MAYO CLINIC LABORATORIES

Test Definition: GDUCR

Gadolinium/Creatinine Ratio, Random, Urine

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

- 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 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.

Forms

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

Specimen Minimum Volume
1.25 mL

Reject Due To

Urine containing preservatives	Reject

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Urine	Refrigerated (preferred)	28 days	
	Ambient	14 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
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)

AThis 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
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