MAYO CLINIC LABORATORIES

Test Definition: TTSC

Thrombin Time (Bovine), Plasma

Overview

Useful For

Detecting or excluding the presence of heparin or heparin-like anticoagulants (which act by enhancing antithrombin's inhibition of thrombin and other procoagulant enzymes) when used in conjunction with the reptilase time (RT) in evaluating unexplained prolonged clotting times

Identifying the cause of a prolonged prothrombin time, activated partial thromboplastin time, or dilute Russell viper venom time when used in conjunction with the RT and fibrinogen assay

Special Instructions

- Coagulation Guidelines for Specimen Handling and Processing

Method Name

Optical Clot-Based

NY State Available

Yes

Specimen

Specimen Type

Plasma Na Cit

Specimen Required

Specimen Type: Platelet-poor plasma

Patient Preparation:

Fasting: 8 hours, preferred but not required

Collection Container/Tube: Light-blue top (3.2% sodium citrate)

Submission Container/Tube: 13-mm x 75-mm, 5-mL, plastic vial (polypropylene preferred)

Specimen Volume: 1 mL Platelet-poor plasma

Collection Instructions:

1. For complete instructions, see Coagulation Guidelines for Specimen Handling and Processing.
2. Centrifuge, transfer all plasma into a plastic vial, and centrifuge plasma again.
3. Aliquot plasma into a separate plastic vial leaving 0.25 mL in the bottom of centrifuged vial.
4. Immediately freeze plasma (no longer than 4 hours after collection) at -20 degrees C or, ideally at -40 degrees C or below.

Additional Information:

1. A double-centrifuged specimen is critical for accurate results as platelet contamination may cause spurious results.
2. Each coagulation assay requested should have its own vial.

Forms

If not ordering electronically, complete, print, and send a Coagulation Test Request (T753) with the specimen.

Specimen Minimum Volume

Platelet-poor plasma: 0.5 mL

Reject Due To

Gross hemolysis	Reject
Gross lipemia	Reject
Gross icterus	Reject

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Plasma Na Cit	Frozen	14 days	

Clinical & Interpretive

Clinical Information

Prolonged clotting times may be associated with a wide variety of coagulation abnormalities including:
-Deficiency or functional abnormality (congenital or acquired) of many of the coagulation proteins
-Deficiency or functional abnormality of platelets
-Specific factor inhibitors
-Acute disseminated intravascular coagulation
-Exogenous anticoagulants (eg, heparin, warfarin)

The prothrombin time and activated partial thromboplastin time are first-order tests for coagulation abnormalities and are prolonged in many disorders. A battery of coagulation tests is often required to determine the cause of prolonged clotting times.

Thrombin catalyzes the transformation of fibrinogen to fibrin (by cleaving fibrinopeptides A and B), which is followed by polymerization of fibrin to form a clot. The thrombin time (TT) test measures the time of clot formation when thrombin is added to citrated plasma. The phospholipid-dependent procoagulant enzyme cascades (intrinsic, extrinsic, and "common" pathway) are bypassed by the addition of exogenous thrombin. Therefore, the TT mainly reflects functions and interactions of solution-phase exogenous thrombin and endogenous fibrinogen.

Reference Values

15.8-24.9 seconds

Interpretation

Prolongation of the thrombin time (TT) is consistent with the presence of heparin-like anticoagulants, hypofibrinogenemia, dysfibrinogenemia, fibrin degradation products, and antibody inhibitors of thrombin. An

immeasurably prolonged TT is usually the result of heparin in the specimen or, rarely, the presence of thrombin antibodies or afibrinogenemia.

When the TT test is performed with diluted bovine thrombin to achieve a normal plasma clotting time of about 20 seconds, the TT can detect unfractionated heparin at a concentration of 0.05 units/mL of heparin.

Other tests useful in interpreting the significance of prolongation of the TT include: reptilase time (RT), human thrombin time, clottable fibrinogen assay, and the fibrin D-dimer assay. These tests are available as components of coagulation profile test panels. As seen in the following table, RT can help distinguish among the various causes of a prolonged TT.

Thrombin time	Reptilase time	Causes	Remarks
Prolonged	Prolonged	Hypofibrinogenemia or afibrinogenemia	Ascertain by determination of fibrinogen
Prolonged	Prolonged	Dysfibrinogenemia	Ascertain by specific assay
Prolonged	Normal	Heparin or inhibitor of thrombin	Differentiate by human TT and/or heparin assays
Prolonged	Prolonged	Fibrin(ogen) split products (FSP)	Ascertain by FSP or D-dimer assay

Note: Rare congenital dysfibrinogenemias associated with venous thromboembolism (eg, fibrinogen Bordeaux) may demonstrate normal thrombin and reptilase times and normal Clauss fibrinogen levels.

Cautions

The thrombin time test, by itself, has little diagnostic value and should be interpreted within the context of additional coagulation assays (eg, prothrombin time, activated partial thromboplastin time, and reptilase time).

Clinical Reference

1. Koepke JA. Coagulation testing systems. In: Practical Laboratory Hematology. Churchill Livingston; 1991
2. Corriveau DM, Fritsma G. Hemostasis and Thrombosis in the Clinical Laboratory. JB Lippincott Company; 1988
3. Galanakis DK. Plasma thrombin time and related tests. In: Williams Hematology. 5th ed. McGraw-Hill Book Company; 1995:L91-L93
4. Greaves M, Preston FE. Approach to the bleeding patient. In: Colman RW, Hirsh J, Marder VJ, et al. eds. Hemostasis and Thrombosis: Basic Principles and Clinical Practice. 4th ed. JB Lippincott Company; 2001:783-837
5. Turgeon TL, ed. Clinical Hematology. 6th ed. Wolkers Kluer and Co; 2018

Performance

Method Description

The thrombin time (TT) assay is performed on the Instrumentation Laboratory ACL TOP. Patient plasma is combined with a bovine thrombin reagent containing bovine albumin, calcium chloride, and buffer immediately triggering the coagulation process in the mixture. Time to clot formation is measured optically using a wavelength of 405 nm.(Package

insert: HemosIL Thrombin Time, IL TOP Operators Manual. Instrumentation Laboratory Company; 06/2017)

PDF Report
No

Day(s) Performed
Monday through Saturday

Report Available
1 to 4 days

Specimen Retention Time
7 days

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 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
85670

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
TTSC	Thrombin Time (Bovine), P	46717-5

Result ID	Test Result Name	Result LOINC® Value
TTSC	Thrombin Time (Bovine), P	46717-5