

Detection of Cortisol in Human Serum with Roche e801

Test Name: Immunoassay for the in vitro quantitative determination of cortisol in human serum and plasma.

Method Name: The Elecsys Cortisol II assay makes use of a competition test principle using a monoclonal antibody which is specifically directed against cortisol. Endogenous cortisol which has been liberated from binding proteins with danazol competes with exogenous cortisol derivative in the test which has been labeled with ruthenium complex for the binding sites on the biotinylated antibody.

Results: Technical Range: 0.109-63.4 µg/dL
Reportable Range: 0.248-63.4 µg/dL

Reference Ranges: A.M.: 7-25 µg/dL
P.M.: 2-14 µg/dL

Clinical Significance: The determination of cortisol is used for the recognition and treatment of functional disorders of the adrenal gland.

Cortisol (hydrocortisone) is quantitatively the major glucocorticoid product of the adrenal cortex. The main reason to measure cortisol is to diagnose human diseases which are caused by the overproduction of cortisol in Cushing's syndrome (CS), deficiency of adrenal steroid excretion in Addison's disease, and for therapy monitoring (e.g. dexamethasone suppression test in Cushing's syndrome and hormone replacement therapy in Addison's disease). Cortisol plays an important role in the regulation of many essential physiological processes, including energy metabolism, maintenance of electrolyte balance and blood pressure, immunomodulation and stress responses, cell proliferation as well as cognitive functions. The major fraction of cortisol circulates bound to plasma proteins as corticosteroid binding globulin and albumin. The biologically active free fraction comprises only 2-5 % of the total hormone concentration.

Elevated serum levels can be found in stress responses, psychiatric diseases, obesity, diabetes, alcoholism and pregnancy, which may cause diagnostic problems in patients with Cushing's syndrome.

Low levels of cortisol are seen in patients with rare adrenal enzyme defects and after long-lasting stress.

The secretion of cortisol is mainly controlled by the hypothalamic-pituitary-adrenal axis (HPA). When cortisol levels in the blood are low, a group of cells in a region of the brain called the hypothalamus release corticotropin-releasing hormone (CRH) which causes the pituitary gland to secrete another hormone, adrenocorticotrophic hormone (ACTH), into the bloodstream. High levels of ACTH are detected in the adrenal glands and stimulate the formation and secretion of cortisol, causing blood levels of

cortisol to rise. As the cortisol levels rise, they start to block the release of CRH from the hypothalamus and ACTH from the pituitary.

Normally, the highest cortisol secretion happens in the second half of the night with peak cortisol production occurring in the early morning. Following this, cortisol levels decline throughout the day with lowest levels during the first half of the night. Therefore, the circadian variations of cortisol secretion and the influence of stress have to be considered for the sampling conditions in serum and plasma.

Submission Criteria:

For specimen collection and preparation, only use suitable tubes or collection containers.

Only the specimens listed below were tested and found acceptable.

Serum

Plasma: Li-heparin and K₂-EDTA plasma

Do not use fluoride plasma

The sample types listed were tested with a selection of sample collection tubes that were commercially available at the time of testing, therefore not all available tubes of all manufacturers were tested. Sample collection systems from various manufacturers may contain differing materials which could affect the test results in some cases. When processing samples in primary tubes (sample collection systems), follow the instructions of the tube manufacturer.

Storage and Stability: 12 months at -20°C

4 days at 2-8°C

Rejection Criteria:

Rejection criteria include but are not limited to:

1. Specimens containing fibrin or clots.
2. Excessive platelet clumping
3. Leaking specimens
4. Substandard mixing or collection
5. Expired or improperly stored collection tubes.
6. Improperly filled tubes based on collection tube manufacturer's guidelines.
7. Contaminated specimens (IV fluid, foreign particles, etc.)
8. Specimens not analyzed within the appropriate time frame.
9. Samples not shipped at appropriate temperature.
10. Samples without 2 proper identifiers or samples having identifiers that do not match the electronic or paper lab requisition.

Authorization:

Diagnostic testing can only be performed with approval from an authorized provider/agency.

Turn Around Time:

1 day.

Instructions for Serum Specimen Submission

General Information

The detection of cortisol in human serum and plasma is performed using a Roche cobas i58 analyzer. However, serum specimens are preferred.

Specimens must be collected and stored at 2-8°C if to be analyzed within 4 days and stored at -20°C if to be analyzed within 12 months. Please be aware that storing specimens at $\leq -70^{\circ}\text{C}$ ($\leq -94^{\circ}\text{F}$) is not permissible.

Specimens MUST be received at Reditus Laboratories within 4 days of collection.

Collection Instructions for Serum Specimen

1. Do not use expired collection tubes. Store collection tubes as per manufacturers recommendations. Use standard venipuncture practices for collecting samples. Filled gold top serum tubes are preferred.
2. Ensure that the patient's name, date-of-birth, and time/date of collection are recorded on the specimen tube along with the name or initials of the individual collecting the sample.
3. Complete all the demographic information on a sample requisition form through the approved electronic submission process
4. Refrigerate the specimen between 2-8°C (36-46°F) and ship or courier the specimen(s) within 48 hours.
5. The specimen(s) *must* be received at the laboratory **no later than** 48 hours *from the time of collection*.
 - a. **Avoid shipping specimens over weekends or holidays** as they may not be received at the laboratory and cold-packs will not maintain the required 2-8°C (36-46°F) specimen temperature.
 - b. Ensure that specimens shipped by commercial carrier are shipped with **overnight delivery**. If shipping on a Friday for Saturday delivery, ***you must include Saturday Delivery*** during shipment, or the specimens will not be received until the following non-holiday business day. Failure to receive specimens within 24 hours of shipment will result in specimens being rejected from testing.
6. For any questions pertaining to sample collection, storage, or shipping, please contact the Reditus Laboratories using the below contact information.

Instructions for Specimen Transport

1. **Messenger/Courier by ground transport.** Place specimen(s) into a biohazard labeled bag and seal securely. Place the test requisition(s) on the outside of the biohazard labeled bag. Place the sealed biohazard bag and test requisition(s) inside the shipping container. Place cold packs, which have been frozen for at least 24 hours, in the leak-proof outer container. The shipping container must be rigid, such as a Styrofoam cooler, and labeled with the UN 3373 Biological Substance Category B marking. Close securely.
2. **Commercial carrier by ground/air transport.** Place the specimen(s) inside a biohazard labeled bag and seal securely. Place the test requisition(s) on the outside of the biohazard labeled bag. Place the sealed bag and completed test requisitions(s) inside the outer shipping container. Place cold packs, which have been frozen for at least 24 hours, in the leak-proof outer container. Label the outer shipping container with Reditus Laboratories address listed below. Complete the return address section to include the name of the person shipping the package, business name and address, and a business phone number. The shipping container must include the UN3373 Biological Substance Category B marking.
3. *Ship specimens by overnight delivery* to the attention of Clinical Chemistry at Reditus Laboratories. This can be accomplished by use of local courier, shipping corporations or U.S. Postal Service.
 - a. **If specimens are shipped on a Friday for Saturday delivery, you must include/indicate Saturday delivery** during shipment, or the specimens will not be received until the following non-holiday business day. Failure to receive specimens within 24 hours of shipment will result

- in specimens being rejected from testing.
4. The specimen(s) must be received at the laboratory **no later than** 48 hours *from the time of collection* and 24 hours from the time of shipment. Do not ship specimens over weekends or holidays as they will not be received, and cold-packs will not maintain the required 2-8°C (36-46°F) specimen temperature.

NOTE: Testing may be delayed, or specimens may be considered UNSATISFACTORY if the above instructions are not followed or the requisition form is not filled out completely. If there are any questions about specimen collection, handling, or shipping please contact the Reditus Laboratories to speak with laboratory personnel.

Ship specimens by a local courier or overnight by commercial carrier to the designated laboratories indicated below.

Send to: Reditus Laboratories
200 Enterprise Drive
Pekin, IL 61554

Phone: (469) 498-0222

Website: <https://www.redituslabs.com/>