MAYO CLINIC LABORATORIES

Test Definition: HBAGQ

Hepatitis B Virus Surface Antigen, Quantitative, Serum

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

For information 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 (HB), confirmed positive HB surface antigen, negative HBe antigen, and positive HBe antibody 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) before shipment and then transport on dry ice.

Necessary Information

Collection date is required.

Specimen Required

Supplies: Sarstedt Aliquot Tube, 5 mL (T914)
Collection Container/Tube: Serum gel
Submission Container/Tube: Plastic vial
Specimen Volume: 2 mL Serum
Collection Instructions: Centrifuge and aliquot serum into a plastic vial.

Forms

If not ordering electronically, complete, print, and send 1 of the following:
-Gastroenterology and Hepatology Test Request (T728)
-Infectious Disease Serology Test Request (T916)

Specimen Minimum Volume

Serum: 0.5 mL

Reject Due To

Gross hemolysis	Reject
Gross lipemia	Reject
Gross icterus	Reject

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Serum	Frozen (preferred)	28 days	
	Ambient	7 days	
	Refrigerated	14 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 the HBsAg level in serum inversely correlates with the immune control of HBV: the higher the immune control, the lower the HbsAg level in the infected individual. Quantitative HbsAg levels in serum or plasma reflect the amount and transcriptional activity of covalently closed circular DNA (cccDNA) inside the 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.

The inactive HBV carrier state is often defined by persistently normal alanine aminotransferase levels and low HBV DNA levels 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 later. 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 the 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 patients who are HBeAg negative.

Reference Values

<0.005 IU/mL

Interpretation

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

A result of less than 0.005 IU/mL indicates that HBsAg is present in the serum specimen at a level below the lower limit of quantification of this assay.

A result of greater than 150 IU/mL indicates that HBsAg is present in the serum specimen at a level above the upper limit of quantification of this assay.

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

In rare cases, some individuals can develop antibodies to mouse or other animal antibodies (often referred to as human anti-mouse antibodies [HAMA] or heterophile antibodies), which may cause interference in some immunoassays. Caution should be used in interpretation of results, and the laboratory should be alerted if the result does not correlate with the clinical presentation.

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 HL. Use of quantitative hepatitis B surface antigen with hepatitis B virus DNA in clinical practice. Clin Liver Dis. 2013;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;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;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;228:39-47
5. Cornberg M, Wong VWS, Locarnini S, Brunetto M, Janssen HLA, Chan HL. The role of quantitative hepatitis B surface antigen revisited. J Hepatol. 2017;66(2):398-411. doi:10.1016/j.jhep.2016.08.009

Performance

Method Description

The Lumipulse G HBsAg-Quant assay includes a set of immunoassay reagents for the quantitative detection of hepatitis B surface antigen (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-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.(Unpublished Mayo method)

PDF Report

No

Day(s) Performed

Every other Tuesday

Report Available

1 to 7 days

Specimen Retention Time

14 days

Performing Laboratory Location

Mayo Clinic Laboratories - Rochester Superior Drive

Fees & Codes

Fees

- Authorized users can sign in to Test Prices for detailed fee information.
- Clients without access to Test Prices can contact Customer Service 24 hours a day, seven days a week.
- Prospective clients should contact their account representative. For assistance, contact Customer Service.

Test Classification

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

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Hepatitis B Virus Surface Antigen, Quantitative, Serum

CPT Code Information

87467

LOINC® Information

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

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