Lab Dept: Coagulation

Test Name: PROTEIN C CHROMOGENIC

General Information

Lab Order Codes:	PRC
Synonyms:	Protein C Activity Assay; Protein C Immunologic Assay
CPT Codes:	85303 – Clotting inhibitors or anticoagulants; Protein C activity
Test Includes:	Protein C activity

Logistics

Test Indications:	Protein C, along with its cofactor Protein S, acts as a potent anticoagulant by destroying activated Factors 5 and 8. It also stimulates the fibrinolytic system. It is Vitamin K dependent, therefore it is decreased in Coumadin therapy or Vitamin K deficiency. Protein C deficiency is a risk factor for thromboembolism. Severe deficiency may cause purpura fulminans in neonates. Incident to a thrombotic event, both procoagulant and regulatory coagulation proteins may be lower than basal state due to excessive consumption or higher than basal state from reactive overproduction. Do not to test for Protein C deficiency during an acute thrombotic event. The Protein C antigen test determines the amount of the molecule present, not its functionality. The Protein C Chromogenic (activity) assay determines the functionality. Therefore, the Protein C Chromogenic (activity) assay is the preferred method.
Lab Testing Sections:	Coagulation
Phone Numbers:	MIN Lab: 612-813-6280 STP Lab: 651-220-6550
Test Availability:	Daily, 24 hours; Testing performed in Minneapolis Laboratory only.
Turnaround Time:	1 – 7 days, Testing is performed on **Fridays only**
Special Instructions:	Elective testing for Protein C deficiency is best done at least 30 days after cessation of Coumadin® therapy. Protein C may be reduced during an acute event (thrombotic, surgical, etc.) therefore it is preferable not to test for it during this time. However a normal value at the time of an acute event excludes a congenital 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:	● 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. **Off campus collections:** ● 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. ***Validation of your lab's centrifuge for platelet poor plasma is required.**
Special Processing:	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. Test within: ● 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:	If the patient is being treated with Coumadin®, this should be noted. Coumadin® will lower Protein C.
Sample Rejection:	Improper tube; clotted sample; under-filled tube; mislabeled or unlabeled specimens

Interpretive

Reference Range:

Age:	Range (%):
Newborn	14 - 42%
1 - 4 days	26 - 44%
5 - 29 days	31 - 53%
30 - 89 days	32 - 54%
90 - 179 days	41 - 67%
180 - 364 days	48 - 70%
1 - 5 years	40 - 92%
6 - 10 years	45 - 93%
11 - 16 years	55 - 111%
17 years and older	70 - 140%

Critical Values: N/A

Limitations: Coumadin® will lower Protein C.

Berichrom® Protein C detects the amidolytically active portion of the activated Protein C, including the non-carboxilated molecules synthesized in vitamin K deficiency. Thus, in conditions of vitamin K deficiency, a higher Protein C activity is found with Berichrom® Protein C than when using the coagulometric method. To obtain a complete picture of a Protein C deficiency, it is therefore advisable to also use the coagulometric method of the antigenic determination technique.

Methodology: Protein C in the patient sample is activated by a specific snake venom activator. The resulting Protein C(a) is assayed in a kinetic test by measuring the increase in absorbance at 405nm.

References:

Siemens Berichrom Protein C package insert (May 2008) OUVV G15 E0501 (699), Siemens Healthcare DiagnosticsInc.,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 Sheets for Protein C with Berichrom Protein C on BCS and BCS XP

BCS System Instruction Manual

BCS XP System Instruction Manual

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

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

Andrew M, Vegh P, Johnston M, et al, "Maturation of the Hemostatic System During Childhood," Blood,1992, 80(8):1998-2005

Updates:

2/6/2012: Test moved from referral to Fairview University to being performed at Children's Laboratory.
9/15/2014: Added Off Campus collection info.