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VIROLOGY

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Hepatitis B

الدكتور بدأ المحاضرة بمراجعة بسيط لأهم المعلومات في المحاضرة السابقة

Hepatitis (A&E) viruses are naked, transmitted by fecal-oral route & caused (mostly) acute disease.

- Hepatitis B has DNA genome
- It's from Hepadnaviridae family (hepa= hepat (liver), dna (DNA genome))
- It's the only virus from this family that can cause diseases in human
- This virus in enveloped yet it has high resistance to factors like heat,..etc, but changing pH can affect it a lot.
- This virus is simple virus with genome size of (3200 bp only!) yet it could affect over 250,000,000 people around the world.
- This virus has only 4 important (7 in total) proteins:

A. HBsAg (hepatitis B surface antigen):

- This protein searches for the (NTCP) receptor on hepatic cells then it binds to it
- There are genetic variations in the virus which results in length variations of HBsAg (S/L/M subtypes). (so we have 8 subtypes of the virus in total)
- This protein is the one that is in vaccines so, every vaccinated person has antibodies for it. However, the people who have been recovered from the virus also have antibodies for this protein, so based on serologic tests, how can you tell if the person is vaccinated or recovered?

B. C-proteins (core proteins "on the capsid")

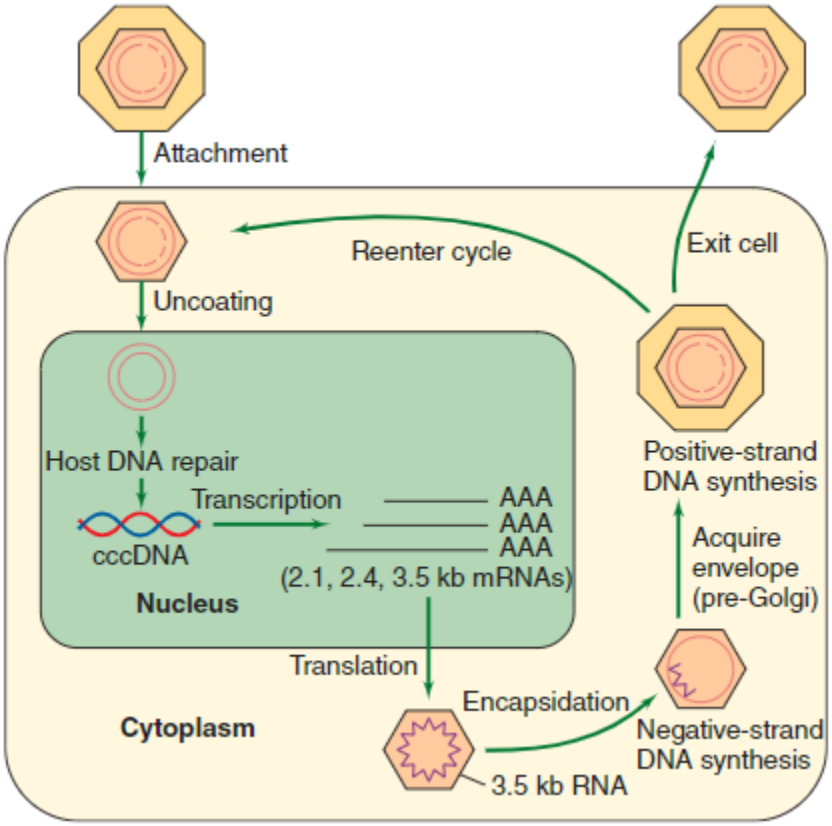
- If you found antibodies (IgG type) for this protein in the patient this will be evidence that this person has recovered from the virus and not just vaccinated.
- If the patient has this protein or the virus genome inside his body for over 6 months, you can tell that he has chronic disease.
- Sometimes, the virus produces a lot of this protein (excess production) as a decoy mechanism (distracts the immune system from the real viruses)

C. X-protein (regulator for transcription)

D. Polymerase protein (for the replication process)

Replication process (from the book)

The infectious virion attaches to cells and becomes uncoated. In the nucleus, the partially double-stranded viral genome is converted to covalently closed circular double-stranded DNA (cccDNA). The cccDNA serves as tem-plate for all viral transcripts, including a 3.5-kb pregenome RNA. The pregenome RNA becomes encapsidated with newly synthesized HBcAg. Within the cores, the viral polymerase synthesizes by reverse transcription a negative-strand DNA copy. The polymerase starts to synthesize the positive DNA strand, but the process is not completed. Cores bud from the pre-Golgi membranes, acquiring HBsAg-containing envelopes, and may exit the cell. Alternatively, cores may be reimported into the nucleus and initiate another round of replication in the same cell.



Routes of transmission for this virus:

1) Blood transmission
2) Needle stick injury
3) Sexual transmission
4) Drug abuse (sharing syringes during that)

The Doctor talks simply about the acute disease that could be done by it:

1) 10-12 days: we can detect low titer of virus by molecular techniques like PCR.
2) Few weeks to months: we can detect HBsAg accompanied by symptoms.
3) We can detect HBcAb (IgM type) “we can see it in the window period”

- then the patient may be completely recovered or go into chronic disease.
- The most determinant factor for developing chronic disease or not is “Age”
- Childs and infants have 90% chance to develop chronic disease.

- To prevent the disease? Vaccination is the most effective thing to do.
- To cure the disease? Tenofovir, lamivudine& there is cure in the form of episome, but it just controls the symptoms (doesn’t cure the disease)

You should know that hepatitis D virus can’t replicate or cause the disease without the presence of hepatitis B in the body.

(Watch sketchy video to link things together)

Hepatitis B – "Hep B Love"

1. HEp B hippy Hippo Van – Causes Hepatitis
2. Hippy dome "hippy pad" – Hepadnavirus family
3. Blue Hues – DS DNA Virus
4. Hippys in garb – Enveloped virus
5. Hippy's inside and outside of the dome - Replicates in the nucleus and outside of it "far out"
6. Circular stand of hippies and one area is not complete - Circular and partially double stranded DNA, and becomes fully double stranded during replication
7. Reverso transcriuptum book w/ fortune teller - Goes from SS DNA to SS RNA then to DS DNA, because it contains its own reverse transcriptase
8. Hippie w/ sex drugs and rick and roll sign - Spread via sex and drugs
9. Mother pushing baby w/ red shirt – vertical transmission when blood during child birth
10. Tiki Torches – Torch infection
11. Cookie sharing, baby w/ larger part - Hep B only about 5-10% develop into chronic infection in adults, newborns will be about 90-95% chance of development
12. Hippy lady w/ beads on a string - Most common disorders w/ rash and arthritis, and poly arteritis nodosa (beads on a string appearance)
13. Body covered with henna – rash, purpuric
14. Kneeling – arthralgia
15. Bead boxes shaped like kidneys – Kidneys are damaged by polyarteritis nodosa
16. 2 big knots on this string - Membranous, and membranoproliferative glomerulonephritis (3 strings "tram track" appearance)
17. Clinical picture – diagnose what stage its in
18. ALT Balloon – ALT is rising in acute HEP B infection
19. Baby w/ deflated ball – initial phase of HBV infection, serum ALT will be normal in neonates
20. Lines in rainbow represent titer levels during course of infection
    a. Species
    b. S = Hep B Surface antigen 1st one (leads to ground glass appearance)
    c. E = Hep B E antigen (has not been enough time to create antibodies) spikey things look like antigen hanging off of a virus
    d. Flat tire – these two above are during the symptomatic
    e. C on the window = Anti-HEP B Core antibody is positive in the window period,
    f. E = anti Hep B E antibody – means low infectivity
    g. S w/ blue curve wrapped around the syringe = Anti Hep B Surface antibody – indicates recovery – this is the value that is checked for immunization, and will be the only one that is positive
    h. Immunized people will be **not be positive** for HEP B Core, or HEP B E antibodies.
21. Magical tarot card table made of stone and card - Long term sequelle of long term infections – Liver cancer (hepatocellular carcinoma)
22. Children in orange, wearing flowy hippy garb, moon necklace, circular headband - HEP D (Circular RNA NEG, Enveloped) needs HEP B surface antigen to cause infection
23. Hippy mom adding hippy flair to children – need HEP B Sag to become infection
24. Holding hands – co infection
25. Kid on shoulders – Superinfection when Hep D is transmitted on top of existing hep B infection
26. Grimacing dad – Hep D (kid on shoulder) post infection has worse outcomes
27. Make peace (Lamb) not war (She elf) - Treatment – Lamivudine and NRTI's
28. Twisted hippy van antennae - Interferon Alpha can be used

Keys to hippy van - Ig w/ HEP B vaccine to neonates who are at risk

29. Ground glass appearance on histology

ملاحظة:

هذا الشيت تم تجميعه من ملاحظات الطلاب وليس من تسجيل للمحاضرة

(إذا وجدت خطأ أو معلومة ذكرها الدكتور في هذه المحاضرة وهي غير موجودة في الشيت فأرجو منك التواصل معنا لتعديل الشيت. ولك جزيل الشكر)

لا تنسونا من صالح دعائكم