Simultaneous circulation of all four dengue serotypes in Manaus, State of Amazonas, Brazil in 2011

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ABSTRACT

Introduction: Manaus, the capital city of the State of Amazonas with nearly 2 million inhabitants, is located in the middle of the Amazon rain forest and has suffered dengue outbreaks since 1998. Methods: In this study, blood samples were investigated using reverse transcriptase-polymerase chain reaction (RT-PCR), aimed at identifying dengue virus serotypes. Results: Acute phase sera from 432 patients were tested for the presence of dengue virus. Out of the 432 patients, 137 (31.3%) were found to be positive. All the four dengue virus serotypes were observed. Conclusions: The simultaneous circulation of the four dengue serotypes is described for the first time in Manaus and in Brazil.

Keywords: Dengue. Reverse transcriptase-polymerase chain reaction. Serotypes.

The first epidemic of dengue fever in Brazil, with isolation of the virus, occurred in 1981, in the State of Roraima, when DENV-1 and DENV-4 were identified. In 1986, DENV-1 was identified in the State of Rio de Janeiro and subsequently disseminated to other states of Brazil.

Manaus, the capital city of the Amazonas State with almost 2 million inhabitants, is located in the middle of the Amazon rain forest and has suffered dengue outbreaks since 1998, when a huge outbreak of dengue fever happened for the first time. Approximately 20,000 cases, caused by serotype 1, were reported. At the end of the same year, dengue serotype 2 was detected for the first time in this city. In 2001, DENV-2 produced the second large outbreak with 30,000 reported cases, including 60 dengue hemorrhagic fever cases. On October of 2002, dengue serotype 3 was detected in Manaus. Since then, during rainy seasons, it has suffered outbreaks with increasing number of severe dengue cases, mostly in children. Lately, on January of 2008, in Manaus, dengue serotype 4 was detected for the first time in Brazil after a lapse of 26 years. Since then, all dengue serotypes have occurred in turns in Manaus. However, following an upward trend of dengue in Brazil, in the first months of 2011, a new dengue fever outbreak started in Manaus with almost 40,000 cases, affecting residents from all regions in the city and causing disease of distinct severities.

A total of 432 blood samples were collected from patients with <7 days of fever presenting to the outpatient clinic and the emergency department of the Fundação de Medicina Tropical Dr. Heitor Vieira Dourado, a tertiary and public health care center, reference for tropical and infectious diseases, located in the City of Manaus, from January to April of 2011. As these were diagnostic samples received during the outbreak, no prior ethical clearance was required.

Viral RNA was extracted from serum samples using the QIAamp Viral RNA mini kit (Qiagen, Germany) as per manufacturers’ instructions. Extracted RNA was stored at -70°C or used for RT-PCR immediately. The RNA was used for dengue virus detection and typing in a semi-nested multiplex reverse transcription-PCR protocol as described by Lanciotti et al. RNA extracts of the positive samples were also re-analyzed in a singleplex PCR reaction using the same individual type-specific primers.

Of the 432 patients with DF, 137 (~31%) were found positive for dengue virus by RT-PCR. One hundred and twenty-one had monoinfection by one single serotype, while 16 had co-infections by two serotypes of DENV. Of the 121 patients with monoinfection, 51, 31, 22, and 17 had serotypes DENV-2, DENV-4, DENV-3, and...
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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.