

Chapter 2

ACTH Stimulation Test for Adrenal Insufficiency with Free Cortisol Levels

Indication:	This test is performed to determine whether the adrenal glands can respond normally to ACTH by producing free cortisol [1, 2]. This test is particularly helpful in patient with albumin <2.5 mg/dL or low CBG.
Preparation:	Patients should be off glucocorticoids that potentially interfere with the cortisol assay (hydrocortisone, prednisone) for 24 h pretesting. Dexamethasone may be used.
Materials Needed:	Three (3) gold top tubes labeled as baseline, 30, and/or 60 min
<div>Free cortisol 0.6 ml: Gold top tube. Transport: Frozen. Remove serum from cells and freeze within 2 hours after collection.</div>	Cortrosyn 250 mcg Syringes/needles
Assay for Cortisol:	Electrochemiluminescence immunoassay (ECLIA).
Precautions:	Cosyntropin is category C for pregnancy.
Interpretation:	Normal response: Peak stimulated cortisol value >1.2 mcg/dl [3, 4] at 30 or 60 min. Most subjects achieve higher cortisol levels at 60 min compared to the 30 min value following 250 mcg of cosyntropin administration.

Caveats:

- This cut-off value may not apply to ICU patients. Further studies are needed to establish appropriate levels in such patients. Benefit from glucocorticoid therapy may be beyond adrenal function status in patients with septic shock [1]
- Free cortisol index (FCI) may be used as an alternative to this dynamic test, if free cortisol assay is not available.
- FCI: Total cortisol (nmol/L)/CBG (mg/dl) < 12 suggests adrenal insufficiency [5]. Total cortisol should be measured in the morning between 8–10 am.

Procedure: Completed as outpatient

- 1. Draw blood sample for baseline serum free cortisol.
- 2. Give Cortrosyn 250 mcg IM.
- 3. At 30 and/or 60 min, draw blood samples for serum cortisol.

Physician name and signature: _____

RN performing the procedure: _____

Additional orders by physician: _____

	Baseline	30 min	60 min
Free cortisol			

References

1. Hamrahian AH, Oseni TS, Arafah BM. Measurements of serum free cortisol in critically ill patients. *N Engl J Med*. 2004;350(16):1629–38.
2. Tan T, Chang L, Woodward A, McWhinney B, Galligan J, Macdonald GA, et al. Characterizing adrenal function using directly measured plasma free cortisol in stable severe liver disease. *J Hepatol*. 2010;53(5):841–8.
3. Lewis JG, Bagley CJ, Elder PA, Bachmann AW, Torpy DJ. Plasma-free cortisol fraction reflects levels of functioning corticosteroid-binding globulin. *Clinica Chimica Acta*. 2005;359(1–2):189–94.
4. Vogeser M, Briegel J, Zachoval R. Dialyzable free cortisol after stimulation with synacthen. *Clin Biochem*. 2002;35(7):539–43.
5. Le Roux CW, Chapman GA, Kong WM, Dhillon WS, Jones J, AlaghbandZadeh J. Free cortisol index is better than serum total cortisol in determining hypothalamic-pituitary-adrenal status in patients undergoing surgery. *J Clin Endocrinol Metab*. 2003;88(5):2045–8.

The Cleveland Clinic Manual of Dynamic Endocrine
Testing

Bahadır Ergin, A.; Kennedy, A.L.; Gupta, M.; Hamrahian,
A.

2015, VIII, 124 p. 23 illus., 3 illus. in color., Softcover

ISBN: 978-3-319-13047-7