

Laboratory experience on the outbreak response to Chikungunya in the French territories of the Americas

CARPHA Consultation and Partners' Forum on Chikungunya in the Caribbean: Meeting today's challenge and preparing for the future
Trinidad, Port of Spain, March 3-5, 2015

Dominique Rousset, MD, PhD – IP French Guiana



1. IPG Virology Laboratory

3 National Reference Centers for the French Departments of the Americas (FDA) :

French Guiana, Martinique, Guadeloupe, Saint-Barthélemy, Saint-Martin

- for Arboviruses
- for Hantaviruses
- for Influenzaviruses (= NIC)

EN NF ISO 15189 : accreditation obtained in 2014

STAFF:

3 Scientists :
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Séverine Matheus (PhD) – **Arbo and Hantavirus**
Antoine Enfissi (PhD) - **Influenzavirus**

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1 Secretary :
Norma Jean Thomas

1 Post – doc :
Sophie De Decker (-> oct 2014)



French Departments of the Americas



2.1 Chikungunya : emergence in french caribbean islands

Mid november 2013 :

Report of clusters of cases of fever + arthralgia in St.Martin / epidemic circulation of dengue

6 december 2013 :

- biological confirmation of chikungunya cases without travel history
- autochthonous circulation
- declaration of **epidemic situation in St Martin**

-> **implementation of enhanced surveillance (PSAGE-CHIK)**

additional autochthonous cases quickly reported in other french caribbean islands (Martinique (18.12), Guadeloupe (24.12), St Barthelemy (30.12))



2.2 PSAGE-Chikungunya : Surveillance, Alert and Management of chikungunya outbreak Programme

Pre-outbreak phase : 1 : reinforced surveillance without transmission
2 : moderate transmission

Early detection of cases in order to prevent/limit the extension of the virus

Active surveillance of clinical suspected cases

- **Systematic report** by general practitioners and medical microbiologists
- **Systematic biological investigations** on all suspected cases
(confirmed / probable case : positive RT-PCR /positive detection of IgM /IgG)
- Reporting of emergency and hospital admissions (severe cases)
- **Monitoring of cases** :
 - epidemiological and entomological investigations in the neighbouring environment of confirmed/probable cases
 - Implementation of **vector control** *(patient house control : spatial in door spraying, breeding sites removal or treatment (BTI))*



2.3 PSAGE-Chikungunya : surveillance system and control measures

Outbreak phase 3 : epidemic

3a : epidemic with local chains of transmission

3b : generalized epidemic

- **Weekly notification of clinical suspected cases** by the sentinel network of general practitioners
- **Vector control** (*neighbourhood control : spatial outdoor spraying*)

Biological investigations restricted to specific cases (pregnant woman, children, patient with comorbidity, severe case...)



2.3 PSAGE-Chikungunya : Coordination and communication

Regional coordination :

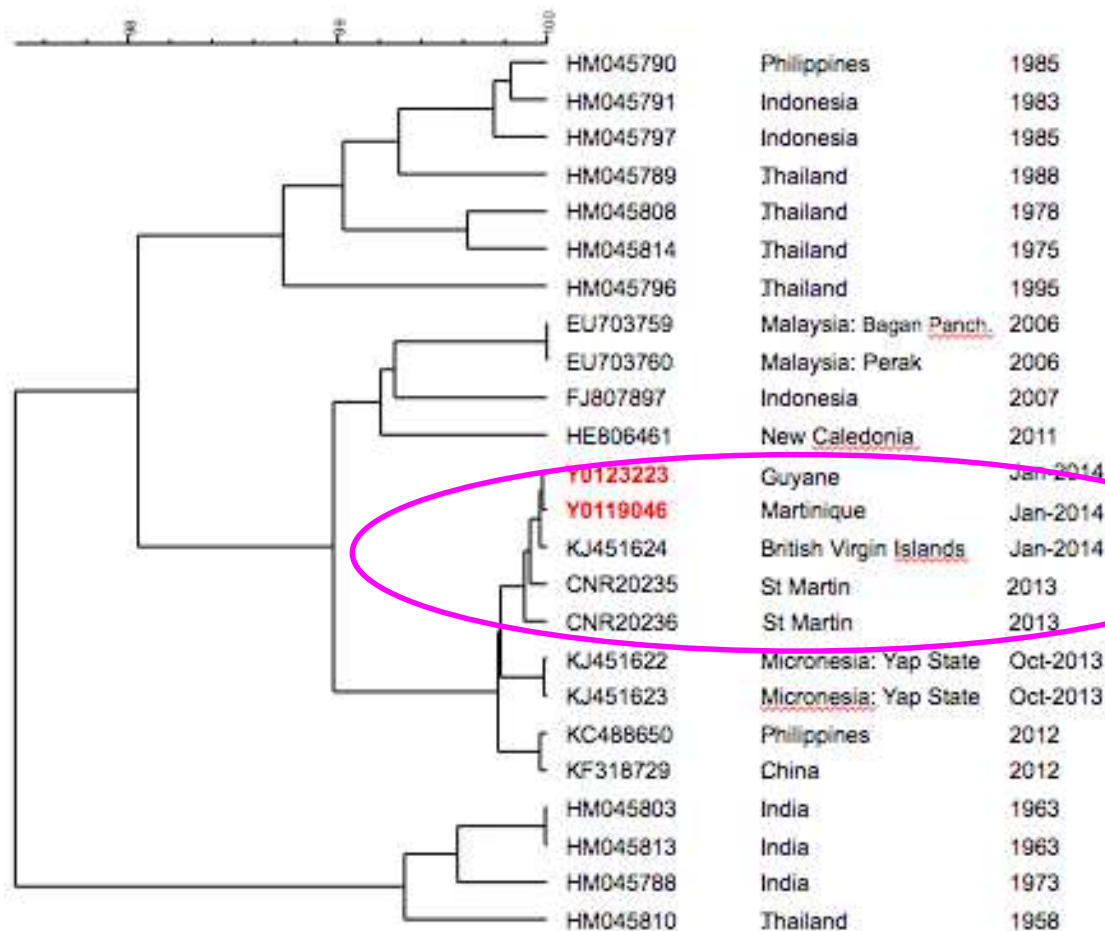
- data collection at the local level and further at the regional level in order to follow the progression of the virus in the different territories
- harmonization (/common tools) during the pre-outbreak and outbreak management phases.

Communication through radio spots, television, flyers and posters
prevention messages in public areas, airports, private practitioner's offices, hospitals and clinics



2.4 Chikungunya : emergence in french caribbean islands

The virus belongs to the Chikungunya **Asian genotype**



Coll: CNR IPG – CIBU PCP IPP
Complete genome sequencing
(PGM)

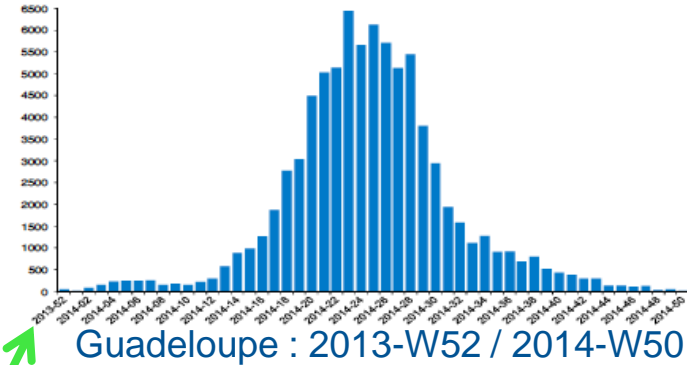
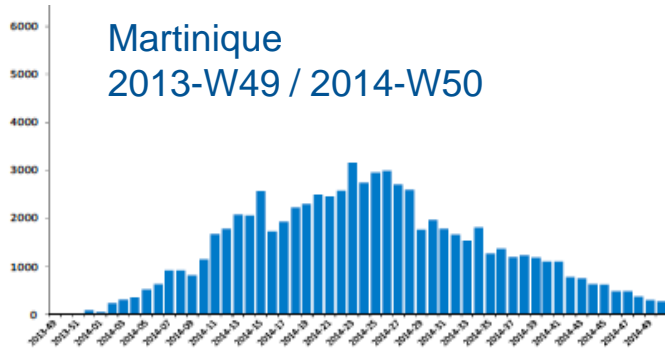
Focus on Asia Phylogroup
Specific 4 AA deletion in nsp3

Caribbean cluster

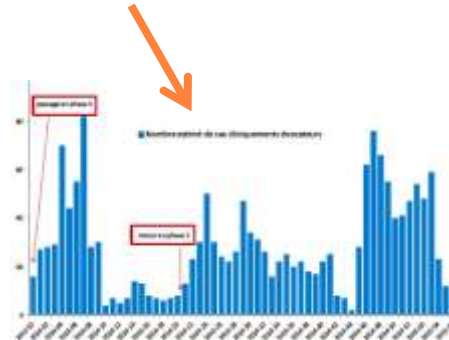
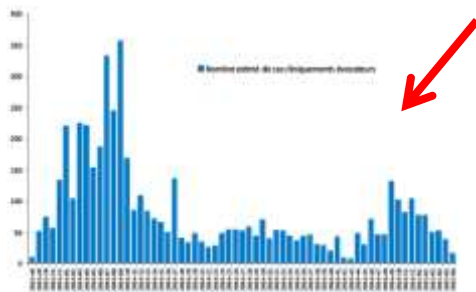


2.5 Chikungunya : FTA epidemiological situation

(from CIRE Antilles Guyane)



	Saint Martin Feb 8, 2015	Saint Barthélemy Feb 8 2015	Martinique Dec 14, 2014	Guadeloupe Dec 14, 2014	French Guiana Feb 8, 2015
Population	36 992	9 171	398 864	411 507	250 109
Epidemic phase (3)	from 2013-W48 22 weeks + strengthening dec 2014	from 2013-W52 22 weeks + strengthening dec 2014	from 2014-W02 ... > 50 weeks	from 2014-W13 to 2014-47 35 weeks	phase 2 since 2014-W08 phase 3 from 2014-W42...
Suspected cases	5280	1690	72 200	81 200	12 308
Estimated incidence	14% *	18%	18%	20%	5%
Fatal cases	3	0	83	67	1



3.1 Lab experience

technics used : « in house » technics

qRT-PCR multiplex Chikungunya and Dengue

from **Panning** *et al*, EID 2008 for chikungunya

and **Callahan** *et al.*, J.Clin.Microbiol 2001 for dengue

Primers

ChikS	TGATCCCGACTCAACCATCCT	241-261
ChikAS	GGCAAACGCAGTGGTACTTCCT	323-302
DenF1	AAGGACTAGAGGTTAKAGGAGACCC	10589-10613
DenR1	GGCGYTCTGTCCTGGAWTGATG	10699-10677

Probes

ChikP	TCCGACATCATCCTCCTTGCTGGC	300-277
DenProb1-3	AACAGCATATTGACGCTGGGAGAGACC	10610-10636
DenProb2-4	AACAGCATATTGACGCTGGGAAAGACC	10616-10642

Serology :

In house MAC- and GAC-ELISA (for IgM and IgG anti-CHIKv)

Reagents : hyperimmune ascitic fluids and chik Ag (new born mice brains)

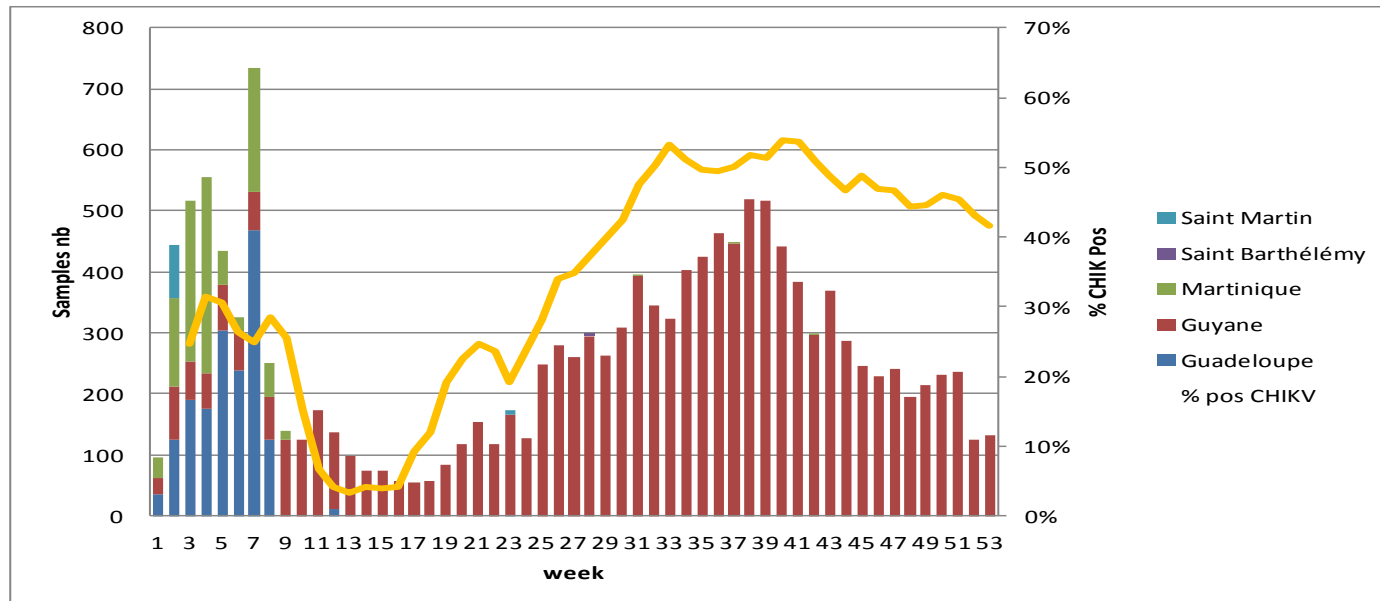
Additional MAC-ELISA routinely performed : Dengue, SLE, YF, Tonate, Mayaro.

EQA : Chik Serology and Chik-PCR EQA organized by European Network for Diagnostics of "Imported" Viral Diseases (ENIVD). Oct 2014 (43 laboratories involved)



3.2 Lab experience in chikungunya diagnosis algorithm and results

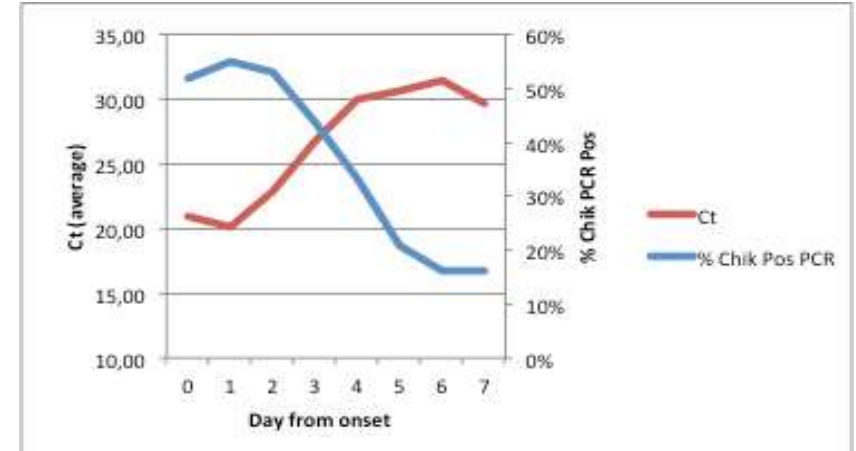
- Algorithm used for chikungunya diagnosis: according to delay from onset :
 - Between D0 and D4 : qRT-PCR chikungunya
 - Between D5 and D7 : qRT-PCR + serology (IgM and IgG anti-CHIKv)
 - After D7 : serology only
- Samples and results :
 - > 14000 samples in 2014 from the FTA
 - 45% pos for Chikungunya (qRT-PCR and/or serology)



3.3 Lab experience in chikungunya diagnosis some comments

qRT-PCR Chik results :

In favor of high but short viral load...



Serology results :

In French Guiana

reactivation of IgM anti TONv and/or MAYv in Chikungunya infection..

Serology	% Chik pos IgM	other alphavirus reactivity (TONv, MAYv)
French Carribean Islands	29%	1%
French Guiana	21%	14%



3.4 Lab experience in other lab support

For FTA:

- First part : Direct analysis of samples (2 months)
- Second part : for Martinique and Guadeloupe reference lab
 - Technology transfert
 - Production and furniture of reagents (Chik ag and ascitic fluid for serology)

Others countries :

- Furniture of reagents (DENV and CHIKV serology) :
Central Laboratory / BOG - Suriname
- Panel of reference sera :
Instituto Carlos Chagas/Fiocruz -Brazil

Often very difficult and time consuming.... due to international (and/or national) regulations

(shipment of biological or infectious samples, dual use agents, ethical considerations....)

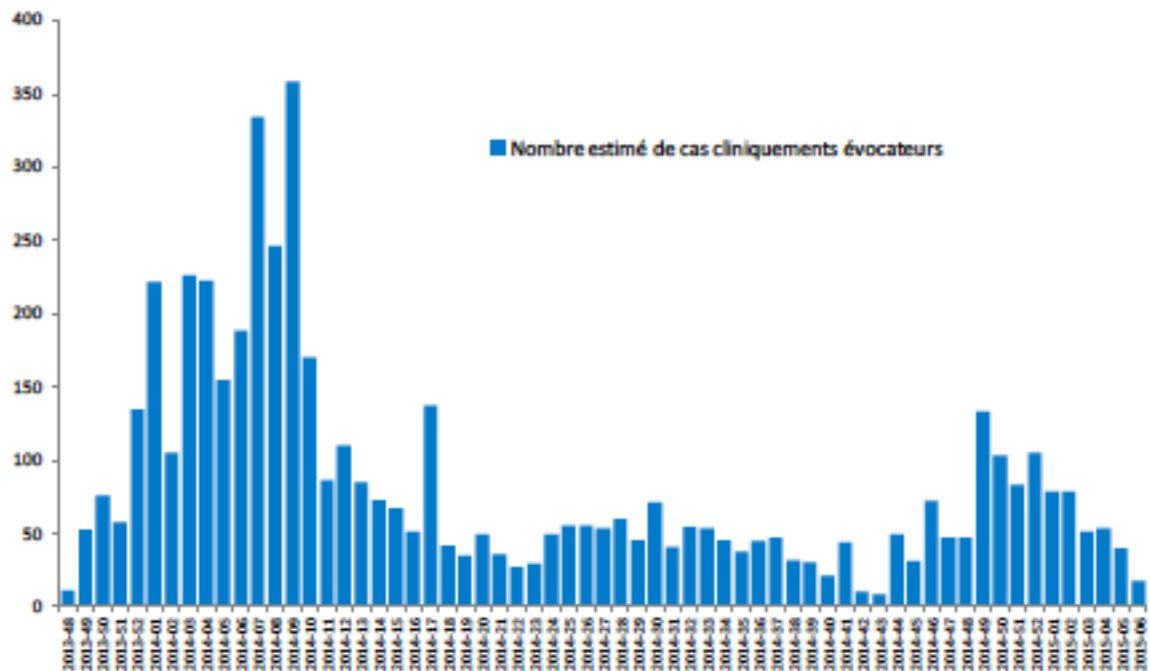
Impossible to find a solution for a shipment to Cuba...



4.2 SAINT-MARTIN : Evolution since July....

Continuation of viral circulation
with strengthening in the end of 2014.

3540 reported clinical cases as of Jun 29, 2014 / 5280 as of Feb 2, 2015





IP Guyane

- Virology lab / NRC arboviruses (associated lab for FDA)
- Direction of IPG
- Medical analysis laboratory
- Entomology unit
- Epidemiology unit

IP Guadeloupe

IP Paris

- PGP-CIBU !
- NRC coordination
- M. Vignuzzi unit
- AB Failloux unit

.....

FTA hospitals : Laboratories and clinicians

- CHU Martinique
- CHU Guadeloupe
- CHAR Cayenne
- CMC Kourou
- CH de Saint Laurent

Private lab

... Saint Martin laboratory

General and specialized practitioners



NRC lab. coordinator

IRBA
Marseille



Thanks for your attention
Muchas gracias por su atención

