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RNA enveloped viruses

Arboviruses

They are transmitted by Arthropods.

Essentially, these viruses are transmitted by Mesquitoes and Ticks, which are blood-sucking vectors.

name of these viruses according to either:

- Disease they cause: e.g. yellow Fever v.
- Place they were first isolated: st. louis encephalitis v.

classified in to two Family:

- Togaviruses (ss+)
- Bunya viruses (ss−)

characterized by:

- Family subdivided into 4 genera on the base of size and antigenic relationship.

- Icosahedral nucleocapsid:
  - ss+ RNA enveloped

- Size:
  - 60-70 nm
  - Flavi virus
  - 52-45 nm
  - Pestivirus

- Rubi virus
- Alpha virus
Bunya viruses

- ss^- RNA
- segmented genome
- enveloped
- Transmission
  - helical nucleocapsid
  - life cycle is depending on ability of the v. to multiply in both vertebral host and blood sucking vector
  - effective transmission occurs when v. present in blood stream of vertebral host in high titer
  - So taken small volume of blood by insecting bite (by blood sucking vector) during ingestion
  - v. replicate in the gut of arthropod
  - spread to other organ include salivary gland
  - infective dose
  - human
Notice life cycle of

Extrinsic incubation period needed

Because

The virus replicated sufficiently in order to saliva of vector Contain enough v. to transmitted to infectious dose.

Other notice

Some of arbor v. transmitted by vertical passages (Transovarin)

From mother tick to her offspring

This very important to maintain survival of the v. if the vertebral 3 page host is unavailable

Notice : only ♀ of arthropod serve as vector because only ♀ require Blood meal For producing progeny
Human are involved in transmission of arboviruses by two different ways:

- As a dead-end host if:
  - Concentration of Virus in human: Very low (too low)
  - Duration of viraemia: Too brief

  For the next bit to transmit v.

  So not transmitted to other person

- As a reservoir of virus in some diseases:
  - E.g., yellow Fever, Dengue

  Because high concentration of virus in the blood

  High level viremia

  Resulting in produce disease

Human in yellow Fever may act as:

- Dead end host
- Act as reservoir when concentration of virus in Blood high

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Infection by arboviruses

Usually Does not cause disease either in arthropod vector in vertebral animal that serve as natural host

Disease occur primarily when virus infect Dead end host e.g. yellow Fever virus cycle is harmless among jungle monkey but when v. infect human yellow Fever occur
clinical Finding and epidemiol. of arbo v.

disease range in severity from
- mild
- rapidly Fatal

clinical picture fits one of 3 categories
- encephalitis
- hemorrhagic Fever
- fever with

Myalgia
Muscle pain(

arthrolgia
pain of Joint(

non hemorrhagic rash

Pathogenesis of disease
- Involve not only
  - Cytocidal
  - but in some immunopathic Compound Following recovery
    - ( immune complex )

immunity
- long life

yellow Fever virus

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**Yellow Fever Virus**

- Characterized by Jaundice and Fever

**Begins with**

- Sudden onset of Fever
- Headache
- Myalgia
- Photophobia

**Then involves**

- Liver
- Kidney
- Heart

**Threatening disease**

- Prostration (lack of energy and accompanied by)

- Gastrointestinal tract Hemorrhage

**Isolation of virus**

- Detection rise of Ab titer

**Treatment**

- No antiviral drug
- High mortality

**If patient recovery**

- No chronic infection
- Long life immunity

**Laboratory diagnosis (dx)**
There are two life cycles of yellow fever that exist in nature with different reservoirs and vectors.

- **Jungle yellow Fever**
  - Is a disease of monkeys.
  - Mosquitoes (species Treetop Hemagogus of Species Haemagogus) act as vectors.
  - Permanent reservoir: accidently infected mosquito.
  - Mosquitoes also act as vectors for humans.
  - Human are reservoir for virus replication.
  - For effective transmission, the virus must replicate in the mosquito during 12-14 days (extrinsic 1.p) after infection.
  - Once the virus infects the mosquito, it can remain in the mosquito for 3-6 days (intrinsic 1.p).

- **Urban yellow Fever**
  - Disease of human transmitted by mosquito (species. Agu
gupti).
  - Mosquitoes act as vectors for disease transmission.
  - Vaccine and mosquito control are effective preventive measures.
  - Vaccine provides 10-year protection.
  - Life attenuated vaccine is used for prevention.
Dengue virus

Disease classified under 2 categories

Classical Dengue
- Break born fever
  - Begin suddenly
  - With flu like syndrome include
    - Fever
    - Malaise
    - Cough
    - Headache

  Severe pain in Muscle
  and Joint (Break born) L.N

Leucopenia after 2 weeks
Symptom disappear but weakness persist

Is much more severe Disease with % 10 Fatal rate

Dengue Hemorrhagic fever
- Break born fever
  - Begin suddenly
  - With flu like syndrome include
    - Fever
    - Malaise
    - Cough
    - Headache

  Severe pain in Muscle
  and Joint (Break born) L.N

  Maculo popular rash

  Its rarely Fatal
  and has Few squealer

Hemorrhagic shock syndrome is due to
- Production large amount of cross reacting Ab at the same time of second dengue infection
- Disseminated intravascular clott

GIT

Skin
Dengue Hemorrhagic Fever

Transmission
- Transmitted by aegupti mosquito which also a vector of yellow Fever virus

- Human are reservoir to Dengue v. but Jungle cycle involving monkey as reservoir and other aedes spp. as vectors is suspected

- Human Mosquito aegupti to another human

Treatment
- no antiviral drugs
- no vaccine for Dengue

Control by
- Control mosquito life cycle by using insecticide and draining stagnant water
Pathogenesis of Dengue virus

Primary infection by one of 4 serotype of Dengue → Stimulate production of specific antibody to that serotype

Shock and Hemorrhage

Result

Causing increased vascular permeability and thrombocytopenia

Pathogenesis of Dengue virus

Re-infection with another serotype → Produce Anamnestic Heterotypic immune response

Larg amount of cross reacting Ab to the First serotype produce

Immune complex that activate complement