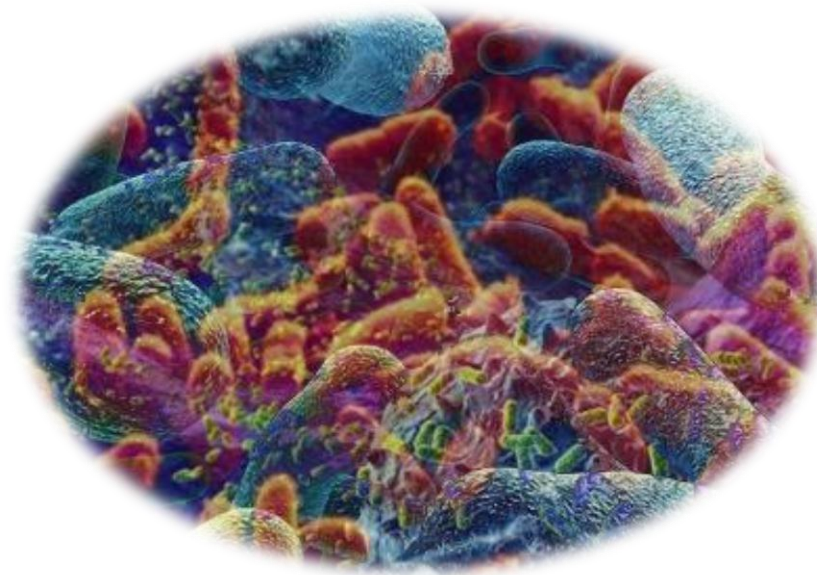


431  
*Microbiology Team*

**Practical (Hepatitis)**

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GIT & HAEMATOLOGY BLOCK



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## 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 KCUH 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.

**Q1: What are the possible causes for his presentation?**

- Viral hepatitis
- Acute Cholecystitis (*associated with fatty meal*).
- Malaria
- Leptospirosis (*Jaundice + Fever + Renal Failure*).
- Typhoid fever
- Hemolytic anemia

**Q2: What investigations would you like to order for him? Explain how these investigations would help you.**

Test	How this investigation will help you?
1. CBC & ESR	Shows non-specific signs of infections or inflammation
2. Blood Film for Malaria	To exclude malaria (thick blood film to detect the organism and thin blood film to specify the species)
3. Liver function test	To assess liver function
4. Viral Hepatitis screening	To exclude viral hepatitis
5. Blood Culture	To exclude typhoid fever

## Investigation results:

CBC	
Hb	14.2 g/L
WBCs	6100 mm <sup>3</sup>
Platelet	271 g/L
ESR	4mm/h
Malaria Blood film	-ve.
Blood culture	is negative.

### Interpretations of results

**normal** so we exclude hemolytic anemia.

**normal** so it is probably a viral infection not bacterial.

**normal**

**normal**

Blood film is **negative** so we exclude malaria.

Blood culture is **negative** so we exclude Typhoid fever.

LFTs (liver function test)	
AST	1557 IU/L (12-37)
ALT	1879 IU/L (20-65)
ALP	441 IU/L (175-476)
Albn	42.3 g/L (30-50)
Bilirubin	86 µmol/L (3-17)

### Interpretations of results

**very high**

**very high** "specific for liver damage"

**normal**

**normal**

**very high** "indicates jaundice"

### Q3: Based on these findings what is the most likely diagnosis?

Viral hepatitis A or B or C

### Q4: What further investigations would you like to order?

Hepatitis serology

✓ **Remember that:**

**hepatitis A** is diagnosed by detection of: **Anti-HAV IgM**

**hepatitis B** is diagnosed by detection of: **HBsAg & Anti-HBcore Ag IgM**

To confirm hepatitis B: **neutralization test**

**hepatitis C** is diagnosed by detection of: **antihepatitis C antibody**

To confirm hepatitis C: **Riba** (recombinant immunoblot assay)

## Serologic results:

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

### Interpretation of the results:

(it wasn't in the slides but the doctor said it so we can reach a diagnosis . Also, Dr.Malak said if we get a question to comment on the results it's important to comment on the negative and the positive findings like below)

1. Anti HAV IgM (antihepatitis A virus IgM) is **positive** so the patient has **Hepatitis A**
2. HBsAg (hepatitis B surface antigen) and Anti HCV (antihepatitis C virus) are **negative** so the patient doesn't have **hepatitis B or hepatitis C**.

### Q5: Based on the serologic results, what is the diagnosis?

Acute Hepatitis A

### Q6: Briefly outline the management of this patient.

Hepatitis A is self-limiting.

1. Supportive therapy (*but don't give Paracetamol*).
2. Stop working to not transmit the infection to anyone else.
3. Give vaccination to the people who came in contact with the patient.
4. Follow up clinical & laboratory (check for LFT, fever and jaundice).

## 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.

**Q1: What type of infectious agents can be transmitted through blood transfusion? (List 4 infections).**

1. Hepatitis B
2. Hepatitis C
3. Malaria
4. HIV
5. HTLV (human T-lymohotropic virus)

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

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

HBsAg: hepatitis B surface antigen - Anti HBc: antihepatitis B core

## Q2: What is your interpretation?

1. The patient is infected with hepatitis C
2. The patient is not infected with hepatitis A or B

## Q3: what do you do next?

1. Repeat the tests and serology (we repeat because the first test was done in the blood bank not by the practitioner)
2. Liver function tests

## Investigation results:

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	~

## Q4: How would you interpret the results ordered by the general practitioner?

1. Liver function tests are normal so the patient is **asymptomatic**
2. The patient is infected with hepatitis C
3. The patient is not infected with hepatitis A or B

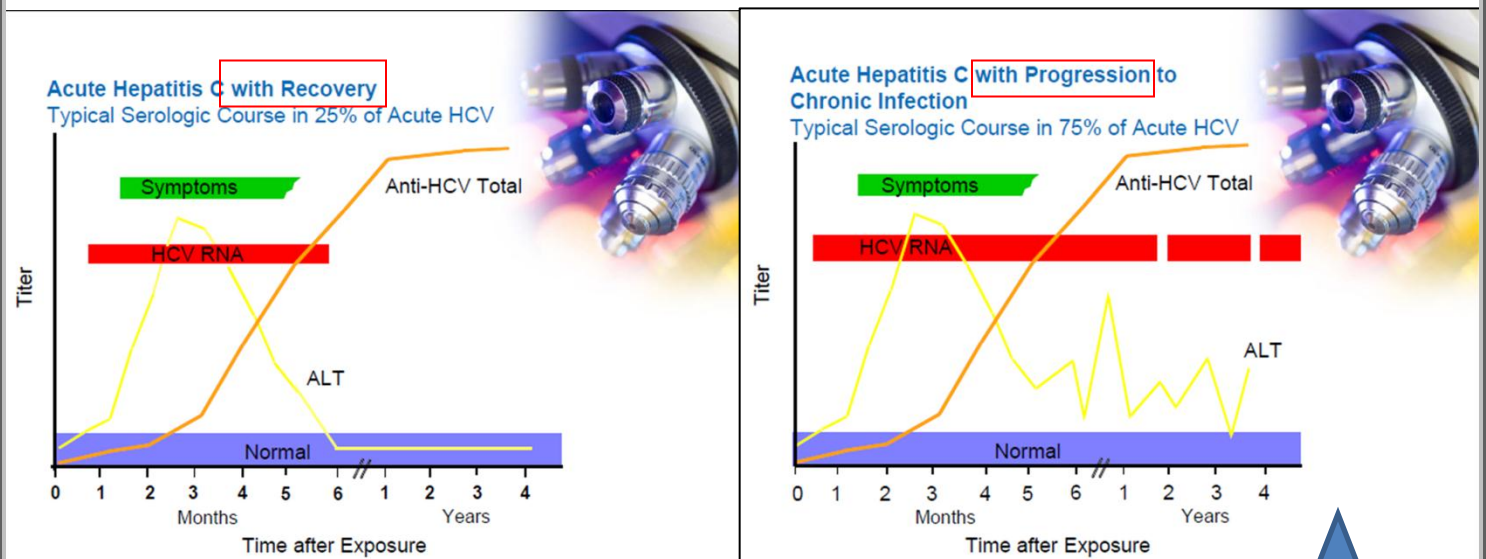
## Q5: How do you diagnose HCV infection?

### 1. Serological assay:

Diagnosed by detection of Anti HCV antibody by ELISA (may cause false positive results that's why **if we get positive we do the confirmatory RIBA**)

Confirmed by recombinant immunoblot assay (RIBA) (may cause false negative in case of immunocompromised patient or early acute hepatitis in this case we use **the molecular test such as PCR**)

### 2. Molecular assay (PCR to detect HCV RNA)



## Explanation:

### First Picture:

Anti HCV (the orange line) appears after 2 or 3 weeks that's why in early acute we use molecular assay (HCV RNA) (because it is the 1<sup>st</sup> marker appears in circulation)  
Later after 5 months after recovery HCV RNA disappears so we can use molecular test (PCR) to check for recovery but NOT serology because the antibodies will persist forever.

### Second picture:

We can see HCV RNA (the red line) is persisting because the patient is not recovering and the infection is progressing to chronic.

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.

**Q6: What is the significance of these tests & how they can help in the management?**

Test	Significance	How it can help?
1. PCR	1-Qualitative: ~ or + (HCV-RNA) 2-Quantitative: viral load	1. Confirm the Dx 2. Monitor response to Rx
2. Genotype (there are 6 genotypes of hepatitis C)	Identify the genotype of HCV	Guide the choice & duration of therapy. (genotype 2 & 3 respond better to therapy so the duration is less)



## CASE (3)

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

The results were as follows:

Test	Result
HBsAg (marker of hepatitis B infection)	positive
HBeAg (marker of hepatitis B replication if positive it means the patient is highly infectious)	negative
Anti-Hbe (marker of low infectivity)	positive
Anti-HBc IgM (mark of acute infection)	negative
Total Anti-HBc	positive
HIV Ag/Ab	negative
Anti-HCV	negative

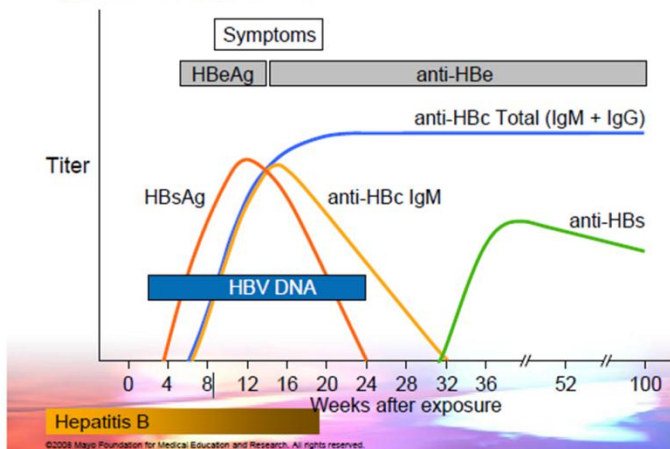
### Serologic Markers

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

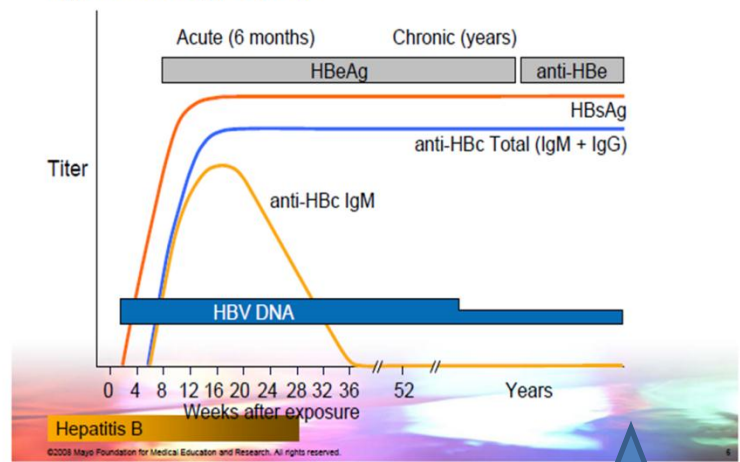
Hepatitis B

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### Acute HBV Infection with Recovery Typical Serologic Course



### Progression to Chronic HBV Infection Typical Serologic Course



### Explanation of serological markers:

#### First picture: (acute infection)

- HBsAg (which indicates presence of infection) is the first antigen to appear in the blood followed by HBeAg (which represents infectivity)
- First antibody to appear in the blood is anti-HBc IgM (which indicate acute infection) then anti-HBe (which indicate less infectivity)
- window period: is the period where there is absence HBsAg (red line) and before AntiHBs (green line)
- Anti HBs indicate immunity and anti-HBc Total indicates exposure.

#### Second picture: (chronic infection)

- HBsAg persists more than 6 months which means there is no resolution.
- It started as acute with the appearance of anti-HBc-IgM then in disappeared and continues as chronic.

### Q1: How would you interpret these results?

Chronic Hepatitis B infection with low infectivity. (Positive Anti HBeAg).

**Q2: On the lights of these Laboratory results how would you manage the newborn?**

1. antibody (immunoglobulin)
- 2.vaccine (recombinant hepatitis B antigen)

**Q3: Is there a risk of transmission of HBV to the newborn?**

- If the mother has positive HBsAg and negative HBeAg the the risk is 10-20%.
- If the mother has both positive (HBsAg and HBeAg) then the risk is 90%.

**Q4: What further management would you offer to the mother?**

Pregnant Hepatitis B carriers should be advised to:

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

Today the mother is admitted in labour and you were among the staff involved in the delivery. During a repair of the episiotomy, accidentally you prick your finger with a needle stained by the patient blood.

**Q1: What should you do?**

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

**Q2: What is the risk of infection to you?**

- If the blood has positive HBsAg and HBeAg then the risk is 37-62%.
- If the blood has positive HBsAg and negative HBeAg the risk is 23-37%.

To help with the schedule below:

- If HBSAG is positive then the patient is infected.
- If Anti HBS is positive the patient is immune.
- If Anti HBC is positive then the patient had exposure.
- If Anti HBC IGM is positive then the infection is acute.

<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	<b>IMMUNE DUE TO HEPATITIS B VACCINATION</b>
HBSAG ANTI-HBC IGM ANTI-HBC ANTI-HBS	POSITIVE POSITIVE POSITIVE NEGATIVE	<b>ACUTELY INFECTED</b>
HBSAG ANTI-HBC IGM ANTI-HBC ANTI-HBS	POSITIVE POSITIVE NEGATIVE NEGATIVE	<b>CHRONICALLY INFECTED</b>
HBSAG ANTI-HBC ANTI-HBS	NEGATIVE POSITIVE NEGATIVE	<b>FOUR INTERPRETATIONS POSSIBLE *</b>

The four interpretations are:

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.

**How to confirm HBV? : Neutralization assay, to rule out cross Reaction.**