



Treatment of Flaviviridae: Zika, Dengue, Yellow Fever

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Disclosure Information

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I have no financial relationship to disclose.

I will not discuss off-label use and/or investigational use in my presentation.

Learning Objectives

- At the completion of this activity, the participant will be able to:
 - Describe the symptoms of a patient infected with a flavivirus.
 - Review the current treatment of common flaviviruses.
 - Describe transmission of flaviviridae
 - Discuss current research on treatments and vaccines.
 - Compare and contrast the flaviviridae viruses.

Flavivirus

- Named from yellow fever virus – flavus means “yellow”
- Belong to the family *Flaviviridae* in the genus *Flavivirus*
- Include arboviruses (transmitted by arthropods)
- Typically transmitted by mosquitoes or ticks
- Can also include transmission from human to human
 - Yellow Fever, Dengue Fever and Zika
- Humans are typically a “dead-end” host
- More than 70 known flaviviridae

Life Cycle of Flaviviruses

From: <https://www.creative-diagnostics.com/flavivirus.htm>

Zika

- Found pretty much everywhere in the tropics
- Transmitted by mosquito, mother to child, sexually, blood transfusion
- Symptoms are generally mild
- Is associated with serious birth defects

World Map of Areas with Risk of Zika

Map Legend

- Country or territory with current Zika outbreak*
- Country or territory that has ever reported Zika cases* (past or current)
- Areas with low likelihood of Zika infection because of high elevation (above 6,500 feet/2,000 meters)
- Country or territory with mosquito* but no reported Zika cases*
- Country or territory with no mosquitoes that spread Zika

*No areas are currently reporting Zika outbreaks
*Locally acquired, mosquito-borne Zika cases
*Aedes aegypti

From: <https://wwwnc.cdc.gov/travel/files/zika-areas-of-risk.pdf>

Zika Symptoms

- Most people won't have any symptoms
- If symptoms are present they are typically mild and include:
 - Fever
 - Rash
 - Headache
 - Joint pain
 - Conjunctivitis (red eyes)
 - Muscle pain
- Symptoms typically last less than 1 week

Zika Treatment

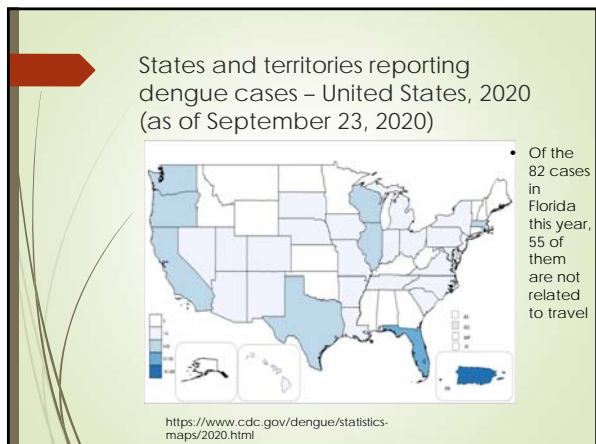
- There is no specific treatment for Zika
- Treat symptoms
 - Use acetaminophen for fever/pain
 - Recommend to not use NSAIDs until dengue has been ruled out due to increased risk of bleeding
- Rest
- Drink fluids

Zika – Travel Recommendations

- Travel Recommendations for Zika
 - If you are pregnant: Do not travel to Zika area
 - If you are planning to get pregnant:
 - Male traveler – wait 3 months
 - Female traveler – wait 2 months

History of Dengue

- "Break-bone fever" described in 1780 in Philadelphia by Ben Rush
- Outbreaks have been described in tropic and sub-tropic areas as well as southern US.
 - Early 20th century:
 - 1934 in Florida
 - 1945 in New Orleans
- Disease discovered to be transmitted by mosquitoes in 1903
- Dengue discovered to be a virus disease in 1906
- In 1944, Sabin (developed the oral polio vaccine) noted that infection with one serotype of dengue did not offer protection against the second serotype!
 - 65% sequence homology
- So 4 serotypes are transmitted in areas where *Aedes aegypti* and *A. albopictus* are found (day feeders)
 - (DEN-1, DEN-2, DEN-3, DEN-4)



Dengue – Typical Symptoms

- ~1 in 4 patients have symptoms
- Symptoms are typically mild:
 - Nausea
 - Vomiting
 - Rash
 - Aches and pains

Dengue – Severe Symptoms

- Severe dengue is present in 1 in 20 patients
 - Shock
 - Internal bleeding
 - Death
- There are signs of severe disease:
 - Stomach tenderness
 - Vomiting of at least 3 times in 24 hours
 - Bleeding from nose or gums
 - Vomiting blood or blood in stool

Dengue - Treatment

- For dengue with typical symptoms then treatment is similar to Zika with the exception of no NSAIDs
- Severe dengue may require hospitalization
 - Don't use corticosteroids, platelets, or 0.45% saline
 - Patients in shock will need isotonic crystalloids or colloidal (albumin) infusions
 - May need PRBCs if significant bleeding

Dengue – Travel Recommendations

- Do what you can to limit mosquito bites
 - Long sleeves
 - Repellant
 - Acetaminophen
- Recommended to continue to take precautions against mosquito bites for 3 weeks after you return home to help prevent local spread of virus
- There is a Dengue vaccine available in some countries for ages 9-45.
 - It is only recommended for those with previous confirmed dengue infection
 - Risk of developing severe dengue in patients who get the vaccine without prior infection and then get a dengue infection

History of Yellow Fever

- Most likely began in Africa and then brought to this hemisphere in the 1600s
- Documented cases in many parts of the United States in the 18th and 19th centuries
- Vector control proved very efficient in helping to limit the spread of Yellow Fever in the 20th century
- WHO estimates that there are about 200,000 cases of disease causing about 30,000 deaths per year

Areas with Yellow Fever risk



<https://www.cdc.gov/yellowfever/maps/index.html>

Yellow Fever - Symptoms

- Most people have no symptoms
- If symptoms develop usually are "flu-like"
 - Fever
 - Chills
 - Headache
 - Back pain
 - N/V
 - Fatigue
 - Weakness

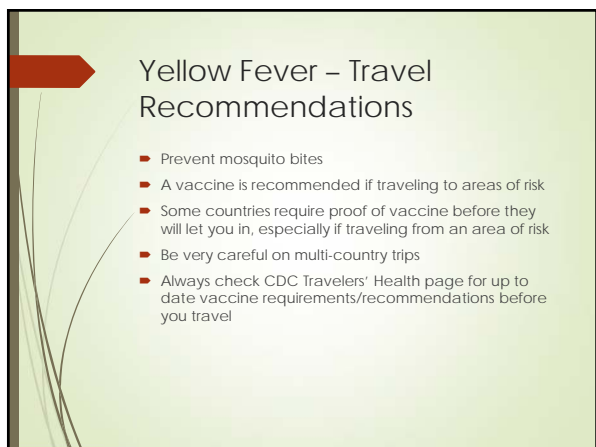
Yellow Fever – Severe symptoms

- Approximately 1 out of 7 will experience a brief remission after early symptoms and then progress to:
 - High fever
 - Jaundice (yellow skin)
 - Bleeding
 - Shock
 - Organ failure
- Approximately 30-60% of those who develop severe disease will die



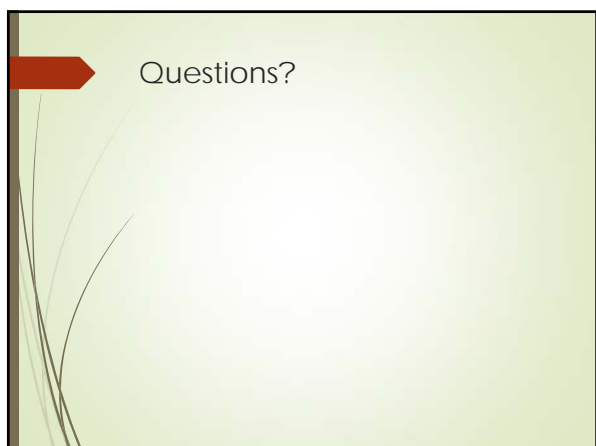
Yellow Fever - Treatment

- Most do not need any treatment
- Rest, PO fluids and pain relievers
- Do not use NSAIDs due to risk of bleeding
- If severe symptoms develop then hospitalization is needed with appropriate supportive care



Yellow Fever - Travel Recommendations

- Prevent mosquito bites
- A vaccine is recommended if traveling to areas of risk
- Some countries require proof of vaccine before they will let you in, especially if traveling from an area of risk
- Be very careful on multi-country trips
- Always check CDC Travelers' Health page for up to date vaccine requirements/recommendations before you travel



Questions?
