MAYO CLINIC LABORATORIES

Test Definition: GDT

Gadolinium, T

Overview

Useful For

Evaluation of dermal tissue for gadolinium

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

Dermal Tissue

Ordering Guidance

This test is useful for evaluation of dermal tissue. No other tissue types have been validated. The reference value applies only to dermal tissue. Fresh, refrigerated, or frozen tissue is preferred.

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 Specimen Vial (T173)

Container/Tube:

Preferred: Mayo metal-free specimen vial (blue label)

Acceptable: Paraffin block is also acceptable if not more than 1 or 2 cuts have been made to it for slides.

Specimen Volume: 5 mg (wet weight)

Collection Instructions:

1. **5 mg (wet weight) of tissue from a skin-punch biopsy is required,** at least 5 mm in diameter.
2. Any specimen vial other than a Mayo metal-free vial used should be plastic, leached with 10% nitric acid for 2 days, rinsed with redistilled water, and dried in clean air.
3. See Trace Metals Analysis Specimen Collection and Transport in Special Instructions for complete instructions.

Additional Information: Paraffin blocks will be returned 3 days after analysis.

Forms

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

Reject Due To

All specimens will be evaluated at Mayo Clinic Laboratories for test suitability.

Specimen Minimum Volume

5 mm (punch)
2.0 mg by dry weight

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Dermal Tissue	Refrigerated (preferred)	14 days	
	Ambient	14 days	
	Frozen	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 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 mcg/g

Interpretation

Elevated gadolinium (>0.5 mcg/g) observed in dermal tissue specimens collected more than 96 hours after administration of gadolinium-based contrast agents indicates some gadolinium deposition. In a small internal study (n=13), patients with histologically confirmed nephrogenic systemic fibrosis (NSF), a history of renal failure, and exposure to gadolinium-based contrast agents (GBCA) had gadolinium concentrations in the range of 6.3 to 348.7 mcg/g in affected tissues. However, unaffected tissues from gadolinium-exposed subjects showed gadolinium concentrations in the range of 0.6 to 68.2 mcg/g.

A detectable gadolinium concentration in tissue suggests recent or past exposure to GBCA.

Cautions

Tissue 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 residual gadolinium present from contrast media infusion. Elevated gadolinium in a specimen collected less than 96 hours after contrast media infusion does **not** indicate risk of nephrogenic systemic fibrosis.

Clinical Reference

1. Otherson JB, Maize JC, Woolson RF, Budisavljevic MN: Nephrogenic systemic fibrosis after exposure to gadolinium in patients with renal failure. Nephrol Dial Transplant 2007;10:1093-1100
2. Perazella MA: Nephrogenic systemic fibrosis, kidney disease, and gadolinium: is there a link? Clin J AM Soc Nephrol 2007;2:200-202
3. Saitoh T, Hayasaka K, Tanaka Y, et al: Dialyzability of gadodiamide in hemodialysis patients. Radiat Med 2006;24:445-451
4. High WA, Ayers RA, Cowper SE: Gadolinium is quantifiable within the tissue of patients with nephrogenic systemic fibrosis. J Am Acad Dermatol 2007;56:710-712
5. High WA, Ayers RA, Chandler J, et al: Gadolinium is detectable within the tissue of patients with nephrogenic systemic fibrosis. J Am Acad Dermatol 2007;56:21-26
6. Girardi M, Kay J, Elston DM, et al: Nephrogenic systemic fibrosis: Clinicopathological definition and workup recommendations. J Am Acad Dermatol 2011;65:1095-1106
7. Aime S, Caravan P: Biodistribution of gadolinium-based contrast agents, including gadolinium deposition. J Magn Reson Imaging 2009;30(6):1259-1267

Performance

Method Description

Gadolinium in tissue is analyzed by inductively coupled plasma-mass spectrometry.(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; Nader R, Horwath AR, Wittwer CT: Tietz Textbook of Clinical Chemistry and Molecular Diagnostics. Sixth Edition. Elsevier 2018)

PDF Report

No

Specimen Retention Time

Fresh tissue: 1 month Block: returned to client after 3 days

Performing Laboratory Location

Rochester

Fees & Codes

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