

Gadolinium, 24 Hour, Urine

## **Overview**

#### **Useful For**

Assessing chronic exposure and monitoring effectiveness of dialysis in a 24-hour urine collection

## **Special Instructions**

- <u>Urine Preservatives-Collection and Transportation for 24-Hour Urine Specimens</u>
- Metals Analysis Specimen Collection and Transport

#### **Method Name**

Inductively Coupled Plasma Mass Spectrometry (ICP-MS)

#### **NY State Available**

Yes

## Specimen

## **Specimen Type**

Urine

#### **Necessary Information**

24-Hour volume (in milliliters) is required.

## Specimen Required

**Patient Preparation:** High concentrations of gadolinium and iodine are known to potentially interfere with most inductively coupled plasma mass spectrometry-based metal tests. If either gadolinium or iodine containing contrast media has been administered, **a specimen should not be collected for 96 hours**.

Supplies: Urine Tubes, 10 mL (T068)

Container/Tube: Plastic, 10-mL urine tube or clean, plastic aliquot container with no metal cap or glued insert

**Specimen Volume:** 0.3 mL **Collection Instructions:** 

- 1. Collect urine for 24 hours.
- 2. Refrigerate specimen within 4 hours of completion of 24-hour collection.
- 3. See Metals Analysis Specimen Collection and Transport for complete instructions.

**Additional Information:** See <u>Urine Preservatives-Collection and Transportation for 24-Hour Urine Specimens</u> for multiple collections.

## **Forms**

If not ordering electronically, complete, print, and send a Renal Diagnostics Test Request (T830) with the specimen.

#### **Urine Preservative Collection Options**



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**Note:** The addition of preservative or application of temperature controls **must occur within 4 hours of completion** of the collection.

Ambient (no	ОК
additive)	
Refrigerate (no	Preferred
additive)	
Frozen (no additive)	ОК
50% Acetic Acid	No
Boric Acid	No
Diazolidinyl Urea	No
6M Hydrochloric	ОК
Acid	
6M Nitric Acid	ОК
Sodium Carbonate	No
Thymol	No
Toluene	No

## **Specimen Minimum Volume**

0.2 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	Refrigerated (preferred)	28 days	
	Ambient	28 days	
	Frozen	28 days	

## **Clinical & Interpretive**

#### **Clinical Information**

Gadolinium is a member of the lanthanide series of the periodic table of elements and is considered a nonessential element. Due to its paramagnetic properties, chelated gadolinium is commonly employed as contrast media (gadolinium-based contrast agents: GBCA) for magnetic resonance imaging and computer tomography scanning.

Gadolinium is primarily eliminated via the kidneys, so exposure can be prolonged in patients with kidney insufficiency. Patients with reduced kidney function and some patients with normal kidney function may exhibit a prolonged gadolinium elimination half-life.

To date the only known adverse health effect related to gadolinium retention is a rare condition called nephrogenic systemic fibrosis (NSF). NSF is a relatively uncommon condition in which fibrous plaques develop in the dermis and often



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in deeper connective tissues. Reported cases have occurred almost exclusively in patients with severe kidney disease, and almost all have been associated with prior use of GBCA. NSF is a painful skin disease characterized by thickening of the skin, which can involve the joints and cause significant limitation of motion within weeks to months. Over the past decade, changes in clinical practice guidelines have almost eliminated the incidence of NSF. However, the association of NSF and observed elevated gadolinium concentrations is still not fully understood.

#### **Reference Values**

0-17 years: Not established

> or =18 years: <1.1 mcg/24 hours

#### Interpretation

Elevated urine gadolinium results from a specimen collected more than 96 hours after administration of a gadolinium-based contrast agent confirms past exposure or continued exposure through anthropogenic sources and prolonged elimination of gadolinium. Gadolinium also has been shown to be present in some municipal water sources, which may contribute to the observation of low concentrations of gadolinium in patients who never have been exposed to gadolinium-based contrast agents.

Elevated gadolinium in a specimen collected more than 96 hours after contrast media infusion does not indicate risk of nephrogenic systemic fibrosis.

#### **Cautions**

Urine gadolinium concentration will be elevated if the specimen is collected less than 96 hours after administration of gadolinium-based contrast agents. This elevation is due to the residual gadolinium present from contrast media infusion. An elevated gadolinium in a specimen collected more than 96 hours after contrast media infusion does not definitively indicate risk of nephrogenic systemic fibrosis or gadolinium toxicity. Ultimately, individuals should consult with their healthcare professionals to interpret any test results.

Gadolinium may also be present in the effluent of metropolitan sewage treatment plants and in the rivers near metropolitan areas. Sewage treatment does not remove gadolinium. Anthropogenic sources of gadolinium could contribute to low concentrations of gadolinium excreted in the urine.

#### Supportive Data

An evaluation of urine gadolinium concentration in healthy human subjects not exposed to gadolinium within 96 hours of specimen collection generated a reference range of less than 0.7 mcg/24 hours with no evidence of age or gender trend.

#### **Clinical Reference**

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- 2. Christensen KN, Lee CU, Hanley MM, et al. Quantification of gadolinium in fresh skin and serum samples from patients with nephrogenic systemic fibrosis. J Am Acad Dermatol. 2011;64(1):91-96
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- 7. Attari H, Cao Y, Elmholdt TR, Zhao Y, Prince MR. A systematic review of 639 patients with biopsy-confirmed nephrogenic systemic fibrosis. Radiology. 2019;292(2):376-386
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- 9. Bornhorst J, Wegwerth P, Day P, et al. Urinary reference intervals for gadolinium in individuals without recent exposure to gadolinium-based contrast agents. Clin Chem Lab Med. 2020;58(3):e87-e90
- 10. Alwasiyah D, Murphy C, Jannetto P, Hogg M, Beuhler MC. Urinary Gadolinium Levels After Contrast-Enhanced MRI in Individuals with Normal Renal Function: a Pilot Study. J Med Toxicol. 2019;15(2):121-127

## **Performance**

#### **Method Description**

The metal of interest is analyzed by inductively coupled plasma mass spectrometry. (Unpublished Mayo method)

## **PDF Report**

No

#### Day(s) Performed

Thursday

## Report Available

2 to 8 days

## **Specimen Retention Time**

14 days

## **Performing Laboratory Location**

Mayo Clinic Laboratories - Rochester Superior Drive

## Fees & Codes

#### **Fees**

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

## **Test Classification**

This test was developed and its performance characteristics determined by Mayo Clinic in a manner consistent with CLIA



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requirements. It has not been cleared or approved by the US Food and Drug Administration.

## **CPT Code Information**

83018

## **LOINC®** Information

Test ID	Test Order Name	Order LOINC® Value
GDU	Gadolinium, 24 Hr, U	8201-6

Result ID	Test Result Name	Result LOINC® Value
29252	Gadolinium, 24 Hr, U	8201-6
TM101	Collection Duration (h)	13362-9
VL82	Volume (mL)	3167-4