

## Overview

### Useful For

Confirming the presence of the listed synthetic glucocorticoids

Confirming the cause of secondary adrenal insufficiency

### Method Name

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

### NY State Available

Yes

## Specimen

### Specimen Type

Urine

### Specimen Required

**Supplies:** Urine tubes, 10 mL (T068)

**Container/Tube:** Plastic, 10-mL urine tube

**Specimen Volume:** 5 mL

#### Collection Instructions:

1. Collect a random urine specimen.
2. No preservative.

### Specimen Minimum Volume

0.6 mL

### Reject Due To

All specimens will be evaluated at Mayo Clinic Laboratories for test suitability.

### Specimen Stability Information

| Specimen Type | Temperature | Time    | Special Container |
|---------------|-------------|---------|-------------------|
| Urine         | Frozen      | 14 days |                   |

## Clinical & Interpretive

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**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 urine 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 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 glucocorticoid 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;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;966:82-90
3. Sandborn WJ. Steroid-dependent Crohn's disease. *Can J Gastroenterol.* 2000;14 Suppl C:17C-22C
4. Benvenuti S, Brandi ML. Corticosteroid-induced osteoporosis: pathogenesis and prevention. *Clin Exp Rheumatol.*

2000;18(4 Suppl 20):S64-S66

5. Loke TK, Sousa AR, Corrigan CJ, Lee TH. Glucocorticoid-resistant asthma. *Curr Allergy Asthma Rep.* 2002;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;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;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;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;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;48[Pt 6]:542-549. doi:10.1258/acb.2011.010250)

### PDF Report

No

### Day(s) Performed

Wednesday

### Report Available

5 to 11 days

### Specimen Retention Time

3 months

### Performing Laboratory Location

Rochester

## 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 |
|---------|------------------------------------|--------------------|
| SGSU    | Synthetic Glucocorticoid Screen, U | 46959-3            |

| Result ID | Test Result Name        | Result LOINC® Value |
|-----------|-------------------------|---------------------|
| 23562     | Betamethasone           | 46946-0             |
| 23563     | Budesonide              | 46947-8             |
| 23564     | Dexamethasone           | 46948-6             |
| 23565     | Fludrocortisone         | 46949-4             |
| 23569     | Megestrol Acetate       | 46953-6             |
| 23570     | Methylprednisolone      | 46954-4             |
| 23571     | Prednisolone            | 46955-1             |
| 23572     | Prednisone              | 46956-9             |
| 23574     | Triamcinolone Acetonide | 46958-5             |