PHYLOGENETICS IN MOLECULAR EPIDEMIOLOGY OF ZIKA VIRUS

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Zika, an arthropod borne virus from genus Flavivirus

Associated with neurological complications

Detected in Brazil with impairment of fetal development

Feb 1 2016: WHO declared as public health emergency
Colombia reported first cases of ZIKV outside Brazil

Very few cases of birth defects: 57 compared with more than 2,000 in Brazil

ZIKV sequence collected from Colombia Oct 2015 - Jan 2016
What was the cause of disparate patterns of Zika-related birth defects?

What led to neurotropism associated with Zika infection?
Methodology

- Downloaded sequences from ZIKA infected patients of current epidemic countries

- Multiple sequence alignment of all protein sequences of NS5 gene.

- Phylogenetic analysis in Molecular epidemiology of Zika virus.

- Homology based structure models of NS5 protein of Zika
Sequence Analysis of NS5 gene

Why this gene was selected for analysis?

C-terminal RNA dependent RNA polymerase

Unique Phylogenetic signals

Isolated from countries of

- Colombia
- Mexico
- Panama
- Martinique
- U.S.A
- Mutation of a highly conserved T to A
- Hydrophilic substitution with hydrophobic res.
- Does it change the interaction of the virus?
Further sequence analysis of the American strains

PVA motif found in the cluster of Latin America

What is the significance of the motif?

PVA motif observed in chorion S19 family (IPR009611, EBI)

Chorion, which is the fetal part of the placenta comprising of trophoblasts

Chorion gene is developmentally regulated - cell proliferation.
PVA motif mean in the context of the chorion?
Site of viral interaction with the placenta
Molecular mimicry using host-like motifs
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- Colombian Strain FLR from Barranquilla
  Ability to replicate in primary human trophoblast & serve as reservoir for transmission

- Asian strain FSS13025 Cambodia 2010
  Could not infect primary human trophoblast.
  - (Bayer A. et al, 2016)
CONCLUSION

- PVA motif is providing role of reservoir of the virus
- Need to monitor the Columbian FLR strain
- Continued surveillance of Zika epidemiology
THANK YOU

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