Access
Immunoassay Systems

HBs Ab
REF A24296

Intended Use

The Access HBs Ab assay is a paramagnetic particle, chemiluminescent immunoassay for the quantitative determination of antibody levels to hepatitis B surface antigen in human serum and plasma using the Access Immunoassay Systems.

Summary and Explanation

Viral hepatitis is a serious global health problem affecting over two billion people worldwide, with 350 million suffering from chronic hepatitis infection. The majority of hepatitis viral infections are caused by three distinct virus types: hepatitis A (HAV), hepatitis B (HBV) and hepatitis C (HCV) virus. Approximately one million people die each year worldwide due to cirrhosis of the liver and hepatocellular carcinoma (HCC), which are commonly associated with chronic hepatitis.[1,2]

Hepatitis B is caused by infection with the hepatitis B virus (HBV). Most adults recover completely from HBV infection. However, the risk of developing chronic infection varies inversely with age and is highest for infants infected at birth compared to older children and adults. Up to 90% of infants infected with HBV will develop chronic infection leading to cirrhosis of the liver or HCC compared to 6-10% of adults who acquire HBV infection.[3,4]

Determination of antibodies directed against hepatitis B virus surface antigen (anti-HBs or HBs Ab) is used to evaluate a person's immune status to HBV infection or to aid in the laboratory diagnosis of hepatitis B infection when used in conjunction with other laboratory methods. The test is performed to assess the need for vaccination (if HBs Ab is absent or below levels considered protective), following completion of vaccination against HBV in high risk groups (healthcare workers, HIV infected persons), or to monitor recovery from acute HBV infection.[5,6,7] The presence of anti-HBs following acute infection generally indicates recovery and immunity from re-infection.[8]

Principles of the Procedure

The Access HBs Ab assay is a one-step immunoenzymatic ("sandwich") assay. A sample is added to a reaction vessel containing hepatitis B surface antigen-alkaline phosphatase conjugate and paramagnetic particles coated with hepatitis B surface antigen. A complex of HBs antigen-alkaline phosphatase and specific antibody is bound to the HBs antigen on the surface of the paramagnetic particles. After incubation in a reaction vessel, materials bound to the solid phase are held in a magnetic field while unbound materials are washed away. Then, the chemiluminescent substrate Lumi-Phos* 530 is added to the vessel and light generated by the reaction is measured with a luminometer. The light production is proportional to the concentration of enzyme conjugate present at the end of the reaction. The quantitative measurement of anti-HBs antibody in the sample is determined from a stored, multi-point calibration curve.

Product Information

Access HBs Ab Reagent Pack

Cat. No. A24296: 100 determinations, 2 packs, 50 tests/pack

- Provided ready to use.
- Store upright and refrigerate at 2 to 10°C.
- Refrigerate at 2 to 10°C for a minimum of two hours before use on the instrument.
- Stable until the expiration date stated on the label when stored at 2 to 10°C.
- Stable at 2 to 10°C for 56 days after initial use.

- Signs of possible deterioration are a broken elastomeric layer on the pack or control values out of range.
- If the reagent pack is damaged (i.e., broken elastomer), discard the pack.

R1a:	Paramagnetic particles coated with hepatitis B virus surface antigen (subtypes "ay" and "ad", human origin, heat inactivated), in TRIS buffered saline, with surfactant, BSA, < 0.1% sodium azide, and 0.0025% Cosmocil**.
R1b:	Pretreatment Solution: TRIS buffered saline with surfactant, BSA, < 0.1% sodium azide, and 0.125% ProClin*** 300.
R1c:	Conjugate: Hepatitis B virus surface antigen (subtypes "ay" and "ad", human origin, heat inactivated) - alkaline phosphatase (recombinant) in phosphate buffered saline, with surfactant, BSA, < 0.1% sodium azide, and 0.25% ProClin 300.

Warnings and Precautions

- For *in vitro* diagnostic use.
- Patient samples and blood-derived products may be routinely processed with minimum risk using the procedure described. However, handle these products as potentially infectious according to universal precautions and good clinical laboratory practices, regardless of their origin, treatment, or prior certification. Use an appropriate disinfectant for decontamination. Store and dispose of these materials and their containers in accordance with local regulations and guidelines.
- Human source material used in the preparation of the reagent has been tested and found negative or non-reactive for Hepatitis C (HCV) and Human Immunodeficiency Virus (HIV-1 and HIV-2). Because no known test method can offer complete assurance that infectious agents are absent, handle reagents and patient samples as if capable of transmitting infectious disease.[9]
- Sodium azide may react with lead and copper plumbing to form highly explosive metal azides. On disposal of liquids, flush with a large volume of water to prevent azide build-up.[10]
- Xi. Irritant: 0.25% ProClin 300.

R 43: May cause sensitization by skin contact.
S 28-37: After contact with skin, wash immediately with plenty of soap and water. Wear suitable gloves.

- The Material Safety Data Sheet (MSDS) is available upon request.

Specimen Collection and Preparation

1. Serum and plasma (lithium heparin, sodium heparin) are the recommended samples.
2. Observe the following recommendations for handling, processing, and storing blood samples:[11]
   - Collect all blood samples observing routine precautions for venipuncture.
   - Allow serum samples to clot completely before centrifugation (minimum 1 hour).
   - Centrifuge the samples.
   - Keep tubes stoppered at all times.
   - Store samples tightly stoppered at room temperature (20 to 25°C) for no longer than eight hours.
   - If the assay will not be completed within eight hours, refrigerate the samples at 2 to 8°C.
3. If the assay will not be completed within 4 days, or for shipment of samples, freeze at -20°C or colder.

4. Use the following guidelines when preparing specimens:
   - In general, allow 1 hour for serum samples to clot completely.
   - All samples stored longer than 8 hours should be centrifuged at 3000 g for 15 minutes prior to testing.
   - Follow blood collection tube manufacturer's recommendations or validated laboratory procedures for centrifugation.
5. Ensure residual fibrin and cellular matter have been removed prior to analysis. Turbid serum or plasma samples containing particulate matter should be transferred from the original tube and re-centrifuged prior to assay. A specimen (original tube) that contains a separating device (gel barrier) is never to be re-centrifuged.
6. If a sample is not to be assayed within 2 hours after centrifugation, transfer the cell-free sample to a storage tube (at least 110 µL sample volume is required plus sample container and system dead volumes). Tightly stopper the tube immediately. Refer to the appropriate system manuals and/or Help system for a specific description of each instrument's dead volume requirements.
7. Samples must be mixed thoroughly after thawing. Remove the suspended fibrin particles or aggregates by centrifugation at 3000 g for 15 minutes. Transfer the sample into a sample cup for testing.
8. Use caution in handling patient specimens to prevent cross-contamination.
9. Thaw samples no more than 5 times.
10. No qualitative differences in the results were found after 33 non-reactive samples and 25 reactive samples were heated at 56ºC for 30 minutes.
11. Specimens with obvious microbial contamination should not be used.

Materials Provided

R1 Access HBs Ab Reagent Packs

Materials Required But Not Provided

1. Access HBs Ab Calibrators
   Provided at zero and approximately 10, 20, 50, 250, and 750 mIU/mL.
   Cat. No. A24297
2. Access HBs Ab Quality Control (QC) or other commercially available control material.
   Cat. No. A24298
3. Access Substrate
   Cat. No. 81906
4. **Access, Access 2:**
   Access Wash Buffer II, Cat. No. A16792
   UniCel DxI:
   UniCel DxI Wash Buffer II, Cat. No. A16793

Procedural Comments

1. Refer to the appropriate system manuals and/or Help system for a specific description of installation, start-up, principles of operation, system performance characteristics, operating instructions, calibration procedures, operational limitations and precautions, hazards, maintenance, and troubleshooting.
2. Mix contents of new (unpunctured) reagent packs by gently inverting pack several times before loading on the instrument. Do not invert open (punctured) packs.
3. Use one hundred ten (110) µL of sample for each determination in addition to the sample container and system dead volumes. Refer to the appropriate system manuals and/or Help system for the minimum sample volume required.
4. The system default unit of measure for sample results is mIU/mL.
5. Time to first result is approximately 55 minutes.

Procedure

Refer to the appropriate system manuals and/or Help system for information on managing samples, configuring tests, requesting tests, and reviewing test results.

Calibration Details

An active calibration curve is required for all tests. For the Access HBs Ab assay, calibration is required every 56 days. Refer to the appropriate system manuals and/or Help system for information on calibration theory, configuring calibrators, calibrator test request entry, and reviewing calibration data.

Quality Control

Quality control materials simulate the characteristics of patient samples and are essential for monitoring the system performance of immunochemical assays. Because samples can be processed at any time in a "random access" format rather than a "batch" format, quality control materials should be included in each 24-hour time period.[12] More frequent use of controls or the use of additional controls is left to the discretion of the user based on good laboratory practices or laboratory accreditation requirements and applicable laws. Include Access HBs Ab QC or other commercially available quality control materials that cover at least two levels of analyte. Follow manufacturer's instructions for reconstitution and storage. Each laboratory should establish mean values and acceptable ranges to assure proper performance. Quality control results that do not fall within acceptable ranges may indicate invalid test results. Examine all test results generated since obtaining the last acceptable quality control test point for this analyte. Refer to the appropriate system manuals and/or Help system for information about reviewing quality control results.

Results

Patient test results are determined automatically by the system software using a smoothing spline math model. The amount of analyte in the sample is determined from the measured light production by means of the stored calibration data. Patient test results can be reviewed using the appropriate screen. Refer to the appropriate system manuals and/or Help system for complete instructions on reviewing sample results. Results are reported in mIU/mL units.

The performance characteristics of the Access HBs Ab assay were established using 10 mIU/mL as the cut-off. Using the Access HBs Ab assay, the presence or absence of antibody to HBs antigen can be determined. Samples whose concentrations are ≥ 10 mIU/mL are considered as reactive in this assay; any sample less than that of the cut-off value is considered as non-reactive in this assay.

Immunity from HBV infection is influenced by multiple factors, including the individual's anti-HBs titer. There is currently no consensus on the protective anti-HBs level, however World Health Organization publications list 10 mIU/mL as the threshold for immunity.[13,14] Users are advised to consult their own governing health agencies for specific recommendations on this threshold.

Limitations of the Procedure

1. The Access HBs Ab assay is limited to the determination of antibodies against hepatitis B virus surface antigen in human serum or plasma (lithium heparin, sodium heparin). The Access HBs Ab assay has not been validated for use with EDTA plasma.
2. The use of serum separator (gel) blood collection tubes has been validated for use with this assay, however it is not possible to survey all manufacturers or tube types. Users are cautioned to conduct their own validation to determine the suitability of their particular tube types.
3. The measuring range of this assay is 0 mIU/mL to the highest calibrator value (approximately 750 mIU/mL). If a sample concentration exceeds the stated value of the highest Access HBs Ab Calibrator S5, the result is reported as greater than that value (e.g., > 750 mIU/mL). Over-range samples may be diluted with negative human serum and re-tested to obtain an estimate of the actual concentration. Refer to the appropriate system manuals and/or Help system for instructions on entering a sample dilution in a test request. The system reports the results adjusted for the dilution.

4. For assays employing antibodies, the possibility exists for interference by heterophile antibodies in the patient sample. Patients who have been regularly exposed to animals or have received immunotherapy or diagnostic procedures utilizing immunoglobulins or immunoglobulin fragments may produce antibodies, e.g. HAMA, that interfere with immunoassays. Additionally, other heterophile antibodies such as human anti-goat antibodies may be present in patient samples.[15,16]
   Such interfering antibodies may cause erroneous results. Carefully evaluate the results of patients suspected of having these antibodies.
5. The Access HBs Ab results should be interpreted in light of the total clinical presentation of the patient, including symptoms, clinical history, data from additional tests, and other appropriate information.
6. Samples containing an apparent HBs Ab level as high as 58,500 mIU/mL did not exhibit a hook effect in the Access HBs Ab assay.
7. This assay alone does not differentiate between vaccine-induced immune response and immune response induced by natural infection.

Specific Performance Characteristics

Intra-Assay

The intra-assay precision was determined by testing four different samples 30 times in the same run during one day. The results of the study are shown below:

Table 1: Intra-assay Precision of the Access HBs Ab Assay

Sample	Mean (mIU/mL)	SD	%CV
1 (Borderline)	11.1	0.3	2.7
2	27.0	1.0	3.7
3	195.1	6.1	3.1
4	664.6	14.1	2.1

Inter-Assay

The inter-assay precision was determined by testing four different samples in duplicate in 37 separate runs over 19 days. The results of the study are shown below:

Table 2: Inter-assay Precision of the Access HBs Ab Assay

Sample	Mean (mIU/mL)	SD	%CV
1 (Borderline)	10.6	0.4	3.8
2	26.5	1.2	4.5
3	193.0	7.0	3.6
4	602.4	21.2	3.5

The Access HBs Ab assay exhibits total imprecision ≤ 10% with reactive samples.

Specificity

Specificity was determined by testing samples that were found non-reactive in a reference assay and tested in the Access HBs Ab assay. A total of 1831 samples including blood donors and hospitalized patients were tested. The specificity on these combined populations was 98.1% (95% CI: 97.4 – 98.7%). The results of the study are shown below:

Table 3: Specificity of the Access HBs Ab Assay

Sample Category	Number of Samples Tested	Number of Non-reactive Samples	Specificity (%)
HBs Ab non-reactive	1831	1796	98.1 (95% CI: 97.4–98.7)

Analytical Sensitivity

The analytical sensitivity of the Access HBs Ab was evaluated with the W.H.O. 1st International Reference Preparation for Anti-Hepatitis B Immunoglobulin (W1042; Lot No. 17-2-77) and with a panel from the French Blood Transfusion Society (SFTS Panel Lot 02/08.02.22C). The analytical sensitivity observed with these standards from individual studies is presented below:

Table 4: Analytical Sensitivity of the Access HBs Ab Assay

Standard	Analytical Sensitivity
WHO (W1042; 17–2–77)	1.87 mIU/mL (95% CI: 0–4.44 mIU/mL)
SFTS Panel (02/08.02.22C)	0.81 mIU/mL (95% CI: 0–3.21 mIU/mL)

Sensitivity

Sensitivity was determined by testing samples that were found reactive in a reference assay and tested in the Access HBs Ab assay. A total of 753 samples including vaccinated subjects and subjects with resolved hepatitis B infection were tested. The sensitivity on these combined populations was 98.4% (95% CI: 97.2 – 99.2%). The results of the study are shown below:

Table 5: Sensitivity of the Access HBs Ab Assay

Sample Category	Number of Samples Tested	Number of Reactive Samples	Sensitivity (%)
HBs Ab Reactive	753	741	98.4 (95% CI: 97.2–99.2)

Eleven well-characterized seroconversion panels and 20 serial bleed panels from HBV vaccine recipients were tested in the Access HBs Ab assay. The observed sensitivity of the Access HBs Ab assay in this study was consistent with current state of the art methods for the determination of anti-HBs.

Cross Reactivity/Interference

A study was performed to investigate potential cross-reactivity caused by infectious agents that can produce symptoms similar to Hepatitis B infection (HAV, HCV, HIV, HSV-1/2, rubella, Toxoplasma, Epstein-Barr virus, measles, HTLV, CMV and mumps). In addition, interference due to heterophilic antibodies (HAMA), abnormal immune system conditions (myeloma, rheumatoid factor, anti-nuclear antibodies), other systemic conditions (haemodialysis, renal failure, alcoholic cirrhosis) and influenza vaccine was evaluated. A total of 387 samples were tested. Sixteen samples (4.1%) that were non-reactive by another commercially available HBs Ab assay were reactive in Access HBs Ab assay. The reactive results were associated with HAV Ab (2 of 16 samples), influenza vaccine (4 of 25), HBs Ag (2 of 20), measles IgM (1 of 11), myeloma IgG (1 of 16), renal failure (3 of 44), rubella IgM (2 of 27), and Toxo IgM (1 of 20).

The Access HBs Ab assay was not affected by the presence of up to 300 mg/L bilirubin (100 mg/L free + 200 mg/L conjugated), 30 g/L triolein (triglycerides), 80 g/L albumin or 5 g/L hemoglobin.

Access
Immunoassay Systems

HBs Ab CALIBRATORS
REF A24297

Intended Use

The Access HBs Ab Calibrators are intended to calibrate the Access HBs Ab assay for the quantitative detection of antibodies to hepatitis B surface antigen in human serum and plasma using the Access Immunoassay Systems.

Summary and Explanation

Quantitative assay calibration is the process by which samples with known analyte concentrations (i.e., assay calibrators) are tested like patient samples to measure the response. The mathematical relationship between the measured responses and the known analyte concentrations establishes the calibration curve. This mathematical relationship, or calibration curve, is used to convert RLU (Relative Light Unit) measurements of patient samples to specific quantitative analyte concentrations.

Traceability

The measurand (analyte) in the Access HBs Ab Calibrators is traceable to the W.H.O. 1st International Reference Preparation for Anti-Hepatitis B Immunoglobulin (W1042, Lot no. 17-2-77). Traceability process is based on EN ISO 17511.

The assigned values were established using representative samples from this lot of calibrator and are specific to the assay methodologies of the Access reagents. Values assigned by other methodologies may be different. Such differences, if present, may be caused by inter-method bias.

Product Information

Access HBs Ab Calibrators
Cat. No. A24297: S0–S5, 2.5 mL/vial

- Provided ready to use.
- Store upright and refrigerate at 2 to 10°C.
- Mix contents by gently inverting before use. Avoid bubble formation.
- Stable until the expiration date stated on the label when stored at 2 to 10°C.
- Vial is stable at 2 to 10°C for 90 days after initial use.
- Signs of possible deterioration are control values out of range.
- Refer to calibration card for exact concentrations.

S0:	Human serum/defibrinated plasma, with 0 mIU/mL antibody to HBs, < 0.1% sodium azide, 0.25% ProClin*** 300.
S1, S2, S3, S4, S5:	Human defibrinated plasma containing approximately 10, 20, 50, 250, and 750 mIU/mL of antibodies to HBs Ag, < 0.1% sodium azide, 0.25% ProClin 300.
Calibration Card:	1

Warnings and Precautions

- For *in vitro* diagnostic use.
- Patient samples and blood-derived products may be routinely processed with minimum risk using the procedure described. However, handle these products as potentially infectious according to universal precautions and good clinical laboratory practices, regardless of their origin, treatment, or prior certification. Use an appropriate disinfectant for decontamination.

Store and dispose of these materials and their containers in accordance with local regulations and guidelines.

- Human source material used in the preparation of the reagent has been tested and found negative or non-reactive for Hepatitis B, Hepatitis C (HCV), and Human Immunodeficiency Virus (HIV-1 and HIV-2). Because no known test method can offer complete assurance that infectious agents are absent, handle reagents and patient samples as if capable of transmitting infectious disease.[9]
- Sodium azide may react with lead and copper plumbing to form highly explosive metal azides. On disposal of liquids, flush with a large volume of water to prevent azide build-up.[10]
- Xi. Irritant: 0.25% ProClin 300.

R 43: May cause sensitization by skin contact.
S 28-37: After contact with skin, wash immediately with plenty of soap and water. Wear suitable gloves.

- The Material Safety Data Sheet (MSDS) is available upon request.

Procedure

Refer to the appropriate system manuals and/or Help system for information on calibration theory, configuring calibrators, calibrator test request entry, and reviewing calibration data.

Calibration Details

The Access HBs Ab Calibrators are provided at six levels – zero and approximately 10, 20, 50, 250 and 750 mIU/mL. Assay calibration data are valid up to 56 days.

Calibrators run in duplicate.

Refer to the appropriate system manuals and/or Help system for the minimum sample volume required.

Limitations of the Procedure

If there is evidence of microbial contamination or excessive turbidity in a reagent, discard the vial.

Access
Immunoassay Systems

HBs Ab QC
REF A24298

Intended Use

The Access HBs Ab QC is intended for monitoring system performance of the Access HBs Ab assay.

Summary and Explanation

Quality control materials simulate the characteristics of patient samples and are essential for monitoring the system performance of the Access HBs Ab immunoassay. In addition, they are an integral part of good laboratory practices.[12,17,18,19,20,21] When performing assays with Access reagents for HBs Ab, include quality control materials to validate the integrity of the assays. The assayed values should fall within the acceptable range if the test system is working properly.

Traceability

The measurand (analyte) in the Access HBs Ab QC is traceable to W.H.O. 1st International Reference Preparation for Anti-Hepatitis B Immunoglobulin (W1042, Lot no. 17-2-77). Traceability process is based on EN ISO 17511.

The assigned values were established using representative samples from this lot of QC and are specific to the assay methodologies of the Access reagents. Values assigned by other methodologies may be different. Such differences, if present, may be caused by inter-method bias.

Product Information

Access HBs Ab QC

Cat. No. A24298: 3.5 mL/vial, 3 vials each level

- Provided ready to use.
- Store upright and refrigerate at 2 to 10°C.
- Mix contents by gently inverting before use. Avoid bubble formation.
- Stable until the expiration date stated on the label when stored at 2 to 10°C.
- Vial is stable at 2 to 10°C for 90 days after initial use.
- Signs of possible deterioration are control values out of range.
- Refer to the QC value card for mean values and standard deviations (SD).

QC 1:	Human defibrinated plasma, < 0.1% sodium azide, 0.25% ProClin*** 300. Negative (non-reactive) for anti-HBs antibodies.
QC 2:	Human defibrinated plasma with human gamma globulins specific for HBs Ag, < 0.1% sodium azide, 0.25% ProClin 300. Positive (reactive) for anti-HBs antibodies at a concentration of approximately 60 mIU/mL.
QC Value Card:	1

Warnings and Precautions

- For *in vitro* diagnostic use.
- Patient samples and blood-derived products may be routinely processed with minimum risk using the procedure described. However, handle these products as potentially infectious according to universal precautions and good clinical laboratory practices, regardless of their origin, treatment, or prior certification. Use an appropriate disinfectant for decontamination. Store and dispose of these materials and their containers in accordance with local regulations and guidelines.

- Human source material used in the preparation of the reagent has been tested and found negative or non-reactive for Hepatitis B, Hepatitis C (HCV), and Human Immunodeficiency Virus (HIV-1 and HIV-2). Because no known test method can offer complete assurance that infectious agents are absent, handle reagents and patient samples as if capable of transmitting infectious disease.[9]
- Sodium azide may react with lead and copper plumbing to form highly explosive metal azides. On disposal of liquids, flush with a large volume of water to prevent azide build-up.[10]
- Xi. Irritant: 0.25% ProClin 300.

R 43: May cause sensitization by skin contact.

S 28-37: After contact with skin, wash immediately with plenty of soap and water. Wear suitable gloves.

- The Material Safety Data Sheet (MSDS) is available upon request.

Procedure

Determine the concentration of antibodies to HBs in the Access HBs Ab QC materials using the Access Immunoassay System in the same manner as a patient sample. Because samples can be processed at any time in a "random access" format rather than a "batch" format, quality control materials should be included in each 24-hour time period.[12] More frequent use of controls or the use of additional controls is left to the discretion of the user based on good laboratory practices or laboratory accreditation requirements and applicable laws. Refer to the appropriate system manuals and/or Help system for information on quality control theory, configuring controls, quality control sample test request entry, and reviewing quality control data.

Limitations of the Procedure

If there is evidence of microbial contamination or excessive turbidity in a reagent, discard the vial.

Expected Values

For the value assignment of the Access HBs Ab QC material, a number of samples, representative of the entire lot, are selected and assayed to provide a reliable estimate of the mean value. The mean values and standard deviations are listed on the QC value card. Variations, such as in technique, equipment, or reagents may result in values different from those listed. Therefore, each laboratory should establish its own mean values and standard deviations (SD).

References

1 Lavanchy, D. Hepatitis B virus epidemiology, disease burden, treatment, and current and emerging prevention and control measures. J Viral Hepat 2004 11:97-107.

2 Hollinger FB, Liang TJ, Hepatitis B Virus Knipe DM et al., eds Fields Virology, 4th ed. Philadelphia, Lippincott Williams & Wilkins, 2001:2971-3036.

3 Mahoney, FJ Update on diagnosis, management and prevention of hepatitis B virus infection, 1999 Clin Microbiol Rev 12:351-366.

4 Jouanolle H, Brissot P. Transmission des virus (de A à E) et prévention. Rev. Prat. 1990, 40: 1660-6.

5 Goudeau A., Dubois F. Le diagnostic étiologique d'une hépatite virale en 1987. Gastroenterol. Clin. Biol., 1987, 11:277-82.

6 Marcellin P, Degos F, Benhamou JP. Traitement des hépatites virales chroniques. In Actualités néphrologiques JeanHamburger , édité par Flammarion Médecine Sciences: 1991 301-318.

7 Degos F. Vaccinations contre les virus des hépatites A et B. Gastroenterol. Clin. Biol. 1990, 14: 521-3.

8 Workowski, KA, and Berman SM. Centers for Disease Control Sexually transmitted disease treatment guidelines. Morbidity and Mortality Weekly Report (MMWR) 2006, Vol 55:71-75.

9 HHS Publication, 4th ed., April 1999. Biosafety in Microbiological and Biomedical Laboratories. Available http://www.cdc.gov/od/ohs/biosfty/bmbl4/bmbl4toc.htm

10 DHHS (NIOSH) Publication No. 78-127, August 1976. Current Intelligence Bulletin 13 - Explosive Azide Hazard. Available http://www.cdc.gov/niosh.

11 Approved Guideline – Procedures for the Handling and Processing of Blood Specimens, H18-A3. 2004. Clinical and Laboratory Standards Institute.

12 Cembrowski GS, Carey RN. Laboratory quality management: QC⇌QA. ASCP Press, Chicago, IL, 1989.

13 World Health Organization. Hepatitis B vaccines. Weekly epidemiological record, 2004, 79(28): 255-63.

14 World Health Organization. Hepatitis B Guide. 2002. Available http://www.who.int/csr/disease/hepatitis/HepatitisB_whocdscsrlyo2002_2.pdf

15 Kricka L. Interferences in immunoassays – still a threat. Clin Chem 2000; 46: 1037–1038.

16 Bjerner J, et al. Immunometric assay interference: incidence and prevention. Clin Chem 2002; 48: 613–621.

17 Broome HE, Cembrowski GS, Kahn SN, Martin PL, Patrick CA. Implementation and use of a manual multi-rule quality control procedure. Lab Med 1985; 16: 533-537.

18 Westgard JO, Barry PL, Hunt MR, Groth T. A multi-rule Shewhart chart for quality control in clinical chemistry. Clin Chem 1981; 27: 493-501.

19 Koch DD, Oryall JJ, Quam EF, Feldbruegger DH, et al. Selection of medically useful QC procedures for individual tests done in a multitest analytical system. Clin Chem 1990; 36: 230-233.

20 Mugan K, Carlson IH, Westgard JO. Planning QC procedures for immunoassays. J Clin Immunoassay 1994; 17: 216-222.

21 Approved Guideline – Statistical Quality Control for Quantitative Measurement Procedures: Principles and Definitions, C24-A3. June 2006. Clinical and Laboratory Standards Institute.

Manufactured for:
Beckman Coulter, Inc.
250 S. Kraemer Blvd.
Brea, CA 92821 U.S.A.

EC REP
Beckman Coulter Ireland Inc.
Mervue Business Park,
Mervue, Galway,
Ireland 353 91 774068

Printed in U.S.A.
Made in France
Revised October 2011

CE 0459