

# **Serological characterization of dengue virus infections observed among dengue hemorrhagic fever/dengue shock syndrome cases in upper Myanmar.**

Mya Myat Ngwe Tun,<sup>1</sup> Kyaw Zin Thant,<sup>2,3</sup> Shingo Inoue,<sup>1</sup> Yae Kurosawa,<sup>4</sup> Yee Yee Lwin,<sup>3</sup> Sanda Lin,<sup>3</sup> Kay Thi Aye,<sup>5</sup> Pe Thet Khin,<sup>6</sup> Tin Myint,<sup>7</sup> Khin Htwe,<sup>8</sup> Cynthia A. Mapua,<sup>9</sup> Filipinas F. Natividad,<sup>9</sup> Kenji Hirayama,<sup>10</sup> and Kouichi Morita<sup>1\*</sup>

<sup>1</sup>Department of Virology, Institute of Tropical Medicine, Nagasaki University and GCOE Program, Nagasaki, Japan

<sup>2</sup>Department of Molecular Epidemiology, Institute of Tropical Medicine, Nagasaki University, Nagasaki, Japan

<sup>3</sup>Virology Research Division, Department of Medical Research (Upper Myanmar), Pyin Oo Lwin, Myanmar

<sup>4</sup>Pentax Co. Ltd., Tokyo, Japan

<sup>5</sup>Virology Research Division, Department of Medical Research (Lower Myanmar), Yangon, Myanmar

<sup>6</sup>Department of Child Health, University of Medicine, Mandalay, Myanmar

<sup>7</sup>University of Medicine (II), Yangon, Myanmar

<sup>8</sup>Department of Child Health, University of Medicine (I), Yangon, Myanmar

<sup>9</sup>Research and Biotechnology Division, St. Luke's Medical Center, Quezon City, Philippines

<sup>10</sup>Department of Immunogenetics, Institute of Tropical Medicine, Nagasaki University and GCOE Program, Nagasaki, Japan

J Med Virol. 2013 Jul;85(7):1258-66.

In Myanmar, dengue fever (DF)/dengue hemorrhagic fever (DHF) is one of the leading causes of morbidity and mortality among children. From Pyinmana Hospital in 2004 and Mandalay Children Hospital in 2006, 160 patients diagnosed clinically to have DHF/dengue shock syndrome (DSS) were examined for immunoglobulin M (IgM) and IgG levels. A focus reduction neutralization test was also used to determine primary or secondary dengue virus (DENV) infection. By using IgM-capture ELISA, 139 cases were confirmed as DENV infections. Of these IgM-positives, 94 samples were collected 7-24 days from the onset of illness, to which 13 (14%) and 81 (86%) were determined to be primary and secondary DENV infections, respectively. The 13 primary DENV infection cases were spread among the various severity groups (DHF grade I-IV and DSS) and represented age groups ranging from <1 year of age to 9 years of age. The patients in these primary infection cases showed a remarkably high IgM with a low IgG titer response compared with the secondary infection cases. No significant differences were observed in IgG titers with clinical severity. The data obtained in this study suggest that primary DENV infection cases exist certainly among DHF/DSS cases in Myanmar, and that additional mechanism(s) aside from the antibody-dependent enhancement mechanism could have influenced the clinical severity in DHF/DSS cases.