
Lab Dept: Coagulation

Test Name: PROTEIN S ACTIVITY

General Information

Lab Order Codes: PRSA

Synonyms: Protein S

CPT Codes: 85306 – Clotting inhibitors or anticoagulants; protein S

Test Includes: Protein S Activity reported as a percent (%).

Logistics

Test Indications: Protein S, a vitamin K dependent plasma protein is the cofactor of activated Protein C. It stimulates the proteolytic inactivation of Factor V and Factor VIII by Protein C, thereby stimulating its coagulation inhibiting effect. A diminished Protein S activity increases thromboembolic risk. Homozygous Protein S deficiency, like homozygous Protein C deficiency, leads to Purpura fulminans in neonates.

Functional assays should be performed first, because all types of Protein S deficiencies will be detected. The free antigen is needed only if the functional assay is decreased and the total antigen assay is needed only if the free antigen is decreased in order to determine the deficiency subtype. If the antigen assays are performed without the functional assay, patients with certain subtypes will not be detected.

Lab Testing Sections: Coagulation

Phone Numbers: MIN Lab: 612-813-6280

STP Lab: 651-220-6550

Test Availability: Daily, 24 hours; Testing performed at Minneapolis Laboratory only.

Turnaround Time: 1-7 days, Testing is performed on **Fridays only**

Special Instructions: Protein S is decreased in Coumadin® therapy/Vitamin K deficiency.

Specimen

Specimen Type: Whole blood

Container: Light Blue top (Buffered Na citrate 3.2%) tube

Draw Volume:	1.8 mL blood (in 2 mL tube) or 2.7 mL blood (in a 3 mL tube).
Processed Volume:	Minimum 0.9 mL plasma
Collection:	<ul style="list-style-type: none"> ● A clean venipuncture is essential, avoid foaming. ● Entire sample must be collected with single collection, pooling of sample is unacceptable. ● Capillary collection is unacceptable. ● Patient's with a hematocrit level >55% must have a special tube made to adjust for the hematocrit; contact lab for a special tube. ● Mix thoroughly by gentle inversion. Deliver immediately to the laboratory at room temperature via courier or pneumatic tube. <p>Off campus collections:</p> <ul style="list-style-type: none"> ● Must be tested within 4 hours. ● Do not refrigerate. ● If not received in our lab within 4 hours of collection, sample must be centrifuged and *platelet-poor plasma removed from cells and transferred to an aliquot tube being careful not to disturb the cell layer. Centrifuge the plasma a second time and transfer into a clean aliquot tube being careful not to include any residual platelets on the bottom of the tube. Freeze at -20°C and deliver to the lab on dry ice within 2 weeks. <p>*Validation of your lab's centrifuge for platelet poor plasma is required.</p>
Special Processing:	<p>Lab staff: Centrifuge in Stat Spin for 5 minutes or 10 minutes at 3000 rpm at room temperature. For primary tube testing, leave plasma on cells OR remove plasma and place in a 4 mL plastic cup; allow for 100 mL of dead-space.</p> <p>Test within:</p> <ul style="list-style-type: none"> ● Four (4) hours when stored in the capped tube above the packed cells 18 to 24°C. ● Four (4) hours as plasma that has been separated from cells by centrifugation when stored 2 to 8°C or 18 to 24°C. ● Two (2) weeks when stored -20°C. ● Six (6) months when stored -70°C (rapidly frozen). ● Plasma must be frozen if testing cannot be completed within four (4) hours. ● Frozen plasmas are thawed at 37°C for three (3) minutes, test immediately.
Patient Preparation:	<p>If the patient is being treated with Coumadin®, this should be noted. Coumadin® will lower Protein S</p>
Sample Rejection:	Improper tube; clotted sample; under-filled tube; mislabeled or unlabeled specimens

Interpretive

Reference Range: Reference range: 70 – 130%

Note: There are insufficient data concerning Protein S activity in normal infants, neonates and children; but normal or near normal activity is most likely present by the age 3-6 months.

Critical Values: N/A

Limitations: This test detects functionally active Protein S.

Activated Protein C resistance (e.g. Heterozygosity or Homozygosity for the factor V Leiden mutation) may lead to a diminished recovery of Protein S.

The antiphospholipid antibodies (e.g. Lupus anticoagulant) may be accompanied by either increased or decreased Protein S activity results.

This assay should not be performed on patients that are on Hirudin or Argatroban anticoagulation.

Methodology: Protein C proteolytically cleaves Factor V which is generated by the activation of the coagulation cascade by Russell's Viper Venom (RVV). In this reaction Protein S acts as a cofactor, which accelerates the reaction. As a result the coagulation time increases proportionally to the activity of Protein S in the sample. The addition of deficient plasma ensures that the test mixture has a sufficient supply of fibrinogen, Factor V and other necessary coagulation factors. Coagulation is triggered at the level of Factor X by the Factor X activator of RVV. Factor X forms thrombin from prothrombin under the action of the remaining Factor V. The resulting thrombin finally converts fibrinogen to fibrin. The coagulation time is then detected optically.

References:

Protein S Ac Reagent package insert (May 2008) Standard Human Plasma package insert, Siemens Healthcare Diagnostics Inc., Newark, DE

Control Plasma N package insert (December 2007) Siemens Healthcare Diagnostics, Newark, DE

Control Plasma P package insert (December 2007) Siemens Healthcare Diagnostics, Newark, DE

Application Sheet for Protein S Ac on BCS and BCSXP.

Andrew M, Paes B, Milner R, et al, (1987) "Development of the Human Coagulation System in the Full Term Infant Blood", 70(1):165-72

Thrombophilia PowerPoint presentation Kandice Kottke-Marchant M.D. PhD.

http://aniaracorp.s3.amazonaws.com/PhyFiles/Thrombophilia2/Marchant_medium.wmv

An Algorithmic Approach to Hemostasis Testing Kottke-Marchant (2008) CAP Press

Updates:

2/6/2012: Test moved from referral to Fairview University to being performed in-house at Children's Laboratory.

9/15/2014: Added Off Campus collection info.

7/18/23: Updated special processing instructions. Testing performed in Minneapolis only.