V.M. (2008) The Diagnosis of Cushing's Syndrome: An endocrine society clinical practice guideline. *JCEM* **93**:1526-1540
2. Dias R., Storr H.L., Perry L.A., Isidori A.M., Grossman A.B. & Savage M.O. (2006) The discriminatory value of the low-dose dexamethasone suppression test in the investigation of paediatric Cushing's syndrome. *Horm Res* **65**(3): 159 - 162