MAYO CLINIC LABORATORIES

Test Definition: SGSS

Synthetic Glucocorticoid Screen, Serum

Overview

Useful For

Confirming the presence of listed synthetic glucocorticoids in serum specimens (see Interpretation)

Confirming the cause of glucocorticoid-induced adrenal insufficiency

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

Method Name

Liquid Chromatography Tandem Mass Spectrometry (LC-MS/MS)

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

Specimen Minimum Volume

Serum: 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

The primary use of this test is to assess exposure to synthetic glucocorticoids in patients with suspected central adrenal insufficiency.

Synthetic glucocorticoids are widely used as anti-inflammatory and immunosuppressive agents. Synthetic glucocorticoids can be used through various routes: oral, intravenous, intramuscular, inhaled, intranasal, and topical. In most cases, exposure to synthetic glucocorticoids is clearly documented in the medical record. However, occasionally, exposure to synthetic glucocorticoids is not clearly evident. This may occur when patients use non-prescription preparations (usually oral or topical) that have glucocorticoids.

Exposure to synthetic glucocorticoids leads to development of features of Cushing syndrome (weight gain, abdominal obesity, moon facies, skin thinning, easy bruising, and metabolic comorbidities) or to glucocorticoid-induced adrenal insufficiency due to hypothalamic-pituitary-adrenal axis suppression by the circulating supraphysiologic synthetic glucocorticoids. Hormonal work up in these cases demonstrates very low corticotropin and cortisol concentrations.

This test allows for measurement of nine synthetic glucocorticoids in patients in whom exogenous glucocorticoid exposure is suspected.

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 cause hypothalamic-pituitary-adrenal axis suppression with development of glucocorticoid-induced adrenal insufficiency.

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 of listed synthetic glucocorticoids does not exclude previous exposure to one or more of tested glucocorticoids, as glucocorticoid-induced adrenal insufficiency (and resolution of features of overt Cushing syndrome) may persist for weeks-months after exogenous glucocorticoids were discontinued. In a patient with documented glucocorticoid exposure, circulating concentrations of synthetic glucocorticoids depend on the route of administration (detected for longer time if joint injection), dose and type of glucocorticoid that influence metabolism and clearance of the glucocorticoid (longer for triamcinolone).

Clinical Reference

1. Cave A, Arlett P, Lee E. Inhaled and nasal corticosteroids: factors affecting the risks of systemic adverse effects. Pharmacol Ther. 1999;83(3):153-179
2. 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;48(Pt 6):542-9. doi:10.1258/acb.2011.010250
3. 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;966:82-90
4. Sandborn WJ: Steroid-dependent Crohn's disease. Can J Gastroenterol. 2000;14 Suppl C:17C-22C
5. Benvenuti S, Brandi ML. Corticosteroid-induced osteoporosis: pathogenesis and prevention. Clin Exp Rheumatol. 2000;18(4 Suppl 20):S64-S66
6. Loke TK, Sousa AR, Corrigan CJ, Lee TH. Glucocorticoid-resistant asthma. Curr Allergy Asthma Rep. 2002;2(2):144-150
7. Fardet L, Petersen I, Nazareth I. Monitoring of patients on long-term glucocorticoid therapy: a population-based cohort study. Medicine (Baltimore). 2015;94(15):e647. doi:10.1097/MD.0000000000000647
8. 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;67(5):593-601.e3. doi:10.1016/j.annemergmed.2015.08.001
9. Ponzetto F, Parasiliti-Caprino M, Settanni F, et al. Simultaneous measurement of cortisol, cortisone, dexamethasone and additional exogenous corticosteroids by rapid and sensitive LC-MS/MS analysis. Molecules. 2022;28(1):248. Published 2022 Dec 28. doi:10.3390/molecules28010248

Performance

Method Description

The synthetic glucocorticoids (betamethasone, budesonide, dexamethasone, fludrocortisone, megestrol acetate, methylprednisolone, prednisolone, prednisone, triamcinolone acetonide) as well as cortisol and cortisone are extracted

from 0.5 mL of urine or serum using an acetonitrile protein precipitation followed by liquid/liquid extraction of the supernatant. Cortisol-d4, triamcinolone-d1 acetonide-d6, dexamethasone-d4, and cortisone-d7, are added to each sample before the acetonitrile protein precipitation and serve as the internal standards. The reconstituted sample extract is injected onto a high performance liquid chromatography system and analyzed by liquid chromatography tandem mass spectrometry.(Taylor RL, Grebe SK, Singh RJ. Quantitative, highly sensitive liquid chromatography-tandem mass spectrometry method for detection of synthetic corticosteroids. Clin Chem. 2004;50[12]:2345-52. doi:10.1373/clinchem.2004.033605)

PDF Report
No

Day(s) Performed
Wednesday

Report Available
5 to 14 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