

### Overview

#### Useful For

Measurement of gadolinium concentration for assessing chronic exposure and monitoring effectiveness of dialysis using a random urine collection

#### Special Instructions

- [Metals Analysis Specimen Collection and Transport](#)

#### Method Name

Only orderable as part of a profile. For more information see GDUCR / Gadolinium/Creatinine Ratio, Random, Urine.

Inductively Coupled Plasma-Mass Spectrometry (ICP-MS)

#### NY State Available

Yes

### Specimen

#### Specimen Type

Urine

#### Specimen Required

Only orderable as part of a profile. For more information see GDUCR / Gadolinium/Creatinine Ratio, Random, Urine.

**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)

**Collection Container/Tube:** Clean, plastic urine collection container

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

**Specimen Volume:** 5.35 mL

#### Collection Instructions:

1. Collect a random urine specimen.
2. See [Metals Analysis Specimen Collection and Transport](#) for complete instructions.

#### Specimen Minimum Volume

1.25 mL

#### Reject Due To

Urine containing preservatives	Reject
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## 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 renal 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, 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 completely eliminated the incidence of NSF. However, the association of NSF and observed elevated gadolinium concentrations is still not fully understood.

### Reference Values

Only orderable as part of a profile. For more information see GDUCR / Gadolinium/Creatinine Ratio, Random, Urine.

0-17 years: Not established

> or =18 years: <0.8 mcg/g Creatinine

### Interpretation

Although much of the gadolinium associated with the administration of gadolinium-based contrast agents (GBCA) is cleared in the urine in the first 96 hours, lower concentrations of gadolinium may persist in the urine for months after GBCA exposure. Elevated urine gadolinium results collected after administration of a GBCA confirm past exposure, prolonged elimination of gadolinium, and/or continued exposure through anthropogenic sources. 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 have never been exposed to GBCA.

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

**Cautions**

The current reference interval was established using healthy individuals with no recent exposure to gadolinium. A recent study found that 95% of patients who received gadobutrol-enhanced magnetic resonance imaging (MRI) did not show urine gadolinium concentrations below the unexposed reference interval (<0.8 mcg/g creatinine) until approximately 132 days after imaging.(1)

This elevation is due to the residual gadolinium present from contrast media infusion. An elevated gadolinium in a specimen collected 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.

**Clinical Reference**

1. McDonald JS, Day PL, Spears GM, Bornhorst JA, McDonald RJ, Jannetto PJ. Serum and urine gadolinium reference intervals in patients with normal renal function following gadobutrol administration. *Invest Radiol.* 2025;60(9):586-591. doi:10.1097/RLI.0000000000001165
2. Christensen KN, Lee CU, Hanley MM, Leung N, Moyer TP, Pittelkow MR. Quantification of gadolinium in fresh skin and serum samples from patients with nephrogenic systemic fibrosis. *J Am Acad Dermatol.* 2011;64(1):91-96
3. Girardi M, Kay J, Elston DM, Leboit PE, Abu-Alfa A, Cowper SE. Nephrogenic systemic fibrosis: Clinicopathological definition and workup recommendations. *J Am Acad Dermatol.* 2011;65(6):1095-1106
4. Telgmann L, Sperling M, Karst U. Determination of gadolinium-based MRI contrast agents in biological and environmental samples: A review. *Anal Chim Acta.* 2013;764:1-16
5. Daftari Besheli L, Aran S, Shaqdan K, Kay J, Abujudeh H. Current status of nephrogenic systemic fibrosis. *Clin Radiol.* 2014;69(7):661-668
6. Aime S, Caravan P. Biodistribution of gadolinium-based contrast agents, including gadolinium deposition. *J Magn Reson Imaging* 2009;30(6):1259-1267
7. McDonald RJ, McDonald JS, Kallmes DF, et al. Intracranial gadolinium deposition after contrast-enhanced MR imaging. *Radiology.* 2015;275(3):772-782
8. 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. doi: 10.1515/cclm-2019-0607
9. 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
10. Othersen JB, Maize JC, Woolson RF, Budisavljevic MN. Nephrogenic systemic fibrosis after exposure to gadolinium in patients with renal failure. *Nephrol Dial Transplant.* 2007;22(11):3179-3185

**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 [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**

83018

**LOINC® Information**

Test ID	Test Order Name	Order LOINC® Value
GDCU	Gadolinium/Creat Ratio, U	93854-8

Result ID	Test Result Name	Result LOINC® Value
615339	Gadolinium/Creat Ratio, U	93854-8