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**Lab Dept:** Coagulation

**Test Name:** PROTEIN S, FREE

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***General Information***

**Lab Order Codes:** PRSE

**Synonyms:** Protein S; Protein S Free Antigen

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

**Test Includes:** Protein S Antigen, Free reported as a %.

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***Logistics***

**Test Indications:** Protein S is a Vitamin K dependent plasma glycoprotein that serves as the cofactor for the anticoagulant function of activated Protein C inactivating activated Factors 5 and 8. Protein S deficiency is a risk factor for thromboembolism. Severe deficiency may cause purpura fulminans. Protein S circulates in plasma in two forms: 40% is free Protein S, 60% is bound to C4B binding protein. Only the Free has cofactor activity for Protein C. therefore, it is the preferred method for measuring Protein S.

**Lab Testing Section:** Coagulation - Sendouts

**Referred to:** Fairview University Medical Center (Fairview/Atlas test: PSF)

**Phone Numbers:** MIN Lab: 612-813-6280

STP Lab: 651-220-6550

**Test Availability:** Daily, 24 hours

**Turnaround Time:** 1 - 3 days, testing is performed 3 times per week.

**Special Instructions:** A clean venipuncture is essential. INR is needed for interpretation. Protein S is decreased in Coumadin therapy/Vitamin K deficiency.

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***Specimen***

**Specimen Type:** Whole blood

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

**Draw Volume:** 2.7 mL blood in a 3 mL tube

**Processed Volume:** Specimens will be processed at reference lab facility if received within 4 hours of collection. Otherwise, specimens need to be processed at referring facility and provide minimum of two 0.5 mL specimens frozen at -70. Follow directions below under [Special Processing](#).

**Collection:** If the patient's hematocrit is >55%, contact laboratory to obtain a special tube. Fill tube completely. Mix thoroughly by gentle inversion.

**Special Processing:** Lab Staff: **Do Not** centrifuge. **Do Not** freeze. Send to reference lab in original Vacutainer® at room temperature if within 4 hours of collection. Forward promptly.

**If specimen is >4 hours old prior to shipment, process specimen as follows:**

Spin sample collected in blue top tube(s) for 5 minutes on the Stat Spin centrifuge, remove plasma and transfer to a 4 mL BCS sample cup(s), spin remaining plasma again for 5 minutes in the Stat Spin Centrifuge. Transfer plasma into two labeled 10x75 mL plastic tubes with a minimum of 0.5 mL in each. Freeze at -70 and send specimens on dry ice to Fairview University.

**Patient Preparation:** If the patient is being treated with Coumadin®, this should be noted. Coumadin® will lower Protein S.

**Sample Rejection:** Improper tube, clotted sample; overfilled tube; underfilled tube, sample received more than 24 hrs after collection; mislabeled or unlabeled specimen

**Interpretive**

**Reference Range:**

FRACTION	SEX	AGE	RANGE (%)
Protein S Free:	Both (M/F)	Newborn:	33 – 67
	Both (M/F)	1 – 4 days:	24 – 48
	Both (M/F)	5 – 29 days:	36 – 64
	Both (M/F)	30 – 89 days:	48 – 78
	Both (M/F)	90 days – 10 years:	60 – 135
	Males:	11 yr - Adult	70 – 148
	Females:	11 yr - Adult	55 – 125

**Critical Values:** N/A

**Limitations:**

Coumadin® will lower Protein S. Normal, full-term newborn infants or healthy premature infants may have decreased levels of total Protein S (15 – 30%), but because of low levels of C4bBP, free Protein S may be normal or near normal adult levels ( $\geq 50\%$ ). Total Protein S reaches adult levels by 80 – 180 days postnatal. There is evidence that functional deficiency of Protein S may occur in patients who have demonstrable Protein S antigen. Spurious low results may be obtained with plasma-based functional Protein S assay in patients who have activated Protein C resistance

**Methodology:**

Latex Immusorbent Assay (LIA)

**References:**

[Fairview University Medical Center Web Page](#) February 2014

Harmening DH (1997) Clinical Hematology and Fundamentals of Hemostasis

**Updates:**

5/20/2004: As of March 1, 2004, Fairview University no longer performs the Protein S, total as part of this test. If there is a clinical need for this the total portion of Protein S, it can be ordered separately. Please contact the laboratory for more information.

Reference ranges for Protein S, total have been removed as well as other references for this test.

Draw volume changed from 4.5 mL to 2.7 mL blood.

5/3/2006: Reference range changes, previously listed as females  $\geq 1$  year: 65 – 125%, males  $\geq 1$  year: 75 – 135%

6/1/2007: Reference range changes, previously listed as females  $\geq 1$  year: 70 – 135%, males  $\geq 1$  year: 75 – 135%

7/24/2007: Reference changes, previously listed as females females  $\geq 1$  year: 65 – 125%, males  $\geq 1$  year: 55 – 135%

6/13/2011: Reference value changes, previously listed as females  $\geq 1$  year: 55 – 125%, males  $\geq 1$  year: 70 – 135%

2/24/2014: Fairview specimen processing update. Ref range change: Males  $\geq 11$  years previously listed as 70-135%.