HBsAg ELISA

CAT NO	DESCRIPTION	PACK SIZE
EIAHBG1	HBsAg ELISA (Hepatitis B Surface Antigen)	96 Tests
EIAHBG2	HBsAg ELISA (Hepatitis B Surface Antigen)	480 Tests

Intended Use:

HBsAg ELISA is an enzyme linked immunosorbent assay (ELISA) for the qualitative detection of HBsAg in human serum or plasma. It is intended for screening of blood donors and for diagnosing of patients related to infection with hepatitis B virus. This reagent is for In vitro Diagnostic use only.

Summary and Principle:

Hepatitis B virus (HBV) is an enveloped, double-stranded DNA virus belonging to the Hepadnaviridae family and is recognized as the major cause of blood transmitted hepatitis together with hepatitis C virus (HCV). Infection with HBV induces a spectrum of clinical manifestations ranging from mild, unapparent disease to fulminant hepatitis, severe chronic liver diseases, which in some cases can lead to cirrhosis and carcinoma of the liver. Classification of a hepatitis B infection requires the identification of several serological markers expressed during three phases (incubation, acute and convalescent) of the infection. Now several diagnostic test are used for screening, clinical diagnosis and management of the disease. Hepatitis B surface antigen or HBsAg, previously described as Australia antigen, is the most important protein of the envelope of Hepatitis B Virus. The surface antigen contains the determinant "a", common to all known viral subtypes and immunologically distinguished in two distinct subgroups (ay and ad). HBV has 10 major serotypes and four HBsAg subtypes have been recognized (adw, ady, ayw, and ayr). HBsAg can be detected 2 to 4 weeks before the ALT levels become abnormal and 3 to 5 weeks before symptoms develop. The serological detection of HBsAg is a powerful method for the diagnosis and prevention of HBV infection and ELISA has become an extensively used analytical system for screening of blood donors and clinical diagnosis of HBV in infected individuals.

For detection of HBsAg, Prestige UK HBsAg ELISA uses antibody "sandwich" ELISA method in which, polystyrene microwell strips are pre-coated with monoclonal antibodies specific to HBsAg. Patient's serum or plasma sample is added to the microwells. During incubation, the specific immunocomplex formed in case of presence of HBsAg in the sample, is captured on the solid phase. Then the second antibody conjugated the enzyme horseradish peroxidase (the HRP-Conjugate) directed against a different epitope of HBsAg is added into the wells. During the second incubation step, these HRP-conjugated antibodies will be bound to any anti-HBs-HBsAg complexes previously formed during the first incubation, and the unbound HRP-conjugate is then removed by washing. Chromogen solutions containing tetramethyl-benzidine (TMB) and urea peroxide are added to the wells. In presence of the antibody-antigen-antibody(HRP) "sandwich" immunocomplex, the colorless Chromogens are hydrolyzed by the bound HRP-conjugate to a blue-colored product. The blue color turns yellow after stopping the reaction with sulfuric acid. The amount of color intensity can be measured and it is proportional to the amount of antigen captured in the wells, and to its amount in the sample respectively. Wells containing samples negative for HBsAg remain colourless.

Reagent Composition:

COMPONENT	SIZE	DESCRIPTION
Microwell Plate	1x96 wells (12x8 well plate) 5x96 (480T)	Each microwell is coated with antibodies to HBsAg. (Anti HBs). The microwells can be broken and used separately. Place unused wells or strips in the provided plastic sealable bag together with the desiccant and store at 2-8°C. Once open the wells are stable for 1 month at 2-8°C.
Negative Control	1x1ml 3x1ml (480T)	Protein stabilized buffer tested non-reactive for HBsAg. Yellow in colour. Ready to use. Once open stable for 1 month at 2-8°C.
Positive Control	1x1ml 3x1ml (480T)	Protein stabilized buffer dilution of HBsAg. Red coloured solution. Once open, stable for 1 month at 2-8°C.
HRP-Conjugate	1x7ml 5x7ml (480T)	Red coloured liquid. HRP conjugated anti-HBs antibodies. Once open, stable for one month at 2-8°C.
Wash Buffer (20X)	1x30ml 2x100ml (480T)	PBS at pH 7.4. 20X concentrate. Once open, stable for one month at 2-8°C.
Chromogen A	1x8ml 1x60ml (480T)	Urea peroxide solution. Ready to use. Once open, stable for one month at 2-8°C.
Chromogen B	1x8ml 1x60ml (480T)	TMB Solution. Ready to use. Once open, stable for one month at 2-8°C.
Stop Solution	1x8ml 1x60ml (480T)	Diluted Sulfuric acid solution (0.5M) Ready to use. Once open, stable for 1 month at 2-8°C.

Plastic Sealable bag, IFU and Cardboard plate covers.

Materials required but not provided:

Distilled water or deionized water, disposable gloves and timer, appropriate waste containers for potentially contaminated materials, dispensing systems, disposable pipette tips, absorbent tissue or clean towel, dry bath incubator or water bath, plate reader, single wavelength 450nm or dual wavelength 450/630nm and microwell aspiration systems.

Specimen Collection:

1. No special patient preparation is required. Collect the specimen in accordance with normal laboratory practice. Either fresh serum or plasma specimens can be used with this assay. Blood collected by venepuncture should be allowed to clot naturally and completely – the serum/plasma must be separated from the clot as early as possible as to avoid haemolysis of the RBC. Care should be taken to ensure that the serum specimens are clear and not contaminated by microorganisms. Any visible particulate matters in the specimens should be removed by centrifugation at 3000 RPM for 20 minutes at room temperature or by filtration.
2. Plasma specimens collected into EDTA, sodium citrate or heparin can be tested, but highly lipaemic, icteric or haemolytic specimens should not be used as they give false results in the assay. Do not heat inactivate specimens. This can cause deterioration of the target analyte. Samples with visible microbial contamination should never be used.
3. The Prestige HBsAg ELISA assay is used only for testing individual serum or plasma samples. Do not use for testing cadaver samples, saliva, urine or other body fluids or pooled (mixed) blood.
4. Transportation and Storage: store specimens at 2-8oC. Specimens not required for assaying within 7 days should be stored at -20oC or lower. Multiple free thaw cycles should be avoided. For shipment, samples should be packaged and labelled in accordance with the existing local and international regulations for transportation of clinical samples and ethological agents.

Storage and Stability:

The contents of the kit will remain stable up to expiry date when stored at 2-8°C. Do not freeze. Keep all components tightly capped and without any contamination.

Precautions and Safety:

The ELISA assays are time and temperature sensitive. To avoid incorrect results, strictly follow the test procedure and do not modify them.

1. **Do not exchange reagents from different lots or use reagents from other commercially available kits. The components of the kit are precisely matched for optimal performance of the tests.**
2. **Make sure that all reagents are within the validity indicated on the kit box and of the same lot. Never use reagents beyond their expiry date stated on labels or boxes.**
3. **CAUTION - CRITICAL STEP: Allow the reagents and specimens to reach room temperature (18-30°C) before use. Shake reagent gently before use. Return at 2-8°C immediately after use.**
4. **Use only sufficient volume of sample as indicated in the procedure steps. Failure to do so, may cause in low sensitivity of the assay.**
5. **Do not touch the bottom exterior of the wells; fingerprints or scratches may interfere with the reading. When reading the results, ensure that the plate bottom is dry and there are no air bubbles inside the wells.**
6. **Never allow the microplate wells to dry after the washing step. Immediately proceed to the next step. Avoid the formation of air bubbles when adding the reagents.**
7. **Avoid assay steps long time interruptions. Assure same working conditions for all wells.**
8. **Calibrate the pipette frequently to assure the accuracy of samples/reagents dispensing. Use different disposal pipette tips for each specimen and reagents in order to avoid cross-contaminations.**
9. **Assure that the incubation temperature is 37°C inside the incubator.**
10. **When adding specimens, do not touch the well's bottom with the pipette tip.**
11. **When measuring with a plate reader, determine the absorbance at 450nm or at 450/630nm.**
12. **The enzymatic activity of the HRP-conjugate might be affected from dust and reactive chemical and substances like sodium hypochlorite, acids, alkalis etc. Do not perform the assay in the presence of these substances.**
13. **If using fully automated equipment, during incubation, do not cover the plates with the plate cover. The tapping out of the remainders inside the plate after washing, can also be omitted.**
14. **All specimens from human origin should be considered as potentially infectious. Strict adherence to GLP (Good Laboratory Practice) regulations can ensure the personal safety.**
15. **WARNING: Materials from human origin may have been used in the preparation of the Negative Control of the kit. These materials have been tested with tests kits with accepted performance and found negative for antibodies to HIV 1/2, HCV, TP and HBsAg. However, there is no analytical method that can assure that infectious agents in the specimens or reagents are completely absent. Therefore, handle reagents and specimens with extreme caution as if capable of transmitting infectious diseases. Bovine derived sera have been used for stabilizing of the positive and negative controls. Bovine serum albumin (BSA) and fetal calf sera (FCS) are derived from animals from BSE/TSE free-geographical areas.**
16. **Never eat, drink, smoke, or apply cosmetics in the assay laboratory. Never pipette solutions by mouth.**
17. **Chemical should be handled and disposed of only in accordance with the current GLP (Good Laboratory Practices) and the local or national regulations.**
18. **The pipette tips, vials, strips and specimen containers should be collected and autoclaved for not less than 2 hours at 121oC or treated with 10% sodium hypochlorite for 30 minutes to decontaminate before any further steps of disposal. Solutions containing sodium hypochlorite should never be autoclaved. MSDS available upon request.**
19. **Some reagents may cause toxicity, irritation, burns or have carcinogenic effects as raw materials. Contact with skin and the mucosa should be avoided but not limited to the following reagents: stop solution, chromogen reagents and the wash buffer.**
20. **The stop solution contains sulfuric acid. Use it with appropriate care. Wipe up spills, immediately and wash with water if comes into contact with the skin or the eyes.**
21. **Proclin 300 is used as preservative and can cause sensation of the skin. Wipe up spills immediately or wash with water if comes into contact with skin or eyes.**
22. **INDICATIONS OF INSTABILITY OR DETERIORATION OF THE REAGENTS: The values of positive and negative controls which are out of the indicated quality control range, are indicators of possible deterioration of the reagents and or operator or equipment errors. In such cases, the results should be considered as invalid and the samples must be retested. In case of consistently erroneous results and proven deterioration or instability of the reagents, immediately discard the reagents in use and use a new kit. Contact the local Prestige representative.**

Procedure:

Reagent preparation:

Allow the reagents to reach room temperature (18-30°C). Check the wash buffer concentration for the presence of salt crystals. If crystals have formed, re-solubilize by warming at 37°C, until crystals dissolve. Dilute the wash buffer (20X) as indicated in the instructions for washing. Use distilled or deionized water and clean vessels to dilute the buffer. All other reagents are ready to use as supplied.

STEP 1

Preparation: Mark 3 wells as Negative controls (e.g. B1,C1,D1), 2 wells as Positive controls (e.g. E1,F1) and one Blank (e.g.A1 – taking care that neither the HRP conjugate nor any samples should be added to the blank well). If the results are read using a plate reader having dual wavelength (450 / 630nm) then the Blank well need not be used. Use the required number of strips for the test.

STEP 2

Addition of the sample and HRP conjugate: Add 50ul of Positive control, Negative Control and Specimen into their respective wells except the

Blank. (Note: Use a separate disposal pipette tip for each specimen, Negative control, Positive control to avoid cross contamination). Add 50ul of HRP Conjugate to each well except the blank well and mix by tapping the plate gently.

STEP 3

Incubation: Cover the plate with the plate cover and incubate for 60 minutes at 37°C.

STEP 4

Washing: At the end of the incubation period, remove and discard the plate cover. Wash each well 5 times with diluted washing buffer. Each time allow the microwells to soak for 30-60 seconds. After the final washing cycle, turn down the plate onto a blotting paper or a clean towel and tap it to remove any residual buffer.

STEP 5

Addition of the chromogens: Add 50ul of Chromogen A and 50ul of Chromogen B into each well including the blank. Incubate the plate at 37oC for 15 minutes avoiding light. The enzymatic reaction between the chromogen solutions and the HRP conjugate produces blue colour in Positive control and HBsAg Positive samples.

STEP 6

Stopping the Reaction: Add 50ul of the Stop solution into each well and mix gently. Intensive yellow colour develops in the positive control and HBsAg positive sample wells.

STEP 7

Measurement: Calibrate the plate reader with the Blank well and read the absorbance at 450nm. If a dual filter instrument is used, set the reference wavelength at 630nm. Calculate the cut off value and evaluate the results. (Note: Absorbances must be read within 10 minutes of adding the stop solution).

Instructions for Washing:

- To remove any effect washing on false positive reactions, a 5 automatic wash cycle is required with 350-400ul of diluted wash buffer used per well per wash. This helps in avoiding false positive reactions and a high background.
- To avoid cross-contamination of the plate with specimen or HRP conjugate, after incubation, do not discard the content of the wells but allow the plate washer to aspirate it automatically.
- Assure that the microplate washer liquid dispensing channels are not blocked or contaminated and sufficient volume of wash buffer is dispensed each time into the wells.
- In case of manual washing, we suggest carrying out 5 washing cycles, dispensing 350-400ul/well and aspirating the liquid 5 times. If poor results are observed with high background, increase washing cycles to soak time per well.
- Treat the liquid aspirated after the reaction from the wells with Sodium hypochlorite (at a concentration of 2.5%) for 24 hours before they are disposed of in the appropriate way.
- The concentrated wash buffer should be diluted 1:20 before use. If less than a whole plate is used, prepare the proportional volume of solution.

Calculation of results:

Each microplate should be considered separately when calculating and interpreting the results of the assay, regardless of the number of plates concurrently processed. The results are calculated by relating each specimen absorbance (A) with the cut off value (C.O) of the plate. If the cut off reading is based on single filter plate reader, the results should be calculated by subtracting the Blank well A from the absorbances of the specimens and the controls. In case the results are based on a dual filter plate reader, do not subtract the blank value A from the specimen and controls absorbances.

Calculation:

Cut off value (C.O) = Nc x 2.1

(Nc = the mean absorbance value for 3 negative controls)

Validation:

Blank well: the absorbance must be <0.080 at 450nm.

Positive Control: the absorbance must be >/= 0.800 at 450/630nm 0r at 450nm after blanking.

Negative control: the absorbance must be <0.100 at 450/630nm or at 450nm after blanking.

If one of the Negative control absorbances does not match the above criteria, this value should be discarded and a mean value should be calculated using the other two values. If more than one negative control absorbance does not meet the criteria, the test is invalid and must be re-tested.

Example:

Blank Value	A1: 0.025	450nm (blanking is required only when reading with a single filter)	
Negative control	B1	C1	D1
	0.020	0.012	0.016
Positive Control	E1	F1	
	2.421	2.369	

Calculation of Nc: ((0.016+0.012+0.018)/3) = 0.015

As the NC value is lower than 0.05, take the NC value as 0.05

Calculation of the cut off: 0.05 x 2.1 = 0.105

Interpretation of the results:

Negative Results: (A/CO <1) Specimens giving absorbance less than that of the Cut off value are negative for this assay. This indicates that the sample is non-reactive for HBsAg and the patient is probably not infected with HBV and the blood unit does not contain HBsAg and could be transfused in case other infectious diseases markers are also absent.

Positive Results: (A/CO >/= 1) Specimens giving an absorbance equal to or greater than the cut off values are considered initially reactive, indicating that HBsAg has been probably detected. All initially reactive samples should be re-tested with the same kit before final interpretation. Repeatedly reactive specimens can be considered positive for HBsAg.

Borderline: (A/CO = 0.9 – 1.1) Specimens with absorbance to cut off ratio between 0.9 to 1.1 are considered borderline and retesting of these specimens in duplicates is required to confirm the initial results.

Follow up, confirmation and supplementary testing of any positive specimen with other analytical systems such as PCR is required. Clinical diagnosis should not be established using a single result.

- After re-testing of the initially reactive samples, both wells show negative results (A/CO <0.9). These samples should be considered negative and the original result must be classified as false positive. As with many sensitive ELISA Assays, false positive results can occur due to several reasons, most of which are connected with, but not limited to inadequate washing step.
- After retesting in duplicates one or both wells show positive results. The final result of this specimen should be recorded as repeatedly positive. Repeatedly reactive specimens could be considered positive for HBsAg and the blood unit must be discarded.
- After re-testing in duplicates, samples with values close to the cut-off should be interpreted with caution and considered borderline zone sample, or uninterpretable for the time of testing.

Performance Characteristics:

Clinical Specificity: The clinical specificity of this assay was determined by a panel of samples from 2500 healthy donors and 300 undiagnosed hospitalized patients. Results are as follows:

Type	No.	Neg	Pos	Confirmed +ve	Specificity	False +ve
Donors	2500	2444	56	53	99.87%	3
Patients	300	273	27	26	99.63%	1

Clinical Sensitivity: Was obtained by testing with 670 well characterized patients.

Type	No.	Neg	Pos	Confirmed +ve	Sensitivity	False -ve
Acute	200	0	200	200	100%	0
Chronic	400	1	399	400	99.75%	1
Recovery	70	65	5	5	100%	0

Analytical Endpoint Sensitivity: The sensitivity of this assay has been calculated by means of reference standards and was found to be at 0.5ng/ml (adr) and 0.5ng/ml (adw,ay).

Analytical Specificity: No cross reactivity with HAV, HCV, HIV, CMV and TP

No interference from RF up to 2000 IU/ml. No high dose hook effect up to HBsAg concentrations of 200000 ng/ml.

Limitations:

- Positive results must be confirmed with another available method and interpreted in conjunction with the patient clinical information.
- Antigens may be undetectable during the early stages of the disease. Negative results are only an indication that the sample does not contain detectable levels of HBsAg.
- If, after re-testing of the initially reactive specimens, the assay results are negative, these samples should be considered as non-repeatable and interpreted as negative. As with many sensitive ELISA assays, false positive reactions occur due to several reasons most of which are related to but not limited to inadequate washing step.
- The most common assay mistakes are: using kits beyond expiry dates, bad washing procedures, contaminated reagents, improper operation with equipment, sample collection issues.
- The prevalence of the marker will affect the assay's predictive values.
- This assay cannot be utilized to test pooled plasma. This kit can only be used with individual serum or plasma samples.

References:

1. Stevens,C.E., P.E Taylor and M.J Trong, 1988. Viral hepatitis and liver disease. Alan R Riss, New York.
2. Bhatnagar, P.K., E.Papas, H.E Blum, D.R.Milich, D.Nitecki, M.J Karels and G.N,Vyas 1982. Immune response to synthetic peptide analogues of hepatitis B surface antigen specific for a a determinant. Proc Natl,Acad USA.
3. Szumness,W., C.E.Stevens, E.J Harley, E.A.Zhang, Q.R.Olesko, D.C.Williams, R.Sadovsky, J.M. Morrison and A. Kellner, 1980. Hepatitis B Vaccine: demonstaration of efficacy in a controlled trial in the high risk population in the U>S N.Engl J Med. 303:833-841.

REF	Catalog number		Temperature limitation
	Consult instructions for use	LOT	Batch code
IVD	*In vitro* diagnostic medical device		Use by
	Manufacturer		

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