MAYO CLINIC LABORATORIES

Test Definition: APROL

Prolonged Clot Time Profile, Plasma

Overview

Useful For

Determining the cause of prolongation of prothrombin time or activated partial thromboplastin time

Screening for prolonged clotting times and determining the presence of factor deficiencies or inhibitor (eg, factor-specific, lupus-like, or the presence of heparin)

Profile Information

Test Id	Reporting Name	Available Separately	Always Performed
APRI	Prolonged Clot Time Prof Interp	No	Yes
PTSC	Prothrombin Time (PT), P	Yes, (order PTTP)	Yes
APTSC	Activated Partial Thrombopl Time, P	Yes, (order APTTP)	Yes
DRV1	Dilute Russells Viper Venom Time, P	Yes, (order DRVI1)	Yes
TTSC	Thrombin Time (Bovine), P	Yes	Yes
CLFIB	Fibrinogen, Clauss, P	Yes, (order FIBTP)	Yes
DIMER	D-Dimer, P	Yes, (order DDITT)	Yes

Reflex Tests

Test Id	Reporting Name	Available Separately	Always Performed
GBETH	General Factor Bethesda Units, P	No	No
5BETH	FV Bethesda Units, P	No	No
8BETH	FVIII Bethesda Units, P	No	No
9BETH	FIX Bethesda Units, P	No	No
F8IS	Coag Factor VIII Assay Inhib Scrn,P	No	No
FACTV	Coag Factor V Assay, P	Yes	No
F_7	Coag Factor VII Assay, P	Yes	No
F_9	Coag Factor IX Assay, P	Yes	No
F_10	Coag Factor X Assay, P	Yes	No
F_11	Coag Factor XI Assay, P	Yes	No
F_12	Coag Factor XII Assay, P	Yes	No
F8A	Coag Factor VIII Activity Assay, P	Yes	No
RTSC	Reptilase Time, P	Yes	No
F_2	Coag Factor II Assay, P	Yes	No

PNP	Platelet Neutralization Procedure	No	No
PTMSC	PT Mix 1:1	No	No
APMSC	APTT Mix 1:1	No	No
DRV2	DRVVT Mix	No	No
DRV3	DRVVT Confirmation	No	No
F5_IS	Factor V Inhib Scrn	No	No
F9_IS	Factor IX Inhib Scrn	No	No
F2_IS	Factor II Inhib Scrn	No	No
F7_IS	Factor VII Inhib Scrn	No	No
10_IS	Factor X Inhib Scrn	No	No
11_IS	Factor XI Inhib Scrn	No	No
PTFIB	PT-Fibrinogen, P	No	No
SOLFM	Soluble Fibrin Monomer	No	No
CH9	Chromogenic FIX, P	Yes	No
CHF8	Chromogenic FVIII, P	Yes	No
HEXLA	HEX LA, P	No	No

Testing Algorithm

Initial testing includes prothrombin time (PT), activated partial thromboplastin time (aPTT), dilute Russell's viper venom time (dRVVT), thrombin time (bovine), fibrinogen, D-dimer, and prolonged clot time interpretation.

If PT is greater than 13.9 seconds, then PT mix will be performed at an additional charge.

If aPTT is greater or equal to 38 seconds, then aPTT mix will be performed at an additional charge.

If aPTT mix is greater or equal to 38 seconds and thrombin time is less than 35.0 seconds (no evidence of heparin), then platelet neutralization procedure will be performed at an additional charge.

If dRVVT ratio is greater or equal to 1.20, then dRVVT mix and dRVVT confirmation will be performed at an additional charge.

If thrombin time is greater or equal to 25.0 seconds, then reptilase time will be performed at an additional charge.

If fibrinogen is less than 150 mg/dL or clinically indicated, then PT-fibrinogen will be performed at an additional charge.

If D-dimer is greater than 500 ng/mL fibrinogen equivalent units, then soluble fibrin monomer will be performed at an additional charge.

If PT, aPTT, or dRVVT is prolonged, then coagulation factor assays may be performed at an additional charge.

If factor assay result is below the normal range, the appropriate factor inhibitor screen may be performed along with the Bethesda titering assay, at an additional charge, if inhibitor screen is positive.

If appropriate, hexagonal lupus anticoagulant will be performed at an additional charge to clarify significant abnormalities in the screen test results.

Special Instructions

- Coagulation Guidelines for Specimen Handling and Processing
- Coagulation Patient Information
- Coagulation Profile Comparison

Method Name

ARPI: Medical Interpretation
PTSC, APTSC, DRV1, TTSC, GBETH, 5BETH, 8BETH, 9BETH, F8IS, FACTV, F_2, F_7, F_9, F_10, F_11, F_12, F8A, RTSC, PNP, APMSC, PTMSC, PTFIB, DRV2, DRV3: Optical Clot-Based
CLFIB: Clauss
DIMER, SOLFM: Latex Immunoassay (LIA)
CH9, CHF8: Chromogenic
HEXLA: Spectrophotometric

NY State Available

Yes

Specimen

Specimen Type

Plasma Na Cit

Ordering Guidance

Multiple coagulation profile tests are available. See Coagulation Profile Comparison for testing that is performed with each profile.

Shipping Instructions

Send the 5 aliquots in the same shipping container.

Necessary Information

Note if patient is currently receiving heparin, Coumadin (warfarin) or any medication affecting coagulation.

Specimen Required

Specimen Type: Platelet-poor plasma
Patient Preparation:
1. Patient should not be receiving anticoagulant treatment (eg, warfarin, heparin). Treatment with heparin causes false-positive results of in vitro coagulation testing for lupus anticoagulant. Coumadin (warfarin) treatment may impair ability to detect the more subtle varieties of lupus-like anticoagulants.
2. Patient should also not be receiving fibrinolytic agents (streptokinase, urokinase, tissue plasminogen activator [tPA]).
3.It is best to perform this study pretransfusion if possible. If patient has been recently transfused, wait at least 48 hours after transfusion to collect the specimen.

Collection Container/Tube: Light-blue top (3.2% sodium citrate)
Submission Container/Tube: Plastic vial
Specimen Volume: 5 mL in 5 plastic vials, each containing 1 mL
Collection Instructions:
1. Specimen must be collected prior to factor replacement therapy.
2. For complete instructions, see Coagulation Guidelines for Specimen Handling and Processing.
3. Centrifuge, transfer all plasma into a plastic vial, and centrifuge plasma again.
4. Aliquot plasma (1-2 mL per aliquot) into 5 separate plastic vials leaving 0.25 mL in the bottom of centrifuged vial.
5. Freeze plasma immediately (no longer than 4 hours after collection) at -20 degrees C or, ideally, -40 degrees C or below.
Additional Information:
1. 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
1. Coagulation Patient Information (T675)
2. If not ordering electronically, complete, print, and send a Coagulation Test Request (T753) with the specimen.

Specimen Minimum Volume
4 plastic vials, each containing 1 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
When coagulation screening tests are performed to verify normal function of the coagulation system (eg, preoperative, routine examination), they sometimes indicate an abnormality that may be unexplained (ie, prolonged clotting times). This consultation provides validation of the prolongation and as comprehensive a workup as needed to define the abnormality.

Possibilities for a cause of prolongation include:
-Artifactual due to high hematocrit (dilution of specimen by anticoagulant if patient hematocrit is 55% or greater)
-Factor deficiencies, congenital or acquired

-Factor inhibitors eg, factor VIII inhibitors (bleeding disorder)
-Lupus anticoagulant (risk for thrombosis or recurrent miscarriage)
-Anticoagulant drug effect eg, (including warfarin [Coumadin or Jantoven], oral anti-Xa inhibitors, oral direct thrombin inhibitors), heparin.

Reference Values
An interpretive report will be provided.

Interpretation
An interpretive report will be provided when testing is completed, noting a presence or absence of a prolonged bleeding disease state.

Cautions
If the patient's hematocrit is 55% or greater, the volume of citrate anticoagulant should be adjusted prior to submitting the specimen for analysis to avoid dilution of plasma by anticoagulant.(1)

For optimal results, the patient should not be receiving oral vitamin K inhibitor (eg, warfarin, Coumadin), heparin, low-molecular weight heparin, hirudin (Refludan), argatroban, or fibrinolytic agents (eg, streptokinase, tissue plasminogen activator). If necessary, testing may be performed on patients receiving these treatments. Medications affecting coagulation parameters must be noted on requisition for accurate interpretation of results. Treatment with heparin causes false-positive results of in vitro coagulation testing for lupus anticoagulant. Coumadin treatment may impair ability to detect the more subtle varieties of lupus-like anticoagulants.

Clinical Reference
1. Clinical and Laboratory Standards Institute. Collection, transport, and processing of blood specimens for testing plasma-based coagulation assays and molecular hemostasis assays; approved guideline-fifth edition. CLSI document H21-A5. CLSI; 2008
2. Kamal AH, Tefferi A, Pruthi RK. How to interpret and pursue an abnormal prothrombin time, activated partial thromboplastin time, and bleeding time in adults. Mayo Clin Proc. 2007;82(7):864-873
3. Kottke-Marchant K, ed. Laboratory Hematology Practice. Wiley Blackwell Publishing; 2012
4. Favaloro EJ, Lippi G, eds. Hemostasis and Thrombosis: Methods and Protocols. Humana Press; 2017

Performance

Method Description
Prothrombin time:
The prothrombin time (PT) assay is performed on the Instrumentation Laboratory ACL TOP. Patient sample is incubated and combined with a PT reagent containing recombinant human tissue factor, synthetic phospholipids, calcium chloride, polybrene, and buffer. The tissue thromboplastin-factor VII/VIIa complex activates factor X. Activated factor X (factor Xa) forms a complex with factor Va, calcium, and phospholipid to activate factor II (prothrombin) to thrombin. Thrombin then acts on fibrinogen (factor I) to form fibrin which clots, the time to clot formation is measured optically using a wavelength of 671 nm providing the assay endpoint (the "prothrombin time").(Package insert: HemosIL RecombiPlasTin 2G. Instrumentation Laboratory Company; R0, 03/2019)

Activated Partial Thromboplastin Time:
The activated partial thromboplastin time (aPTT) assay is performed on the Instrumentation Laboratory ACL TOP. Patient sample 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. Mixing studies (APMSC / Activated Partial Thromboplastin Time [APTT] Mix 1:1, Plasma) using normal pooled plasma are performed on samples with a prolonged aPTT to assist in discriminating between factor deficiency states and coagulation inhibitors unless further testing is not indicated.(Package insert: HemosIL SynthASil. Instrumentation Laboratory Company; R11, 06/2017)

Dilute Russell's Viper Venom Time:
The dilute Russell's viper venom time (dRVVT) screening assay is performed on the Beckman Coulter ACL TOP. Patient sample is incubated for a specified time, then combined with a dRVVT screening reagent containing Russell's viper venom, phospholipids, heparin neutralizing agents, calcium, buffers, and stabilizers to trigger the coagulation process. Subsequently, the time to clot formation is measured optically using a wavelength of 671 nm. The patient dRVVT screening clotting time is normalized by dividing the patient result by the mean dRVVT screening clotting time of normal pooled plasma to yield a ratio (dRVVT screen ratio).(Package insert: LA CHECK DRVVT. Precision Biologic; R14, 03/2012)

Thrombin Time:
The thrombin time assay is performed on the Instrumentation Laboratory ACL TOP. Patient sample 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 671 nm.(Package insert: HemosIL Thrombin Time. Instrumentation Laboratory Company; R1, 12/2018)

Fibrinogen, Clauss assay:
The Clauss fibrinogen assay is performed using the HemosIL Fibrinogen-C kit on the Instrumentation Laboratory ACL TOP. Patient sample, containing fibrinogen, is mixed with reagent containing excess thrombin. The excess thrombin converts the fibrinogen in the patient sample to fibrin. The amount of time it takes to form a clot is inversely proportional to the amount of fibrinogen present in the patient sample.(Package insert: HemosIL Fibrinogen-C. Instrumentation Laboratory Company; R7, 06/2017)

D-Dimer:
The D-dimer assay is performed using the HemosIL D-Dimer HS 500 kit on the Instrumentation Laboratory ACL TOP instrument. D-dimer is assayed in plasma by adding polystyrene latex particles coated with monoclonal antibodies specific for D-dimer domain. The latex particles agglutinate in the presence of soluble fibrin degradation products containing the D-dimer domain. The degree of agglutination is directly proportional to the concentration of D-dimer in the sample and is determined by measuring the decrease of transmitted light caused by the aggregates (turbidimetric immunoassay).(Package insert: HemosIL D-Dimer HS 500. Instrumentation Laboratory Company; 04/2018)

PDF Report
No

Day(s) Performed
Monday through Friday

Report Available

3 to 7 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

See Individual Test IDs

CPT Code Information

85379-DIMER
85384-CLFIB
85390-26-APRI
85610-PTSC
85613-DRV1
85670-TTSC
85730-APTSC
85130-Chromogenic FVIII (if appropriate)
85130-Chromogenic FIX (if appropriate)
85210-Factor II (if appropriate)
85220-Factor V (if appropriate)
85230-Factor VII (if appropriate)
85240-Factor VIII (if appropriate)
85250-Factor IX (if appropriate)
85260-Factor X (if appropriate)
85270-Factor XI (if appropriate)
85280-Factor XII (if appropriate)
85335-Bethesda titer (if appropriate)
85335-Factor V inhibitor screen (if appropriate)
85335-Factor VIII inhibitor screen (if appropriate)
85335-Factor IX inhibitor screen (if appropriate)
85366-Soluble fibrin monomer (if appropriate)
85385-PT-Fibrinogen (if appropriate)
85597-Platelet neutralization for lupus inhibitor (if appropriate)
85598-Hex LA (if appropriate)

85611-PT mix 1:1 (if appropriate)
85613-DRVVT mix (if appropriate)
85613-DRVVT confirm (if appropriate)
85635-Reptilase time (if appropriate)
85732-APTT mix 1:1 (if appropriate)

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
APROL	Prolonged Clot Time Prof	98125-8

Result ID	Test Result Name	Result LOINC® Value
APTSC	Activated Partial Thrombopl Time, P	14979-9
CLFIB	Fibrinogen, Clauss, P	48664-7
TTSC	Thrombin Time (Bovine), P	46717-5
603324	Reviewed by	18771-6
603183	Prolonged Clot Time Prof Interp	69049-5
DIMER	D-Dimer, P	In Process
INRSC	INR	6301-6
PTSEC	Prothrombin Time (PT), P	5902-2
RVR1	DRVVT Screen Ratio	15359-3