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« Spread of Zika virus in the Asia Pacific region »
Conflict of interest

No conflict of interest
Main arboviruses in Asia Pacific

*Flavivirus* genus
- Dengue +++ (Asia Pacific)
- Zika +++ (Asia Pacific)
- Japanese encephalitis (Southeast Asia, PNG Guam) (*Culex*)

*Alphavirus* genus
- Chikungunya +++ (Asia Pacific)
- Ross River (Australia) (*Aedes* but neither *aegypti* nor *albopictus*)

Arboviruses not reported in Asia Pacific

*Flavivirus*
- Yellow fever (why?)
- WNV (Lineage 1b Australia, 1c Central Asia, by *Culex*)

*Aedes aegypti and albopictus* (vectors for ZIKV, DENV, CHIKV) in Asia Pacific
2007: Yap, Federated States of Micronesia, 7,500 inhabitants

- First detection of ZIKV out of Asia and Africa
- Where did ZIKV come from? (Southeast Asia but how was it introduced?)
- Vector: *Aedes henselii* ++++, very limited distribution
- Adaptation of ZIKV to new mosquitoes and hosts
- About 75% of the population reported symptoms of infection
- No complication
ZIKV Pacific: 2007 – 2013

Second unexpected event

Nothing to declare?

First International Conference on Zika Virus.
Washington DC, February 22-25, 2017
2013-2014: French Polynesia

- Where did ZIKV come from?
- Strain close but different to the strain isolated in Yap, closest to the Cambodia 2010 strain
- Vector: Aedes aegypti
- Clinical symptoms: 11%, seroprevalence over 50%

Fourth unexpected event:
- First severe complications: GBS +++
- Microcephaly was reported retrospectively

Fifth unexpected event:
- Non vector borne transmission: materno-fetal, transfusion, sexual
Spread throughout the Pacific

Number of countries and territories impacted?

Number of cases?

Complications out of French Polynesia (?)

- 1 microcephaly in a newborn in New Zealand from a mother returning from the American Samoa

Circulation still ongoing +++ but not always reported

Do not focus only on the Americas

First International Conference on Zika Virus.
Washington DC, February 22-25, 2017
Circulation demonstrated by returning travelers
Circulation underreported +++
Number of cases? Complications?
Circulation still ongoing
First reported outbreak in Southeast Asia: Singapore
- About 260 cases
- Strain close to a strain that circulated in Asia before 2007
Why only 1 outbreak?

Thailand: Imported cases in Israel and Australia before detection of autochthonous cases

Maldives: Imported cases in Finland

Vietnam: 232 cases since 2016
2016: 110,000 DENV +++

Philippines: 57 cases

Singapore: 1 outbreak

Malaysia: 8 cases

Vietnam: 232 cases since 2016
2016: 110,000 DENV +++

First International Conference on Zika Virus.
Washington DC, February 22-25, 2017
## ZIKV in Asia Pacific region: gap in knowledge

### Hypotheses

#### Pacific: large spread

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Details</th>
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<tbody>
<tr>
<td>Origin of first outbreak in Yap 2007</td>
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<td>Origin of second outbreak in French Polynesia 2013-2014?</td>
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<tr>
<td>Mutations in ZIKV associated with increased epidemicity and virulence that occurred in French Polynesia?</td>
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<td>Geographic distribution of ZIKV in the Pacific?</td>
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<td>Pre-existing immunity against other flaviviruses in the population, not protective?</td>
<td>(&gt; 80% DENV seroprevalence in French Polynesia)</td>
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<td>No outbreak in Hawaii, why? (Aedes albopictus competence in the lab. vs. real life) (≠ CHIKV Réunion Island, France)</td>
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#### Asia: limited spread

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<tr>
<td>Favorable conditions for the emergence of ZIKV (like for DENV but also for YFV, which is not emerging)</td>
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<td>Why only 1 outbreak reported (Singapore)?</td>
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<td>Other small/silent outbreaks, misdiagnosed for DENV, but no large outbreak?</td>
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<td>Why « old » ZIKV strain emerged in Singapore?</td>
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<td>What is the impact of pre-existing immunity against ZIKV that was detected in the region since the 60’s (seroprevalence)</td>
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<td>No recent data on ZIKV seroprevalence</td>
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<td>Is there a cross protection against ZIKV induced by vaccination against other Flavivirus? especially against JEV in Asia?</td>
<td>(however vaccination against YFV in Brazil does not seem to be protective)</td>
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WELCOME TO FRENCH POLYNESIA

WE HAVE MORE THAN ZIKV