

TEST: CORTISOL

PRINCIPLE:

Corticosteroids are synthesized from cholesterol in the adrenal cortex, and cortisol is the main corticosteroid produced and secreted by humans. Physiological actions of cortisol include regulation of carbohydrate metabolism, electrolyte balance, water distribution and immunosuppressant and anti-inflammatory activity. Cortisol secretion is dependent on the integrity of the hypothalamic-pituitary-adrenal (HPA) axis and the steroid exerts a negative feedback on its own synthesis through this axis. Cortisol measurement is thus an important parameter in the investigation of apparent HPA dysfunction.

Cortisol circulates largely in protein-bound forms, the majority being attached to corticosteroid binding globulin. The half-life of cortisol in the circulation is about 80 minutes, with approximately 1% excreted unchanged in the urine. This excreted fraction is called urinary “free cortisol” and if renal function is normal, will reflect the level of circulating non-protein bound cortisol. Most immunological methods employed for the determination of urinary free cortisol omit chromatographic steps thereby co-measuring cortisol metabolites. After metabolic breakdown, mainly in the liver, cortisol is excreted into the urine as dihydro- and tetrahydro-derivatives conjugated to glucuronic acid.

The circulating cortisol concentration is normally subject to a circadian rhythm, with the maximum level being reached at 8-9 a.m. and the minimum around midnight. Concentrations are usually elevated in pregnancy and in patients receiving high dose estrogen therapy. Anomalous cortisol concentrations can result from stimuli such as trauma, fear, fever, shock, hypoglycemia and depression.

In pathological states of the HPA axis, elevated or depressed values of cortisol may be found. Adrenal tumors and pituitary or ectopic adrenocorticotrophic hormone (ACTH)-producing tumors are frequently associated with cortisol over-production (Cushing’s syndrome), while adrenal insufficiency results in cortisol under-production (Addison’s disease).

SPECIMEN REQUIREMENTS:

2ml serum collected in a red top tube with no additive or in a serum separator tube (gel barrier). Store in the refrigerator at 2°-8° for up to 7 days. For long term storage, freeze at -20° C or below. Avoid thaw freeze cycles.

METHOD: Enhanced Chemiluminescence

REFERENCES:

1. Harris GW, Donovan BT, Best OH, Taylor NB (eds). The adrenal gland. *The Physiological Basis of Medical Practice*. ed. 1555-1568; 1966.
2. James VHT, Landon J (eds). Control of corticosteroid secretion – current views and methods of assessment. *Recent Advances in Endocrinology*. Ed. 8: 50-94; 1968.
3. Hellman L et al. Cortisol is secreted episodically by normal man. *Journal of Clinical Endocrinology and Metabolism*. 30: 411-422; 1970.

Normal Range:

Before 10:00 a.m.: 4.46-22.7 µg/ml

After 5:00 p.m.: 1.7-14.1 µg/ml

Normal reference intervals (100 samples) were obtained from sera of normal patients sampled at the times indicated.

Turnaround Time: 1 day