Product information

User's Manual

Protein-S ELISA

Enzyme Immunoassay for the detection of
Total and Free Protein-S in citrated human plasma

REF AE29029

Σ 96

RUO

For Research Use Only – Not for Use in Diagnostic Procedures

Version 007
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1 INTENDED USE

This Protein-S ELISA is a solid phase enzyme immunoassay for the determination of Total and Free Protein-S in citrated human plasma. For research use only, not for use in diagnostic procedures.

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Principle of the test

The Protein-S is a sandwich ELISA using microplates coated with a capture antibody specific for human Protein-S. Diluted plasma samples (1:51) are incubated in the wells allowing Protein-S pre-sent in the plasma to bind to the antibody. The unbound fraction is removed by washing. Afterwards anti-human Protein-S detection antibody conjugated to horseradish peroxidase (conjugate) is incubated and reacts with the antigen-antibody complex on the microwell surface. Following incubation, unbound conjugate is washed off. Addition of TMB-substrate generates an enzymatic colorimetric (blue) reaction, which is stopped by diluted acid (color changes to yellow). The rate of color formation from the chromogen is measured in optical density units with a spectrophotometer at 450 nm. Using a curve prepared from the Reference Plasma provided with the kit, the Protein-S antigen relative percent concentration in the plasma samples can be determined.

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2 KIT CONTENTS

TO BE RECONSTITUTED				
Item	Quantity	Cap color	Solution color	Description / Contents
Sample Buffer (5x)	1 x 20ml	White	Yellow	5 x concentrated Tris, sodium chloride (NaCl), bovine serum albumin (BSA), sodium azide < 0.1% (preservative)
Wash Buffer (50x)	1 x 20ml	White	Green	50 x concentrated Tris, NaCl, Tween 20, sodium azide < 0.1% (preservative)
Reference Plasma	3 x 0,4ml	White	-	Containing: lyophilized human plasma
Control N	3 x 0,2ml	White	-	Containing: lyophilized human plasma
Control D	3 x 0,2ml	White	-	Containing: lyophilized human plasma
READY TO USE				
Item	Quantity	Cap color	Solution color	Description / Contents
Conjugate, IgG	1 x 15ml	Blue	Blue	Containing: Protein-S antibody conjugated to horseradish peroxidase, bovine serum albumin (BSA)
PEG solution	2 x 2ml	Red	Colorless	Polyethylene glycol, sodium azide < 0.1% (preservative)
TMB Substrate	1 x 15ml	Black	Colorless	Containing: Stabilized TMB/H_2O_2
Stop Solution	1 x 15ml	White	Colorless	Containing: 1M Hydrochloric Acid
Microtiter plate	12 x 8 well strips	N/A	N/A	With breakaway microwells. Refer to chapter 3 for coating.
* Color increasing with concentration				
MATERIALS REQUIRED, BUT NOT PROVIDED				
Microtiter plate reader 450 nm reading filter and recommended 620 nm reference filter (600-690 nm). Glass ware (cylinder 100-1000ml), test tubes for dilutions. Vortex mixer, precision pipettes (10, 100, 200, 500, 1000 µl) or adjustable multipipette (100-1000µl). Microplate washing device (300 µl repeating or multichannel pipette or automated system), adsorbent paper. Our tests are designed to be used with purified water according to the definition of the United States Pharmacopeia (USP 26 - NF 21) and the European Pharmacopeia (Eur.Ph. 4th ed.).				

3 STORAGE CONDITIONS

Store all reagents and the microplate at 2-8°C/35-46°F, in their original containers. Once prepared, reconstituted solutions except for the Reference Plasma and the Controls are stable at 2-8°C/35-46°F for 1 month. After reconstitution the Reference Plasma and Controls are stable for 8 hours when stored at 2-8°C/35-46°F. Reagents and the microplate shall be used within the expiry date indicated on each component, only. Avoid intense exposure of TMB solution to light. Store microplates in designated foil, including the desiccant, and seal tightly.

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4 PRECAUTIONS OF USE

4.1 Health Hazard Data

THIS PROUCT IS FOR RESEARCH USE ONLY. Thus, only staff trained and specially advised in method of ELISA techniques may perform the kit. NOT FOR USE IN DIAGNOSTIC PROCEDURES. Although this product is not considered particularly toxic or dangerous in conditions of the intended use, refer to the following for maximum safety:

Recommendations and precautions

This kit contains potentially hazardous components. Though kit reagents are not classified being irritants to eyes and skin we recommend avoiding contact with eyes and skin and wear disposable gloves.

WARNING ! Buffers contain sodium azide (NaN_3) as a preservative. NaN_3 may be toxic if ingested or adsorbed by skin or eyes. NaN_3 may react with lead and copper plumbing to form highly explosive metal azides. On disposal, flush with a large volume of water to prevent azide build-up. Please refer to decontamination procedures as outline by CDC or other local/national guidelines.

Do not smoke, eat or drink when manipulating the kit. Do not pipette by mouth

The Reference Plasma and the Controls included in this kit have been tested by approved methods and found negative for HbsAg, Hepatitis C and HIV 1. However, no test can guarantee the absence of viral agents in such material completely. Thus, handle Reference Plasma, Controls and samples as if capable of transmitting infectious disease and according to national requirements.

4.2 General directions for use

In case that the product information, including the labelling, is defective or incorrect please Do not mix or substitute reagents or microplates from different lot numbers. This may lead to variations in the results.

Do not mix or substitute Controls, Calibrators, Conjugates or microplates from different lot numbers. This may lead to variations in the results.

Allow all components to reach room temperature (20-26°C/68-78.8°F) before use, mix well and follow the recommended incubation scheme for an optimum performance of the test.

Incubation: We recommend test performance at 23ºC/73.4ºF for automated systems.

Never expose components to higher temperature than 37ºC/98.6ºF.

Always pipette substrate solution with brand new tips only. Protect this reagent from light. Never pipette conjugate with tips used with other reagents prior.

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5 SAMPLE COLLECTION, HANDLING AND STORAGE

Use preferentially plasma samples freshly collected with 3.2% or 3.8% sodium citrate as an anticoagulant. Blood withdrawal must follow national requirements. Do not use icteric, lipemic, hemolysed or bacterially contaminated samples. Blood samples should be collected in clean, dry and empty tubes. After centrifugation, the plasma samples should be used immediately, otherwise stored tightly closed at 2-8°C/35-46°F up to eight hours, or frozen at -20°C/-4°F for longer periods. (Thomas: Labor und Diagnose; CLSI Guideline GP44-A4)

6 PREPARATION OF REAGENTS AND SAMPLES

6.1 Preparations prior to starting

Dilute concentrated reagents:

Dilute the concentrated sample buffer 1:5 with distilled water (e.g. 20 ml plus 80 ml). Dilute the concentrated wash buffer 1:50 with distilled water (e.g. 20 ml plus 980 ml).

Reference Plasma:

Reconstitute Reference Plasma by adding 0.4 ml distilled water and shake gently. Allow the reconstituted plasma to stand for 10 minutes at room temperature before use. The Reference Plasma is stable for 8 hours when stored at 2-8°C/35-46°F.

Controls:

Reconstitute Control N and Control D by adding 0.2 ml distilled water and shake gently. Allow the reconstituted Controls to stand for 10 minutes at room temperature before use. The Controls are stable for 8 hours when stored at 2-8°C/35-46°F.

Pretreatment with polyethylene glycol (PEG) for Free Protein S determination:

Do not dilute plasma samples before PEG pretreatment. Add 15µL of PEG solution to 85 µL plasma or Controls. To prepare the reference curve add 45µL of PEG solution to 255 µL of the reconstituted Reference Plasma. Vortex the samples and place them on ice for 30 minutes. Following incubation centrifuge the samples for 10 minutes at 3000 x g. Prepare the reference curve, the Control dilution and the sample dilution by using the supernatant as described as follow.

Predilution of the Reference Plasma for Total and Free Protein S determination:

For Total Protein S the predilution is prepared by using the reconstituted Reference Plasms. For Free Protein S the predilution is prepared by using the supernatant of the PEG-treated Reference Plasma. Prepare a 1:2 dilution of each reference plasma in prediluted sample buffer (1x) and mix well, e.g. 100 µL sample buffer + 100 µL plasma.

Preparation of the reference curve:

Separate reference curves are used for Total and Free Protein S assays. The dilution sets are prepared by using the predilutions of the Reference Plasma for Total and Free Protein S, respectively.

Volume Reference Plasma	Volume Sample Buffer	Reference Level
60 µl	1000 µl	150 %
40 µl	1000 µl	100 %
30 µl	1000 µl	75 %
20 µl	1000 µl	50 %
10 µl	1000 µl	25 %
10 µl	2000 µl	12.5 %

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Dilution of the Samples and Controls:

For Total Protein S: Add 20 µl plasma to 1000 µl sample buffer (1x) and mix well.

For Free Protein S: Add 20 µl of supernatant of the PEG-treated plasma to 1000 µL sample buffer (1x) and mix well.

Washing:

Prepare 20 ml of diluted wash buffer (1x) per 8 wells or 200 ml for 96 wells (e.g. 4 ml concentrate plus 196 ml distilled water).

Automated washing:

Consider excess volumes required for setting up the instrument and dead volume of robot pipette.

Manual washing:

Discard liquid from wells by inverting the plate. Knock the microwell frame with wells downside vigorously on clean adsorbent paper. Pipette 300 µl of diluted wash buffer into each well, wait for 20 seconds. Repeat the whole procedure twice again.

Microplates:

Calculate the number of wells required for the test. Remove unused wells from the frame, replace and store in the provided plastic bag, together with desiccant, seal tightly (2-8°C/35-46°F).

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6.2 Pipetting Scheme

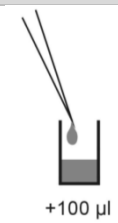
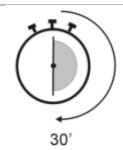
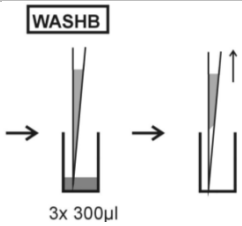
We suggest pipetting calibrators, controls and samples as follows:

for quantitative interpretation use the working dilutions of the Reference Plasma to establish a standard curve

	1	2	3	4...	
A	150	25	P1		
B	150	25	P1		
C	100	12.5	P2		
D	100	12.5	P2		
E	75	CD	P3		
F	75	CD	P3		
G	50	CN	...		
H	50	CN	...		

150: Reference Level 150 %
100: Reference Level 100 %
75: Reference Level 75 %
50: Reference Level 50 %
25: Reference Level 25 %
12.5: Reference Level 12.5 %
CD: control ‚deficient plasma
CN: control ‚normal plasma'
P1: sample 1
P2: sample 2
P3: sample 3

6.3 Test Steps

Step	*Description*
1.	Ensure preparations from step 6.1 above have been carried out prior to pipetting.
2.	Use the following steps in accordance with the intended quantitative interpretation of the results:
	Calibrators, controls, and samples
3.	 • Pipette 100 µl of each diluted sample plasma into the designated microwells. • Pipette 100 µl of each working dilution of the Reference Plasma and the diluted Controls into the designated wells.
4.	 Incubate for 30 minutes at 20-26°C/68-78.8°F.
5.	 Wash 3x in each case with 300 µl washing buffer (diluted 1:50).

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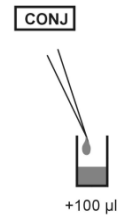
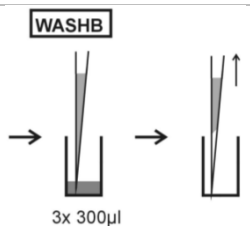
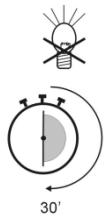
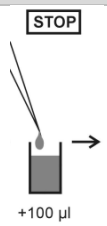
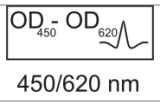
	CONJUGATE	
6.		Pipette 100 µl conjugate into each well.
7.		Incubate for 30 minutes at 20-26°C/68-78.8°F.
8.		Wash 3x in each case with 300 µl washing buffer (diluted 1:50).
	SUBSTRATE	
9.		Pipette 100 µl TMB substrate into each well.
10.		Incubate for 30 minutes at at 20-26°C/68-78.8°F., protected from intense light.
	STOP	
11.		Pipette 100 µl stop solution into each well, using the same order as pipetting the substrate.
12.		Incubate 5 minutes minimum.
13.		Agitate plate carefully for 5 sec.
14.		Read absorbance at 450 nm (recommended 450/620 nm) within 30 minutes.

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7 INTERPRETATION

For **quantitative interpretation** establish the reference curve by plotting the optical density (O.D.) of each dilution of the Reference Plasma (y-axis) against the corresponding value of the Reference Level in % (x-axis). For best results we recommend log/lin coordinates and 4-Parameter Fit. From the O.D. of each sample, read the corresponding sample relative value expressed in %. Multiply the sample relative value obtained from the reference curve by the assigned factor referred in the quality control leaflet to calculate the Protein-S antigen level in % of normal.

Example of a standard curve

We recommend pipetting each dilution of the Reference Plasma in parallel for each run.
Do NOT use this example for interpreting the sample results!

Reference Level	OD 450/620 nm	Results (%)	CV % (Variation)
12.5 %	0.618	11.68	1.07
25 %	0.896	26.58	0.94
50 %	1.212	48.72	1.03
75 %	1.521	77.35	0.97
100 %	1.708	99.16	1.01
150 %	2.034	148.71	1.01

Example of calculation

Sample	Replicate (OD)	Mean (OD)	Sample relative value (%)	Factor	Conc. Protein S (%)
P 01	1.008/1.020	1.014	39.9	1.03	41.09
P 02	1.651/1.649	1.650	94.6	1.03	97.43

Samples that are above the highest calibrator value should be reported as > max. They should be diluted accordingly and be re-assayed. Samples below calibrator range should be reported as < Min.

For lot specific data, see enclosed quality control leaflet. Medical laboratories might perform an in-house quality control by using own controls and/or internal pooled sera, as foreseen by national regulations.

Each laboratory should establish its own normal range based upon its own techniques, controls, equipment, and sample population according to their own established procedures.

In case that the values of the controls do no meet the criteria the test is invalid and has to repeated.

The following technical issues should be verified: Expiration dates of (prepared) reagents, storage conditions, pipettes, devices, photometer, incubation conditions and washing methods.

If the items tested show aberrant values of any kind of deviation or that the validation criteria are not met without explicable cause, please contact the manufacturer or the supplier of the test kit.

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8 TECHNICAL DATA

Sample material:	Plasma
Sample volume:	20 µl plasma diluted 1:51 with 1x sample buffer
Total incubation period:	90 minutes at 20-26°C/68-78.8°F.
Calibration range:	12.5-150 %
Analytical sensitivity:	1.0%
Storage:	at 2-8°C/35-46°F in original bottles.
Number of determinations:	96 tests

8.1 Precision

To determine the precision of the assay, the variability (intra assay) was assessed by examining its reproducibility on three plasma samples selected to represent a range over the reference curve.

Intra-Assay		
Sample No.	Mean %	CV (%)
1	115.0	2.9
2	92.0	1.1
3	44.0	1.4

Inter-Assay		
Sample No.	Mean %	CV (%)
1	120.6	4.7
2	44.5	4.9
3	9.2	9.8

8.2 Calibration

This assay is calibrated against the WHO second international standard for Protein S. The values are given in relative percent (%) as compared to pooled normal plasma.

9 LITERATURE

Murdock PJ, Brooks S, Mellars G, Cheung G, Jacob D, Owens DL, Parmar M, Riddell A (1997). A simple monoclonal antibody based ELISA for free protein S. Comparison with PEG precipitation. Clinical and Laboratory Haematology 19: 111-114.

Deutz-Terlouw PP, Ballering L, van Wijngaarden A, Bertina RM (1989). Two ELISA's for measurement of protein S, and their use in the laboratory diagnosis of Protein S deficiency. Clinica Chimica Acta 186: 321-334.

Persson KEM, Hillarp A, Dahlbäck B (2001). Analytical considerations for free protein S assays in protein S deficiency. Thrombosis and Haemostasis 86: 1144-1147.

Walker FJ (1984). Protein S and the regulation of activated protein C. Seminars in Thrombosis and Hemostasis 10: 131-138.

Preissner KT (1990). Biological relevance of the Protein C system and laboratory diagnosis of Protein C and S deficiencies. Clinical Science 17: 351-364.

Lothar Thomas: Labor und Diagnose. Indikation und Bewertung von Laborbefunden für die medizinische Diagnostik., 8. Auflage, TH Books.

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CLSI Guideline GP44-A4: Procedures for the Handling and Processing of Blood Specimens for Common Laboratory Tests

Manufactured for :
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SYMBOLS USED WITH IBL-AMERICA ASSAYS

Symbol	English	Deutsch	Français	Español	Italiano
	Consult instructions for use	Gebrauchsanweisung beachten	Consulter les instructions d'utilisation	Consulte las instrucciones de uso	Consultare le istruzioni per l'uso
CE	European Conformity	CE-Konfirmitäts-kennzeichnung	Conformité aux normes européennes	Conformidad europea	Conformità europea
IVD	In vitro diagnostic device	In-vitro-Diagnostikum	Usage Diagnostic in vitro	Para uso Diagnóstico in vitro	Per uso Diagnostica in vitro
RUO	For research use only	Nur für Forschungszwecke	Seulement dans le cadre de recherches	Sólo para uso en investigación	Solo a scopo di ricerca
REF	Catalogue number	Katalog-Nr.	Numéro de catalogue	Número de catálogo	Numero di Catalogo
LOT	Lot. No. / Batch code	Chargen-Nr.	Numéro de lot	Número de lote	Numero di lotto
	Contains sufficient for <n> tests/	Ausreichend für "n" Ansätze	Contenu suffisant pour "n" tests	Contenido suficiente para <n> ensayos	Contenuto sufficiente per "n" saggi
	Storage Temperature	Lagerungstemperatur	Température de conservation	Temperatura de conservación	Temperatura di conservazione
	Expiration Date	Mindesthaltbarkeits-datum	Date limite d'utilisation	Fecha de caducidad	Data di scadenza
	Legal Manufacturer	Hersteller	Fabricant	Fabricante	Fabbricante
Distributed by	Distributor	Vertreiber	Distributeur	Distribuidor	Distributore
Content	Content	Inhalt	Conditionnement	Contenido	Contenuto
Volume/No.	Volume / No.	Volumen/Anzahl	Volume/Quantité	Volumen/Número	Volume/Quantità

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