Test Definition: GDS

Gadolinium, S

Overview

Useful For

Aiding in documenting past exposure to gadolinium-based contrast agents in serum specimens

Special Instructions

- Trace Metals Analysis Specimen Collection and Transport

Method Name

Inductively Coupled Plasma-Mass Spectrometry (ICP-MS)

NY State Available

Yes

Specimen

Specimen Type

Serum

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:

-Metal Free B-D Tube (No Additive), 6 mL (T184)

-Metal Free Specimen Vial (T173)

Collection Container/Tube: Royal blue-top (metal-free, no additive)

Submission Container/Tube: 7-mL Mayo metal-free, screw-capped, vial

Specimen Volume: 0.8 mL

Collection Instructions:

1. Allow the specimen to clot for 30 minutes; then centrifuge the specimen to separate serum from the cellular fraction.

2. Remove the stopper. Carefully pour specimen into Mayo metal-free, screw-capped vial, avoiding transfer of the cellular components of blood. **Do not** insert a pipette into the serum to accomplish transfer, and **do not** ream the specimen with a wooden stick to assist with serum transfer.

3. See Trace Metals Analysis Specimen Collection and Transport in Special Instructions for complete instructions.

Additional Information: If ordering the trace element blood collection tube from BD, order catalog #368380.

Forms

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

Specimen Minimum Volume

0.2 mL

Reject Due To

Gross hemolysis	OK
Gross lipemia	OK
Gross icterus	OK

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Serum	Refrigerated (preferred)	14 days	METAL FREE
	Ambient	14 days	METAL FREE
	Frozen	14 days	METAL FREE

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 GBCAs. 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

<0.5 ng/mL

Interpretation

Elevated gadolinium observed in serum specimens drawn more than 96 hours after administration of gadolinium-containing contrast media is not typical of most patients with normal renal function, and may indicate prolonged elimination of gadolinium and exposure to anthropogenic sources.

Cautions

Serum gadolinium concentration may be elevated if the specimen is drawn less than 96 hours after administration of gadolinium-based contrast agents (GBCA). This elevation is due to residual gadolinium present from contrast media infusion. An elevated serum gadolinium in a specimen collected more than 96 hours after contrast media infusion does not definitively indicate risk of nephrogenic systemic fibrosis (NSF) or significant gadolinium toxicity. Ultimately, patients should consult with their healthcare providers to interpret any test results.

Supportive Data

A small number of patients studied at Mayo Clinic have demonstrated measureable (0.6-2.1 ng/mL) gadolinium in serum collected 30 days after gadolinium infusion, so some prolonged elimination is possible.

Serum gadolinium concentrations above the stated reference range may indicate prolonged elimination, residual gadolinium retention, or continuing environmental exposure. However, elevated serum gadolinium concentrations do not necessarily indicate toxicity.

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

4. 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

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

6. 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

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

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

9. 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) in serum and urine is analyzed by inductively coupled plasma-mass spectrometry (ICP-MS) 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)

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

LOINC® Information

Test ID	Test Order Name	Order LOINC Value
GDS	Gadolinium, S	80912-9

Result ID	Test Result Name	Result LOINC Value
29251	Gadolinium, S	80912-9