

Overview

Useful For

Confirming the presence of listed synthetic glucocorticoids (see Interpretation)

Confirming the cause of secondary adrenal insufficiency

This test is **not useful for** detection of fluticasone propionate.

Method Name

Liquid Chromatography Tandem Mass Spectrometry (LC-MS/MS) Stable Isotope Dilution Analysis

NY State Available

Yes

Specimen

Specimen Type

Serum

Specimen Required

Supplies: Sarstedt Aliquot Tube, 5 mL (T914)

Collection Container/Tube:

Preferred: Red top

Acceptable: Serum gel

Submission Container/Tube: Plastic vial

Specimen Volume: 2 mL

Collection Instructions: Centrifuge and aliquot serum into a plastic vial.

Specimen Minimum Volume

1.1 mL

Reject Due To

Gross hemolysis	OK
Gross lipemia	OK
Gross icterus	OK

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Serum	Frozen (preferred)	14 days	
	Ambient	24 hours	
	Refrigerated	7 days	

Clinical & Interpretive

Clinical Information

Synthetic glucocorticoids are widely used and have important clinical utility both as anti-inflammatory and immunosuppressive agents. The medical use of these agents, as well as their surreptitious use, can sometimes lead to a confusing clinical presentation. Patients exposed to these steroids may present with clinical features of Cushing syndrome but with suppressed cortisol levels and evidence of hypothalamus-pituitary-adrenal axis suppression.

Reference Values

- Negative
- Cutoff concentrations
- Betamethasone: 0.10 mcg/dL
- Budesonide: 0.20 mcg/dL
- Dexamethasone: 0.10 mcg/dL
- Fludrocortisone: 0.10 mcg/dL
- Megestrol acetate: 0.10 mcg/dL
- Methylprednisolone: 0.10 mcg/dL
- Prednisolone: 0.10 mcg/dL
- Prednisone: 0.10 mcg/dL
- Triamcinolone acetonide: 0.10 mcg/dL

Values for normal patients not taking these synthetic glucocorticoids should be less than the cutoff concentration (detection limit).

Interpretation

This test screens for and quantitates, if present, the following synthetic glucocorticoids: betamethasone, budesonide, dexamethasone, fludrocortisone, megestrol acetate, methylprednisolone, prednisolone, prednisone, and triamcinolone acetonide.

The presence of synthetic glucocorticoids in serum indicates current or recent use of these compounds. Since several of these compounds exceed the potency of endogenous cortisol by 1 or more orders of magnitude, even trace levels may be associated with cushingoid features.

Cautions

This method cannot detect all available synthetic steroids available either as pharmaceutical compounds or chemicals present in food. The assay confirms only the listed synthetic glucocorticoids. For more information see Interpretation.

Lack of detection does not preclude use of synthetic glucocorticoids because adrenal suppression may persist for some time after the exogenous steroid is discontinued.

Clinical Reference

1. Cave A, Arlett P, Lee E: Inhaled and nasal corticosteroids: factors affecting the risks of systemic adverse effects. *Pharmacol Ther.* 1999 Sep;83(3):153-179

2. Bijlsma JWJ, Van Everdingen AA, Huisman M, De Nijs RNJTL, Jacobs JWG: Glucocorticoids in rheumatoid arthritis: effects on erosions and bone. *Ann NY Acad Sci.* 2002 Jun;966:82-90

3. Sandborn WJ: Steroid-dependent Crohn's disease. *Can J Gastroenterol.* 2000 Sep;14 Suppl C:17C-22C

4. Benvenuti S, Brandi ML: Corticosteroid-induced osteoporosis: pathogenesis and prevention. *Clin Exp Rheumatol.* 2000 Jul-Aug;18(4 Suppl 20):S64-S66

5. Loke TK, Sousa AR, Corrigan CJ, Lee TH: Glucocorticoid-resistant asthma. *Curr Allergy Asthma Rep.* 2002 Mar;2(2):144-150

6. Fardet L, Petersen I, Nazareth I: Monitoring of patients on long-term glucocorticoid therapy: a population-based cohort study. *Medicine (Baltimore).* 2015 Apr;94(15):e647. doi: 10.1097/MD.0000000000000647

7. Cronin JJ, McCoy S, Kennedy U, et al: A randomized trial of single-dose oral dexamethasone versus multidose prednisolone for acute exacerbations of asthma in children who attend the emergency department. *Ann Emerg Med.* 2016 May;67(5):593-601.e3. doi: 10.1016/j.annemergmed.2015.08.001

Performance**Method Description**

The synthetic glucocorticoids are extracted from 0.5 mL of urine using an acetonitrile protein precipitation followed by methylene chloride liquid extraction of the solvent. Cortisol-9, 11, 12, 12-d, and triamcinolone-d1 acetonide-d6 are added to each sample before the liquid extraction and serve as the internal standards. Then, 17 mL of the reconstituted sample extract is injected into a high-performance liquid chromatography system and analyzed by tandem mass spectrometry. The mass spectrometer has an electrospray interface and is operated in the multiple reaction monitoring positive mode. The calibration utilizes a 4-point standard curve over a concentration range of 0 to 25 mcg/dL.(McWhinney BC, Ward G, Hickman PE: Improved HPLC method for simultaneous analysis of cortisol, 11-deoxycortisol, prednisolone, methylprednisolone, and dexamethasone in serum and urine. *Clin Chem.* 1996 Jun;42:979-981; Savu S, Silvestro L, Haag A, Sorgel F: A confirmatory HPLC-MS/MS method for ten synthetic corticosteroids in bovine urines. *J Mass Spectrom.* 1996 Dec;31[12]:1351-1363; Djedovic NK, Rainbow SJ: Detection of synthetic glucocorticoids by liquid chromatography-tandem mass spectrometry in patients being investigated for Cushing's syndrome. *Ann Clin Biochem.* 2011 Nov;48(Pt 6):542-549. doi: 10.1258/acb.2011.010250)

PDF Report

No

Day(s) Performed

Wednesday

Report Available

5 to 10 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 was developed and its performance characteristics determined by Mayo Clinic in a manner consistent with CLIA requirements. It has not been cleared or approved by the US Food and Drug Administration.

CPT Code Information

80299

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
SGSS	Synthetic Glucocorticoid Screen, S	43141-1

Result ID	Test Result Name	Result LOINC® Value
23593	Betamethasone	41745-1
23594	Budesonide	41747-7
23595	Dexamethasone	14062-4
23596	Fludrocortisone	41754-3
23600	Megestrol Acetate	41762-6
23601	Methylprednisolone	14186-1
23602	Prednisolone	12727-4
23603	Prednisone	12434-7
23605	Triamcinolone Acetonide	41767-5