MAYO CLINIC LABORATORIES

Test Definition: TRYPT

Tryptase, Serum

Overview

Useful For

Evaluation of individuals with suspected mast cell activation, which may occur as a result of anaphylaxis or allergen challenge

Evaluation of patients with suspected mast cell activation syndrome

Evaluation of patients with suspected cutaneous or systemic mastocytosis

Testing Algorithm

For more information see Mast Cell Disorder: Diagnostic Algorithm, Bone Marrow.

Special Instructions

- Mast Cell Disorder: Diagnostic Algorithm, Bone Marrow

Method Name

Fluorescence Enzyme Immunoassay (FEIA)

NY State Available

Yes

Specimen

Specimen Type

Serum

Specimen Required

Supplies: Sarstedt Aliquot Tube, 5 mL (T914)
Collection Container/Tube:
Preferred: Serum gel
Acceptable: Red top
Submission Container/Tube: Plastic vial
Specimen Volume: 0.5 mL
Collection Instructions: Centrifuge and aliquot serum into a plastic vial
Additional Information: Tryptase degenerates very quickly when left in the presence of red blood cells.

Forms

If not ordering electronically, complete, print, and send a General Request (T239) 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	Frozen (preferred)	14 days	
	Refrigerated	7 days	

Clinical & Interpretive

Clinical Information

Tryptase, a neutral protease, is a dominant protein component of the secretory granules of human mast cells. There are four genes on the human tryptase locus, however, only two of them encode biologically relevant secreted isoforms, designated as alpha- and beta-tryptase.(1) Both secreted isoforms are expressed as inactive proenzymes and spontaneously release from resting mast cells, accounting for measurable basal serum tryptase (BST) concentrations.(1,2) The concentration of protryptases reflect the total number of mast cells within the body but are not an indication of mast cell activation.

Amino acid sequence alterations differentially affect the processing of alpha- and beta-tryptase. Beta-protryptase is efficiently processed to a mature form, which is stored in granules and released as a proteolytically active tetramer that is bound to heparan or chondroitin sulfate proteoglycans. Though highly homologous to beta-tryptase, the two alpha-tryptase isoforms have amino changes that render them either activation resistant or catalytically inactive. Upon mast cell activation, degranulation releases mature tryptase, which is almost exclusively in the form of beta-tryptase.

During an anaphylactic episode, mast cell granules release tryptase resulting in measurable increases in blood, generally within 30 to 60 minutes.(3) The levels decline under first-order kinetics with half-life of approximately 2 hours. Measurement of tryptase at 1 to 6 hours and at least 24 hours after the anaphylactic episode may be useful in demonstrating a return to baseline concentrations and evaluating the kinetics of the response. Tryptase concentrations may also be increased for a period of time following allergen challenge.

Tryptase is the preferred marker of mast cell involvement in the evaluation of mast cell activation syndrome (MCAS). Elevations exceeding 20% of an individual's baseline + 2 ng/mL fulfill one of the three diagnostic criteria for MCAS.(4) Elevations in basal serum tryptase concentrations are also useful in the evaluation of mastocytosis, a hematologic neoplasm characterize by accumulation of neoplastic mast cells in various organs.(5) Mastocytosis can be categorized as cutaneous and systemic. Cutaneous mastocytosis is generally associated with normal or slightly elevated (11.5-20.0 ng/mL) concentrations of tryptase. In systemic mastocytosis, high concentrations may be observed, with greater than 20 ng+/mL being a minor criterion for the diagnosis of this condition.

Increased concentrations of basal serum tryptase may also be elevated in other conditions, complicating the diagnostic workup of mast cell disorders. Physiological concentrations of BST have been shown to vary among healthy individuals with upper limits of normal ranging from 8.2 to 15 ng/mL in different studies.(6) The source of variation between these studies remains unclear; however, hereditary alpha-tryptasemia (HaT), a genetic trait found in 4% to 7.5% of the western population, has been reported as the most prevalent underlying cause.(6) Individuals with HaT have one or more extra copies of the *TSPAB1* gene, which encodes alpha-tryptase, leading to higher concentrations of BST. As most patients harboring the HaT are asymptomatic, the European Competence Network on Mastocytosis and the American Initiative in Mast Cell Diseases have recommended that the normal reference interval for serum tryptase should be 15 ng/mL or lower to avoid unnecessary referrals and workup for mast cell disorders in healthy individuals.(6)

Reference Values

<11.5 ng/mL

Interpretation

Transient tryptase concentrations greater than or equal to 11.5 ng/mL may be consistent with mast cell activation in the context of anaphylaxis or allergen challenge; measurement of tryptase in specimens obtained 1 to 6 hours and at least 24 hours after the episode may be useful in demonstrating a return to baseline concentrations.

Basal tryptase concentrations greater than or equal to 11.5 mg/mL may be consistent with cutaneous mastocytosis.

Basal tryptase concentrations greater than or equal to 20 ng/mL may be consistent with systemic mastocytosis.

Cautions

The most prevalent cause of elevated basal serum tryptase has been associated with hereditary alpha-tryptasemia, a common autosomal dominant trait unaccompanied by mast cell related symptoms in most individuals.

Normal tryptase concentrations may be observed in some patients with acute mast cell activation if specimens are obtained greater than 12 hours after an anaphylactic episode or allergen challenge.

Some individuals may demonstrate an increase in tryptase concentrations above baseline after anaphylaxis or allergen challenge while remaining below 11.5 ng/mL; measurement of tryptase in specimens obtained 1 to 6 hours and at least 24 hours after the episode may be useful in demonstrating a transient increase in concentrations.

Clinical Reference

1. Lyons JJ, Yi T. Mast cell tryptases in allergic inflammation and immediate hypersensitivity. Curr Opin Immunol. 2021;72:94-106. doi:10.1016/j.coi.2021.04.001
2. Lyons JJ, Sun G, Stone KD, et al. Mendelian inheritance of elevated serum tryptase associated with atopy and connective tissue abnormalities. J Allergy Clin Immunol. 2014;133(5):1471-1474. doi:10.1016/j.jaci.2013.11.039
3. Platzgummer S, Bizzaro N, Bilo MB, et al. Recommendations for the use of tryptase in the diagnosis of anaphylaxis and clonal mastcell disorders. Eur Ann Allergy Clin Immunol. 2020;52(2):51-61. doi:10.23822/EurAnnACI.1764-1489.133
4. Valent P, Akin C, Bonadonna P, et al. Proposed diagnostic algorithm for patients with suspected mast cell activation syndrome. J Allergy Clin Immunol Pract. 2019;7(4):1125-1133.e1. doi:10.1016/j.jaip.2019.01.006
5. Valent P, Akin C, Hartmann K, et al. Updated diagnostic criteria and classification of mast cell disorders: A consensus proposal. Hemasphere. 2021;5(11):e646. doi:10.1097/HS9.0000000000000646
6. Valent P, Hoermann G, Bonadonna P, et al. The normal range of baseline tryptase should be 1 to 15 ng/mL and covers

healthy individuals with HalphaT. J Allergy Clin Immunol Pract. 2023;11(10):3010-3020. doi:10.1016/j.jaip.2023.08.008

Performance

Method Description
Anti-tryptase, covalently coupled to ImmunoCAP, reacts with tryptase in the patient serum specimen. After washing, enzyme-labeled antibodies against tryptase are added to form a complex. After incubation, unbound enzyme-labeled antibodies are washed away, and the bound complex is incubated with a developing agent. After stopping the reaction, the fluorescence in the eluate is measured. The fluorescence is directly proportional to the concentration of tryptase in the serum specimen.(Package insert: ImmunoCAP Tryptase. Phadia AB; 10/2019)

PDF Report
No

Day(s) Performed
Monday through Friday

Report Available
2 to 5 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 has been cleared, approved, or is exempt by the US Food and Drug Administration and is used per manufacturer's instructions. Performance characteristics were verified by Mayo Clinic in a manner consistent with CLIA requirements.

CPT Code Information
83520

LOINC® Information

Test Definition: TRYPT

Tryptase, Serum

Test ID	Test Order Name	Order LOINC® Value
TRYPT	Tryptase, S	21582-2

Result ID	Test Result Name	Result LOINC® Value
TRYPT	Tryptase, S	21582-2