Test Definition: GDCRU

Gadolinium/Creat Ratio, Random, U

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
GDCR	Gadolinium/Creat Ratio, U	No	Yes
CDCR	Creatinine Concentration	No	Yes

Special Instructions

- Trace Metals Analysis Specimen Collection and Transport

Method Name

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

CDCR: 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 metals 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	
	Ambient	28 days	
	Frozen	28 days	

Clinical and 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 renal function and some patients with normal renal 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 renal 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

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 (GBCA).

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

Cautions

Urine gadolinium concentration will be elevated if the specimen is collected less than 96 hours after administration of gadolinium-based contrast agents (GBCA). 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 (NSF) 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;22:3179-3185

2. Perazella MA: Nephrogenic systemic fibrosis, kidney disease, and gadolinium: is there a link? Clin J Am Soc Nephrol 2007;2:200-202

3. 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

4. Girardi M, Kay J, Elston DM, et al: Nephrogenic systemic fibrosis: Clinicopathological definition and workup recommendations. J Am Acad Dermatol 2011;65:1095-1106

5. Telgmann L, Sperling M, Karst U: Determination of gadolinium-based MRI contrast agents in biological and environmental samples: A review. Analytica Chimica Acta 2013;764:1-16

6. Daftari Besheli L, Aran S, Shaqdan K, et al: Current status of nephrogenic systemic fibrosis. Clin Radiol. 2014 Jul;69(7):661-668

7. Aime S, Caravan P: Biodistribution of gadolinium-based contrast agents, including gadolinium deposition. J. Magn Reson Imaging 2009;30(6):1259-1267

8. McDonald RJ, McDonald JS, Kallmes DF, et al: Intracranial gadolinium deposition after contrast-enhanced MR imaging. Radiology 2015;275:772-782

Performance

Method Description

Gadolinium (Gd) is analyzed by inductively coupled plasma-mass spectrometry in standard mode using terbium (Tb) 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; Nader R, Horwath AR, Wittwer CT: Tietz Textbook of Clinical Chemistry and Molecular Diagnostics. Sixth Edition. 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: Roche Diagnostics, 12/2016)

PDF Report

No

Day(s) Performed

Thursday

Report Available

1 to 7 days

Specimen Retention Time

14 days

Performing Laboratory Location

Rochester

Fees and 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-Gadolinium Concentration

82570-Creatinine Concentration

LOINC® Information

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

Result ID	Test Result Name	Result LOINC Value
CDCR	Creatinine Concentration	2161-8
32873	Gadolinium/Creat Ratio, U	93854-8