



**THE**



**SYSTEM**

# Microbiology

Sheet

Slide

Handout

Number: **2**

Subject: **Hepatitis C, D and E**

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Price: .....

Last lecture we started talking about hepatitis A and B ,, today we will talk about hepatitis C,D and E.

This sheet was written according to record of section1 ,, let's start ☺

## **Hepatitis C**

1- Hepatitis c is an enveloped RNA virus.

2- Its 100% curable virus in which the patient can get rid of it completely if treated, 10years ago the chance of complete recovery of hepatitis c was about 40% according to the genome. But nowadays if you are infected by **hepatitis C** the treatment can cure you 100% .

### **Transmission of hepatitis c :**

The transmission of hepatitis c is just like the transmission of hepatitis B.

**It can be transmitted by :**

- 1- Sexual intercourse.
- 2- Needle injection and sharing needles with other people.
- 3- Tattoo.
- 4- Blood transfusion.

The cause of transmission is highly related to your location and in which country you are for example In the west : the most common causes of **hepatitis c** are:

1. injection of drugs
2. MSM.. men having sex with men .. same gender sex .
3. blood transfusion .

It was the last 1980 when they started to screen for hepatitis c So If a patient came to you and he had an accident in the 70s which resulted in injury that required a lot of blood transfusion so if he came complaining of hepatitis c this blood transfusion can be one of the causes.

At one stage in Egypt about 30% of the Egyptians population were infected by **hepatitis c**, the reason behind that was The mass vaccination .. as the doctors used the same needle to vaccinate more than one person ( about 400 person were injected by the same needle).

## course of the disease

Hepatitis c loves the liver, it goes to the liver and lives there .

Then it starts replicating and multiplying in the liver and then get released to different hepatocytes and infect them .

The virus can get to the blood and cause viremia .

**Note that** Hepatitis c doesn't cause fulminant hepatitis or severe hepatitis.

It rarely causes fulminant disease because the hepatitis c is a weak virus .

So If patient came to you with sever hepatitis, think about hepatitis A or B but **NOT C** because as we said the virus is weak.

## Natural history of the disease

Unlike hepatitis B in which only 5% of patients become chronic, 85% hepatitis c infections are chronic and only 15 %of the patients will resolve . This is due to the large immune response produced by the body against hepatitis B While hepatitis c the body doesn't fight it much well .

So again !! 85% of hepatitis c patients become chronic .

About 20% of them will develop **cirrhosis** which then might cause **Decompensation** OR **hepatocellular carcinoma**.

Please note that it needs 20-30 years to develop all these problems .

For instance a person has got hepatitis c now you don't have to treat him now you can wait for 1,2,3,4 years because these problems need very long time to take place .

Hepatitis B ... can cause hepatocellular carcinoma without cirrhosis . But in hepatitis c we must have cirrhosis to develop hepatocellular carcinoma ( hepatoma ... liver cancer ).

## What happens inside your body ?!

- 1- you start with acute infection.
- 2- then chronic and huge inflammation in the liver takes place.
- 3- liver repairs itself. The liver can to some extent repair itself properly.
- 4- however if you have ongoing insult (proto oncogenic and oncogenic structures) deposited in the liver all the time the repair will not be in terms of structure as it should be.
- 5- the patient will have fibrosis . This happens due to the secretion a lot of proteins like collagen and procollagen that leads to fibrosis then to Cirrhosis .

## The incubation period

About 20-60 weeks.

## Symptoms:

Hepatitis c is a weak virus ,, and most of the time the infection is asymptomatic and most patients don't even know that they have the disease.

However there might be non-specific symptoms : the most common symptom is fatigue and tiredness This is due to the ingoing inflammation in the liver ( the infection is chronic and for the rest of your life ) so the patient is tired all the time.

But when you get to the **end state** which is the **cirrhosis** all symptoms become the same Whether its caused by hepatitis c, hepatitis B, alcohol . fatty liver disease .

These symptoms include:

\* abnormal liver function \* jaundice \* lower limb edema \*itching \* tiredness .

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Other symptom of hepatitis c is extra-hepatic manifestation

*What is extra-hepatic manifestation?*

*It's a condition of the disease in which it involves not only the liver but the skin, kidney and even the nervous system .( this was not mentioned in the record .. I wrote this just to make things more clear )*

- Hepatitis c can cause **extra-hepatic manifestation** and its peculiar and specific to hepatitis c

This condition includes :

1- **Hematologic** : mixed cryoglobulinemia.

**Cryoglobulinemia** is a medical condition in which the blood contains large amounts of cryoglobulins-proteins (mostly immunoglobulins themselves) that become insoluble at reduced temperatures.

2- **Renal** : Glomerulonephritis.

3- **Dermatologic** that includes the following:

- Prophyria cutanea tarda.
- Cutaneous necrotizing vasculitis
- Lichen planus

These are all **immune mediated reactions** caused by hepatitis c.

As we said before the doctor can delay the treatment of hepatitis c infection BUT If this extra-hepatic manifestation occurred this is strong indication for treatment and you have to treat your patient now .

For Example if a patient came to you with normal liver enzymes , hepatitis c level is high , no evidence for any damage in the liver But he has (mixed cryoglobulinemia, Glomerulonephritis or any of the previous mentioned dermatologic problems ) you must push him for treatment .

## **Diagnosis**

- 1- very careful history
- 2- measure ALT and AST levels which could be elevated or normal in any hepatitis infection
- 3- serology ( the most important one ) You search for **anti- hepatitis C** ( antibodies against hepatitis c ) If it was detected ( +ve) then you search For the **viral RNA** .

Anti hepatitis c is +ve means one of the following :

- 1- you have the infection now.
- OR**
- 2- previously you had got the disease.

Then detect the presence of the viral RNA ( *you only measure if the RNA is present or not .. it has nothing to do with the level of RNA molecules*)

Now !! if :

- 1- **RNA is present** .....> the patient has the disease now.

- 2- **RNA is not present** .....> the patient has been infected previously and now he doesn't have the disease .

**There is No Vaccine for the hepatitis c .**

### **Treatment:**

Viruses have 2 types of proteins

- 1- Structural
- 2- Non-structural protein

These non-structural proteins are the most important proteins regarding anti-viral drugs.

All new viral drugs depend on these non- structural proteins .. in this way these drugs inhibit replication of the virus Such as **protease inhibitors** and thus inhibiting the viral replication .

The viral RNA load and level can be used to test your treatment.

To say you started the treatment by 2million RNA molecules after treatment it was undetectable then the treatment is working well . However if you started with 20,000 and ended up with 2 million then the treatment is not working .

### **Hepatitis D**

Hepatitis D Is an enveloped RNA virus.

It has very low prevalence however it can cause fulminant liver disease which is sever liver disease (sever hepatitis) .

The most important thing about it is that it is **DEFECTIVE VIRUS** In which it **can't survive by itself it needs the presence of hepatitis B to survive** ..

this is because hepatitis D can't produce its envelope, it needs the machinery of hepatitis B to create the envelope .

So you must have hepatitis B to get D . No one can have hepatitis D only without B .

The infection can be:

- 1- Co-infection ( both hepatitis B and D together )
- 2- Super-infection ( the patient already has hepatitis B then get infected by hepatitis D )

**1- co-infection ( together B and D)**: This disease is really bad because 2 viruses are affecting the liver together This is the **most common** among both cases. Usually the infection is **ACUTE infection** having B and D together.

And it often result in **fulminant infection** and **70%cirrhosis.**

Survivors rarely develop chronic infection (less than 5%).

**2- super infection** : In which you get infected with hepatitis B then you get infected with D. **It rarely occurs** . But it can happen at any time of infection with hepatitis B *as long as you have hepatitis B you can get hepatitis D*, it **usually results in chronic infection** about 80% of super infections are ***chronic***. Once you get hepatitis D there will be degeneration in liver function test and cirrhosis.

## **When do I suspect that the patient has super-infected by hepatitis D ?**

When I have stable hepatitis B patient and then **suddenly deteriorate** and get worse then you should think about Super-infection.

- **Transmission of the disease is just like B**
- **Incubation period same as hepatitis B or even shorter**

## **Protection**

related to hepatitis B if you protect against hepatitis B then you protected against hepatitis D because we can't have hepatitis D as mono infection.

## **Treatment**

Like hepatitis B if you get rid of hepatitis B then you can get rid of D.

In addition you can use interferon to treat hepatitis D.

## **Diagnosis**

- 1- measure hepatitis D antibodies ( anti hepatitis D ).
- 2- measure the viral load.
- 3- measure the increase in the level of ALT and AST.

## Hepatitis E

This virus is very similar to **hepatitis A** in terms of transmission as both are transmitted **FECAL- ORAL** transmission .

It is common in Farms and farmers and contaminated water.

The virus also can be found between pigs , cows , and kittles. So its mainly found in farms as we said this is why its commonly found in western world India and Asia . So, the infection is **zoonotic**.

The disease caused by hepatitis E is **self limiting disease** only if the female patient is not pregnant.

If the virus infected the female **during pregnancy it causes fulminant liver disease** .

The virus is very similar to hepatitis A but the disease is not as sever as hepatitis A .

This virus replicates in the liver.

Hepatitis E can cause :

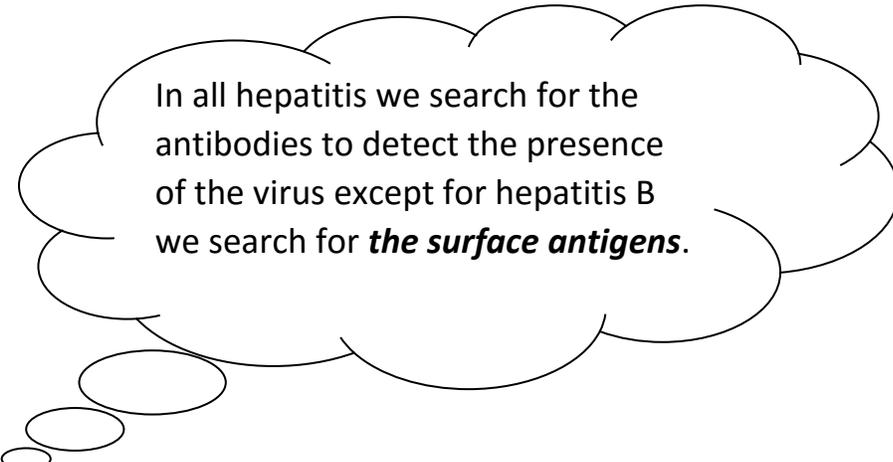
- 1- chronic infection.
- 2- neurological diseases like shrinkage of neurons .

If a patient came to you with weird neurological symptoms think about hepatitis E

## Detection

Search for IgM for hepatitis c ( anti E antibodies).

Then you can detect by the stool but we rarely do that .



In all hepatitis we search for the antibodies to detect the presence of the virus except for hepatitis B we search for ***the surface antigens***.

Please, refer to slides!!!

😊إنما أنت جزء من أسما العلوم في الأرض ... فابتسم

بالتوفيق

Sorry for any mistake.