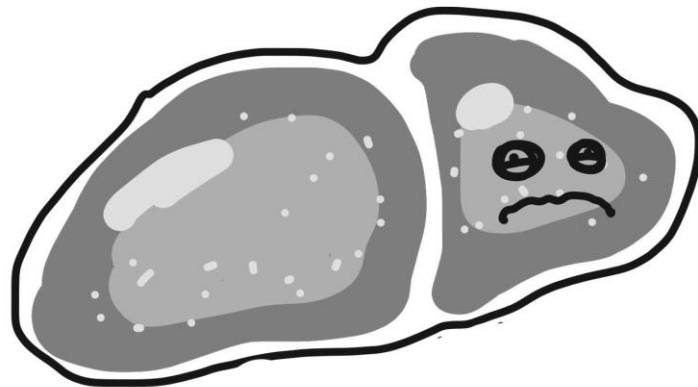
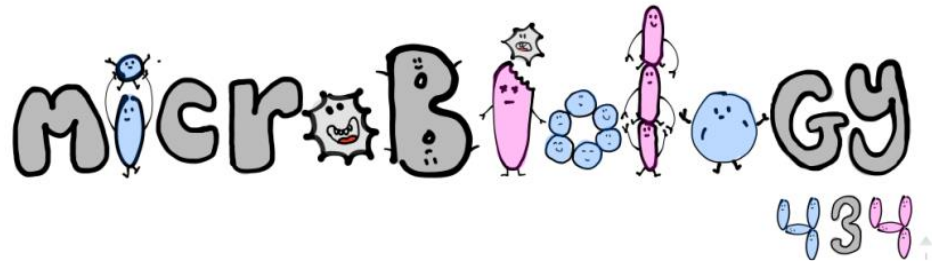


# Hepatitis A - E & other Fecal oral viruses



# Viral hepatitis

- As part of generalized infection (CMV, EBV, Yellow fever virus)
- Infects primarily the liver:

- ◆ Faecal-borne hepatitis (A & E):


- 1-HAV: *Picornaviridae*.
- 2-HEV: *Hepeviridae*



**A-Nonenveloped**

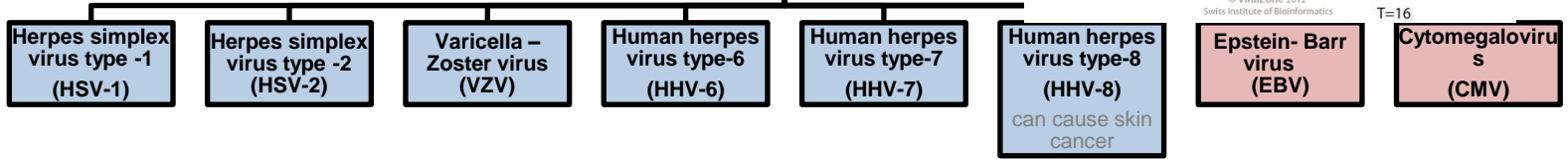
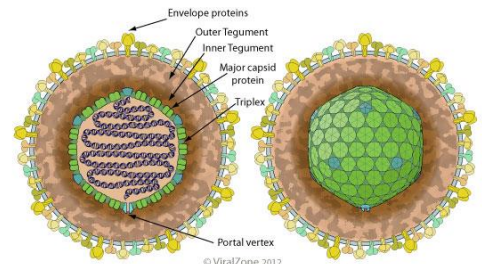
- B-Icosahedral
- C-ss, + sense RNA
- D-One serotype

- ◆ Blood-borne hepatitis (B, C & D)

	HAV (Hepatitis A)	HEV (Hepatitis E)
<b>Epidemiology</b>	A worldwide (epidemic), endemic in tropical countries.	Outbreak of waterborne & sporadic cases
<b>Transmission</b>	<ul style="list-style-type: none"> <li>➤ <b>Faecal-oral route</b> [major route] <ul style="list-style-type: none"> <li>○ <u>Contaminated food &amp; water</u></li> </ul> </li> <li>➤ Sexual contact (homosexual men)</li> <li>➤ Blood transfusion (v.rarely)</li> </ul>	<ul style="list-style-type: none"> <li>➤ <b>Waterborne*</b></li> <li>➤ Zoonotic foodborne (uncooked meat of infected animal).</li> <li>➤ Blood borne.</li> <li>➤ Perinatal</li> </ul>
<b>Age</b>	<ul style="list-style-type: none"> <li>❖ In developing countries; <b>Children*</b></li> <li>❖ In developed countries; Young adults</li> </ul>	Young adults
<b>Pathogenesis</b>	<p>CMI: cell mediated immunity [the cytotoxic T cells start to attack the liver that is infected by the virus so there will be disturbance in the liver enzymes and bilirubin will show in the blood]</p> <ul style="list-style-type: none"> <li>❖ Damage of virus-infected hepatocyte</li> <li>❖ ↑ <b>ALT, AST &amp; Bilirubin</b></li> </ul>	--
<b>Clinical features</b>	<ul style="list-style-type: none"> <li>❖ IP=2-6 Weeks.even after the incubation period the virus will replicate and shed in the stool</li> <li>❖ <b>Pre-icteric</b> [pre-characteristic ] <b>phase:</b> <ul style="list-style-type: none"> <li>1-fever            2-fatigue.</li> <li>3-Nausia        4-Vomitting.</li> <li>5-RUQP. Rt upper quadrant pain</li> </ul> </li> <li>❖ <b>Icteric</b> [characteristic ] <b>phase:</b> <ul style="list-style-type: none"> <li>1-dark urine. 2-pale stool.</li> <li>3-jaundice</li> </ul> </li> <li>❖ <b>Asymptomatic &amp; anicteric infection</b> ⇒ <u>common</u></li> <li>❖ <b>Symptomatic</b> illness ⇒ ↑ <b>Age.</b></li> </ul> 	Longer the HAV IP =4-8 Weeks.
<b>Lab diagnosis</b>	<p><b>Serology:</b></p> <p>Anti-HAV <b>IgM</b> ⇒ <b>Current infection.</b> [the best for diagnosis]</p> <p>Anti-HAV <b>IgG</b> ⇒ <b>1-Previous infection. 2-immunity.</b></p>	<b>ELISA</b> ⇒ Anti-HE <b>IgM.</b>
<b>Treatment</b>	Supportive therapy	Not specific
<b>Prevention</b>	<p>1-Sanitation &amp; hygiene measures.</p> <p>2-Hlg: [ Human Ig ]</p> <ul style="list-style-type: none"> <li>➤ Given before or within 2 Weeks of exposure</li> <li>➤ Indication: <b>A-travellers. B-Unvaccinated. C-exposed patients.</b></li> </ul> <p>3-Vaccine:</p> <ul style="list-style-type: none"> <li>➤ Inactivated</li> <li>➤ Given <b>IM</b> at [0,6-12 M]</li> <li>➤ &gt;1 Y of age</li> <li>➤ Side effect: Mild local reaction</li> <li>➤ Indication: <ul style="list-style-type: none"> <li>#Patients at high risk of <u>infection.</u></li> <li>#Patients at high risk of <u>severe diseases.</u></li> </ul> </li> <li>➤ <b>A combination vaccine (HAV &amp; HBV).</b></li> </ul>	<ul style="list-style-type: none"> <li>➤ <b>Sanitation &amp; hygiene measures.</b></li> <li>➤ No Ig.</li> <li>➤ <b>No vaccine.</b></li> </ul>
<b>Prognosis</b>	<p><b>Self-limited disease</b></p> <p>Fulminant hepatitis → Rare</p> <p>Mortality rate ~ 0.1 - 0.3%</p> <p>No chronicity or malignancy changes</p>	<ul style="list-style-type: none"> <li>○ Fulminant disease. [ more in HEV ]</li> <li>○ Mortality Rate: <ul style="list-style-type: none"> <li>▪ 10 times &gt; HAV. (1-3%).</li> <li>▪ 20% in pregnancy.</li> </ul> </li> </ul>

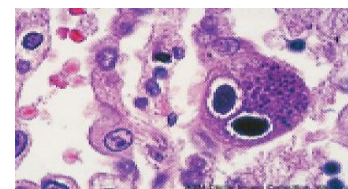
- dsDNA
- Icosahedral
- Enveloped

# Herpesviridae



Virus	Epstein – Barr Virus EBV	Cytomegalovirus CMV
<b>Characteristics</b>	It is lymphotropic. (Having an affinity for lymphocytes) It has <b>oncogenic properties</b> : <ul style="list-style-type: none"> <li>• <b>Burkett's lymphoma.</b></li> <li>• <b>Nasopharyngeal carcinoma.</b></li> </ul>	<ul style="list-style-type: none"> <li>▪ Infected cell <b>enlarged with Multinucleated.</b> [cyto=cell, megal=big]</li> <li>▪ Latent in <b>monocyte, lymphocyte.</b></li> </ul>
<b>Epidemiology</b>	<b>Distribution:</b> worldwide <b>Transmission:</b> Saliva [ <b>kissing disease</b> ] <b>Age:</b> Socio-economic status: Side Effects <ul style="list-style-type: none"> <li>▪ <b>Low Side Effects class</b> → early childhood [ by sharing cups and spoons * saliva* ]</li> <li>▪ <b>High Side Effects class</b> → adolescence</li> </ul>	<b>Distribution:</b> worldwide. <b>Transmission:</b> <ul style="list-style-type: none"> <li>▪ <b>Early in life:</b> Trans-placental, Birth canal, Breast milk.</li> <li>▪ <b>Young children: saliva</b></li> <li>▪ <b>Later in life:</b> sexual contact</li> <li>▪ Blood transfusion &amp; organ transplant.</li> </ul>
<b>Clinical features</b>	<u><b>1-Immunocompetent host</b></u> <ul style="list-style-type: none"> <li>❖ Asymptomatic</li> <li>❖ <b>Infectious mononucleosis [glandular fever]:</b> <ol style="list-style-type: none"> <li>1. Mainly in <b>teenagers &amp; young</b> adults</li> <li>2. <b>Incubation period</b> = 4-7 weeks</li> <li>3. Fever, pharyngitis, malaise, LymphAdenoPathy, hepatosplenomegaly &amp; abnormal LFT (Liver function test) ± hepatitis.</li> <li>4. <b>Complications :</b> (acute air way obstruction, splenic rupture, CNS infection)</li> </ol> </li> <li>❖ Chronic EBV infection</li> </ul> <u><b>2- Immunocompromised host:</b></u> Lympho-proliferative disease (LD)	<u><b>1. Acquired Infections:</b></u> <b>Immunocompetent host:</b> <ul style="list-style-type: none"> <li>• Asymptomatic</li> <li>• Self-limited illness <ul style="list-style-type: none"> <li>○ Hepatitis</li> <li>○ <b>Infectious mononucleosis like syndrome</b> [Heterophile AB is <b>-ve</b>]</li> </ul> </li> </ul> <b>Immunocompromised host</b> <ul style="list-style-type: none"> <li>➤ Encephalitis, Retinitis, Pneumonia,</li> <li>➤ <b>Hepatitis</b>, Esophagitis, Colitis</li> </ul> <u><b>2. Congenital Infections.</b></u>
<b>Investigations</b>	<b>Hematology:</b> ↑ WBC → lymphocytosis (Atypical lymphocytes) <b>Serology:</b> <ul style="list-style-type: none"> <li>▪ <b>Non-specific AB test:</b> Heterophile Abs +ve Paul-Bunnell or mono-spot test</li> <li>▪ <b>EBV-specific AB test:</b> IgM Abs to EBV capsid antigen.</li> </ul>	<b>Histology:</b> Intranuclear inclusion bodies [ <b>Owl's-eye</b> ] <b>Culture:</b> <ul style="list-style-type: none"> <li>➤ In human fibroblast 1-4 wks → CytoPathic Effect</li> <li>➤ Shell Vial Assay → 1-3 days</li> </ul> <b>Serology:</b> <ul style="list-style-type: none"> <li>➤ <b>Anti Bodyz :</b> <ol style="list-style-type: none"> <li>1. <b>IgM:</b> current inf</li> <li>2. <b>IgG:</b> previous exposure</li> </ol> </li> <li>➤ <b>Anti gene</b> → CMV <b>pp65</b> Ag by IFA</li> </ul> <b>PCR</b>
<b>Treatment</b>	Antiviral drug is not effective in IMN [ infective mononucleosis ] <ul style="list-style-type: none"> <li>▪ <b>Resistant to acyclovir.</b></li> </ul>	<b>Ganciclovir:</b> is effective in the treatment of severe inf. <b>Foscarnet:</b> the 2nd drug of choice. <b>Resistant to acyclovir.</b>
<b>Prevention</b>	No vaccine	<ul style="list-style-type: none"> <li>➤ <b>Screening;</b> Organ \ Blood donors, Organ recipients.</li> <li>➤ Leukocyte-depleted blood.</li> <li>➤ <b>Prophylaxis: Ganciclovir, CMVIG .</b></li> <li>➤ No vaccine.</li> </ul>

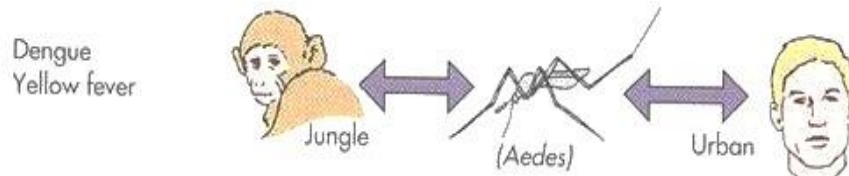
- they differentiate between EBV and CMV by the heterophile antibody and specific antibody
- heterophiles is **positive** in EBV but **negative** in CMV



Owl's eye

## Arthropod –borne Viruses (Arboviruses) - Yellow Fever virus

	<ul style="list-style-type: none"> <li>➤ Flaviviridae</li> <li>➤ <b>Asymptomatic to Jaundice + Fever ± hemorrhage ± renal failure</b></li> </ul>
Epidemiology	<b>Tropical Africa &amp; South America:</b> <ol style="list-style-type: none"> <li>1. <b>Jungle Yellow Fever</b></li> <li>2. <b>Urban Yellow Fever</b></li> </ol>
Illnesses	<p><b>Jungle Yellow Fever:</b> [zoonotic like HEV ]</p> <ul style="list-style-type: none"> <li>▪ <b>Vector:</b> mosquito</li> <li>▪ <b>Reservoir:</b> Monkey</li> <li>▪ <b>Accidental host:</b> human</li> <li>▪ It is a disease of <b>Monkeys</b></li> </ul> <p><b>Urban Yellow Fever:</b></p> <ul style="list-style-type: none"> <li>▪ <b>Vector:</b> mosquito</li> <li>▪ <b>Reservoir:</b> human</li> <li>▪ It is a disease of <b>humans</b></li> </ul>
Diagnosis	<ul style="list-style-type: none"> <li>➤ <b>Reference Lab</b></li> <li>➤ <b>Lab. Methods:</b> <ol style="list-style-type: none"> <li>A- Isolation</li> <li>B - <b>IgM</b> -AB* - ELISA, IF: (most used)</li> <li>C – YellowFever V- <b>RNA by RT-PCR</b></li> </ol> </li> </ul>
Prevention	<p><b>1-Vector Control:</b></p> <ul style="list-style-type: none"> <li>▪ Elimination of vector breeding sites</li> <li>▪ Using insecticides</li> <li>▪ Avoidance contact with vectors (repellants, net)</li> </ul> <p><b>2-Vaccines:</b> Yellow Fever vaccine (<b>Live Attenuated Vaccine</b> , one dose /10 yrs.)</p>



### MCQs:

1) which are Faecal-borne hepatitis ?

- a- A      b- C      c- A&B      D- A&E

2) icteric phase in Hepatitis A include :

- A- Fever      B- Nausea      c- Jaundice      D- fatigue

3) Previous infection with hepatitis A shows ..... in serology test.

- A- IgA      B- IgG      C- IgE      D- IgM

4) what is the major route of transmission in Hepatitis E?

- A- waterborne      B- fecal-oral route      C- bloodborne      D- zoonotic foodborne

5) which Hepatitis that have high mortality rate in pregnancy ?

- A- Hepatitis B      B- Hepatitis C      C- Hepatitis A      D- Hepatitis E

6) which virus has oncogenic properties?

- A- MCV      B- EBV      C- HIV      D- Arbovirus

7) what is the specific serology test for EBV ?

- A- IgG      B- IgE      C- IgM      D- IgA

8) what is the treatment for CMV ?

- A- Acyclovir      B- Ganciclovir      C- supportive therapy      D- None

9) Urban yellow fever is a disease of :

- A- Monkeys      B- Mosquitos      C- Humans      D- Sandfly

10) what is the only Hepatitis that we have a vaccine for?

- A- Hepatitis A      B- Hepatitis E      C- Hepatitis C      D- Hepatitis G

ANS: 1-D 2-C 3-B 4-A 5-D 6-B 7-C 8-B 9-C 10-A

Hello there.

My name is *Hepatitis A virus*.  
*Picornaviridae* is my family.

I'm pass to you through the mouth, in things like milk and seafood.

I also like poor hygiene and lots of people close together.

I love school camps.

I get into your liver.

I give you nausea, side pain, vomiting and fever.

You can vaccinate against me though.

Plus I don't hang around as long some of my cousins.



HEPATITIS A VIRUS

Hello, My name is *Hepatitis E Virus*.

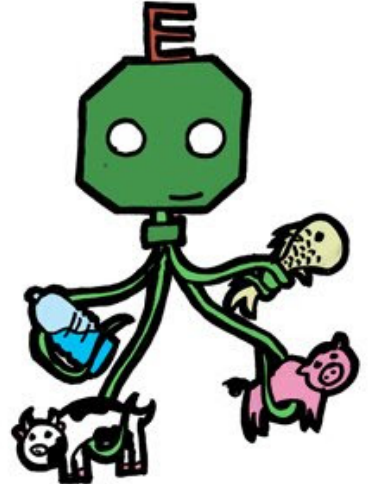
I am a *Hepevirus*.

I'm like cousin Hepatitis A.

I move around in your water.

I get into seafood, but I also hang out in farm animals like pigs and cows.

I'm most fond of places with unclean water.



HEPATITIS E VIRUS

Hello there, I'm *EBV*.

I'm a member of the *Herpesviridae* family.

I have double stranded DNA.

My disease is called infectious mononucleosis, mono, and glandular fever.

I cause sore throat and cough, fever, nausea and swollen lymph nodes.

You get very tired all the time.

In bad cases, I can swell up your liver or spleen, or infect your heart, lungs and brain.

Some cancers are more common after I visit.



EPSTEIN-BAR VIRUS

Hey, I'm *Yellow Fever Virus*.

I am from family *Flaviviridae*.

I am in Africa and South America.

I am an arborvirus.

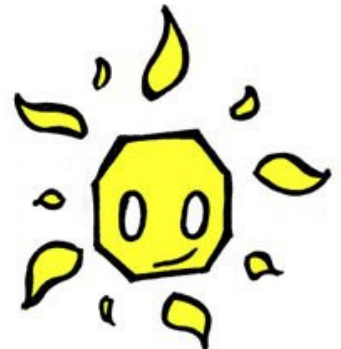
This means I am carried in mosquitoes and ticks.

I travel in their saliva.

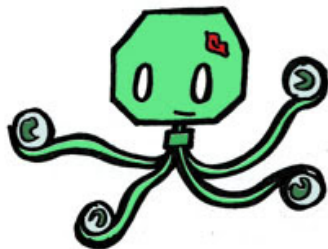
Like many of my arborvirus friends, I give you fever and haemorrhage.

Then headache and chills.

I make you yellow with jaundice.



YELLOW FEVER VIRUS



CYTOMEGALOVIRUS

Howdy.

My name is *CMV*.

*Herpesviridae* is my family.

My primary illness can look alot like my cousin *EBV* and sometimes we get confused for each other.

You may not even notice me at all.

I cause lots of problems in people with weak immune systems.

I have two different homes to grow in.

My urban life cycle hangs around houses.

My sylvatic cycle uses monkeys in the jungle.

Oh well, there is a vaccine against me.

حنان محمد عبدالمنعم  
مها الربيعة  
نجد العمران  
أشواق المطيري  
رشا بصاص

My primary illness in pregnant mothers stops babies from developing properly before they are born.