



# ***MICROBIOLOGY PRACTICAL***

**GI BLOCK; 2019**

# Objectives:

1. Understand the use of viral serological studies for the diagnosis of hepatitis A , B & C infections.
2. To know measures to prevent hepatitis A & B infections.
3. To know the viral serological tests used to screen blood donors.
4. Risk of transmission of HBV

# Case 1

Mohammed Khan is a 20 year-old male who has recently arrived from India to work as a food handler in a restaurant in Riyadh. Three weeks after his arrival he was seen in A&E Dept. of KKUH because of repeated vomiting, abdominal pain and fever. On examination, his temperature was 38°C, his pulse rate 110/min and BP 120/80mmHg, he was jaundiced and had tenderness in the right upper quadrant of his abdomen.

# Case 1

Mohammed Khan is a 20 year-old male who has recently arrived from India to work as a food handler in a restaurant in Riyadh. Three weeks after his arrival he was seen in A&E Dept. of KKUH because of **repeated vomiting, abdominal pain and fever**. On examination, his temperature was **38°C**, his pulse rate 110/min and BP 120/80mmHg, he was **jaundiced** and had **tenderness in the right upper quadrant** of his abdomen.

# **QUESTIONS**

1. What are the possible causes for his presentation?
2. What investigations would you like to order for him? Explain how these investigations would help you.

<b>Test</b>	<b>How this investigation will help you?</b>
1. CBC & ESR	
2. Blood Film	
3. Liver function test	
4. Viral Hepatitis screening	
5. Blood Culture	

<b>Test</b>	<b>How this investigation will help you?</b>
1. CBC & ESR	Shows non-specific signs of infections or inflammation
2. Blood Film	To exclude malaria
3. Liver function test	To assess liver function
4. Viral Hepatitis Serology Panel	To exclude viral hepatitis
5. Blood Culture	To exclude typhoid fever

# *Investigation*

CBC		LFTs		
Hb	14.2 g/L	AST	1557 IU/L	(12~37)
WBCs	6100 mm <sup>3</sup>	ALT	1879 IU/L	(20~65)
Platelet	271 g/L	ALP	441 IU/L	(175~476)
ESR	4mm/h	Albn	42.3 g/L	(30-50)
Malaria Blood film	-ve.	Bilirubin	86 μmol/L	(3~17)
Blood culture is negative.				



**3. Based on these findings  
what is the most likely diagnosis?**

**4. What further investigations would  
you like to order?**

**5. The serologic results were as follows:**

TEST	RESULT
Anti-HAV-IgM	Positive
HBsAg	Negative
Anti-HCV	Negative
Anti-HEV IgM	Negative

**6. Based on the serologic results, what is the diagnosis?**

**7. Briefly outline the management of this patient.**

## **Case 2**

**Mohammed Abdullah is a 34 year old married Saudi male who has donated two units of blood at KKUH for a relative undergoing an operation. Two days later, the Blood Bank called him because of abnormal blood test results and advised him to see his physician.**

**On arrival to the blood bank, the doctor informed him that his blood is not suitable for transfusion because of the presence of infection.**

# QUESTIONS

1. What type of infectious agents can be transmitted through blood transfusion? (List 4 infections).

- The next day Mohammed came to see his general practitioner with a letter from the Blood Bank. The letter revealed the result shown below.

**What is your interpretation?**

Test	Result
HBsAg	Negative
Anti-HBc	Negative
Anti-HCV	Positive
HIV-Ag/Ab	Negative
Anti-HTLV	Negative

**What do you do next?**

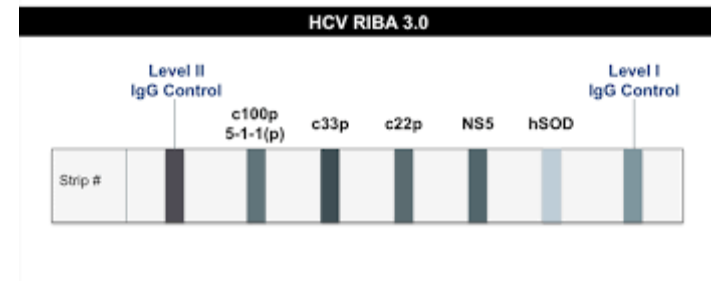
# How would you interpret the results ordered by the GP?

Lab. Test	Patient Result	Normal Range
ALT	49	20-65 IU
AST	29	12-37 IU
Bilirubin	4	3-17 mol/L
HIV~Ag/Ab	Negative	~
Anti~HCV	Positive	~
HBsAg	Negative	~
Anti~HBc	Negative	~
Anti~HBs	Negative	~

## 4. How do you diagnose HCV infection?

### Serological assay

- ◆ Screening for (Anti-HCV) by ELISA
- ◆ Confirmatory test by recombinant immunoblot assay (RIBA)  
Or Line Immunoassay INNO-LIA HCV



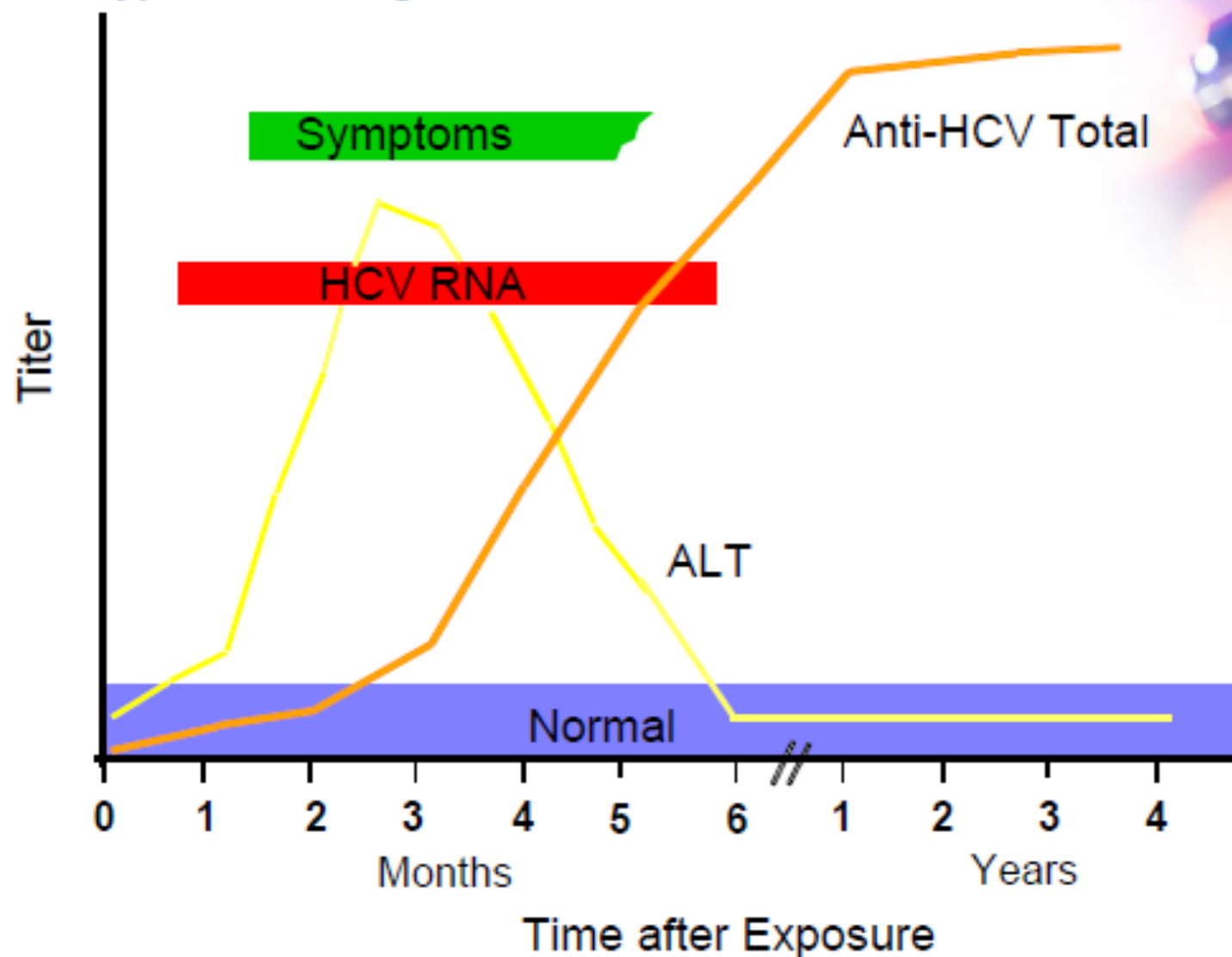
### Molecular assay





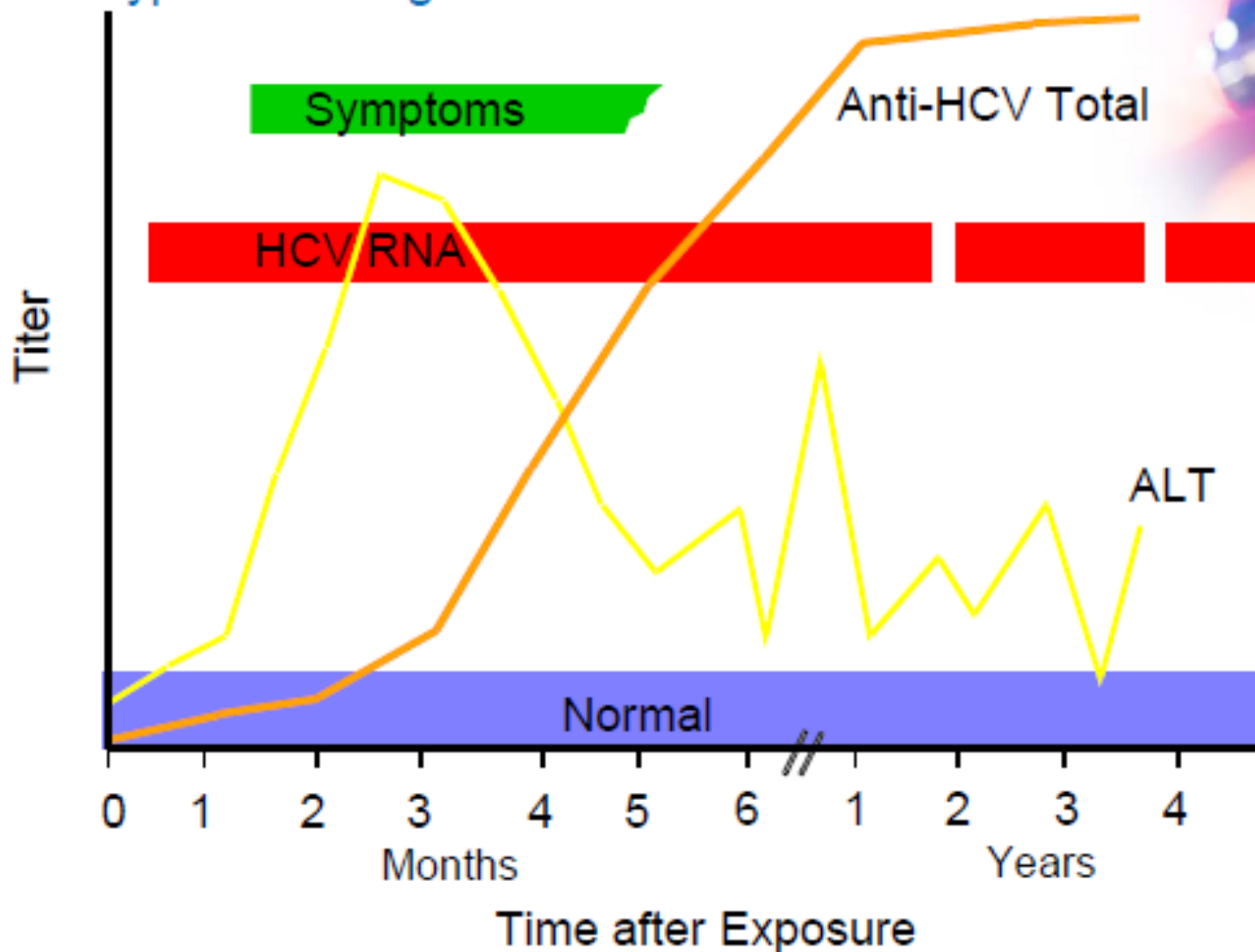
## Acute Hepatitis C with Recovery

Typical Serologic Course in 25% of Acute HCV



# Acute Hepatitis C with Progression to Chronic Infection

Typical Serologic Course in 75% of Acute HCV

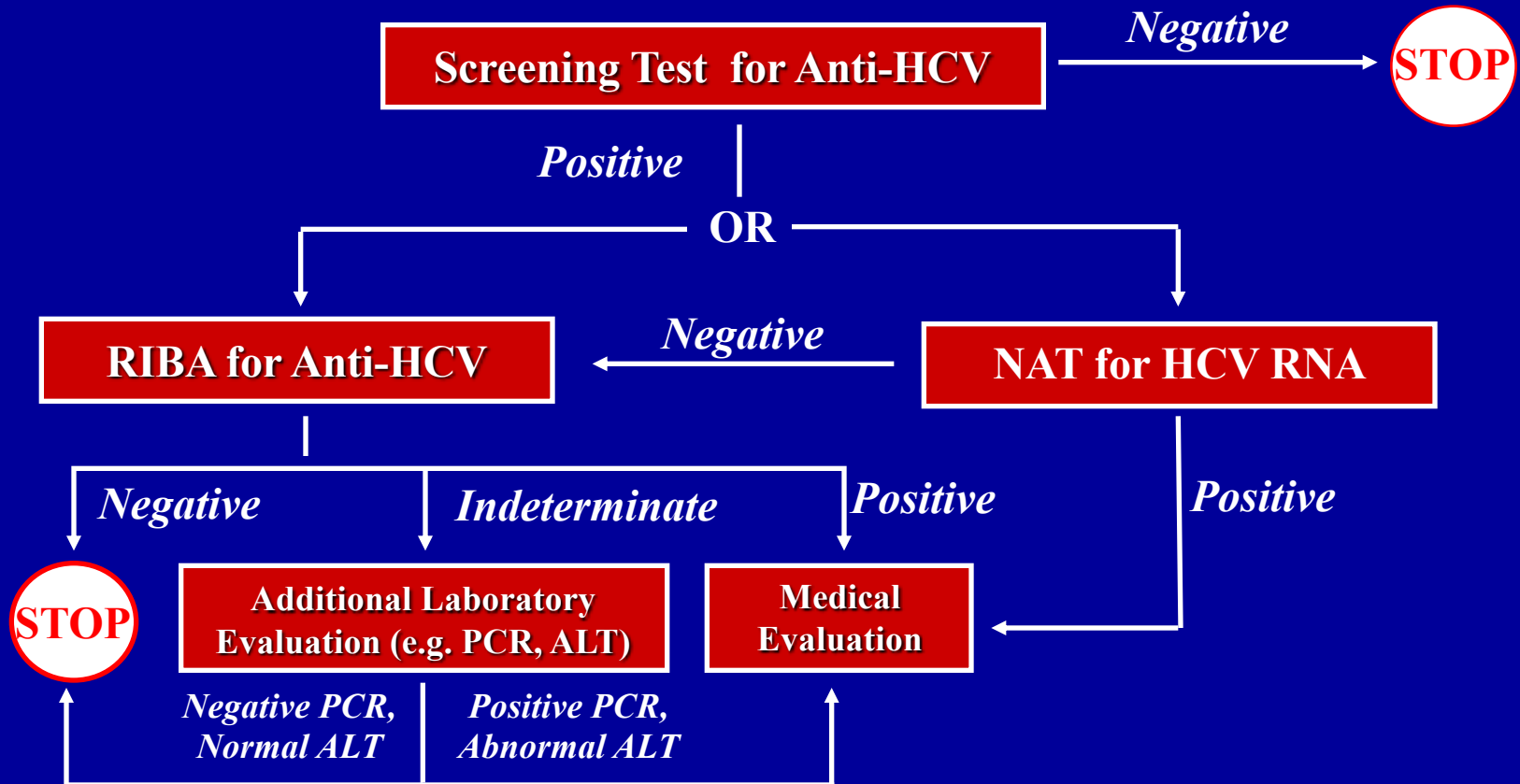


**The General practitioner arrange for him to see hepatologist who examine him and review his results. He further added PCR with genotype for Hepatitis C.**

**What is the significance of these tests & how they can help in the management:**

<b>Test</b>	<b>Significance</b>	<b>How it can help?</b>
<b>1. PCR</b>	<b>1~Qualitative: ~ or + (HCV~RNA)  2~Quantitative: viral load</b>	<b>1. Confirm the Dx  2. Monitor response to Rx</b>
<b>2. Genotype</b>	<b>Identify the genotype of HCV</b>	<b>Guide the choice &amp; duration of therapy.</b>

# HCV Infection Testing Algorithm for Diagnosis of Asymptomatic Persons



## **Case 3**

A 15-weeks pregnant Saudi woman was seen for the first time at the antenatal clinic at KKUH. As part of the antenatal screening, the doctor arranged for blood screening for viral serology.

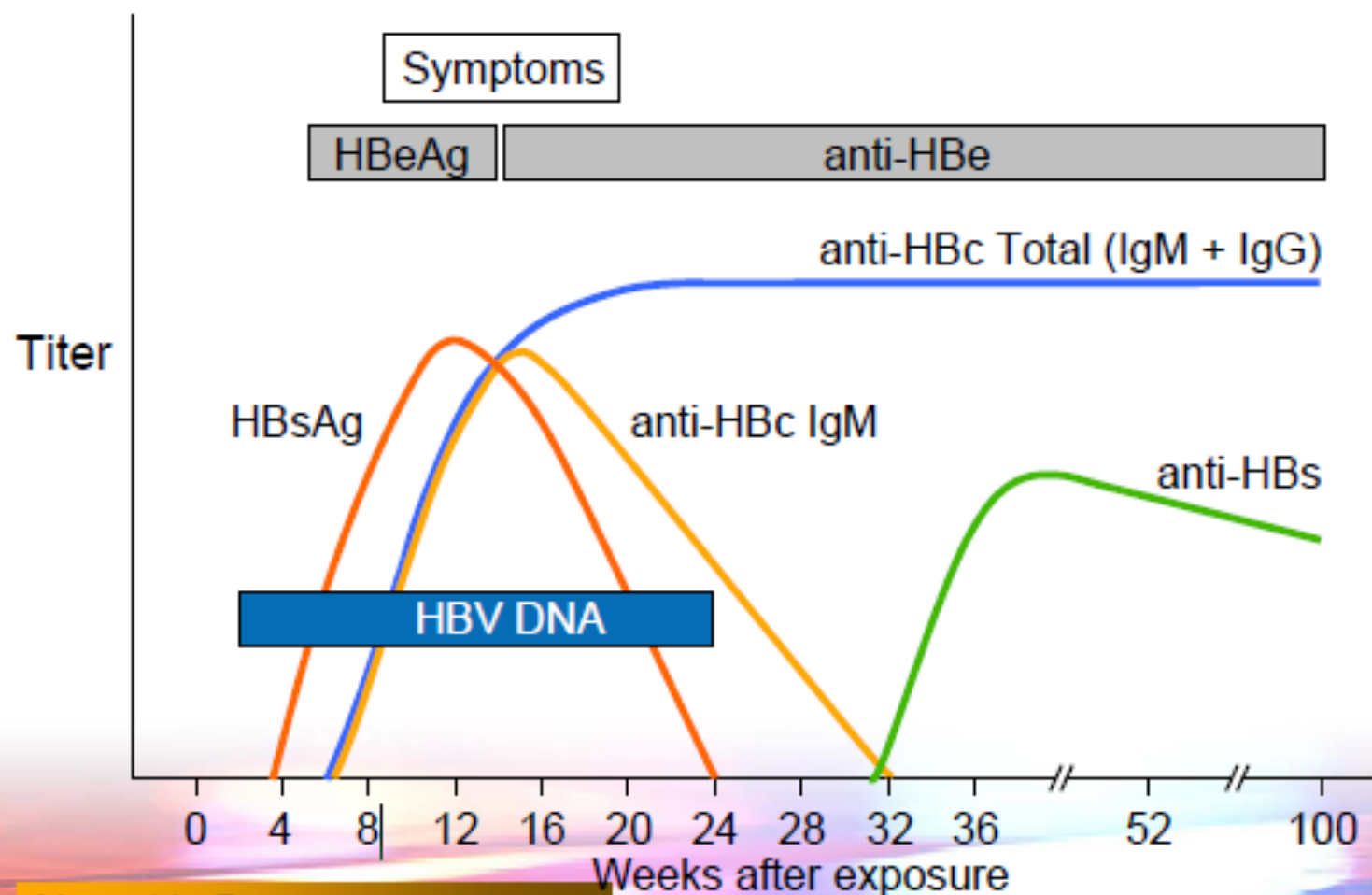
The results were as follows :

Test	Result
<b>HBsAg</b>	<b>positive</b>
<b>HBeAg</b>	<b>negative</b>
<b>Anti~HBe</b>	<b>positive</b>
<b>Anti~HBc IgM</b>	<b>negative</b>
<b>Total Anti~HBc</b>	<b>positive</b>
<b>HIV Ag/Ab</b>	<b>negative</b>
<b>Anti~HCV</b>	<b>negative</b>



# Acute HBV Infection with Recovery

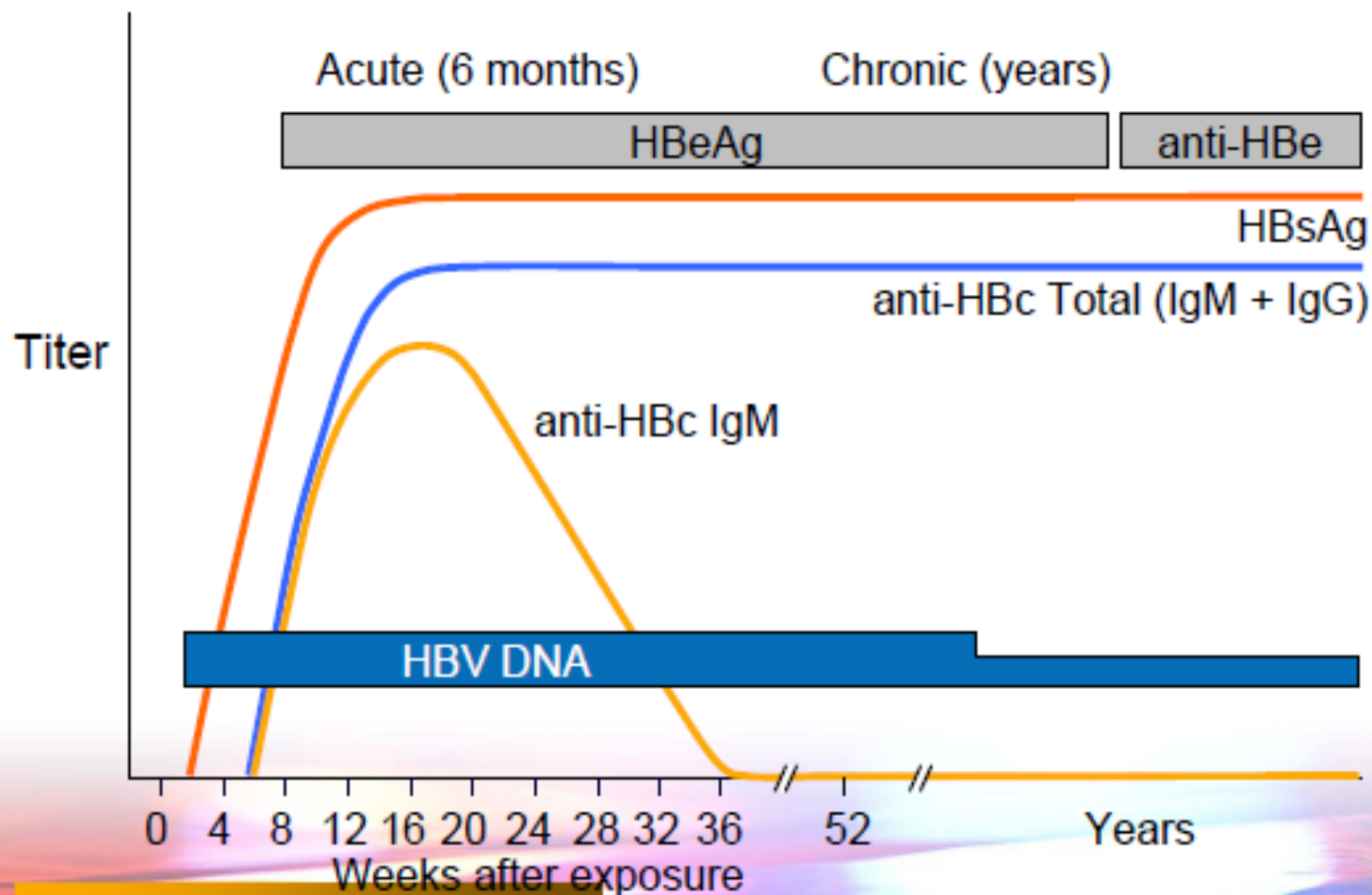
## Typical Serologic Course



Hepatitis B

# Progression to Chronic HBV Infection

## Typical Serologic Course



Hepatitis B


## Serologic Markers

HBs Ag+	Acute infection or chronic carrier
Anti-HBs Ab+ (qualitative, quantitative)	Recent or past infection, immunization
Anti-HBc IgM+	Acute infection
Anti-HBc Total+	Acute or past infection
HBe Ag+	Chronic carrier with viral replication
Anti-HBe Ab+	Chronic carrier without viral replication

1. How would you interpret these results?
2. On the lights of these Laboratory results how would you manage the newborn?

**3. Is there a risk of transmission of HBV to the newborn?**

### 3. Is there a risk of transmission of HBV to the newborn?

HBsAg (+) mother  10~20%  
HBeAg (-)

HBsAg (+) mother  90%  
HBeAg (+)

**4. What further management would you offer to the mother?**

➤ **Pregnant Hepatitis B carriers should be advised to**

- ~ Be seen at least annually by their regular medical doctor.
- ~ Obtain vaccination against hepatitis viruses A as indicated.
- Discuss the risk for transmission with their partner and need for testing.
- Not donate blood, body organs, other tissue.
- Not share any personal items that may have blood on them (e.g., toothbrushes ).



Today the mother was admitted in labour and you were among the staff involved in the delivery.

During a repair of the episiotomy, you accidentally prick your finger with a needle stained by the patient blood.

**What should you do?**

# 1. What should you do?

- ~ Report occupational exposures immediately.
- ~ The hepatitis B vaccination status and the vaccine-response status (if known) should be reviewed.
  - HBsAg
  - Anti-HBc
  - Anti-HBs

**TABLE 3. Recommended postexposure prophylaxis for exposure to hepatitis B virus**

Vaccination and antibody response status of exposed workers*	Treatment		
	Source HBsAg <sup>†</sup> positive	Source HBsAg <sup>†</sup> negative	Source unknown or not available for testing
<b>Unvaccinated</b>	HBIG <sup>‡</sup> x 1 and initiate HB vaccine series <sup>§</sup>	Initiate HB vaccine series	Initiate HB vaccine series
<b>Previously vaccinated</b>			
Known responder**	No treatment	No treatment	No treatment
Known nonresponder <sup>¶</sup>	HBIG x 1 and initiate revaccination or HBIG x 2 <sup>§</sup>	No treatment	If known high risk source, treat as if source were HBsAg positive
Antibody response unknown	Test exposed person for anti-HBs <sup>¶</sup> 1. If adequate,** no treatment is necessary 2. If inadequate, <sup>¶</sup> administer HBIG x 1 and vaccine booster	No treatment	Test exposed person for anti-HBs 1. If adequate, <sup>¶</sup> no treatment is necessary 2. If inadequate, <sup>¶</sup> administer vaccine booster and recheck titer in 1–2 months

\* Persons who have previously been infected with HBV are immune to reinfection and do not require postexposure prophylaxis.

<sup>†</sup> Hepatitis B surface antigen.

<sup>‡</sup> Hepatitis B immune globulin; dose is 0.06 mL/kg intramuscularly.

<sup>¶</sup> Hepatitis B vaccine.

\*\* A responder is a person with adequate levels of serum antibody to HBsAg (i.e., anti-HBs  $\geq 10$  mIU/mL).

<sup>¶</sup> A nonresponder is a person with inadequate response to vaccination (i.e., serum anti-HBs < 10 mIU/mL).

<sup>§</sup> The option of giving one dose of HBIG and reinitiating the vaccine series is preferred for nonresponders who have not completed a second 3-dose vaccine series. For persons who previously completed a second vaccine series but failed to respond, two doses of HBIG are preferred.

<sup>¶</sup> Antibody to HBsAg.

## 2. What is the risk of infection to you?

the risk of developing serologic evidence of HBV inf

if the blood (+) HBsAg

(+) HBeAg  37-62%

the risk of developing serologic evidence of HBV inf

if the blood (+) HBsAg

(-) HBeAg  23-37%

*Tests*

## RESULTS

## INTERPRETATION

**HBSAG**  
**ANTI-HBC**  
**ANTI-HBS**

NEGATIVE  
NEGATIVE  
NEGATIVE

**HBSAG**  
**ANTI-HBC**  
**ANTI-HBS**

**HBSAG**  
**ANTI-HBC**  
**ANTI-HBS**

**HBSAG**  
**ANTI-HBC**  
**IGM ANTI-HBC**  
**ANTI-HBS**

**HBSAG**  
**ANTI-HBC**  
**IGM ANTI-HBC**  
**ANTI-HBS**

**HBSAG**  
**ANTI-HBC**  
**ANTI-HBS**

<i>Tests</i>	RESULTS	INTERPRETATION
HBSAG ANTI-HBC ANTI-HBS	NEGATIVE NEGATIVE NEGATIVE	<b>SUSCEPTIBLE</b>
HBSAG ANTI-HBC ANTI-HBS	NEGATIVE POSITIVE POSITIVE	
HBSAG ANTI-HBC ANTI-HBS		
HBSAG ANTI-HBC IGM ANTI-HBC ANTI-HBS		
HBSAG ANTI-HBC IGM ANTI-HBC ANTI-HBS		
HBSAG ANTI-HBC ANTI-HBS		

<i>Tests</i>	RESULTS	INTERPRETATION
HBSAG ANTI-HBC ANTI-HBS	NEGATIVE NEGATIVE NEGATIVE	<b>SUSCEPTIBLE</b>
HBSAG ANTI-HBC ANTI-HBS	NEGATIVE POSITIVE POSITIVE	<b>IMMUNE DUE TO NATURAL INFECTION</b>
HBSAG ANTI-HBC ANTI-HBS	NEGATIVE NEGATIVE POSITIVE	
HBSAG ANTI-HBC IGM ANTI-HBC ANTI-HBS		
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HBSAG ANTI-HBC ANTI-HBS		

<i>Tests</i>	RESULTS	INTERPRETATION
HBSAG ANTI-HBC ANTI-HBS	NEGATIVE NEGATIVE NEGATIVE	<b>SUSCEPTIBLE</b>
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HBSAG ANTI-HBC ANTI-HBS	NEGATIVE NEGATIVE POSITIVE	<b>IMMUNE DUE TO HEPATITIS B VACCINATION</b>
HBSAG ANTI-HBC IGM ANTI-HBC ANTI-HBS	POSITIVE POSITIVE POSITIVE NEGATIVE	
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<i>Tests</i>	RESULTS	INTERPRETATION
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HBSAG ANTI-HBC IGM ANTI-HBC ANTI-HBS	POSITIVE POSITIVE POSITIVE NEGATIVE	<b>ACUTE HB</b>
HBSAG ANTI-HBC IGM ANTI-HBC ANTI-HBS	POSITIVE POSITIVE NEGATIVE NEGATIVE	
HBSAG ANTI-HBC ANTI-HBS		

<i>Tests</i>	RESULTS	INTERPRETATION
HBSAG ANTI-HBC ANTI-HBS	NEGATIVE NEGATIVE NEGATIVE	<b>SUSCEPTIBLE</b>
HBSAG ANTI-HBC ANTI-HBS	NEGATIVE POSITIVE POSITIVE	<b>IMMUNE TO HBV DUE TO NATURAL INFECTION</b>
HBSAG ANTI-HBC ANTI-HBS	NEGATIVE NEGATIVE POSITIVE	<b>IMMUNE DUE TO HEPATITIS B VACCINATION</b>
HBSAG ANTI-HBC IGM ANTI-HBC ANTI-HBS	POSITIVE POSITIVE POSITIVE NEGATIVE	<b>ACUTE HB</b>
HBSAG ANTI-HBC IGM ANTI-HBC ANTI-HBS	POSITIVE POSITIVE NEGATIVE NEGATIVE	<b>CHRONIC HB</b>
HBSAG ANTI-HBC ANTI-HBS	NEGATIVE POSITIVE NEGATIVE	

<i>Tests</i>	RESULTS	INTERPRETATION
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HBSAG ANTI-HBC ANTI-HBS	NEGATIVE POSITIVE POSITIVE	<b>IMMUNE DUE TO NATURAL INFECTION</b>
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HBSAG ANTI-HBC IGM ANTI-HBC ANTI-HBS	POSITIVE POSITIVE POSITIVE NEGATIVE	<b>ACUTE HB</b>
HBSAG ANTI-HBC IGM ANTI-HBC ANTI-HBS	POSITIVE POSITIVE NEGATIVE NEGATIVE	<b>CHRONIC HB</b>
HBSAG ANTI-HBC ANTI-HBS	NEGATIVE POSITIVE NEGATIVE	<b>FOUR INTERPRETATIONS POSSIBLE *</b>



1. May be recovering from acute HBV infection.
2. May be distantly immune and test not sensitive enough to detect very low level of anti-HBs in serum.
3. May be susceptible with a false positive anti-HBc.
4. May be undetectable level of HBsAg present in the serum and the person is actually a carrier.

- عن أبي هريره رضي الله عنه
- أن رسول الله صلي الله عليه وسلم قال:

{ كلمتان خفيفتان على اللسان , ثقيلتان في الميزان  
حبيبتان إلي الرحمن :

سبحان الله وبحمده ،

سبحان الله العظيم {

