

Overview

Useful For

Assessing chronic exposure and monitoring effectiveness of dialysis in a random urine collection

Profile Information

Test Id	Reporting Name	Available Separately	Always Performed
GDCU	Gadolinium/Creat Ratio, U	No	Yes
CRETR	Creatinine, Random, U	No	Yes

Special Instructions

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

Method Name

GDCU: Inductively Coupled Plasma-Mass Spectrometry (ICP-MS)

CRETR: Enzymatic Colorimetric Assay

NY State Available

Yes

Specimen

Specimen Type

Urine

Specimen Required

Patient Preparation: High concentrations of gadolinium and iodine are known to interfere with most 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: 3 mL

Collection Instructions:

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

Forms

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

Specimen Minimum Volume

1.5 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	
	Frozen	28 days	
	Ambient	14 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

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 never have 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

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, patients should consult with their healthcare providers 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. Othersen JB, Maize JC, Woolson RF, Budisavljevic MN: Nephrogenic systemic fibrosis after exposure to gadolinium in patients with renal failure. *Nephrol Dial Transplant*. 2007 Nov;22\(11\):3179-3185](#)
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 Jan;64(1):91-96
3. Girardi M, Kay J, Elston DM, et al: Nephrogenic systemic fibrosis: Clinicopathological definition and workup recommendations. *J Am Acad Dermatol*. 2011 Dec;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. *Analytica Chimica Acta*. 2013 Feb;764:1-16
5. Daftari Besheli L, Aran S, Shaqdan K, et al: Current status of nephrogenic systemic fibrosis. *Clin Radiol*. 2014 Jul;69(7):661-668
6. Aime S, Caravan P: Biodistribution of gadolinium-based contrast agents, including gadolinium deposition. *J Magn Reson Imaging*. 2009 Dec;30(6):1259-1267
7. McDonald RJ, McDonald JS, Kallmes DF, et al: Intracranial gadolinium deposition after contrast-enhanced MR imaging. *Radiology*. 2015 Jun;275:772-782
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 Feb 25;58(3):e87-e90. doi: 10.1515/cclm-2019-0607.

Performance

Method Description

Gadolinium is analyzed by inductively coupled plasma-mass spectrometry in standard mode using terbium as an internal standard and a plasma matrix calibration. (Leung N, Pittelkow MR, Lee CU, et al: Chelation of gadolinium with deferoxamine in a patient with nephrogenic systemic fibrosis. *NDT Plus*. 2009;2[4]:309-311; [Rifai N, Horwath AR, Wittwer CT, eds: *Tietz Textbook of Clinical Chemistry and Molecular Diagnostics*. 6th ed. Elsevier. 2018](#))

Creatinine enzymatic method is based on the determination of sarcosine from creatinine with the aid of creatininase, creatinase, and sarcosine oxidase. The liberated hydrogen peroxide is measured via a modified Trinder reaction using a colorimetric indicator. Optimization of the buffer system and the colorimetric indicator enables the creatinine concentration to be quantified both precisely and specifically. (Package insert: Creatinine plus ver 2. Roche Diagnostics; V15.0, 03/2019)

PDF Report

No

Day(s) Performed

Thursday

Report Available

1 to 7 days

Specimen Retention Time

14 days

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 Regional Manager. 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. This test has not been cleared or approved by the US Food and Drug Administration.

CPT Code Information

83018

82570

LOINC® Information

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

Result ID	Test Result Name	Result LOINC® Value
CRETR	Creatinine, Random, U	2161-8

615339	Gadolinium/Creat Ratio, U	93854-8
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