Title: Role of dengue microparticles in dengue pathogenesis

Supervisors: Dr Oscar, Guey Chuen Perng

Keywords: Genetics, Infectious Disease, Molecular Medicine, Translational medicine

Field: Clinical Project with lab work, data analysis

Duration: 4-6 weeks

Project Description:
Dengue, the widest spread mosquito-borne disease with around 50 million cases annually, caused by dengue virus (DENV). DENV infection can cause both mild and severe dengue illness which share certain clinical features including fever, hemorrhagic tendency and thrombocytopenia. The clinical feature to distinguish severe symptoms from mild is the presence of plasma leakage in severe dengue infection. Several hypotheses have been addressed to DENV-related plasma leakage both in vitro and in vivo, such as unregulated cytokine/chemokine production, DENV NS1-activated complement, epithelial cells clearance by DENV-induced autoantibodies. However, the pathogenesis of dengue has been hampered by the lack of animal models. Although non-human primates can be infected with DENV, they do not develop disease. Therefore, the dengue pathogenesis in human remains to be clarified. Microparticles (MPs) are the small particles, size around 100-1000nm in diameter, budding from cell membrane, based on their ability to carry and transfer the bio-cargo to the recipient cells, MPs has been report to play an important role in cell-cell communication. MPs have been applied as a clinical index in estimating the severity in various diseases. In the viral studies, some virus, such as hepatitis C virus, hijacked MPs released mechanism to support viral replication and transmission in human. According to our labs study, we recently observed an alternative morphology of DENV particles, which size as same as MPs in human, in patient serum. Ex vivo infected primary cells also produced the same observed DENV particles, which morphology distinct from in vitro cell line produced DENV, suggesting diverse pathogenesis mechanism of DENV in human. Therefore, in this project we attend to understand the role of dengue-derived microparticles (DENV-MPs) in dengue pathogenesis in human, which can further understand more about the actual life cycle of DENV in human and provide a novel
concept for anti-DENV therapy development.

**Requirements:** basic knowledge about biochemistry and molecular biology and if possible genetics