



U.S. AIR FORCE

# Announcements



- Register for the Epi-Tech Trainings:
  1. Log-on or Request log-on ID/password:  
<https://tiny.army.mil/r/zB8A/CME>
  2. Register for Epi-Tech Surveillance Training:  
<https://tiny.army.mil/r/7laAB/EpiTechFY16>
- Please enter your name/service and e-mail into the chat box to the left or email the disease epidemiology program at:  
[usarmy.apg.medcom-phc.mbx.disease-epidemiologyprogram13@mail.mil](mailto:usarmy.apg.medcom-phc.mbx.disease-epidemiologyprogram13@mail.mil)
  - You will receive a confirmation email within the next 48 hours with your attendance record
- Please mute your phones and DO NOT place us on hold. Press \*6 to mute/unmute your phone.

*I n t e g r i t y - S e r v i c e - E x c e l l e n c e*



# Zika Virus



**USAF School of Aerospace Medicine/Epidemiology Consult Services**  
**Presented by: Dr. Will Reeves (Entomologist)**  
**DSN: 798-3071 (Comm: 937 938-3071)**  
**23 February 2016**



U.S. Army Medical Department

**ARMY PUBLIC HEALTH CENTER** (Provisional)



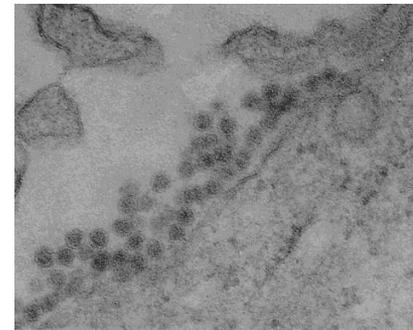
**NAVY AND MARINE CORPS PUBLIC HEALTH CENTER**  
PREVENTION AND PROTECTION START HERE



# What is Zika Virus?



- Isolated in 1947 from Zika Forrest, Uganda and published in 1952 it was named as an arbovirus in 1957\* along with the other often unrelated viruses.
- Arboviruses as a group are not related to each other but are transmitted by arthropods.
- They include *Alphavirus*, *Orbivirus*, *Coltivirus*, *Flavivirus*, and some *Rhabdovirus* among others.
  - Zika virus is in the genus *Flavivirus*, Family Flaviviridae; and
  - This family has some of the most infamous vector borne diseases (e.g., yellow fever, dengue, and tick-borne encephalitis).
- Zika virus is naturally transmitted by *Aedes* mosquitoes primarily in the subgenus *Stegomyia*.





# Phylogeny



- Zika virus is not closely related to many of the well known flaviviruses.
- Along with Spondweni virus it is half of the Spondweni serocomplex.

What does this mean?

- Only some antigenic tests cross react and PCR assays designed for Dengue, West Nile, or Yellow Fever viruses are not likely to produce false positives for Zika. Note: Chikungunya virus is not a *Flavivirus*.





# Zika Biology



- Most arboviruses are very poorly studied; thus, we know little about them. Zika virus is only slightly better studied than the majority of these viruses.
- Zika infects humans, a few other primates, and a few mosquitoes in the genus *Aedes*.
- We know very little about the possible reservoirs outside of Africa and have little data on the susceptibility of New World monkeys, native mosquitoes, or other wildlife.





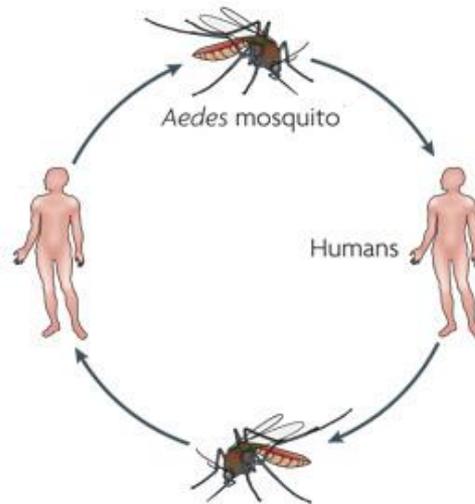
# Zika Virus Disease



- Most people infected with Zika Virus Disease do not present with symptoms (this is true for the majority of arboviruses).

~10-20% of classic Zika virus infections were mild febrile illness with a fever, rash, yellowing of the eyes and some general feelings of malaise and muscle pain.

Zika Virus Disease was not considered a significant disease for many years and like the vast majority of mosquito borne flaviviruses it was largely ignored.





# More About Zika Virus History



- Discovered in Zika Forest in Uganda (1947) and believed to be a monkey virus.
- A few years later it was isolated from sick people in the same region. Note: In a follow up study up to 40% of the people in part of Nigeria were previously infected.
- The virus was soon determined to be endemic throughout much of Africa and later SE Asia.





# Zika Virus Outbreak on Yap Island



- The first really large outbreak of Zika Virus reported occurred in 2007 on the Islands of Yap, Fed. States of Micronesia.
- The virus was initially misdiagnosed as dengue.
- In this outbreak over 70% of the population was seropositive.
- Subsequent outbreaks were reported in French Polynesia.



Photo from : Lt Col Mark Duffy



# New World 2015-Present



- Zika Virus was discovered in Brazil in 2015 following the Chikungunya and historically large dengue outbreaks.
- Local transmission was suspected and by February 2016 almost every country in the Americas had local transmission.



*Aedes aegypti*



*Aedes albopictus*



# Arboviruses as Teratogens



- A large number of arboviruses are known or strongly suggested of being teratogenic or abortogenic.
  - Many other non-arboviruses have similar properties (e.g. rubella virus, CMV, ...).
  - These are well documented in the veterinary arboviruses.
- Thus the hypothesis that Zika Virus might also have this property is not novel.
- There have been similar observations about West Nile virus and numerous endemic *Flavivirus*, *Orthobunyavirus*, *Orbivirus*, and *Alphavirus* strains in the Americas.



# Vectors



In the Americas we have two probable vectors:



*Aedes aegypti*



*Aedes albopictus*



# Basic Vector Biology



- These mosquitoes evolved to live around and in human structures.
- In the CONUS they have a hard time breeding inside houses; and
- They have relatively short flight ranges (  $\frac{1}{2}$  mile - the majority don't even fly ~500 yards).



Third World



VS

Key West, FL



# Breeding habitats



Small containers made by people and filled with fresh water.





# Not in other places



These species do not breed in large bodies of water (swamps, lakes, saline water or moving water).





# Mosquito Control



## Control relies on:

- Cleanup of containers with water;
- Treating with larvicides;
- Personal protection with DEET (or Picaridin);
- Permethrin treated uniforms; and
- Proper uniform wear

# Mosquito Control



Note: Sprays must be applied when and where mosquitoes are active so many spraying activities are not effective or even recommended.



# Extrinsic Incubation Period

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**The extrinsic incubation period is the time needed for a MOSQUITO to become infectious after it takes a blood meal.**

**This is limited by temperature.**

**At low temperatures mosquitoes often never complete the extrinsic incubation period.**

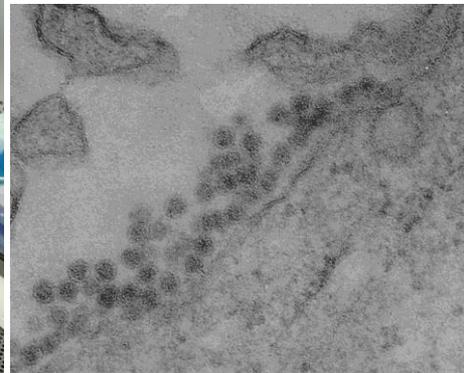
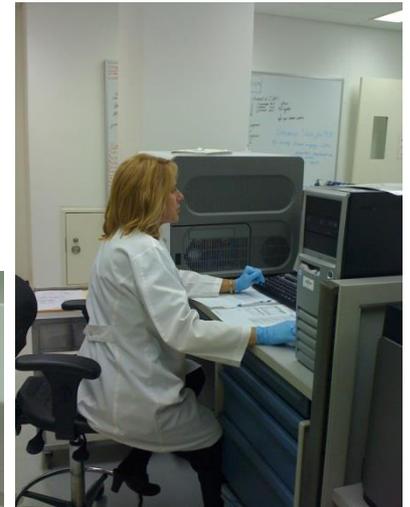


# Diagnostics



A rapidly changing situation; however, basics will not change:

- Reverse Transcriptase PCR  
~ 1 week after onset of symptoms
- Immunology  
IgG vs IgM  
Cross Reactions
- Virus isolation  
Zika is a BSL-2
- Fetal tissues (Refer to CDC guidance)





# Treatment

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- **No specific antivirals or vaccines are available.**
- **There is a general recommendation to avoid the use of NSAIDs because of the possible hemorrhagic complications with dengue or similar viruses.**
- **Generally treat the signs and symptoms.**
- **Most patients apparently recover fully in ~2 weeks.**
- **There are a few reports of sexual transmission.**



# Reporting

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- Zika virus disease is not currently a reportable medical event (RME) in DoD, but it is a disease of concern.
- Laboratory confirmed cases should be reported in DRSi as **"Any Other Unusual Condition Not Listed,"** with "Zika" entered in the comment field along with a pertinent travel history and, in the absence of a pertinent travel history, recent travel by their sexual partners. For female patients, pregnancy status should be recorded.
- Report Zika virus disease to the state and local health departments per local civilian reporting requirements to improve cross-communication and mitigate the risk of local transmission.
- Direct questions on reporting to the appropriate Service-specific public health POCs.



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# ***QUESTIONS ?***



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