Test Definition: HBAGQ

HBs Ag, Quantitative, S

Overview

Useful For

Monitoring of progression of chronic hepatitis B in individuals who are confirmed to be positive for hepatitis B surface antigen

Monitoring of response to antiviral therapy in individuals who have chronic hepatitis B but are negative for hepatitis B e antigen and positive for hepatitis B e antibody

Testing Algorithm

See Hepatitis B: Testing Algorithm for Screening, Diagnosis, and Management

Special Instructions

- Viral Hepatitis Serologic Profiles
- HBV Infection-Monitoring Before and After Liver Transplantation
- Hepatitis B: Testing Algorithm for Screening, Diagnosis, and Management

Highlights

This test measures the level of hepatitis B surface antigen in the serum of patients being monitored for progression of chronic hepatitis B and their response to antiviral therapy. Such measurement is especially useful in those individuals who have negative HBe antigen and positive HBe antibody results with relatively low hepatitis B viral DNA levels (eg, <2000 IU/mL) in serum.

Method Name

Chemiluminescent Enzyme Immunoassay

NY State Available

Yes

Specimen

Specimen Type

Serum

Ordering Guidance

This test should only be requested in individuals with chronic hepatitis B, confirmed positive hepatitis B surface (HBs) antigen, negative HBe antigen (HBe Ag), and positive HBe antibody (anti-HBe) results.

Additional Testing Requirements

Testing for hepatitis B virus (HBV) DNA (HBVQN / Hepatitis B Virus [HBV] DNA Detection and Quantification by Real-Time PCR, Serum) and core-related antigen (HBCRQ / Hepatitis B Virus Core-Related Antigen, Quantitative, Serum) levels in serum will be helpful in monitoring response to curative antiviral therapy for chronic hepatitis B.

Shipping Instructions

Ship specimen frozen on dry ice only. If shipment will be delayed for more than 24 hours, freeze serum at -20 to -80 degrees C (up to 60 days) until shipment on dry ice.

Necessary Information

Date of collection is required.

Specimen Required

Collection Container/Tube: Serum gel

Submission Container/Tube: Plastic vial

Specimen Volume: 2 mL

Collection Instructions:

1. Centrifuge blood collection tube per collection tube manufacturer's instructions (eg, centrifuge and aliquot within 2 hours of collection for BD Vacutainer tubes).

2. Transfer serum into aliquot tube.

Reject Due To

Gross hemolysis	Reject
Gross lipemia	Reject
Gross icterus	Reject

Specimen Minimum Volume

0.5 mL

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Serum	Frozen (preferred)	28 days	
	Refrigerated	14 days	
	Ambient	7 days	

Clinical & Interpretive

Clinical Information

Hepatitis B surface antigen (HBsAg) is the first serologic marker appearing in the serum or plasma at 6 to 16 weeks following exposure to hepatitis B virus (HBV). In acute infection, HBsAg usually disappears in 1 to 2 months after the onset of symptoms. Persistence of HBsAg for more than 6 months in duration indicates development of either a chronic carrier state or chronic HBV infection.

Production of HBsAg is modulated by the interplay between the virus and host immune response, and HBsAg level in serum is inversely correlated with the immune control of HBV: the higher the immune control, the lower the HBsAg level in the infected individual. Quantitative HBsAg level in serum or plasma reflects the amount and the transcriptional activity of covalently closed circular DNA (cccDNA) inside hepatocytes of individuals with chronic hepatitis B (CHB). Therefore, quantitative HBsAg provides information concerning disease activity over and above an estimation of viral replication. In general, together with HBV DNA in serum or plasma, quantification of HBsAg in the same specimen is useful in the diagnosis of the true inactive HBV carrier state and in monitoring the clinical response to pegylated-interferon (PegIFN) and/or nucleoside/nucleotide analog (NA) therapy for CHB.

Inactive HBV carrier state is often defined by persistently normal alanine aminotransferase levels and low HBV DNA level in serum or plasma (<2000 IU/mL) in an individual negative for hepatitis B e antigen (HBeAg) with no or minimal liver injury. These individuals can have very good prognosis without the need of antiviral therapy, despite having fluctuating levels of HBV DNA over time. Some patients have low HBV DNA levels at one time but viral and biochemical reactivation at a later time. The HBsAg levels in serum or plasma of inactive HBV carriers tend to change very slowly with time and remain at low levels (ie, <1000 IU/mL), serving as a useful adjunct to HBV DNA level to aid in the identification of these individuals.

Clinical studies have shown that the change of HBsAg level in serum or plasma during PegIFN therapy mimics the change of both intrahepatic cccDNA and intrahepatic HBsAg, suggesting that a decline of HBsAg level in serum or plasma is associated with the induction of an effective anti-HBV immune response for monitoring CHB patients treated with PegIFN. Since decline of HBsAg level in serum or plasma during PegIFN therapy is confined mainly to patients who achieve therapeutic response, monitoring of HBsAg levels help distinguish patients likely to achieve a response from those who will not. On-treatment, HBsAg levels at weeks 12 and 24 of PegIFN therapy have high negative predictive values for therapeutic response and are useful to serve as stopping rules for the non-responders.

Although HBV DNA remains the key molecular marker to monitor the response and adherence of NA treatment in CHB patients, monitoring of HBsAg level every 6 months can give an estimate on the duration of NA treatment needed to achieve HBsAg seroclearance. HBsAg levels may be useful to predict HBV reactivation or sustained response after cessation of NA therapy. Currently, HBsAg seroclearance is still the acceptable endpoint to stop NA in HBeAg-negative

patients.

Reference Values

<0.005

Interpretation

This assay quantifies hepatitis B surface antigen (HBsAg) in serum within the range of 0.005 to 150 IU/mL.

Result of <0.005 IU/mL indicates that HBsAg is present in the serum specimen at a level below 0.005 IU/mL (the lower limit of quantification of this assay).

Result of >150 IU/mL indicates that HBsAg is present in the serum specimen at a level above 150 IU/mL (the upper limit of quantification of this assay).

In untreated hepatitis B e antigen (HBeAg)-positive patients, HBsAg levels of >100,000 IU/ml are associated with high replicative HBsAg carrier (immune tolerance). In untreated, HBeAg-negative patients, HBsAg levels of <1000 IU/ml and hepatitis B virus DNA <2000 IU/ml in serum or plasma are associated with lower risk for hepatocellular carcinoma, while HBsAg levels of <100 IU/ml are associated with high rates of spontaneous HBsAg clearance.

Cautions

Given the complex kinetics of hepatitis B virus (HBV) replication in chronic hepatitis B, a single undetectable result of hepatitis B surface antigen (HBsAg) in the serum specimen of an HBV-infected individual receiving antiviral therapy does not indicate cure or the absence of this virus in this individual. Serial measurements of HBsAg and other tests, such as HBV DNA (HBVQN / Hepatitis B Virus [HBV] DNA Detection and Quantification by Real-Time PCR, Serum) would be helpful or necessary to determine the definitive infection status in such individuals.

Individuals, especially neonates and children, who recently received hepatitis B vaccination may have transient positive HBsAg test results because of the large dose of HBsAg used in the vaccine relative to the individual's body mass.

Performance characteristics have not been established for the following specimen characteristics:

-Grossly icteric (total bilirubin level of >20 mg/dL)

-Grossly lipemic (triolein level of >2000 mg/dL)

-Grossly hemolyzed (hemoglobin level of >98 mg/dL)

-Containing particulate matter

-Cadaveric specimens

Clinical Reference

1. Wong GLH, Chan HLY: Use of quantitative hepatitis B surface antigen with hepatitis B virus DNA in clinical practice. Clin Liver Dis. 2013 Feb;2(1):8-10. doi: 10.1002/cld.165

2. Tseng TC, Kao JH: Clinical utility of quantitative HBsAg in natural history and nucleos(t)ide analogue treatment of chronic hepatitis B: new trick of old dog. J Gastroenterol. 2013 Jan;48(1):13-21. doi: 10.1007/s00535-012-0668-y

3. Choi SJ, Park Y, Lee EY,et al: Performance evaluation of LUMIPULSE G 1200 autoimmunoanalyzer for the detection of serum hepatitis B virus markers. J Clin Lab Anal. 2013 May;27(3):204-206. doi: 10.1002/jcla.21584

4. Yang R, Song G, Guan W, Wang Q, Liu Y, Wei L: The Lumipulse G HBsAg-Quant assay for screening and quantification of the hepatitis B surface antigen. J Virol Methods. 2016 Feb;228:39-47

5. Cornberg M, Wong VWS, Locarnini S, Brunetto M, Janssen HLA, Chan HLY: The role of quantitative hepatitis B surface antigen revisited. J Hepatol. 2017 Feb;66(2):398-411. doi: 10.1016/j.jhep.2016.08.009

Performance

Method Description

Lumipulse G hepatitis B surface antigen (HBsAg Quant is an assay system, including a set of immunoassay reagents, for the quantitative detection of HBsAg in specimens based on chemiluminescent enzyme immunoassay technology using a 2-step sandwich immunoassay method. Specimen or HBsAg-Quant calibrator and sample treatment solution are added to the antibody-coated particle solution and mixed. HBsAg in specimens specifically binds to anti hepatitis B surface (anti-HBs) monoclonal antibodies on the particles, and antigen-antibody immunocomplexes are formed. The particles are washed and rinsed to remove unbound materials. Alkaline phosphatase (ALP)-labeled anti-HBs monoclonal antibodies specifically bind to HBsAg of the immunocomplexes formed. The particles are washed and rinsed to remove unbound materials. Substrate solution is added and mixed with the particles. AMDPPD (3-[2'-spiroadamantane]-4-methoxy-4-[3'-phosphoryloxy]phenyl-1,2-dioxetance disodium salt) contained in the substrate solution is dephosphorylated by the catalysis of ALP indirectly conjugated to particles. Luminescence (at a maximum wavelength of 477 nm) is generated by the cleavage reaction of dephosphorylated AMPPD. The luminescent signal reflects to the amount of HBsAg.(Package insert: Lumipulse G HBsAg-Quant, 2OQ04TE, ver. 2. Fujirebio Inc; 06/2015)

PDF Report

No

Specimen Retention Time

14 days

Performing Laboratory Location

Rochester

Fees & Codes

Test Classification

This test was developed, and its performance characteristics determined by Mayo Clinic in a manner consistent with CLIA requirements. This test has not been cleared or approved by the US Food and Drug Administration.

CPT Code Information

82397

LOINC® Information

Test ID	Test Order Name	Order LOINC Value
HBAGQ	HBs Ag, Quantitative, S	63557-3

Result ID	Reporting Name	LOINC®
HBSQ1	HBs Ag, Quantitative, S	63557-3