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will speak on

Various Phenomena in Transmission Process of Dengue Disease

ABSTRACT: One of the most important public health programs in many tropical countries is the program to control or to eliminate dengue. This is because dengue is regarded as a very dangerous disease that may lead to death. The disease is caused by one of four known strains of avivirus, namely DEN-1, DEN-2, DEN-3, and DEN-4. It is transmitted mainly by female *Aedes aegypti*, although it is also reported that *Aedes albopictus* can transmit the disease in some circumstances. There are three stages of severity of an infected human: Dengue Fever (DF) comes with mild cold symptoms, Dengue Hemmorrhagic Fever (DHF) causes blood discharge from the vessel, and Dengue Shock Syndrome (DSS) that may lead to death. In the endeavor to eliminate the disease, some efforts have already been made in many countries, such as destroying the adult class of the mosquitoes with insecticides and stimulating predation of the larval class of the mosquitoes. Some other attempts are being investigated, such as developing a safe vaccine that can protect humans from the four known dengue viruses. It is necessary to understand the behavior of the transmission in order to achieve proper strategy to control the spread of the disease. It is believed that mathematical modeling we can perform the task. Various transmission model and simulation are shown here.

Within the human body, the spread of dengue viruses is even more complicated. It is known that the virus disappeared within approximately seven days after viremia. Here we show a model which takes into account two immune responses corresponding to increase of infected cells and a kind of predator-prey type response between immune cells and infected cells. With this model, the phenomenon that the virus quickly disappeared approximately 7 days after the onset of the symptom is shown. Stable endemic equilibrium appeared as the basic reproductive ratio is larger than one. This existence of the endemic equilibrium does not depend on the immune responses, and hence the intensity of the endemic equilibrium cannot be analyzed only from the basic reproductive ratio. It is shown that a linear combination of the immune responses gives classification of the virus dynamic. Numerical simulations indicate that the growth of immune response and the invasion rate are very crucial in identification of the intensity of infection.

DATE: **Thursday, October 9, 2008**

TIME: **11:30am – 12:30pm**

PLACE: **MAP 318**

Refreshments will be served.