DENGUE VIRUS

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CONTENTS

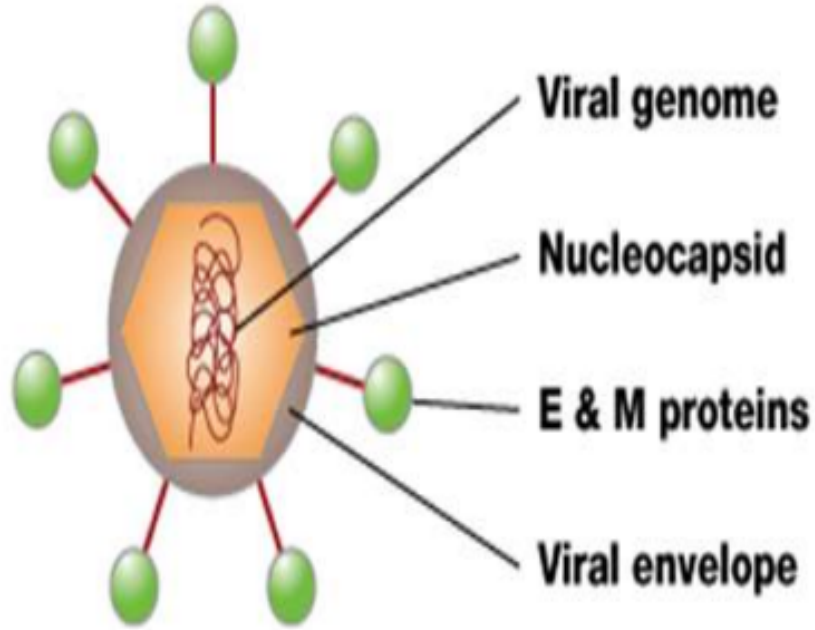
INTRODUCTION

- Dengue virus: a single-stranded RNA virus belonging to the genus Flavivirus.
- It consists of four closely related serotypes (DEN 1-4) classified according to biological and immunological criteria.
- The mature dengue virion consists of a single-stranded RNA genome surrounded by an icosahedral or isometric nucleocapsid.
- This nucleocapsid is covered by a lipid envelope

MORPHOLOGY

- Complete virion is about 50 nm in diameter and the viral genome is approximately 11 kb in length.
- Envelope proteins carries out biological functions of the virus—

1) transport of the viral genome into the host cell.
2) Haemagglutination of erythrocytes Nucleocapsid
3) induction of neutralizing antibodies
4) protective immune responses.



- Seven nonstructural (NS1, NS2a, NS2b, NS3, NS4a, NS4b, and NS5)
- proteins are involved in the pathogenesis of severe
- disease.

NS1 is involved in viral RNA replication.

It gets expressed on the surface of infected cells, without

- forming part

of the virion.

- Levels of secreted NS1 (sNS1) in plasma positively

correlate with viral titers.

The higher levels of NS1 in secondary dengue might imply an

important role for NS1 in the formation of circulating immune

complexes in causing severe dengue.

CLINICAL FEATURES

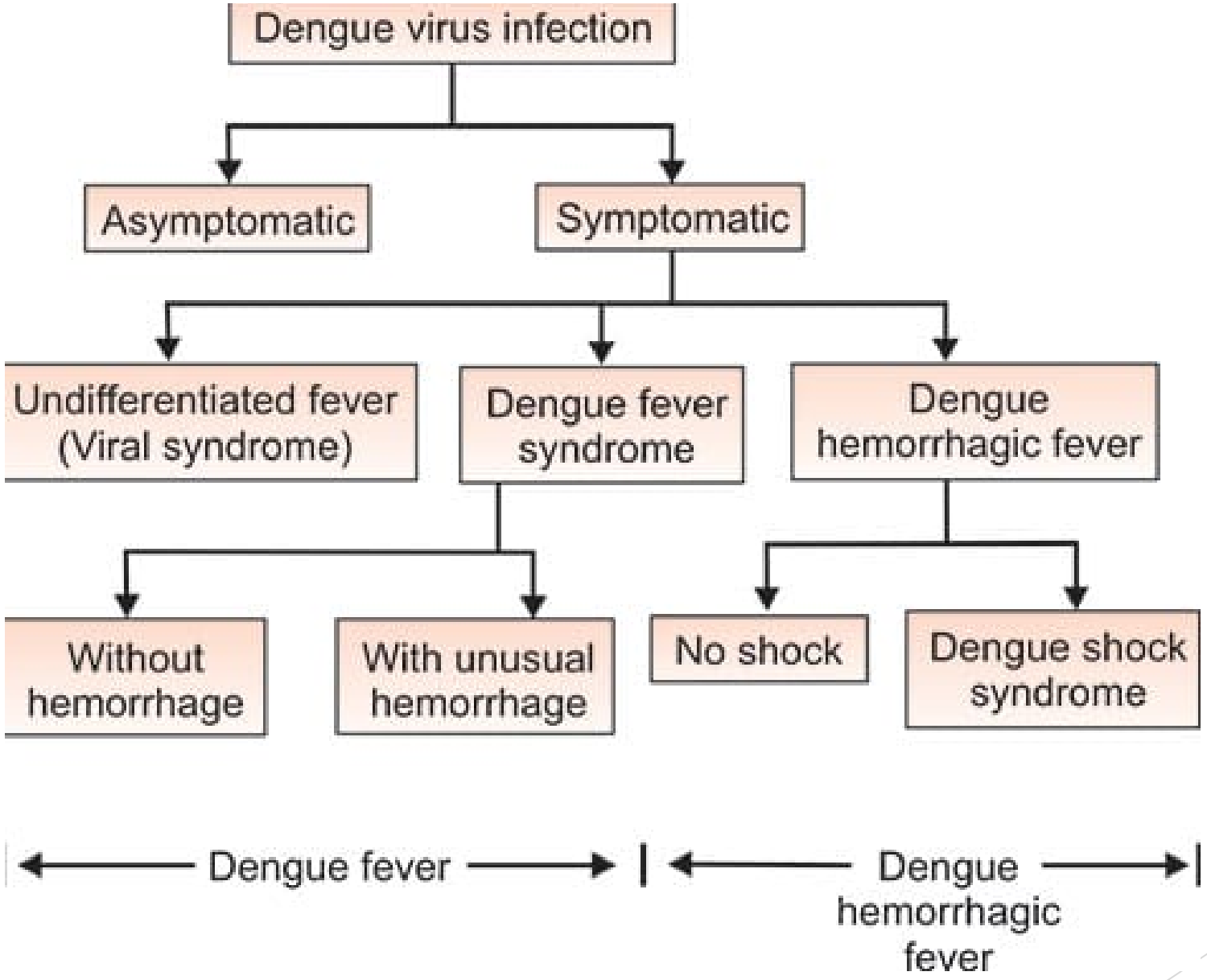
Clinical findings Dengue manifests after an incubation period of 3-14 days.

a) Febrile phase Patients typically develop a high-grade fever of sudden onset with headache, retrobulbar pain, photophobia, accompanied by facial flushing, skin erythema and pain in the back and limbs (break-bone fever), lymphadenopathy and maculopapular rash. The fever is typically biphasic (saddleback) (Clinical case).This acute febrile phase usually lasts 2-7 days and is often characterised by generalised body ache, myalgia,arthralgia, rubeliform exanthema and headache.

Critical phase Patients become worse around the time of defervescence, when the temperature drops to 37.5-38°C or less and remains below this level,usually on days 3-8 of illness. Progressive leukopenia followed by a rapid decrease in platelet count usually precedes plasma leakage. An increasing hematocrit above the baseline may be one of the earliest additional signs. Complications with hemorrhagic manifestations(dengue hemorrhagic fever) or with shock (dengue shock syndrome) can occur in persons who have

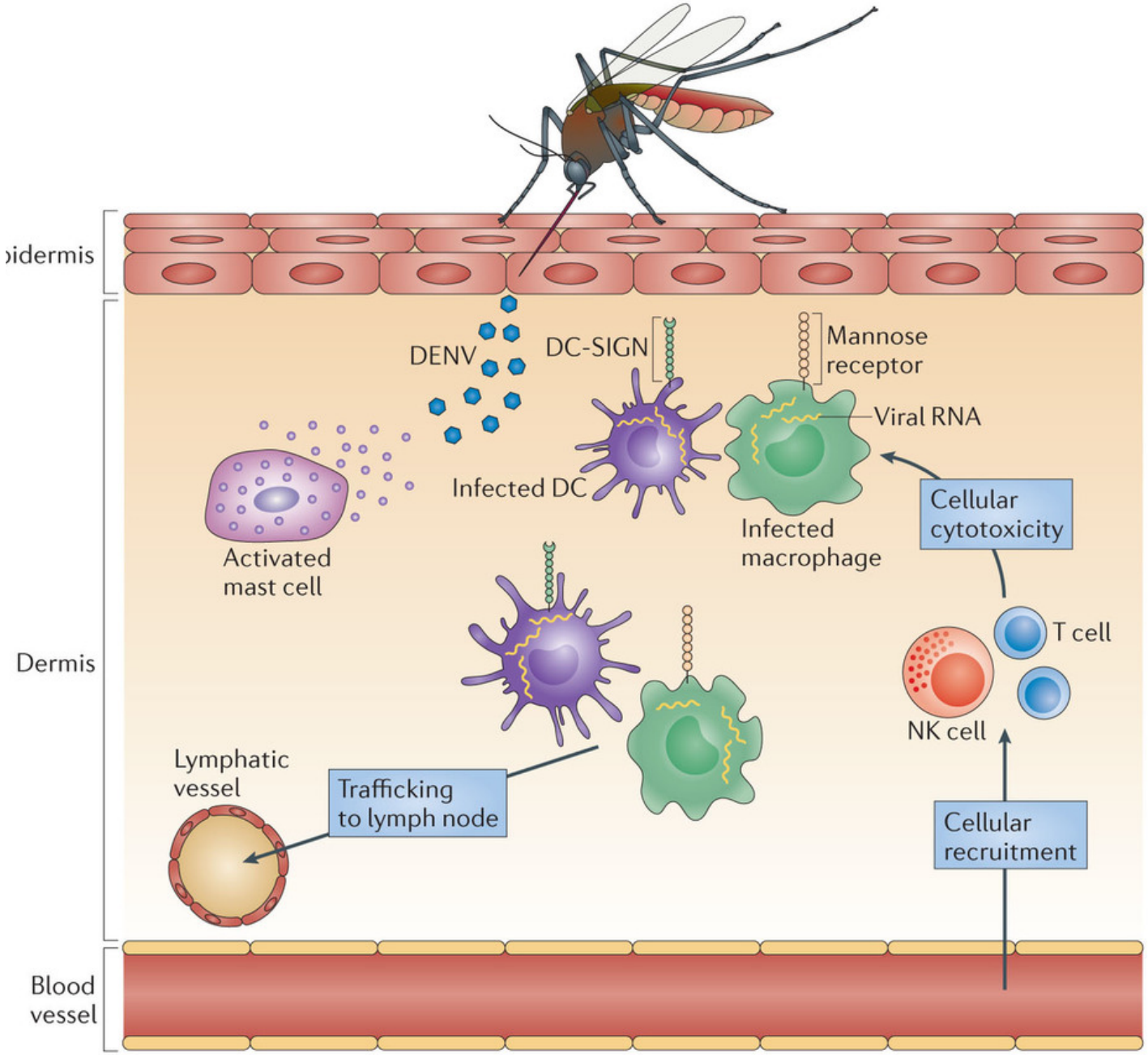
non-neutralising heterologous antibodies from a previous infection or in infants with maternal antibodies. These complications, first recognised in Thailand, have since occurred in many countries in Western Pacific, Southeast Asia including India. They are also common in previously healthy children in the indigenous populations of endemic areas.

Dengue virus is transmitted from person to person by Aedes aegypti mosquitoes. The extrinsic incubation period is 8-10 days. No vertebrate hosts other than humans have been identified.


Dengue virus infection
Asymptomatic
Symptomatic
Undifferentiated fever (Viral syndrome)
Dengue fever syndrome
Dengue hemorrhagic fever
Without hemorrhage
With unusual hemorrhage
No shock
Dengue shock syndrome
Dengue fever
Dengue hemorrhagic fever

PATHOGENESIS

- **VECTOR : Aedes aegypti mosquito**
- **MODE OF INFECTION : Through bite of infected aedes aegypti mosquito**
- **When an infected aedes mosquito bite a person, it deposits the virus into the person body at the skin puncture site**
- **The virus attached to the receptor present on the immune cell in the skin tissue**
- **Then enters the lymphatic circulation and release various biological mediators resulting in inflammatory response**
- **The virus initially multiplies locally then spread into the blood circulation resulting in viremia**
- **In severe condition it result in haemorrhagic case like dengue which occur due to blood vessels becoming permeable resulting in plasma leakage**



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LABORATORY DIAGNOSIS

Laboratory diagnosis The virus can be isolated in the first week of ilness but this is rarely done. The mainstay of diagnosis is the detection of a non-structural viral protein antigen (NS1). This can be detected in the blood up to 7-10 days of onset of disease. Demonstration of circulating IgM antibody provides early diagnosis as it appears within two to five days of onset of illness and persists for one to three months. The IgM ELISA test offers reliable diagnosis. A strip immunochromatographic test for IgM is available for rapid diagnosis. However, the test has to be confirmed by ELISA. The IgG antibodies are detected in a paired serum sample to show rising titres.

PROPHYLAXIS

- **Wear fully covered clothes**
- **Using mosquito net**
- **Using pesticides**
- **Destroy breeding ground**
- **Use mosquito repellents**
- **Do not let water stagnate anywhere**

TREATMENT

There is no specific treatment fór dengue. Supportive management, with cold tepid sponging,paracetamol for fever (Aspirin/ NSAIDs like Ibuprofen,etc., should be avoided since they may cause gastritis, vomiting, acidosis, platelet dysfunction and severe bleeding), fluid and electrolyte replacement and platelet infusion when counts are 10,000 and less, should be done.Dengue shock is treated with whole blood transfusion and management of shock.

REFERENCE

Textbook of microbiology by - Ananthanarayan and Paniker

THANK YOU