

EDI™ Total Prostate-specific antigen CLIA kit

Chemiluminescence Immunoassay (CLIA) for the quantitative measurement of total PSA in Serum.

REF CL0815R RUO 

INTENDED USE

This Chemiluminescence Immunoassay (CLIA) kit is intended for the quantitative determination of human Total Prostate-specific antigen levels in serum using the ECL100 or ECL25 Immunoassay analyzer. This test is used as an aid in the detection of prostate cancer in men.

For Research Use only

SUMMARY OF PHYSIOLOGY

Prostate-specific antigen (PSA) is a biomarker that has several bound and unbound forms, and comparing the concentrations between these forms can allow for determining the likelihood of prostate cancer being present. Total PSA include both PSA bound to protease inhibitors and uncomplexed PSA¹. When the concentrations of free and total PSA are compared, this can be used to detect prostate cancer. Free and total PSA serum tests are used together to screen for prostate cancer and reduce the prevalence of unnecessary biopsies being performed².

ASSAY PRINCIPLE

This CLIA is designed, developed, and produced for the quantitative measurement of human total PSA in serum samples. The assay utilizes a two-site “sandwich” technique with two antibodies that bind to different epitopes of total PSA.

Assay calibrators, controls, or patient samples are added directly to a reaction vessel containing streptavidin coated magnetic particles. An acridinium ester antibody and a biotin antibody are added. The magnetic particles capture the biotin antibody as well as an immuno complex in the form of “magnetic particles – biotin total PSA antibody –total PSA–acridinium ester total PSA antibody”.

The materials bound to the solid phase are held in a magnetic field while unbound materials are washed away. Then, the trigger solution is added to the reaction vessel and light generated by the reaction is measured with the ECL100 or ECL25 analyzer. The relative light units (RLU) are proportional to the concentration of total PSA in the sample. The amount of analyte in the sample is determined from a stored, multi-point calibration curve and reported in serum total PSA concentration.

REAGENTS: PREPARATION AND STORAGE

This test kit must be stored at 2 – 8°C upon receipt. For the expiration date of the kit refer to the label on the kit box. All components are stable until this expiration date. Reagents from different kit lot numbers should not be combined or interchanged.

Standard Batch Quantity: 100/kit

1. Total PSA Magnetic Particle Solution (L0654)

Qty: 1 x 1.6 mL (50/kit), 1 x 2.8 mL (100/kit),
1 x 6.6 mL (250/kit)
Storage: 2 – 8°C

Preparation: Ready to Use

2. Biotin Total PSA Antibody (L0655)

Qty: 1 x 4.8 mL (50/kit), 1 x 8.5 mL (100/kit),
1 x 19.8 mL (250/kit)
Storage: 2 – 8°C
Preparation: Ready to Use

3. Acridinium Ester Total PSA Antibody (L0656)

Qty: 1 x 4.8 mL (50/kit), 1 x 8.5 mL (100/kit),
1 x 19.8 mL (250/kit)
Storage: 2 – 8°C
Preparation: Ready to Use

4. Total PSA Calibrators (L0657 – L0658)

Liquid human total PSA in a bovine serum albumin-based matrix with an azide preservative. Refer to vials for exact concentration.

Qty: 2 x vials of 0.5 mL each
Storage: 2 – 8°C
Preparation: 0.5 mL of Calibrators, mix by inversions or gentle vortexing. Make sure that Calibrators are well mixed before use.

5. Total PSA Controls (L0659 – L0660)

Liquid human total PSA in a bovine serum albumin-based matrix with an azide preservative. Refer to vials for exact concentration.

Qty: 2 x vials of 0.5 mL each
Storage: 2 – 8°C
Preparation: 0.5 mL of Controls, mix by inversions or gentle vortexing. Make sure that Controls are well mixed before use.

SAFETY PRECAUTIONS

The reagents must be used in a professional laboratory environment and are for in vitro diagnostic use. Source material which contains reagents of bovine serum albumin was derived in the contiguous 48 United States. It was obtained only from healthy donor animals maintained under veterinary supervision and found free of contagious diseases. Wear gloves while performing this assay and handle these reagents as if they were potentially infectious. Avoid contact with reagents containing hydrogen peroxide. Do not get in eyes, on skin, or on clothing. Do not ingest or inhale fumes. On contact, flush with copious amounts of water for at least 15 minutes. Use Good Laboratory Practices.

MATERIALS REQUIRED BUT NOT PROVIDED

The instrument only uses materials supplied by Epitepe Diagnostics, Inc. When materials available from third-party suppliers are used, Epitepe Diagnostics, Inc. takes no responsibility for the validity of results obtained. Material is available for purchase from Epitepe Diagnostics, Inc. Please contact your distributor for more information.

1. ECL100 Immunoassay Analyzer or ECL25 Immunoassay Analyzer

2. CL011 Cuvettes (for ECL100) or CL010 Cuvettes (for ECL25)
3. Wash Reagent (P-594)
4. Trigger Solutions A and B (P-595)

SPECIMEN COLLECTION AND PREPARATION

Only 10 µL of human serum or plasma sample is required for total PSA measurement in singlet. Samples should not be taken from patients taking biotin-containing multivitamins or dietary supplements at least 48 hours prior to specimen collection. Whole blood should be collected and must be allowed to clot for minimum 30 minutes at room temperature before the serum is separated by centrifugation (850 – 1500 RPM for 10 minutes). The serum should be separated from the clot within three hours of blood collection and transferred to a clean test tube. Serum samples should be stored at 15-25°C for three days, 2-8°C for five days, and –20°C or below for three months. Avoid more than three freeze-thaw cycles of specimen. It is necessary to take care in the sample collection procedure to avoid hemolysis.

Some substances in the samples will interfere with the test results. The common interfering substances and maximum allowable concentrations are as follows:

- bilirubin 60 mg/dL
- triglycerides 1500 mg/dL
- hemoglobin 900 mg/dL
- biotin 200 nmol/L
- For patients receiving high-dose biotin therapy (5 mg/ day), samples must be collected 8 hours after taking the last dose of biotin

A single assay of this item requires 10 µL sample. This quantity does not include the dead volume in the sample container, the capacity required for retesting, and other measurement items. For the definition of the minimum required sample size, refer to the equipment manual.

CALIBRATION

An active calibration curve is required for all tests. For the assay, calibration is required for the first-time use of a reagent lot and is valid for 28 days. However, we recommend calibration every 14 days after initial calibration or when either kit control is out of range.

QUALITY CONTROL

The characteristics of patient samples are simulated through controls and are critical to validate the performance of CLIA assays due to the random-access format. Use of controls is left to the discretion of the user, based on good laboratory practices, requirements, and applicable laws. We suggest performing a control test once every day. Quality control results that do not fall within acceptable ranges may indicate invalid test results.

ASSAY PROCEDURE

1. Reagents from different kit lot numbers should not be combined or interchanged. Make sure that there are no air bubbles in any reagents, calibrator and control vials.
2. Reagent Preparation
 - 2.1 Remove reagent cartridges from packaging and replace the solid caps with the provided soft caps for ECL100. For ECL25, carefully remove the aluminum foil seal on each container on the cartridges.
 - 2.2 For the ECL100, take out the Magnetic Particle bottle and make sure to roll between hands and gently but thoroughly mix until the magnetic particle solution is homogenous.

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The solution should be uniform with no clumps of magnetic particles visible; this step is vital for assay performance.

- Note: For ECL 100, if the Magnetic Particle Solution volume is over 3 mL, it will be provided in a glass bottle. It will need to be transferred from the glass bottle to the plastic vial in the cartridge with the rest of the reagents. Make sure the Magnetic Particle Solution is mixed well before transferring.
- 2.3 For ECL25, mix the magnetic beads by moving back and forth the bottom part of the cartridge at upright position. Make sure to look inside the cartridge until the solution is uniform with no clumps of magnetic particles visible and no air bubbles. Recap the bottle. Open the top soft cap of all reagent bottles, leaving only the hollow soft rubber.
 - 2.4 The reagents are now ready to be loaded into the ECL100 or ECL 25 for calibration.
 3. Assay Program
The following table illustrates the protocol used by the ECL100 or ECL25 for instrument operation.

Component	Quality Control Hole (µL)	Sample Hole (µL)
Total PSA Calibrators (L0657-L0658)	10	-
Samples	-	10
Total PSA Magnetic Particle Solution (L0654)	25	25
Biotin Total PSA Antibody (L0655)	75	75
Acridinium Ester Total PSA Antibody (L0656)	75	75
Incubation Period		
Wash the reaction cuvette 3 times with wash reagent.		
Trigger Solution A (P-595)	200	200
Trigger Solution B (P-595)	200	200

The total incubation time is less than 30 minutes.

INTERPRETATION OF RESULTS

The chemiluminescence analyzer calculates the concentration values of the sample and the control by a standard curve (fitting method: four parameters or point-to-point) and the measured RLU. Values are compared with the range of the marked value. If it exceeds the indicated quality control range, it indicates that the test is unqualified and needs to be re-tested.

Due to methodological differences or antibody/antigen specificity, there may be deviations between the test results of reagents from different manufacturers. Therefore, direct comparisons should not be made to avoid false interpretation.

EXPECTED VALUES

Total PSA concentrations were measured in serum samples collected from 125 apparently healthy adults using the EDI™ Human Total Prostate-specific antigen CLIA Kit. The observed range of total PSA is summarized in the table below.

Age	Total PSA Concentration (ng/mL)
Normal	0.0 - 3.9
Elevated	4.0 - 10.0
Very Elevated	> 10.1

It is highly recommended that each laboratory should establish their own normal range for total PSA based on local populations.

LIMITATIONS OF THE PROCEDURE

1. This product is for use on the ECL100 or ECL25 Immunoanalyzer only. Refer to the appropriate system

manuals and/or Help system for a specific description of installation, start-up, operation, system performance, instructions, calibration, precautions, hazards, maintenance, and troubleshooting.

2. Reagents from different lots cannot be mixed.
3. Test results from this product should not be the sole basis for clinical diagnosis.
4. If the test sample result is higher than the upper limit of the calibration curve, it is recommended to re-measure after dilution according to a certain ratio. The measurement result is recalculated according to the dilution ratio to ensure the accuracy of the result.
5. When the sample concentration of Total PSA is lower than the detection lower limit, the test result can be reported as <0.07 ng/mL. When the sample concentration is higher than the detection upper limit, it can be reported as >278.81 ng/mL.

PERFORMANCE CHARACTERISTICS

Hook Effect

The assay shows no hook effect up to 2962.36 ng/mL.

Limit of Blank

The limit of blank (LoB) was determined by 60 replicates in three assays of calibrator matrix to be 0.02 ng/mL.

Limit of Detection

The limit of detection (LoD) was determined by 60 replicates in three assays of low-level samples to be 0.07 ng/mL.

Limit of Quantification

The limit of quantification (LoQ) was determined by 60 replicates in three assays of low-level samples to be 0.11 ng/mL.

Linearity

Linearity was determined by two assays with a diluted standard of high total PSA concentration. In each assay, the average of two replicates of each of the diluted samples is used for a correlation analysis against calculated theoretical values. The linearity of this test is up to 278.81 ng/mL.

Standard	Average Concentration (ng/mL)	Theoretical Concentration (ng/mL)	Linear Recovery (%)	R ²
1	0.00	0.00	100	0.999
2	2.90	2.90	100	
3	5.68	5.81	98	
4	12.02	11.62	103	
5	24.10	23.23	104	
6	73.00	69.70	105	
7	144.40	139.41	104	
8	305.25	278.81	109	

Intra-assay Precision

Precision was determined by measuring eight replicates of three specimens. The results are as follows:

Sample	Average Concentration (ng/mL)	SD	CV (%)
1	5.71	0.13	2.3
2	43.51	0.95	2.2
3	270.55	5.43	2.0

Inter-assay Reproducibility

Reproducibility was determined by measuring three specimens in twenty-four replicates over the run of three assays. The results are summarized below:

Sample	Average Concentration (ng/mL)	SD	CV (%)
1	5.59	0.23	4.2

2	45.33	2.10	4.6
3	284.14	17.12	6.0

Cross Reactivity

Cross-reactivity was assessed by analyzing several specimens containing several analytes at elevated concentrations. The results are summarized below:

Analytes	Theoretical Concentration	Measure Concentration (ng/mL)
Human Epididymal protein 4	1505.52 pmol/L	< 0.00
Human Alphafetoprotein	964.45 IU/mL	< 0.00
Human Squamous cell Carcinoma Antigen	68.08 ng/mL	< 0.00
Cancer Antigen 72-4	318.27 U/mL	< 0.00

Interference

Bilirubin, hemoglobin, and lipid triglycerides were tested as potential interferents to total PSA. Randomly selected samples were spiked with the potential interferents at the concentrations listed in the table below:

Interferent (Concentration tested, mg/mL)	Test (ng/mL)	Control (ng/mL)	Bias (<i>d</i> _{obs} , %)	
Bilirubin	0.005	4.59	4.49	2.1
		42.63	42.63	0.0
	0.01	4.44	4.49	-1.2
		41.60	42.63	-2.4
	0.02	4.37	4.49	-2.8
Hemoglobin	0.5	42.26	42.63	-0.9
		5.35	5.32	0.6
	1.0	46.65	44.04	5.9
		5.25	5.32	-1.3
	2.0	44.12	44.04	0.2
		5.36	5.32	0.7
Lipids	1.0	43.66	44.04	-0.9
		5.55	5.51	0.8
	5.0	45.44	43.33	4.9
		5.48	5.51	-0.5
	10.0	45.67	43.33	5.4
		5.39	5.51	-2.2
	43.62	43.33	0.7	

WARRANTY

This product is warranted to perform as described in its labeling and literature when used in accordance with all instructions. Epitope Diagnostics, Inc. DISCLAIMS ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, and in no event shall Epitope Diagnostics, Inc. be liable for consequential damages. Replacement of the product or refund of the purchase price is the exclusive remedy for the purchaser. This warranty gives you specific legal rights and you may have other rights, which vary from state to state.

REFERENCES

1. Catalona WJ, Partin AW, Slawin KM, et al. Use of the Percentage of Free Prostate-Specific Antigen to Enhance Differentiation of Prostate Cancer From Benign Prostatic Disease: A Prospective Multicenter Clinical Trial. *JAMA*. 1998;279(19):1542-1547. doi:10.1001/jama.279.19.1542
2. James G. Huang, MD, PGDipSurgAnat, FRACS., Nicholas Campbell, MD, FRACS., S. Larry Goldenberg, MD, FRCSC, FACS, FCAHS, PSA and beyond: Biomarkers in prostate cancer. *BCMJ*, Vol. 56, No. 7, September, 2014, Page(s) 334-341 - Clinical Articles.

TECHNICAL ASSISTANCE AND CUSTOMER SERVICE

For technical assistance or place an order, please contact Epitope Diagnostics, Inc. at (858) 693-7877 or fax to (858) 693-7678.

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