MAYO CLINIC LABORATORIES

Test Definition: APTSC

Activated Partial Thromboplastin Time (APTT), Plasma

Overview

Useful For

Screening for certain coagulation factor deficiencies and abnormalities (eg, factor VIII, IX, XI, or XII)

Detecting coagulation inhibitors such as lupus anticoagulant, antiphospholipid antibodies, specific factor inhibitors, and nonspecific inhibitors

Evaluating a prolonged activated partial thromboplastin time (APTT) test result to assist in differentiating coagulation factor deficiencies from coagulation inhibitors, especially when the APTT mixing test results are combined with results of other coagulation tests and clinical information

Monitoring heparin (unfractionated) therapy

Method Name

Only orderable as part of a profile or as a reflex. For more information see:
ALUPP / Lupus Anticoagulant Profile, Plasma
ALBLD / Bleeding Diathesis Profile, Limited, Plasma
AATHR / Thrombophilia Profile, Plasma and Whole Blood
APROL / Prolonged Clot Time Profile, Plasma
ADIC / Disseminated Intravascular Coagulation/Intravascular Coagulation and Fibrinolysis (DIC/ICF) Profile, Plasma

Optical Clot-Based

NY State Available

Yes

Specimen

Specimen Type

Plasma Na Cit

Necessary Information

Heparin or warfarin therapy should be noted.

Specimen Required

Only orderable as part of a profile or as a reflex. For more information see:
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ALBLD / Bleeding Diathesis Profile, Limited, Plasma
AATHR / Thrombophilia Profile, Plasma and Whole Blood

APROL / Prolonged Clot Time Profile, Plasma
ADIC / Disseminated Intravascular Coagulation/Intravascular Coagulation and Fibrinolysis (DIC/ICF) Profile, Plasma

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

The activated partial thromboplastin time (APTT) measures the integrity of the intrinsic (factors VIII, IX, XI, and XII) and common (factors II, V, X, and I [fibrinogen]) pathway coagulation factors as well as contact factors, prekallikrein (PK) and high-molecular-weight kininogen (HMWK). The APTT assay depends on phospholipid (a partial thromboplastin), contact activator (eg, silica), and ionic calcium supplied in the reagents.

A prolonged APTT may be caused by congenital or acquired coagulation factor deficiencies, anticoagulant effect such as heparin anticoagulation therapy, and inhibition due to lupus anticoagulants as well as other nonspecific coagulation inhibitors (eg, monoclonal immunoglobulins).

Although the APTT is commonly used as an initial test for detecting coagulation factor deficiencies, various reagents differ considerably in their sensitivity to deficiencies of coagulation factor proteins. The reagents are generally most sensitive to deficiencies of "contact factors" (XII, PK, and HMWK) and factor XI, less sensitive to deficiencies of factors VIII and IX (the "antihemophilic factors"), and least sensitive to deficiencies of common procoagulant pathway factors (X, V, II, I). The APTT typically prolongs when the activities of factors XI and XII are below the hemostatically adequate level of 40% to 50%. Although factor XII deficiency does not cause bleeding, it is a relatively common cause of APTT prolongation. Nevertheless, an APTT may still be normal when the factor VIII level is as low as 25% to 35% or factor IX as low as 20% to 30%, as seen in some patients with mild hemophilia A or B, respectively. Conversely, a shortened APTT due to increased factor VIII activity secondary to inflammation, pregnancy, or estrogen use, or other conditions may mask deficiencies of other factors.

The APTT also has divergent sensitivity to nonspecific inhibitors of the intrinsic and common coagulation pathways, such as lupus anticoagulant (LAC) and specific coagulation factor inhibitors. LACs are antibodies directed towards neoepitopes presented by complexes of phospholipid and proteins, such as prothrombin (factor II) or beta 2 glycoprotein I, instead of coagulation factors. They interfere with the in vitro phospholipid component of the APTT assay and result in a prolonged clotting time. Clinically, lupus anticoagulant represents an important marker of thrombotic tendency. In contrast,

patients with specific coagulation inhibitors, such as factor VIII inhibitor antibodies, have a significant risk of hemorrhage and often require specific treatment for effective management.

Reference Values

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ALUPP / Lupus Anticoagulant Profile, Plasma
ALBLD / Bleeding Diathesis Profile, Limited, Plasma
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APROL / Prolonged Clot Time Profile, Plasma
ADIC / Disseminated Intravascular Coagulation/Intravascular Coagulation and Fibrinolysis (DIC/ICF) Profile, Plasma

25-37 seconds
The activated partial thromboplastin time (APTT) may be 35% longer in full-term newborns that reach adult reference range by age 3 months and twice the adult upper limit in premature infants reaching adult reference range by age 6 months.

Interpretation

Prolongation of the activated partial thromboplastin time (APTT) can occur as a result of deficiency of 1 or more coagulation factors (acquired or congenital in origin) or the presence of an inhibitor of coagulation such as heparin, a lupus anticoagulant, a nonspecific inhibitor such as a monoclonal immunoglobulin, or a specific coagulation factor inhibitor.

The APTT mixing study, which uses equal volumes of patient and normal pool plasma, may be performed on specimens with a prolonged APTT to assist in differentiating coagulation factor deficiencies from coagulation inhibitors of all types. Correction of the APTT mix to within the normal reference range usually indicates a coagulation factor deficiency (normal plasma in the mixture ensures at least 50% activity of all coagulation factors). If the prolonged APTT is due to an inhibitor (eg, specific coagulation factor inhibitor, lupus anticoagulant, heparin), the APTT mix typically fails to correct a prolonged APTT. However, the presence of a weak inhibitor may be missed by the APTT mixing study.

Accurate interpretation of both APTT and APTT mixing study results may often require additional testing. For example, the thrombin time test is helpful for identifying or excluding the presence of heparin; the platelet neutralization procedure (using a modified APTT method) for identifying or excluding lupus anticoagulant; the prothrombin time and dilute Russell's viper venom time for further assessment of the common procoagulant pathway; and coagulation factor assays to detect and identify deficient or abnormal factors. These assays are available as components of reflexive and interpretive testing panels (eg, APROL / Prolonged Clot Time Profile, Plasma).

The APTT test is frequently used to monitor therapy with unfractionated heparin (UFH). Since APTT reagents can vary greatly in their sensitivity to UFH, it is important to establish a relationship between APTT response and heparin concentration.(1) The therapeutic APTT range in seconds should correspond with a UFH concentration of 0.3 to 0.7 U/mL as assessed by a heparin assay (inhibition of factor Xa activity with detection by a chromogenic substrate [1]). We have established the therapeutic APTT range to be approximately 70 to 120 seconds.

Shortening of the APTT usually reflects either elevation of factor VIII activity secondary to acute or chronic illness or inflammation, or spurious results from suboptimal venipuncture, specimen collection or processing. A normal or

shortened APTT result does not exclude a hemostatic defect; therefore, specific clotting factor assays should be performed despite a normal APTT when there is clinical impression of bleeding diathesis.

Cautions

For diagnostic activated partial thromboplastin time (APTT) testing, other than heparin therapeutic monitoring, specimens should not have any residual heparin present.

Mild coagulation factor deficiency may not result in prolongation of the APTT. The APTT testing will not detect all lupus anticoagulants or coagulation inhibitors.

Lipemic specimens may interfere with the instrument clot detection mechanism.

The APTT mixing studies have no utility when the patient APTT is normal.

Clinical Reference

Favaloro EJ, Lippi G. eds. Hemostasis and Thrombosis: Methods and Protocols. Humana Press; 2017

Performance

Method Description

The activated partial thromboplastin time (APTT) assay is performed on the Instrumentation Laboratory ACL TOP. Patient plasma is combined and incubated with an APTT reagent containing phospholipid, a negatively charged contact factor activator, and buffer. After a specified incubation time, calcium is added to trigger the coagulation process in the mixture. Subsequently, the time to clot formation is measured optically using a wavelength of 671 nm.(Package insert: HemilsIL SynthASil Instrumentation Laboratory Company; 06/2017)

PDF Report

No

Day(s) Performed

Monday through Friday

Report Available

Same day/1 day

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

85730

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
APTSC	Activated Partial Thrombopl Time, P	14979-9

Result ID	Test Result Name	Result LOINC® Value
APTSC	Activated Partial Thrombopl Time, P	14979-9