

## Results report

- 1 . Title of Research and Development : Project for Development of Innovative Research Technique in Genetic Epidemiology of Malaria and Other Parasitic Diseases in Lao PDR for Containment of Their Expanding Endemicity
- 2 . Principal Investigator : Shigeyuki Kano (Director, Department of Tropical Medicine and Malaria, Research Institute, National Center for Global Health and Medicine)
- 3 . Counterpart Principal investigator : Paul Brey (Director, Institut Pasteur du Laos, Ministry of Health (Lao PDR))

### 4 . Results of Research and Development:

#### 1) Study on Malaria:

Sampling in the field and analysis of the gene variation of drug-resistant malaria were conducted.

In May, 2015, a malarial field study in Attapeu prefecture was conducted and blood samples from 719 villagers were collected. Three diagnostic measures such as micrography, rapid diagnostic tests, and PCRs were performed for those samples. As a result, the analysis of 381 specimens had been finished and 3 (0.8%) were positive by micrography, 5 (1.3%) were positive by the RDT and 42 (11.0%) were positive by the genetic analysis by the Real-time PCR method. There were significantly many adult males of asymptomatic parasite carriers (Hidden Malaria, Parasite Reservoir) at sample collection (36 men, 6 woman,  $P < 0.05$ ). In addition, only 5 cases are with falciparum malaria parasites (11.9%), but 37 cases (88.1%) were with vivax parasites. For the elimination of malaria by the year 2030 in Laos, proper detection and appropriate treatment of those asymptomatic vivax parasite carriers are of highest concern.

Genetic variation of drug-resistant malaria, particularly an artemisinin-resistant new marker (K13) gene was analysed. As the result, I could collaborate it with research project "K13 Artemisinin Resistance Multicenter Assessment (KARMA) consortium" of the Pasteur Institute International Network and showed distribution of the variation of the K13 propeller gene of the Laotian falciparum malaria parasites. This SATREPS project contributed to a report about the distribution of the variation in the world as an article of New England Journal of Medicine, 2016 (in print).

#### 2) Study on Schistosomiasis mekongi:

In April, 2015, in the field study in Champasak, feces specimen from 152 students were collected and subjected to micrography, and the genetic test by the LAMP method. Two people (1.3%) were positive by the micrography, and 1 person (0.7%) was positive by the LAMP method. These results were not satisfactory after the mass drug administration (MDA) in the areas. In addition, 1,975 snails, intermediate hosts which transmitted *Schistosoma mekongi* were collected and infection rate was tested by DNA analysis. Those shellfish was proved to be *Neotricula aperta* gamma, but all shellfishes were *S. mekongi*-negative.

#### 3) Study on Opisthorchiasis viverrini:

In April, 2015, in the field study in Champasak, 32 (21.1%) students were with positive eggs of the liver fluke by micrography. On the other hand, 21 people (13.8%) were with positive by the LAMP method. Further analysis will be necessary whether we could distinguish different parasite eggs from those of *Opisthorchis viverrini* (Ov) by micrography or by the LAMP method.

Comparison by observing Ov positive homes and negative homes, demonstrated some secrets of being free from the disease, such as how they use kitchen, particularly in using and washing of cutting boards. This positive deviances in detail are now being investigated.