

Chernecky & Berger: Laboratory Tests and Diagnostic Procedures, 5th ed.

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Activated Partial Thromboplastin Time (APTT) and Partial Thromboplastin Time (PTT)—Plasma

Note: Activated partial thromboplastin time (APTT) is the current method of this test, which is still commonly referred to as “PTT.”

Norm.

Standardized times should be reported by each laboratory because results depend on the type of activator used. In general, standards are less than 35 seconds and vary by 20–36 seconds.

Premature infants	<120 seconds
Newborn	<90 seconds
Infants	24–40 seconds
Children	24–40 seconds
Adult panic level	>70 seconds

Therapeutic Heparin Therapy Levels

Acute coronary artery disease	50–80 seconds
Peripheral vascular disease with embolism	50–80 seconds

Panic Level Symptoms and Treatment

Symptoms

Prolonged bleeding, hematoma at venipuncture site, cerebrovascular accident, hemorrhage, shock.

Treatment

Note: Treatment choice(s) depend(s) on client's history and condition and episode history.

1. Assess heparin therapy.
2. Administer protamine sulfate (usual dose of 1 g of protamine sulfate for every 100 units of heparin).
3. Monitor vital signs.
4. Monitor for neurologic changes every hour until levels are within desired range.

Increased.

Major causes: Genetic or acquired deficiency of blood clotting factors IX, X, XI, or XII and with factor V or II deficiencies.

These deficiencies usually must be below 30%–40% of normal levels for clotting factors to produce increased APTT and bleeding tendencies as seen in hemophilia A. Longer times are associated with deficiencies of high molecular weight (HMW) kininogen and Fletcher factor (prekallikrein). Longer times also occur with abruptio placentae, afibrinogenemia, cardiac surgery, hypothermia, cirrhosis, disseminated intravascular coagulation, dysfibrinogenemia, fibrinolysis, Fitzgerald factor deficiency (severe), hemorrhagic disease of the newborn, hypofibrinogenemia, liver disease, hypoprothrombinemia, presence of circulating anticoagulants, lupus anticoagulant, and von Willebrand's disease and in clients receiving hemodialysis.

Drugs include alcohol, antistreplase (a thrombolytic agent), bishydroxycoumarin (excess therapy), chlorpromazine, codeine, eptifibatide, heparin calcium, heparin sodium, methotrexate, phenothiazines, salicylates, warfarin administration, and valproic acid.

Decreased.

Shortened times occur with abnormalities of Fletcher factor, which are not associated with bleeding and in which thromboemboli may occur. A shortened APTT (less than or equal to control) on presentation in clients with chest pain is associated with increased risk of acute MI.

Description.

Partial thromboplastin time (PTT) evaluates how well the coagulation sequence is functioning by measuring the amount of time it takes for recalcified, citrated plasma to clot after partial thromboplastin is added to it. The PTT is abnormal in 90% of coagulation defects and screens for deficiencies and inhibitors of all factors except VII and XIII. This test is most commonly used to monitor effectiveness of heparin therapy and to screen for disorders of coagulation. When commercial activating materials are used to standardize the test, the PTT is called the APTT, or “activated partial thromboplastin time.”

Professional Considerations

Consent form NOT required.

Preparation

1. For intermittent heparin dosing, the sample should be drawn 1 hour before the next dose. A baseline APTT may not be needed before heparin therapy unless disease is suspected.
2. Tube: 2.7- or 4.5-mL blue-topped tube, a control tube, and a waste tube or syringe.
3. Do NOT draw specimens during hemodialysis.
4. Do NOT draw specimens from a closed-loop blood sampling system in an arterial line that uses heparin flush solution.

Procedure

1. Withdraw 2 mL of blood into a discard syringe or vacuum tube. Remove the syringe or tube, leaving the needle in place. Attach a second syringe, and draw a blood sample quantity of 2.4 mL for a 2.7-mL tube, or 4.0 mL for a 4.5-mL tube. Collect the sample without trauma.

Postprocedure Care

1. If the test cannot be performed within 2 hours after specimen collection, separate and freeze the plasma.
2. Transport the specimen to the laboratory immediately.

Client and Family Teaching

1. Surgery may be postponed if the results are prolonged.
2. Bleeding precautions for prolonged values include the following: use a soft toothbrush; use an electric razor; avoid aspirin or aspirin products; avoid constipation; wear loose clothing; avoid intramuscular injections.
3. Watch for and report signs of bleeding: bruising, petechiae, blood in stool/urine/ sputum, bleeding from invasive lines, bleeding gums, abnormal or excessive vaginal bleeding.
4. Many herbs can cause bleeding effects. For this reason, do not take any herbal preparations or natural remedies without receiving your doctor's approval.

Factors That Affect Results

1. Do NOT draw samples from an arm into which heparin is infusing.
2. Failure to completely fill the tube will alter the results.
3. If you are drawing samples from an arterial line with a heparin-flush pressure bag, at least 10 mL of blood must be withdrawn before the PTT sample is drawn.
4. Failure to discard the first 1 to 2 mL of traumatic venous draw may result in a falsely decreased APTT.
5. A false-normal PTT may occur if factor levels are deficient but not less than 25% to 30% of normal.
6. Factor I (fibrinogen) deficiency may not be detectable unless levels are <100 mg/dL.
7. Hematocrit >55% may cause falsely prolonged results. The test should be redrawn in a tube furnished by the laboratory that has had the concentration or amount of citrate adjusted for the elevated hematocrit level.
8. Freezing the sample will decrease the test sensitivity to lupus anticoagulant and to deficiencies of XII, XI, HMW kininogen, and prekallikrein.
9. Herbs or natural remedies that may increase PTT include *dan shen* (red-ginseng, *Salvia miltiorrhiza*), *dang gui* [variants: tangkuei, dong quai] (*Angelica sinensis*) (in clients receiving warfarin concurrently), feverfew (*Tanacetum parthenium*), *ginkgo biloba*, ginger, and ginseng.

Other Data

1. 1 mg of protamine sulfate will reverse the effects of 100 units of heparin.
2. Hemophilia A causes increased APTT with normal PT and bleeding time.
3. Hemophilia B is diagnosed by increased APTT with normal or increased PT and direct assay of levels of factor IX.
4. APTT is not helpful in the diagnosis of hemophilia type.
5. APTT and PT are both increased with prothrombin and HMW kininogen and prekallikrein deficiencies.
6. Age, sex, and ABO blood group may have an influence on the APTT in normal clients.

7. Acceptable alternatives to APTT monitoring of direct anticoagulation thrombin inhibitors (DTIs) include the ecarin clotting time (ECT) and the thrombin inhibitor management (TIM) test.

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