MAYO CLINIC LABORATORIES

Test Definition: AMPIP

Amyloid Protein Identification, Paraffin, Mass Spectrometry

Overview

Useful For

Definitive identification of amyloid proteins

Reflex Tests

Test Id	Reporting Name	Available Separately	Always Performed
MLCPC	Microdissection, Laser Capture	No, (Bill Only)	No
MSPTC	Mass Spectrometry	No, (Bill Only)	No

Testing Algorithm

Testing begins with a Congo red stain. If the Congo red stain is positive, testing proceeds with microdissection at an additional charge to obtain tissue of interest and subsequently perform mass spectrometry at an additional charge to identify protein involved.

In some instances, per pathologist discretion, a different initial Congo red stain may be performed using SS2PC / Special Stain, Group II, Other (Bill Only).
-If the stain is negative for amyloid, then this test will not be performed, and only the SS2PC will be charged.
-If the stain is positive for amyloid, this test will be performed, and the SS2PC billing charge will be credited.

A pathology consultation is typically not required. If the amyloid subtyping results do not fit the clinical findings, PATHC / Pathology Consultation may be added if appropriate, upon client approval.

For more information see Amyloidosis: Laboratory Approach to Diagnosis.

Special Instructions

- Amyloidosis: Laboratory Approach to Diagnosis
- Pathology Consultation Ordering Algorithm

Method Name

Histological Stain/Liquid Chromatography Tandem Mass Spectrometry (LC-MS/MS)

NY State Available

Yes

Specimen

Specimen Type

AMYLOID

Ordering Guidance

This test **should only** be ordered on patients for whom a primary diagnosis has already been established. If a patient does not have a primary diagnosis, order PATHC / Pathology Consultation or refer to the Pathology Consultation Ordering Algorithm. **Testing of tenosynovial specimens is only available on patients aged 75 years or older**. Orders not meeting these criteria will be canceled and materials will be returned.

If a pathology consultation is desired in addition to this test, order PATHC / Pathology Consultation alone and send the required paperwork with specimen. Indicate that amyloid protein identification is desired. If needed, this test will be added by the reviewing pathologist and will be reported with the consultation. For more information see PATHC / Pathology Consultation.

Shipping Instructions

Attach the green pathology address label included in the kit to the outside of the transport container.

Necessary Information

1. Preliminary pathology report and history are required.

2. Include performed Congo red slide.

3. A brief explanatory note or consultative letter is also recommended.

Specimen Required

Specimen Type: Formalin-fixed or B5-fixed paraffin-embedded tissue block

Collection Instructions:

1. Do not send fixed tissue slides for testing. Testing can only be done on paraffin-embedded tissue blocks.

2. If Congo red stain has already been performed, send Congo red stained slide along with the tissue block.

Forms

If not ordering electronically, complete, print, and send 1 of the following forms with the specimen:

-Cardiovascular Test Request (T724)

-Hematopathology/Cytogenetics Test Request (T726)

-Renal Diagnostics Test Request (T830)

-Kidney Transplant Test Request

Reject Due To

Fixed tissue slides	Reject
Wet/frozen tissue	Reject
Cytological smears	Reject
Nonformalin fixed tissue	Reject
Nonparaffin	Reject

embedded tissue	
Tenosynovial specimens patients younger than 75 years	Reject

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
AMYLOID	Ambient (preferred)		
	Refrigerated		

Clinical & Interpretive

Clinical Information

Amyloidosis is a group of hereditary and acquired diseases unified by extracellular tissue deposition of misfolded proteins resulting in end organ damage. Amyloidosis can be a systemic or localized disease. Although many cases of amyloidosis are hereditary, most are acquired as the result of an underlying monoclonal B-cell/plasma cell malignancy, as a phenomenon of aging, or as the result of long-standing chronic inflammation. Specific amyloid-related diseases are therefore associated with specific amyloid proteins. These include kappa or lambda immunoglobulin light chains (AL amyloidosis), transthyretin (ATTR amyloidosis), serum amyloid A (AA amyloidosis), and other uncommon subtypes. Because treatment of patients with amyloidosis differs radically for the different amyloid subtypes, it is critically important to accurately identify the proteins that constitute the amyloid deposits.

The basic diagnosis of amyloidosis is typically achieved by Congo red staining of paraffin-embedded tissue biopsy specimens obtained from diverse anatomic sites and demonstrating Congo red-positive, apple-green birefringent, amyloid deposits in the tissues. The next step is to definitively subtype the amyloid deposits. This test fulfills that need. It relies on laser microdissection of Congo red-positive amyloid deposits followed by analysis by liquid chromatography tandem mass spectrometry to accurately determine the identity of the proteins that constitute the amyloid.

Transthyretin amyloidosis is a common form of systemic amyloidosis whose clinicopathologic significance varies significantly depending on the anatomic site of involvement. Although cardiac ATTR deposition is often an indication for disease-modifying therapy, tenosynovial ATTR deposition is considered a potential early marker (risk factor) for subsequent cardiac involvement but does not in itself warrant treatment. Only a minority of patients with tenosynovial ATTR go on to develop cardiac ATTR, and progression, when it occurs, may take many years to decades. Available data suggest that older patients have a higher pretest probability of concurrent cardiac ATTR (median age 77 years, IQR 75-79 years).(1) However, ATTR amyloidosis in other anatomic sites, such as bone marrow, gastrointestinal tract, urinary bladder, prostate, and gallbladder, is a more reliable predictor of concurrent cardiac ATTR amyloidosis.(2-5)

Reference Values

An interpretive report will be provided.

Interpretation

An interpretation will be provided.

Cautions

In rare instances amyloid deposits may show a false-negative result by Congo red staining. Because this test depends on the presence of Congo red-positive amyloid, these cases may not be identified as amyloid by this testing algorithm. Correlation with clinical and pathologic features and other laboratory test results is recommended to definitively exclude a diagnosis of amyloidosis.

Clinical Reference

1. Ohno T, Mihara S, Morishige M, Nakamura T. Prevalence of amyloid deposits in synovium and flexor retinaculum, risk factors and asymptomatic cardiac involvement in patients with carpal tunnel syndrome. J Hand Surg Eur Vol. 2026;51(5):550-556
2. Chiu A, Dasari S, Kurtin PJ, et al. Bone marrow amyloid: a comprehensive analysis of 1,469 samples, including amyloid type, clinical features, and morphologic distribution. Amyloid. 2022;29(3):156-164
3. Hagen CE, Dasari S, Theis JD, et al. Gastrointestinal amyloidosis: an often unexpected finding with systemic implications. Hum Pathol. 2023;139:27-36
4. Gilani SI, Dasari S, Tekin B, et al. Identification of amyloidosis of the urinary tract and prostate: Opportunities for early diagnosis and intervention in systemic disease. Hum Pathol. 2023;142:62-67
5. Hagen CE, Dasari S, Theis JD, et al. Gallbladder amyloidosis is often unexpected and may have systemic implications. Am J Clin Pathol. 2025;164(4):613-619. doi:10.1093/ajcp/aqaf090
6. Theis JD, Dasari S, Vrana JA, Kurtin PJ, Dogan A. Shotgun-proteomics-based clinical testing for diagnosis and classification of amyloidosis. J Mass Spectrom. 2013;48(10):1067-1077
7. Said SM, Sethi S, Valeri AM, et al. Renal amyloidosis: origin and clinicopathologic correlations of 474 recent cases. Clin J Am Soc Nephrol. 2013;8(9):1515-1523
8. Dasari S, Theis JD, Vrana JA, et al. Amyloid typing by mass spectrometry in clinical practice: a comprehensive review of 16,175 samples. Mayo Clin Proc. 2020;95(9):1852-1864. doi:10.1016/j.mayocp.2020.06.029
9. Klein CJ, Vrana JA, Theis JD, et al. Mass spectrometric-based proteomic analysis of amyloid neuropathy type in nerve tissue. Arch Neurol. 2011;68(2):195-199
10. Vrana JA, Gamez JD, Madden BJ, Theis JD, Bergen HR III, Dogan A. Classification of amyloidosis by laser microdissection and mass spectrometry-based proteomic analysis in clinical biopsy specimens. Blood. 2009;114(24):4957-4959

Performance

Method Description

Affected areas are removed from paraffin-embedded tissues by laser microdissection. Protein digestion is performed, followed by liquid chromatography tandem mass spectrometry.(Unpublished Mayo method)

PDF Report

No

Day(s) Performed
Monday through Friday

Report Available
7 to 15 days

Specimen Retention Time
Submitted block: Not retained; Congo red-stained slides performed at Mayo Clinic: Indefinitely

Performing Laboratory Location
Mayo Clinic Laboratories - Rochester Main Campus

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
88313
82542 (if appropriate)
88380 (if appropriate)

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
AMPIP	Amyloid Protein ID, Par, LC MS/MS	101405-9

Result ID	Test Result Name	Result LOINC® Value
71185	Interpretation	50595-8
71186	Participated in the Interpretation	No LOINC Needed
71187	Report electronically signed by	19139-5
71189	Material Received	81178-6
71592	Disclaimer	62364-5
72109	Case Number	80398-1