

Laboratory surveillance of dengue fever in New-Caledonia - 2004

I. Introduction

After a period of calm in 1999 and 2000, the risk of renewed outbreaks in New Caledonia rose to a higher level in 2001 due to an increasing number of DEN 1 foci in the Pacific, particularly in French Polynesia, where more than 33,000 people were affected in 2001, and then in Wallis and Futuna in 2002-03. After numerous imported cases in 2002, this threat became a reality in New Caledonia in 2003 with a major epidemic, probably one of the biggest the Territory has ever known. In 2004, moderate transmission of the virus recommenced then most probably halted at the end of the cool season.

Laboratory surveillance of dengue fever is conducted by the virology laboratory at the New Caledonia Pasteur Institute (IPNC). This surveillance combines an active component covered by the Sentinel Network with response to lab test requests received from outside the Network.

II. Sentinel Network in 2004

➤ Composition:

For the most part, the initial composition of the Sentinel Network remained the same as in previous years, i.e. 23 public or private centres spread throughout the three Provinces in such a way as to ensure proper geographic and socio-economic coverage. All the Provincial health care centres continued to be part of the network so as to identify any possible re-emerging foci after the 2003 epidemic as quickly as possible.

➤ Operating procedure:

When a sentinel physician comes across a clinically suspect case, he or she fills out an information sheet and orders a set of lab tests to confirm the case. The disease-specific tests are covered 100% by the public health subvention funding New Caledonia has provided to the Pasteur Institute. Other analyses prescribed at the same time, e.g. platelet count/composition, are paid by the patient and can be reimbursed at normal health coverage rates.

The laboratory decides on the exact diagnostic parameters depending on the start date given for the illness. With early samples (D1 to D6 from when the fever first appears), the lab looks for viral RNA using a molecular biology technique that makes it possible to identify the viral type (PCR : *Polymerase Chain Reaction*). On late samples (after D6), specific IgM detection is carried using an ELISA method. Positive cases are declared probable (positive results for IgM from a single sample) or confirmed (positive PCR or seroconversion found in two successive samples).

Suspected cases (test requested) and then positive cases are reported as soon as they are available to the prescribing physician and the DASS-NC (New Caledonia Department of Health and Social Affairs) for immediate implementation of vector control measures and for epidemiological purposes.

Depending on how the epidemiological situation evolves, the Pasteur Institute produces periodical surveillance reports, sent by fax or e-mail to sentinel sites and the DASS (5 reports in 2004).

III. Results and analysis

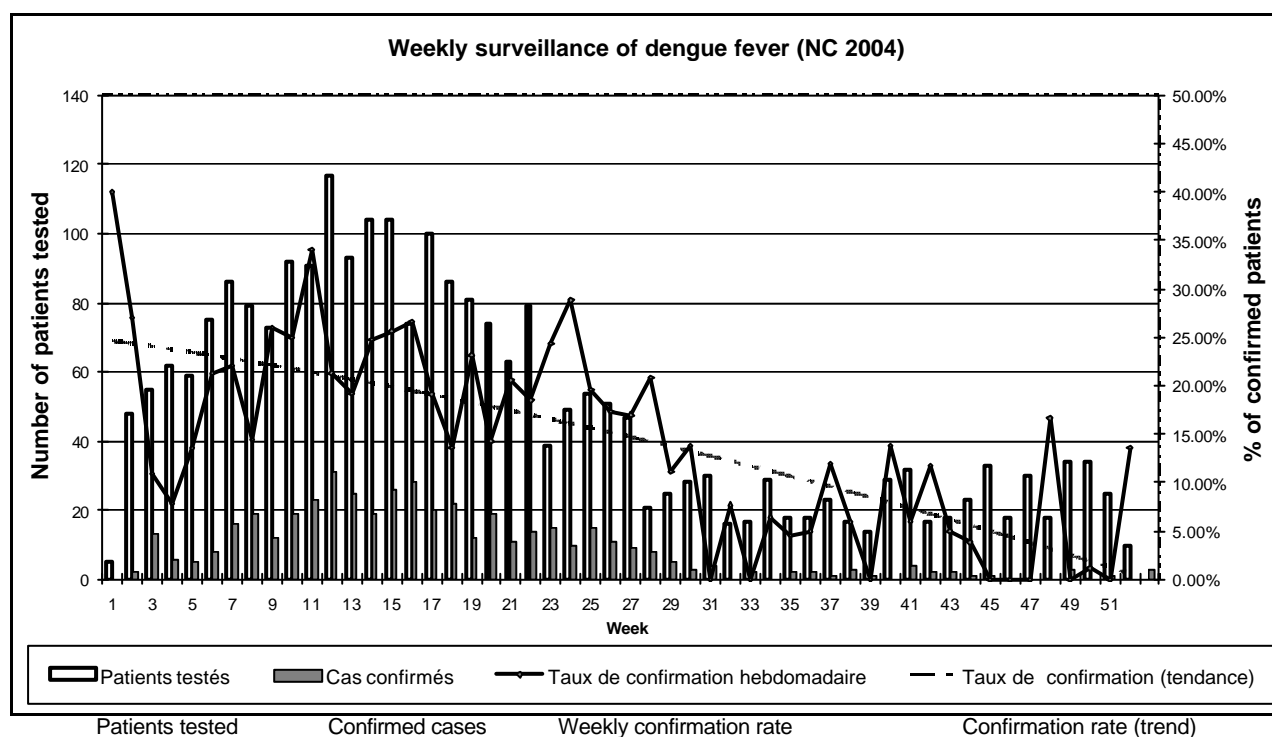
➤ Overall laboratory results:

Origin	Number of patients tested by the laboratory			
	Total	Recruited by the Sentinel Network	Patients that had repeated samples taken (2 or more)	Declared positive (IgM or PCR +)
New Caledonia	2563	531 (20.76%)	104 (4%)	460 (17.9%)
Wallis and Futuna	73	-	-	17 (23.3%)
Region *	92	-	-	45 (48.9%)

* : samples received from Palau, Vanuatu, Guam, Chuuk and Yap.

The number of patients diagnosed in 2004 was only 20% of the number of declared cases in 2003, and, in a similar way, the sample positivity rate dropped some 50% (34.4% in 2003). These two indicators clearly describe a post-epidemic year with residual transmission of the virus. Through the IPNC's activities within the Pacific Public Health Surveillance Network (PPHSN), the Institute contributed to identification of the most recent region focus in Micronesia (June-October 2004).

➤ Chronology of positive cases:



Most cases were identified between January and July 2004, with a slight peak in March. From August onwards, the weekly confirmation rate dropped, thereby showing a probable halt in transmission. In addition, this situation was validated by a lack of cases confirmed through PCR after late July.

➤ Geographic origin of the patients tested by the laboratory and declared positive for dengue fever:

Province	Municipal district (<i>commune</i>)	Confirmed cases in 2004	Province	Municipal district (<i>commune</i>)	Confirmed cases in 2004
Northern Province 41 cases	Belep	1	Southern Province 359 cases	Boulouparis	5
	Canala	2		Bourail	8
	Hienghene	3		Dumbéa	37
	Houailou	3		Farino	0
	Kaala Gomen	0		Isle of Pines	0
	Kone	14		La Foa	5
	Kouaoua	1		Moindou	0
	Koumac	0		Mont Dore	43
	Népoui	0		Noumea	238
	Ouégoa	0		Paita	20
	Poindimié	3		Sarraméa	0
	Ponerihouen	2		Thio	0
	Pouébo	0		Yaté	3
	Pouembout	1		Loyalty Island Province 45 cases	Lifou
	Poum	0	Maré		28
Poya	1	Ouvéa	6		
Touho	1	Unknown origin		15	
Voh	9	Total		460	

Some 22 of the 33 municipal districts (*communes*) in New Caledonia declared at least one laboratory confirmed case in 2004. Effective transmission was probably only maintained over the first six months of the year in the greater Noumea area and, in clearly smaller percentages, in the Kone-Voh region and on Mare in April-May.

➤ Demographic characteristics of dengue-positive patients:

- *Distribution by sex:*

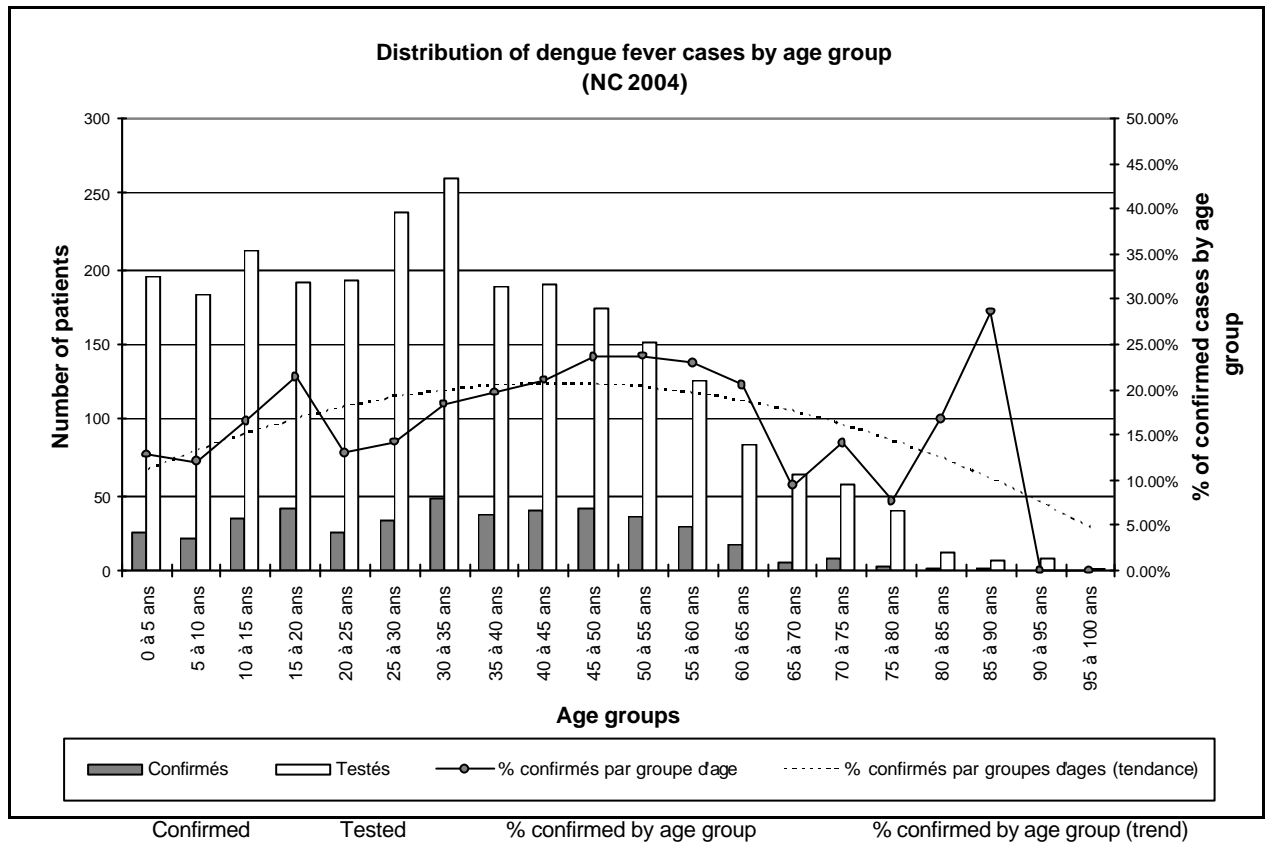
The distribution of positive cases by sex did not show any predominance:

Sex	Number of cases	Distribution
Male	219	47.6%
Female	241	52.4%

- *Age of patients:*

The mean was situated at 34.6 years of age but showed extreme dispersion going from 1 month to 88 years of age.

As in 2003, the confirmation rate by age group, given below, did not show any significant variations. Type 1 dengue fever had probably only been transmitted at fairly low levels between 1975 and 1978, then as a moderate outbreak in 1989-90 (the outbreak over those two years was mainly due to the Type 3 virus). Given the time span since these periods of transmission of the same virus type, no immunological protection could be shown for the age categories involved.

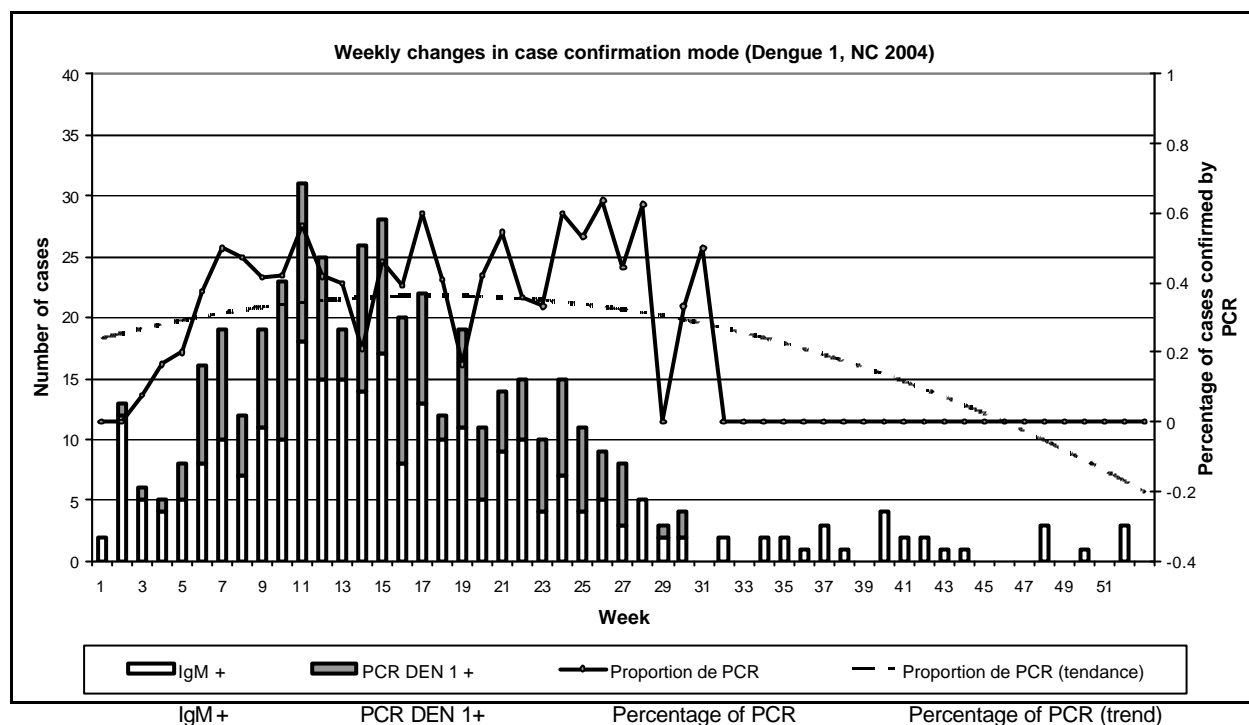


➤ Virological data :

The 460 cases that had positive dengue-specific tests results were distributed as follows:

- Cases confirmed by identification of DEN 1 viral RNA: 179
- Probable cases due to the presence of IgM: 281

After late July, no further cases were confirmed through viral genome identification. It is likely that most of the so-called “probable” cases identified from positive IgM results did not correspond to infections at the time of testing. They probably involved IgM persisting some time after the illness or unspecified reactivity linked to polyclonal activation as part of another acute infection process.



➤ Mortality :

As at 31/12/2004, two reports of deaths that occurred in a dengue fever context had been recorded by the DASS-NC.

IV. Conclusion

From 2001 onwards, New Caledonia was exposed to a high risk of a DEN 1 outbreak from neighbouring countries and territories, in particular, French Polynesia and Wallis & Futuna, with which there are frequent, large-scale exchanges of population.

In the Pacific region, transmission of the Type 1 virus began in late 2000, when it was first reported in Palau. A major epidemic then took place in French Polynesia from February to November 2001. It began on Bora-Bora then gradually spread to most of the island group. After that other foci were reported in Samoa, Tokelau, the Cook Islands and then Hawaii. In early 2002, cases were reported in the Solomon Islands, then in Vanuatu and in New Caledonia. In late 2002, there was an outbreak in Wallis and Futuna. Finally, in 2003, a very intense outbreak occurred in New Caledonia that also affected Tonga and then Fiji. Things were calmer in 2004, which was characterized by the gradual disappearance of foci. A single case of reemergence, that lasted only a few weeks, took place in Micronesia (states of Yap and Chuuk).

The Sentinel Network's role in 2004 was to identify as quickly as possible initial reactivated foci at the beginning of the hot season. This moderate-level transmission only continued unbroken in the greater Noumea area until the month of July, and then most likely ended at the close of the cool season.

In early 2005, there are no signs of the outbreak reoccurring. Endemisation of the virus in the Territory has probably been avoided but this needs to be confirmed by on-going surveillance, at the very least through surveillance network activity

Alain BERLIOZ-ARTHAUD
 IPNC, Centre de Biologie Médicale
 9-11, avenue Paul Doumer
 BP 61 - 98845 Nouméa Cedex
 Nouvelle-Calédonie
 Téléphone : 687 27 02 85
 Télécopie : 687 27 33 90
 E-mail : aberlioz@pasteur.nc