Dengue Situation in Brazil by Year 2000

Hermann G Schatzmayr

Departamento de Virologia, Instituto Oswaldo Cruz, Av. Brasil 4365, 21045-900 Rio de Janeiro, RJ, Brasil

Dengue virus types 1 and 2 have been isolated in Brazil by the Department of Virology, Instituto Oswaldo Cruz, in 1986 and 1990 respectively, after many decades of absence. A successful continental Aedes aegypti *control program in the Americas, has been able to eradicate the vector in most countries in the 60's, but the program could not be sustained along the years. Dengue viruses were reintroduced in the American region and the infection became endemic in Brazil, like in most Central and SouthAmerican countries and in the Caribbean region, due to the weaning of the vector control programs in these countries. High demographic densities and poor housing conditions in large urban communities, made the ideal conditions for vector spreading. All four dengue types are circulating in the continent and there is a high risk of the introduction in the country of the other two dengue types in Brazil, with the development of large epidemics. After the Cuban episode in 1981, when by the first time a large epidemic of dengue hemorrhagic fever and dengue shock syndrome have been described in the Americas, both clinical presentations are observed, specially in the countries like Brazil, with circulation of more than one dengue virus type. A tetravalent potent vaccine seems to be the only possible way to control the disease in the future, besides rapid clinical and laboratory diagnosis, in order to offer supportive treatment to the more severe clinical infections.*

Key words: Flaviviridae - dengue-1 - dengue-2 - dengue in Brazil

After decades of absence, dengue virus type 1 was isolated in April 1986 in a large epidemic close to the city of Rio de Janeiro, by the Department of Virology of the Instituto Oswaldo Cruz (IOC) (Schatzmayr et al. 1986). The virus spreaded quickly in the same year to other cities along the northeast coast, where the vector *Aedes aegypti* has been reintroduced since the late 70's. This vector has been eliminated from most American countries including Brazil, in a continental effort to eradicate yellow fever, supported by the Pan American Health Organization in the 60's. However, the eradication has not been achieved in Suriname, Guyanas, Venezuela, Caribbean Islands and the United States. Due to lack of funds to maintain the campaign and the emergence of other priorities along the years, the mosquito was reintroduced through the region, from the infested countries and in 1995, and the distribution of *Ae. aegypti* reached the same level as before the eradication campaign (Gubler 1997). In Brazil the vector has been detected in the State of Bahia in 1975 and in the State of Rio de Janeiro by 1977. The expansion of *Ae. aegypti* in the 70's and 80's brought an increased movement of dengue viruses in the American region. Dengue viruses type 2 and type 3 were present in the Americas prior to 1977, causing epidemics especially in the Caribbean region. Type 3 apparently disappear from the Americas, in the middle 70's, returning in 1994, causing a major epidemic in Nicaragua and becoming established in Mexico and Central America. In 1977, type 1 was reintroduced with epidemics in Jamaica, Cuba, Puerto Rico and Venezuela. This serotype spreaded quickly throughout the Caribbean, Mexico, Central America and the northern South America, reaching later, Brazil and almost all countries in South America. In 1981, a new strain of dengue type 2 was introduced into Cuba, probably of Asian origin and was responsible for the first epidemic of severe dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS) in the Americas, with 158 deaths. The same strain reached other countries including Brazil, always associated to an increased severity of the clinical cases. Finally, in 1981, dengue type 4 was detected in eastern Caribbean Islands, spreading also like the type 1, to many countries in the next years (Gubler 1997, Pinheiro & Corber 1997). Although at moment only types 1 and 2 are present in Brazil, the data above emphasize the high risk of the introduction of types 3 and 4 in our country.

As in many other countries of the region, dengue became soon a national public health problem in Brazil and more than 1,8 million cases, with a

Fax: +55-21-270.6397. E-mail: hermann@ioc.fiocruz.br
Received 7 August 2000
Accepted 4 September 2000

peak of 570,148 cases in 1998, have been notified until June 2000 in the country (Ministério da Saúde 2000). Dengue type 2 was first detected in 1990, again in the State of Rio de Janeiro and a clear increase of the number of more severe cases was observed (Nogueira et al. 1990, 1991, Miagostovich et al. 1993).

During the first epidemic of type 1, reported as a "virgin soil" epidemic, studies conducted in the area showed about 40% of silent infections in the affected populations, confirming data obtained in other countries (Dietz et al. 1990).

The dengue cases reported in Brazil in the last years, represent about 80% of the total number reported in the Americas, emphasizing the magnitude of the problem. At the moment only the dengue types 1 and 2 are present in Brazil, but as already pointed out there are a high risk of the introduction of the other types, which are present in Central America, Caribbean and north of South America.

Dengue epidemics has been already described in 24 of the 26 states and in the Federal District/ Brasília. An increase in the severity of the clinical course of the dengue infections after the type 2 introduction, could be observed, although one fatal case, have been observed, due to type 1, before dengue type 2 has been introduced in the country. Until June 2000, 893 dengue hemorrhagic fever/ dengue shock syndrome cases have been notified in Brazil, with 45 deaths (Ministério da Saúde 2000).

The efforts to reduce and control the vectors have been based largely in adult mosquito control campaigns, often associated to epidemics, since the house-by-house larvae control became impossible to be carried out in the country, specially in the under-developed urban areas. The participation of the population in vector control is also quite limited, well above the necessary to control in-house breeding sites. *Ae. albopictus*, a species known to transmit dengue in Asia, specially in endemic situations, have been introduced in Brazil by the 80's, probably by Asian ships coming for iron ore transportation. The vector spreaded at the Southeast region, which is the most populated one and could turn on another difficult factor for dengue control, if this vector become involved in dengue virus transmission, what so far, has not been confirmed at field conditions.

A network of laboratories has been established in the country for the diagnosis of the disease, under IOC support, soon after the first cases have been confirmed in Rio de Janeiro. Virus isolation on the clone C6/36 of *Ae. albopictus* cell line, dengue IgM antibodies detection, immunoperoxidase and RT-PCR applied to sera and vectors, are the methods normally used in the laboratory for dengue diagnosis (Nogueira et al. 1992, Miagostovich et al. 1993, 1997).

Besides the classical symptoms of dengue fever and the seldom observed severe shock syndrome, the last ones mostly associated to secondary infections, the involvement of the central nervous system has been described, including encephalopaty and encephalitis (Chimelli et al. 1990) and more studies are needed in this field. Arterial hypertension has been confirmed as an important risk factor for development of more severe dengue clinical presentations (Cunha et al. 1998).

Molecular studies of the Brazilian dengue strains types 1 and 2, showed that they belong to genotypes Caribbean and Jamaica respectively (Vorndam et al. 1994, Miagostovich et al. 1998) but a permanent virus watch program should be implemented, in order to evaluate the circulating strains along the years and also to early detection of the possible introduction of a new dengue serotype or genotype in the country.

REFERENCES

Chimelli L, Dumas H, Barretto-Netto M, Ramos RG, Dias M, Gray F 1990. Dengue: neuropathological findings in 5 fatal cases from Brazil. *Clin Neuropathol 9*: 157-162.

Cunha RV, Zagne SMO, Miagostovich MP, Schatzmayr HG, Nogueira RMR 1998. Arterial hypertension as a possible risk factor for dengue hemorrhagic fever/ dengue shock syndrome in Niterói, Rio de Janeiro. *Rev Inst Med Trop São Paulo 31*: 246-247.

Dietz VJ, Gubler DJ, Rigau-Pérez JG, Pinheiro F, Schatzmayr HG, Bailey R, Gunn RA 1990. Epidemic dengue 1 in Brazil, 1986: evaluation of clinically based dengue surveillance system. *Am J Epidemiol 131*: 693-701.

Gubler DJ 1997. Dengue and dengue hemorrahgic fever: its history and resurgence as a global public health problem. In DJ Gubler, G Kuno (eds), *Dengue and Dengue Hemorrhagic Fever*, Cab International, New York, p. 1-22.

Miagostovich MP, Nogueira RMR, Cavalcanti SMB, Marzochi KBF, Schatzmayr HG 1993. Dengue epidemic in the state of Rio de Janeiro, Brazil: virological and epidemiological aspects. *Rev Inst Med Trop São Paulo 35*: 149-154.

Miagostovich MP, Nogueira RMR, Schatzmayr HG, Lanciotti RS 1998. Molecular epidemiology of den-2 in Brazil. *Mem Inst Oswaldo Cruz 93*: 625-626.

Miagostovich MP, Santos FB, Araujo ESM, Dias J, Schatzmayr HG, Nogueira RMR 1997. Diagnosis of dengue by using reverse transcriptase-polymerase chain reaction. *Mem Inst Oswaldo Cruz 92*: 595-600.

Ministério da Saúde 2000. National Epidemiology Cen-

ter, National Health Foundation.

Nogueira RMR, Miagostovich MP, Lampe E, Schatzmayr HG 1990. Isolation of dengue virus type 2 in Rio de Janeiro. *Mem Inst Oswaldo Cruz 85:* 253.

Nogueira RMR, Miagostovich MP, Cavalcanti SMB, Marzochi KBF, Schatzmayr HG 1992. Levels of IgM antibodies against dengue virus in Rio de Janeiro, Brazil. *Res Virol Institut Pasteur 143*: 423-427.

Nogueira RMR, Zagner SMO, Martins ISM, Lampe E, Miagostovich MP, Schatzmayr HG 1991. Dengue hemorrhagic fever/dengue shock syndrome (DHF/DSS) caused by serotype 2 in Brazil. *Mem Inst Oswaldo Cruz 86*: 269.

Pinheiro FP, Corber SJ 1997. Global situation of dengue and dengue hemorrhagic fever and its emergence in the Americas. *Wld Health Statist Quart 50*: 161-169.

Schatzmayr HG, Nogueira RMR, Travassos da Rosa APA 1986. An outbreak of dengue virus at Rio de Janeiro. *Mem Instituto Oswaldo Cruz 81*: 245-246.

Vorndam V, Nogueira RMR, Trent DW 1994. Restriction enzyme analysis of American region dengue viruses. *Arch Virol 136*: 191-196.