

# Lao – Lux lab / Vaccine preventable diseases 2017-2018

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## Executive summary of activities.

The LaoLux Laboratory (LLL) is supported by the infectious disease research unit at the Luxembourg Institute of Health (LIH). The LLL aims to build capacity for investigations of human and animal infectious diseases that are of relevance for Lao PDR. All studies are conducted in close collaboration with

local partners and focus mainly on the molecular epidemiology of vaccine-preventable infectious diseases, as well as animal and zoonotic diseases. These studies have importance for stakeholders in public and animal health by providing estimates about the burden of specific infections, by promoting outbreak control and vaccination programmes, by improving animal health and productivity, and by proposing measures to optimize national public health strategies.

As a continuation of our previously published study showing low immune responses to tetanus, hepatitis B and diphtheria components of the childhood pentavalent vaccine (DTP-HepB-Hib), a large-scale study was initiated in collaboration with the Institut de la Francophonie pour la Médecine Tropicale (IFMT). The aim of the study was to evaluate the vaccine immunogenicity and to identify factors that may have an effect on immune response in children with documented full vaccination.

In an ongoing collaboration with the Children Hospital, we are genetically characterizing the major determinants of respiratory infections in children. This is of importance not only to understand the epidemiology of the respiratory pathogens, but also to empirically guide clinicians to select the appropriate treatment.

Despite introduction of measles-containing vaccination into the national routine immunization program, measles virus circulation persists in Lao PDR. We are investigating when maternal antibodies become undetectable and whether vaccination at an earlier time point should be considered.

In response to the vaccine-derived polio outbreak that affected several provinces in 2015, we conducted a retrospective serosurvey to evaluate the susceptibility of the population to poliovirus before the outbreak. We show a suboptimal vaccination coverage or waning of neutralizing antibodies among adults that may sustain silent circulation of

poliovirus.

In response to a Hepatitis A virus outbreak in Xiengkhuang province we determined the seroprevalence of anti-hepatitis A virus IgG in a cross-sectional age-stratified study and find high levels of infection in the general population.

One of our major focuses is on hepatitis B virus infection. We have investigated infection in several sub-populations, including Lao blood donors, child transfusion recipients and garment factory workers.

Our collaboration with the Faculty of Agriculture, University of Health Sciences continued with a project evaluating the risk of farmers in rural areas and slaughterhouse workers to become infected with hepatitis E virus. In addition, we show that pigs and ruminants play a role for hepatitis E virus epidemiology.

**Our staff gave external presentations;**

- + Faculty of Agriculture, August 2017 (2 oral presentations)
- + National Health Research Forum (Vientiane, Lao PDR), October 2017 (2 posters and one oral presentation)
- + Mekong Hepatitis Symposium, November 2017 (one oral presentation)

**Our training activities in this period included;**

- + Giving “Immunology” and “Vaccinology” seminars to first year Masters students from Institut de la Francophonie pour la Medicine Tropicale (IFMT)
- + Supervised 5 IMFT Masters students. The subjects of their theses were;
  - “Seroprevalence of diphtheria among vaccinated children 9-23 months old in Lao People’s Democratic Republic (PDR), 2017”
  - “Hepatitis B seroprevalence after pentavalent

vaccination among children in Lao PDR, 2017”

- “Seroprevalence of tetanus among fully vaccinated children in Lao PDR, 2017”
- “Study of the seroprevalence of tetanus in pregnant women and the transfer of anti-tetanus immunoglobulin to child in Lao PDR”
- “Seroprevalence of Hepatitis A virus (HAV) and risk factors in Xieng Khouang Province”
- Training for Lao Military staff in vaccine-preventable infectious diseases, May 2017
- Staff received First Aid Training, June 2017
- Training for Luxembourgish veterinarian student Sophie Faber, August 2017; literature reviews, scientific methods, field trips and giving internal and external seminars

**Our collaborations with local partners this period included:**

- + The National Blood Transfusion Centre and branches, Lao Red Cross, Vientiane Capital Several hospitals at the Central, Provincial, district and health centre level
- + Institut de la Francophonie pour la Médecine Tropicale (IFMT), Vientiane Capital
- + University of Health Sciences, Vientiane Capital
- + Faculty of Agriculture, National University of Laos Vientiane Capital
- + Luxembourg Development Cooperation Agency (LUX DEV)

**Manuscripts published 2017**

+ High prevalence of intestinal worms in children up to 5 years of age in Huaphan province, Lao People’s Democratic Republic (PDR).

Nanthavong N, Black, AP, Khattignavong P, Lorphachan L, Vilivong K, Goossens S, Buisson Y, Quet F, Muller CP, Nakamura S. Parasite Epidemiology and Control. 2017 August; 2(3): 114-117.

+ Low and disparate seroprotection after pentavalent childhood vaccination in the Lao People's Democratic Republic: a cross-sectional study.

Evdokimov K, Sayasinh K, Nouanthong P, Vilivong K, Samountry B, Phonekeo D, Strobel M, Haegeman F, Heimann P, Muller CP, Black AP. Clin Microbiol Infect. 2017 Mar;23(3):197-202. doi: 10.1016/j.cmi.2016.10.007. Epub 2016 Oct 15. PMID: 27756713

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The laboratory is funded by a grant from the Government of the Grand Duchy of Luxembourg.

### Team:

#### Scientists:

1. Dr. Antony Black, Responsible of the Lab
2. Dr. Phonethipsavanh Nouanthong

#### Junior scientists:

1. Dr. Kinnaly Saidalasuk
2. Dr. Vilaysone Khounvisith
3. Dr. Phonepaseuth Khampanisong

#### Technicians:

1. Ms. Latdavone Khenkha
2. Ms. Bounta Vongphachanh

#### Visiting scientists from Department of Infection and Immunity, Luxembourg: Lisa Hefele (PhD student)

1. Daria Kleine (Medical student)
2. Silvia Tritz (undergraduate student)

#### Project carried on in the lab

- + Immunogenicity of pentavalent vaccine in Lao PDR
- + Transfusion transmitted infections in Lao Children
- + Seroprevalence and risk factors of hepatitis B and C virus infections in female workers of Lao garment factories

- + Immunity levels to poliovirus in Lao children and adults before the vaccine-derived poliovirus outbreak: a retrospective study
- + Research and capacity building activities on zoonotic viruses in Lao PDR
- + Hepatitis A virus seroprevalence in Xiengkhouang Province.