MAYO CLINIC LABORATORIES

Test Definition: ACTH

Adrenocorticotropic Hormone, Plasma

Overview

Useful For
Determining the cause of hypercortisolism and hypocortisolism

Method Name
Electrochemiluminescence Immunoassay

NY State Available
Yes

Specimen

Specimen Type
Plasma EDTA

Necessary Information
Separate specimens should be submitted when multiple tests are ordered.

Specimen Required
Patient Preparation: For 12 hours before specimen collection, patient **should not** take multivitamins or dietary supplements (eg, hair, skin, and nail supplements) containing biotin (vitamin B7).
Supplies: Sarstedt 5 mL Aliquot Tube (T914)
Collection Container/Tube: Ice-cooled, lavender top (EDTA)
Submission Container/Tube: Plastic vial
Specimen Volume: 1 mL
Collection Instructions:
1. Morning (7 a.m.-10 a.m.) specimen is desirable.
2. Collect with a pre-chilled lavender top (EDTA) tube and transport to the laboratory on ice.
3. Within 2 hours of collection centrifuge at refrigerated temperature and immediately separate plasma from cells.
4. Immediately freeze plasma.

Forms
If not ordering electronically, complete, print, and send 1 of the following forms with the specimen:
-General Request (T239)
-Oncology Test Request (T729)

Specimen Minimum Volume
0.75 mL

Reject Due To

Gross hemolysis	Reject
Gross lipemia	OK

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Plasma EDTA	Frozen (preferred)	28 days	
	Ambient	2 hours	
	Refrigerated	3 hours	

Clinical & Interpretive

Clinical Information

Corticotropin (previously adrenocorticotropic hormone: ACTH) is synthesized by the pituitary in response to corticotropin-releasing hormone (CRH), which is released by the hypothalamus. ACTH stimulates adrenal cortisol production. Plasma ACTH and cortisol levels exhibit peaks (6-8 a.m.) and nadir (11 p.m.).

Disorders of cortisol production that might affect circulating ACTH concentrations include:
Hypercortisolism
-Cushing syndrome:
- Cushing disease (pituitary ACTH-producing tumor)
- Ectopic ACTH-producing tumor
- Ectopic CRH
- Adrenal cortisol-producing tumor
- Adrenal hyperplasia (non-ACTH dependent, autonomous cortisol-producing adrenal nodules)

Hypocortisolism
-Addison disease-primary adrenal insufficiency
-Secondary adrenal insufficiency
-Pituitary insufficiency
-Hypothalamic insufficiency
-Congenital adrenal hyperplasia-defects in enzymes involved in cortisol synthesis

Reference Values

7.2-63 pg/mL (a.m. draws)
Reference ranges are based on samples drawn between 7 a.m.-10 a.m.
No established reference values for p.m. draws
Pediatric reference values are the same as adults, as confirmed by peer reviewed literature.

Petersen KE. ACTH in normal children and children with pituitary and adrenal diseases. I. Measurement in plasma by radioimmunoassay-basal values. Acta Paediatr Scand. 1981;70(3):341-345

For International System of Units (SI) conversion for Reference Values, see

www.mayocliniclabs.com/order-tests/si-unit-conversion.html.

Interpretation

In a patient with hypocortisolism, an elevated corticotropin (previously adrenocorticotropic hormone: ACTH) indicates primary adrenal insufficiency, whereas a value that is not elevated is consistent with secondary adrenal insufficiency from a pituitary or hypothalamic cause.

In a patient with hypercortisolism (Cushing syndrome), a suppressed value is consistent with a cortisol-producing adrenal adenoma or carcinoma, primary adrenal micronodular hyperplasia, or exogenous corticosteroid use.

Normal or elevated ACTH in a patient with Cushing syndrome puts the patient in the ACTH-dependent Cushing syndrome category. This is due to either an ACTH-producing pituitary adenoma or ectopic production of ACTH (bronchial carcinoid, small cell lung cancer, others). Further diagnostic studies such as dexamethasone suppression testing, corticotropin-releasing hormone stimulation testing, petrosal sinus sampling, and imaging studies are usually necessary to define the ACTH source.

ACTH concentrations vary considerably depending on physiological conditions. Therefore, ACTH results should always be evaluated with simultaneously measured cortisol concentrations.

Cautions

In very rare instances of the ectopic corticotropin (previously adrenocorticotropic hormone: ACTH) syndrome, the elevated ACTH may be biologically active but not detected by the immunometric assay.

In rare cases, some individuals can develop antibodies to mouse or other animal antibodies (often referred to as human anti-mouse antibodies [HAMA] or heterophile antibodies), which may cause interference in some immunoassays. The presence of antibodies to streptavidin or ruthenium can also rarely occur and may also interfere in this assay. Caution should be used in interpretation of results and the laboratory should be alerted if the result does not correlate with the clinical presentation.

Under ACTH 1-24 medication, ACTH measurement is not recommended, due to negative interference with the sandwich assay.

Patients taking glucocorticoids may have suppressed levels of ACTH with an apparent high level of cortisol. This may be due to cross-reactivity with the cortisol immunoassays. If exogenous Cushing is suspected, a cortisol level determined by liquid chromatography tandem mass spectrometry (eg, CINP / Cortisol, Mass Spectrometry, Serum) should be used with the ACTH level for the interpretation.

Values obtained with different assay methods or kits may be different and cannot be used interchangeably. Test results cannot be interpreted as absolute evidence for the presence or absence of malignant disease.

Clinical Reference

1. Bornstein SR, Allolio B, Arlt W, et al. Diagnosis and treatment of primary adrenal insufficiency: an endocrine society clinical practice guideline. J Clin Endocrinol Metab. 2016;101(2):364-389.
2. Nieman LK, Biller BMK, Findling JW, et al. The diagnosis of Cushing's syndrome: an Endocrine Society clinical practice guideline. J Clin Endocrinol Metab. 2008;93(5):1526-1540.

Performance

Method Description

The Roche Elecsys ACTH (corticotropin, previously adrenocorticotropic hormone) assay is a sandwich, electrochemiluminescence immunoassay that employs a biotinylated monoclonal ACTH-specific antibody and a monoclonal ACTH specific antibody labeled with a ruthenium complex. ACTH in the specimen reacts with both the biotinylated monoclonal ACTH-specific antibody and the monoclonal ACTH-specific antibody labeled with a ruthenium complex, forming a sandwich complex. Streptavidin-coated microparticles are added and the mixture incubates allowing the newly formed sandwich complex to become bound to the solid phase via the biotin streptavidin interaction. The reaction mixture is aspirated into the measuring cell where the microparticles are magnetically captured onto the surface of the electrode. Application of voltage to the electrode induces the chemiluminescent emission, which is then measured.

The assay employs two monoclonal antibodies specific for ACTH (9-12) and for the C-terminal region (ACTH 36-39). Due to common antigenic structure, the antibodies recognize intact biologically active ACTH 1-39 and the ACTH precursors pro-opiomelanocortin and pro-ACTH.(Package insert: Elecsys ACTH. Roche Diagnostics; V 1.0, 12/2020)

PDF Report

No

Day(s) Performed

Monday through Saturday

Report Available

1 to 3 days

Specimen Retention Time

2 weeks

Performing Laboratory Location

Mayo Clinic Laboratories - Rochester Superior Drive

Fees & Codes

Fees

- Authorized users can sign in to Test Prices for detailed fee information.
- Clients without access to Test Prices can contact Customer Service 24 hours a day, seven days a week.
- Prospective clients should contact their account representative. For assistance, contact Customer Service.

Test Classification

This test has been cleared, approved, or is exempt by the US Food and Drug Administration and is used per manufacturer's instructions. Performance characteristics were verified by Mayo Clinic in a manner consistent with CLIA requirements.

CPT Code Information

82024

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
ACTH	Adrenocorticotropic Hormone, P	2141-0

Result ID	Test Result Name	Result LOINC® Value
ACTH	Adrenocorticotropic Hormone, P	2141-0