

Approaches in Hepatology
Hepatology Made Easy

Markers for HBV and their interpretation

- 1) HBs antigen: (s= surface): It is the principal marker for HBV infection. Its presence indicates current HBV infection.

عشان كده هو ال marker الأساسي والأولى للكشف عن الإصابة بعدوى فيروس ب

- HBsAg (Hepatitis B surface antigen): A "positive" or "reactive" HBsAg test result means that the person is infected with hepatitis B. This test can detect the actual presence of the hepatitis B virus (called the "surface antigen") in the blood.
- If a person tests "positive," then further testing is needed to determine if this is a new "acute" infection or a "chronic" hepatitis B infection. A positive HBsAg test result means that you are infected and can spread the hepatitis B virus to others through your blood.
- How to interpret that accurately?

ازای نترجم وجوده بشكل دقيق؟

- If it is positive before 6 months since the onset of HBV infection along with positive HBc antibody IgM, it indicates recent or acute HBV infection to be confirmed by high elevation of ALT (HBc Ab IgM appears before HBs Ag) (Value of ALT: non-invasive test indicating the presence of hepatitis).

↳ HBs antigen + HBc antibody IgM (first) + ↑↑↑ ALT »»»» acute HBV hepatitis.

- If it persists in the blood after 6 months since the onset of HBV infection along with Positive HBc antibody IgG, it indicates chronic infection which needs other markers like HBe antigen, ALT, PCR (viral load), necroinflammatory activity (biopsy or Fibroscan) to be evaluated for treatment according to current guidelines.

↳ HBs antigen ± HBe-antigen ± mild ↑ ALT ± positive PCR ± degree of fibrosis
»»»»»»» chronic HBV infection.

- Note: Positive HBs antigen is not enough to start treatment.

2) HBs antibody: anti-HBs or HBsAb (Hepatitis B surface antibody)

- A "positive" or "reactive" anti-HBs (or HBsAb) test result indicates that a person is protected against the hepatitis B virus. This protection can be the result of receiving the hepatitis B vaccine or successfully recovering from a past hepatitis B infection.
 - o A positive anti-HBs (or HBsAb) test result means you are "immune" and protected against the hepatitis B virus and cannot be infected. You are not infected and cannot spread hepatitis B to others.
- To interpret HBs antibody, Do HBc Ab IgG. The possibilities are:
 - ↳ Positive Anti-HBS Ab + Positive HBc Ab IgG >>>>> This means past infection (previous HBV infection) that was cleared from the blood by the effect of the immune system (no current HBV infection/ no treatment).
 - ↳ Positive Anti-HBS Ab + Negative HBc Ab IgG >>>>> This means that the patient was immunized by vaccine for HBV.
- In the case of previous Vaccination by vaccine for HBV, and after finishing the three doses (3 doses 0 & 1 & 6), The patient needs to do [HBs antibody titer] to evaluate the efficacy of vaccine.
 - If titer < 10----> needs 3 doses again of HBV vaccine.
 - Titer 10_100 ----> needs one additional dose.
 - Titer > 100---> perfect immunization but may need booster dose after 5 years.

3) HBc antibody: (c= core)

- A "positive" or "reactive" anti-HBc (or HBc Ab) test result indicates a past or current hepatitis B infection. It needs a concomitant test for HBs antigen in order to interpret it correctly.
- This test can only be fully understood by knowing the results of the first two tests (HBsAg and anti-HBs Ab).
- HBc Ab has two types:
 - IgM = recent infection less than 6 months.
 - IgG = chronic infection or past infection (previous infection) more than 6 months.

A) Positive HBc Ab IgM + Positive HBs Ag >>>> Acute hepatitis needs to evaluate liver enzymes test.

B) Positive HBc Ab IgM + Negative HBs Ag >>>> Window period.

وهي الفترة ما بعد ظهور HBc antibody IgM بصفته اول الدلالات ظهورا وحتى ظهور HBs antigen.

C) Positive HBc Ab IgG + Positive HBs Ag >>>> Chronic infection needs to request HBeAg, ALT, PCR, and fibroscan.

D) Positive HBc Ab IgG + Negative HBs Ag >>>> It needs to do HBs antibody.

↳ Positive HBs Ab >>>> This means the patient had a previous infection with HBV and the immune system has overcome the infection. Therefore, the patient is no longer infected with HBV and has no need for treatment.

4) HB e antigen (e = envelope): It is a marker that indicates infectivity and active replication of the virus. It is usually done after HBs antigen when it is proof positive. It is essential for decision about treatment in chronic HBV together with ALT, PCR, and necroinflammatory activity (biopsy or fibroscan).

هذا الانتيجين لا يتم طلبه الا فى حالات ال chronic HBV infection

So, patients with chronic HBV infection are classified according to HBe antigen status into:

- ❖ HBe antigen positive
- ❖ HBe antigen negative.

Also, it is essential to differentiate between phases of HBV infection.

هذا الانتيجين مهم جدا فى حالات الالتهاب المزمن او العدوى المزمنة لفيروس بى لانه مهم جدا لتحديد ما اذا كان المريض يحتاج لعلاج ام لا ايضا مع الانزيمات ALT و البى سي ار والفيبروسكان... كما ان وجوده يعنى ان المريض معدى للاخرين بشكل كبير الى جانب انه يدل على زيادة نشاط الفيروس داخل الكبد.

5) HBe antibody: It is a marker that indicates that the immune system partially attenuates active HBV infection leading to seroconversion of HBe antigen into HBe antibody, so the patient becomes less infective, also the viral replication becomes less active with less necroinflammatory activity in the liver tissue.

ده بنستخدمه ونطلبه لما نعطي المريض علاج و ايجابيته تعنى بداية الاستجابة الصحيحة للعلاج والزوال التدريجي لتكاثر الفيروس وتأثيره على خلايا الكبد

- ✓ **For Summary:** Different lab situations in HBV infection
- ↑↑↑ ALT + HBc AB IgM (positive) ± HBs Ag + high HBV DNA PCR = acute HBV hepatitis.
 - HBs Ag (positive) + HBc Ab IgG (positive) ± HBe antigen ± ↑ALT (> ULN) ± positive PCR ± necroinflammatory activity (F0→F4) ----->>>> chronic HBV infection in general.
 - HBc Ab IgM (positive) + HBs Ag (negative) -----> window period.
 - HBs Ag (positive) + ↑ ALT (> ULN) ± HBe Ag ± HBe Ag + PCR (>2000) ± necroinflammatory activity (≥ F2) -----> chronic active HBV hepatitis.
 - HBs Ag (positive) + HBe Ag (positive) + ↑ ALT (> ULN) + positive high PCR -----> Chronic active HBV with active replication. This phase is also called phase 2 of Chronic HBV (immune reactive HBe antigen positive). Recent name: HBe Ag positive chronic hepatitis.
 - HBs Ag (positive) + HBe Ag (positive) + persistent normal ALT + ↑↑↑ PCR + No or minimal necroinflammatory activity -----> chronic HBV immune tolerant phase. Recent name: HBe Ag positive chronic infection.
 - HBs Ag (positive) + HBe Ag (negative) + Persistent normal ALT + low PCR -----> Inactive carrier. Recent name: HBe Ag negative chronic infection.
 - HBs Ag (positive) + HBe Ag (negative) + ↑ALT (> ULN) -----> HBe Ag negative chronic hepatitis.
 - HBs Ag (negative) + HBe Ag (negative) + HBc Ab IgG (positive) + normal ALT + very low PCR → occult HBV infection.

والاخيره دى حاله نادره وخاصه جدا ولا تحتاج الى علاج ولكن الخطوره تاتى عند استعمال مثبطات مناعه مثل steroids &

immunosuppressive drugs & chemotherapeutic agents for malignancies.

- HBs Antibody (positive)+ HBc Ab IgG (positive) -----> immune after previous infection or past infection.
- HBs antibody (positive) + all other markers negative ----> immune due to previous vaccine.

Marker	HBeAg-positive infection	HBeAg-positive hepatitis	HBeAg-negative infection	HBeAg-negative hepatitis	Resolved infection
HBsAg	High	Intermediate	Low	Intermediate	Negative
HBeAg	Positive	Positive	Negative	Negative	Negative
HBV DNA	Very high	High	<2000-20 000 IU/ mL	>2000-20 000 IU/ mL	Undetectable
ALT	Normal	Increased	Normal	Increased	Normal
Risk for disease progression	Minimal	Yes	Minimal	Yes	None
Treatment	Monitor	NA/PFG-IFN	Monitor	NA/PFG-IFN	None ^a
LHBs			Low	High	
Anti-HBc	Low	High	Low	High	Positive
HBcrAg	Very high	High	Intermediate	Low	Undetectable
HBV RNA	Very high	High	High-intermediate	Intermediate-low	