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Dean's Foreword

Looking back over the year 2015 I feel proud of the work and achievements of our Faculty. It was a positive and productive year in all aspects of the Faculty's activities and outputs. One of the highlights of the year for me was the number of awards, both internal and external, received by Faculty members. It was great to see the hard work and expertise of both our academic and support staff recognized by these awards. You can see details of all the awards on page 102.

Another highlight was meeting with one of my predecessors. I was fortunate to lead the celebrations for Professor Emeritus Santasiri Sornmani's 80th birthday. Prof Sornmani was Dean of the Faculty from 1982 to 1990, and during the birthday celebrations he shared many stories and recollections. I found him inspirational, and I know many others thought the same.

In such a busy year and a year with many new plans beginning, it was difficult to choose just a few topics for this foreword but I have settled on the selection below.

INVESTING IN RESEARCH

The past year saw much investment in research at the Faculty. This included improving our working environment, such as providing sufficient, dedicated lab space and necessary equipment. It also included training. Our 'Crafting the Future' series of workshops provided practical advice and insight on the complete research process, from designing a study to applying for funding to preparing a manuscript for submission. Training was also offered on how to translate research into products and innovations to enhance human health.

We invited several experts, including those from the Ministry of Public Health Thailand, MORU, and the National Research Council of Thailand, to join us in a workshop to revise and refine the Faculty's 15 year research direction.

This investment will help us capitalize on our already strong research base. For example, we have already seen further work on Cipargamin (KAE609), a new synthetic antimalarial, building on the successful initial trial published in The New England Journal of Medicine.

THE HOSPITAL FOR TROPICAL DISEASES

The Hospital was successfully re-accredited and I am grateful to the staff for their level of commitment and focus to maintain the necessary high standards.

I have been delighted by the impact of the new social ward rounds. These twice-weekly rounds bring together staff, patients and families. They have proven an important communication and learning activity for staff. The rounds involve families in a patient's care, which can improve recovery and rehabilitation after they are discharged. The rounds also provide opportunities for patients to ask questions and receive compassionate, empathetic and supportive attention.

The disease landscape of Thailand has changed, so last year we began planning how best to broaden the scope of the hospital. The hospital will remain a tropical disease specialist, but will reflect the fact that non-infectious diseases are now the greatest cause of death in Thailand. The hospital will also adapt to better prepare for the demands of Thailand's ageing society. The HomeCare and Intermediate Care wards will have increased occupancy to provide a greater number of older patients with the care they need in a more home-like environment.

EFFICIENCY AND RESOURCES

As a Faculty, we know that global resources are finite. Therefore, we want to ensure that we use them as efficiently as possible. Unfortunately, we did not meet our energy-, water-, and paper-use reduction goals in 2015 but we are moving in the right direction. I remain optimistic that, working together, we will achieve our 2016 targets.

Levels of government spending on medical research are not guaranteed in Thailand or in our funding-partner countries, so we must be aware of budgeting accurately and making the best use of our spending. It is not necessarily about cutting costs, but about ensuring good value.

TRANSLATIONAL RESEARCH

In 2015, the Faculty increased its focus on ensuring that research translates into increased health quality. This can be a long and sometimes difficult process, but I believe creating benefits for humankind should be our personal and professional goal. The Faculty works closely with three key communities in Thailand to target neglected or even forgotten health issues. For example, our work in Tha Song Yang District, Tak Province, will ultimately lead to a practical method to reduce the impact of amoebiasis.

THE BANGKOK SCHOOL OF TROPICAL MEDICINE

While the School has a great reputation and attracts many international students, we also recognize there are areas for change and improvement. To produce well-rounded and able graduates, we are moving towards outcome-based education. This new approach will help ensure that our students not only learn the basic clinical sciences and how to diagnose, manage, and prevent disease, but also become lifelong learners. We want our graduates to be self-aware, to be committed to personal and professional development, and to see the social and community contexts of medicine both in Thailand and worldwide. With greater emphasis on critical thinking, problem-solving and communication, outcome-based medical education can create independent and dynamic health professionals.

With changes in technology, communications, and how people access information, distance and online courses are becoming more and more popular. The School has taken note of this trend and in 2015 started planning its own MOOC (Massive Open Online Course) to extend the reach of our academics and bring medical education to those who cannot attend on-campus classes.

Looking forward to 2016, we have an exciting new addition to the learning opportunities on offer – the Discovery Museum of Tropical Diseases. The museum will provide the public with interactive and informative exhibitions that allow them to learn more about the Faculty and its past, present, and future work. In addition, critical information will be made available on the prevention and identification of common tropical diseases.

I encourage you to take some time to look through this Annual Review and learn more about the work of your colleagues and to see differences they are making to public health –locally, nationally, regionally, and globally.

For a healthier future,

Prof. Yaowalark Sukthana

Strategic Plan

STRATEGIC PLAN (2014-2017)

The five year plan covers eight keys area that will be addressed in the Faculty's mission to achieve its vision to be a world leader in Tropical Medicine. For each key area there is a clear aim and the Faculty works towards achieving that aim through its activities and prioritization.

TEACHING EXCELLENCE

The Faculty aims to make the Bangkok School of Tropical Medicine **one of the top five Tropical Medicine schools in the world,** by further improving its teaching and learning as well as providing courses and curricula that reflect the groundbreaking research conducted by the Faculty's researchers. We also aim to ensure our graduates are equipped and inspired to create positive change for global public health.

- In 2015 – a survey of students found that 92% were satisfied or very satisfied with their education at the School. During the year 45% of the Faculty's previous graduates were recognized as change agents for better society through receiving independent awards, securing influential positions or making other substantial contributions to public health. We have increased the diversity of the School, currently 70% of the students and 10% of the teaching staff are international.

RESEARCH AND INNOVATION EXCELLENCE

The Faculty is a key driver in Tropical Medicine research in the ASEAN region, and will strive to continue pushing the boundaries of knowledge even further, with the aim to **be one of the top three Tropical Medicine research institutions.** This will be achieved by continuing to increase the number and quality of publications and their impact.

- In 2015 – the Faculty had an average publication rate of 2.7 articles per researcher, an increase from 2.3 from 2014. Our researchers were awarded 15 international research grants with combined funding of 145.5 million Thai baht.

OUTSTANDING CLINICAL OUTCOMES

The Hospital for Tropical Diseases aims to provide patients presenting with tropical diseases with the **highest level of care in Southeast Asia,** by employing the country's leading specialists in Tropical Medicine, providing excellent levels of service and having the most modern facilities and medical equipment available.

- In 2015 – 69% of out-patients said they were very satisfied in all the service areas focused on by the Hospital. The Hospital has seven areas of service satisfaction, known as the 7 TM STARS: Talk, Image, Standard, Turnaround, Atmosphere, Response and System.

PEOPLE EXCELLENCE

People are the most valuable resource for the Faculty and it will continue to recruit the best employees at all levels. In order to attract the top talent we will invest heavily in co-workers' career development and in making their work at the Faculty challenging and rewarding. The Faculty aims to be the **best university employer in Thailand.**

- In 2015 – 82% of employees said they felt the Faculty's goals aligned their own and that they were engaged with their work.

INFRASTRUCTURE EXCELLENCE

Through the "TM Green" campaign, the Faculty aims to **reduce its environmental footprint** by encouraging the habit of reducing, reusing, recycling, and repairing resources. The campaign raises employees' awareness about maintaining a greener environment, both locally and globally.

- In 2015 – the amount of green space on the campus was increased by 10% through planting of vertical and roof gardens. Increased activity in the Hospital and Research facilities meant electricity and paper use increased, but the Faculty was able to reduce water use by 2%. We are aware there is room for improvement in our energy and resource conservation and will reaffirm our commitment in 2016.

CUSTOMER AND COMMUNITY SERVICE EXCELLENCE

The Faculty is committed to valuing the needs of its customers and stakeholders by providing quality academic and other services. The Faculty aims to be in the **top 10% of service providers in Thailand.** The Faculty works continuously to improve services, and to adapt to the ever-changing environment it operates in.

- In 2015 - there was a focus on public relations and communications to help increase customer engagement. In a survey of students and patients, key customers of the Faculty, 93% were happy with the service they received and would recommend it to friends and family.

ALLIANCE EXCELLENCE

One of the Faculty's main strategic advantages is our extensive network of collaborators and partners and the Faculty strives to constantly strengthen and expand these connections. Aiming to be **in the top 10 preferred partners** of all of its collaborators, the Faculty works to maintain successful and mutually beneficial relationships with national and international partners. One of the key areas of focus is to ensure that the logistics of collaboration are easy, flexible, and allow for expansion.

- In 2015 - a survey sent to all international collaborators found that 70% were happy or very happy with the communication and relationship they had with the Faculty.

LEADERSHIP AND MANAGEMENT EXCELLENCE

Effective leadership and management is a key component to ensure the Faculty's continued success, and it invests heavily in developing skills. The Faculty aims to **have 85% of Committee members trained in Education Criteria for Performance Excellence,** a 160-hour course that forms the basis of a valuable framework to help plan, perform, and measure results.

- In 2015 – 75% of the current Committee are trained in using the Excellence Criteria.

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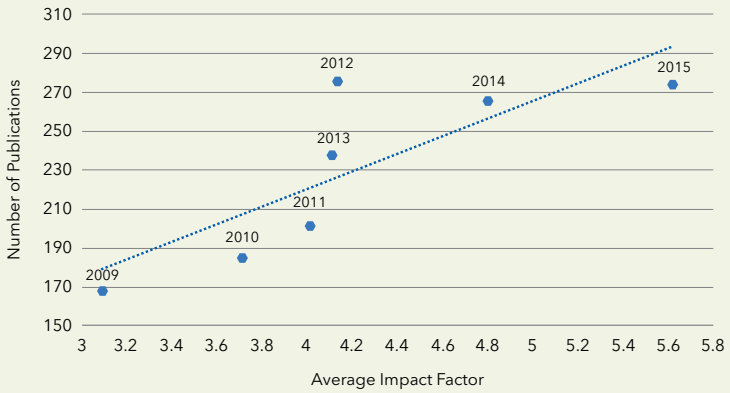
Executive Summary

RESEARCH

Publications have steadily increased, both in terms of number and journal impact factor. In 2015, the total number of publications from the Faculty and its collaborative unit, MORU, was 274, an increase of 3% from 2014. The average journal impact factor greatly increased, from 4.8 in 2014 to 5.62 in 2015.

At the end of 2015, the Faculty had 226 ongoing or recently completed research projects. This level of research and output shows the Faculty's progress towards becoming a top Tropical Medicine research facility by 2017.

IMPACT FACTOR AND NUMBER OF PUBLICATIONS

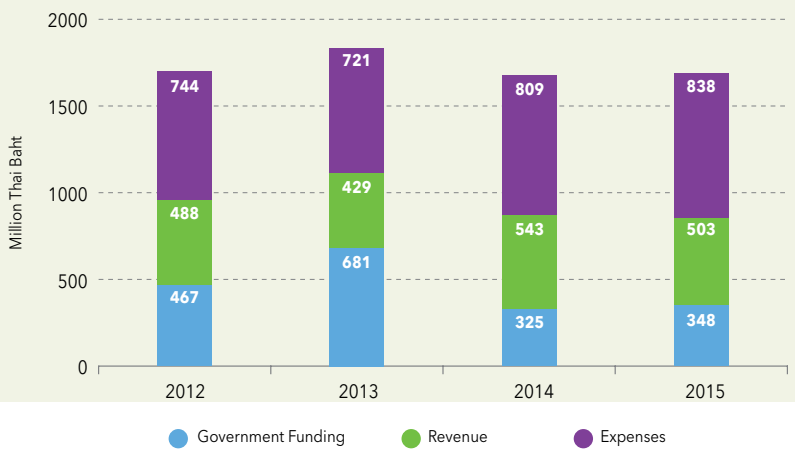


FINANCES

The Faculty had a strong year financially, with a 5% increase in total income from 2014. The Faculty has two distinct areas of income – Government Funding and Revenue. The Revenue category contains a variety of different sources, including student and patient fees, national and international research grants, and rent and service agreements.

Expenditure in 2015 was below income with total expenses at 838 million THB and total income at 851 million THB.

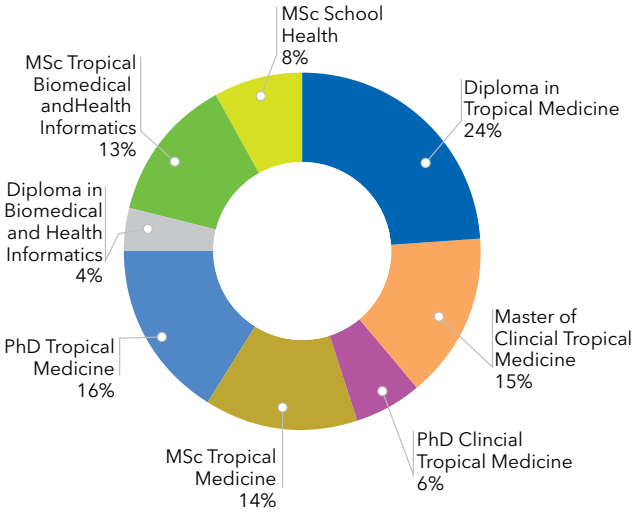
FACULTY INCOME AND EXPENSES



BANGKOK SCHOOL OF TROPICAL MEDICINE

The School has continued successfully to attract students, with an increasing number of international students. In 2015, 70% of enrolled students were non-Thai, a significant increase from 2014. This increasing internationalism is a sign of the progress the BSTM is making towards its aim of becoming a Top-Five Tropical Medicine School by 2017.

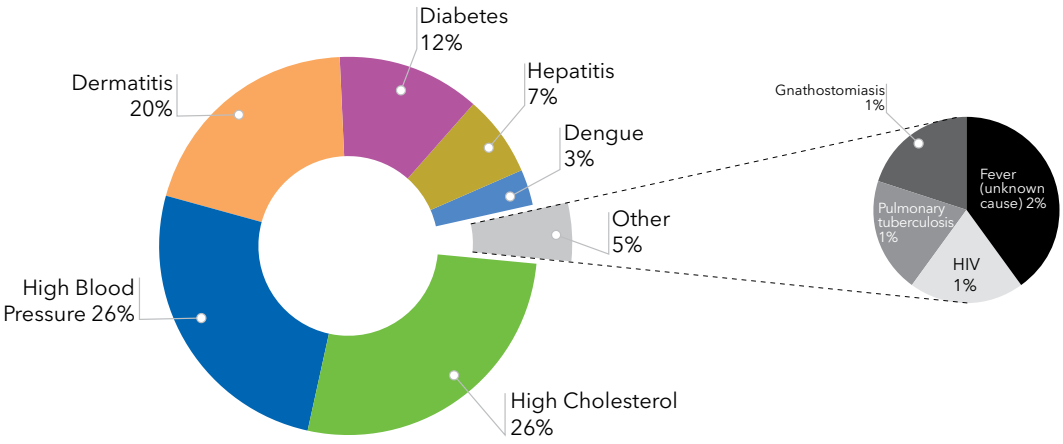
Of the international students, 73% came from the ASEAN community, 17% from wider Asia, with the remainder coming from Europe. Seventeen different countries are now represented in the School. In 2015, the most popular course was the Diploma in Tropical Medicine, which was also the most diverse, with ten nationalities enrolled.



HOSPITAL FOR TROPICAL DISEASES

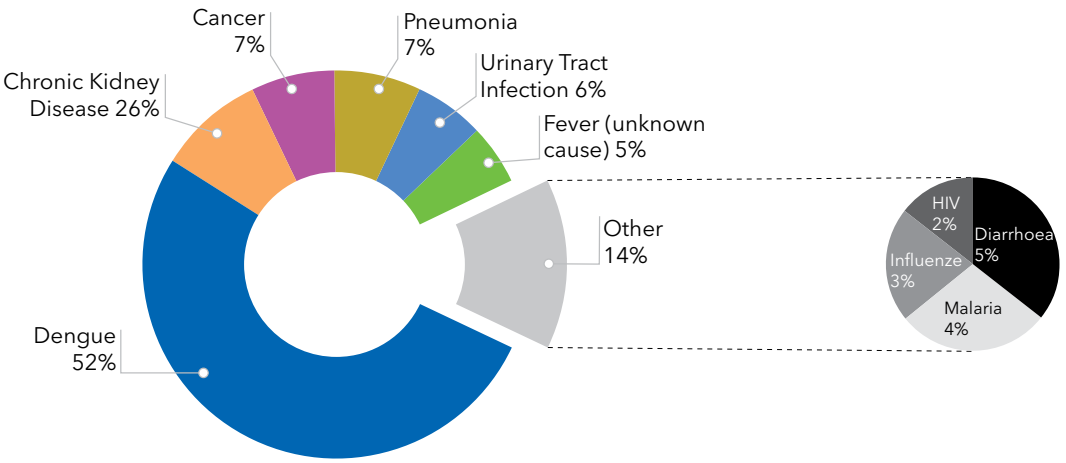
The Hospital was busy throughout 2015, with over 39,000 outpatient cases and nearly 2,300 inpatient cases. Non-communicable diseases dominated the outpatient cases, with high blood pressure and high cholesterol contributing more than half of all visits.

OUTPATIENT CASES



More than half of the in-patients were admitted with dengue, a large increase from 2014 in terms of both absolute number and percentage. In 2014, there were 300 inpatients with dengue, 32% of the total, while in 2015 there were 1,118, which was 52% of the total inpatients. This sharp increase was due to two contributing factors--the dengue outbreak that affected much of Asia, and the fact that the Hospital is now an established specialist center, receiving dengue patients from many other hospitals.

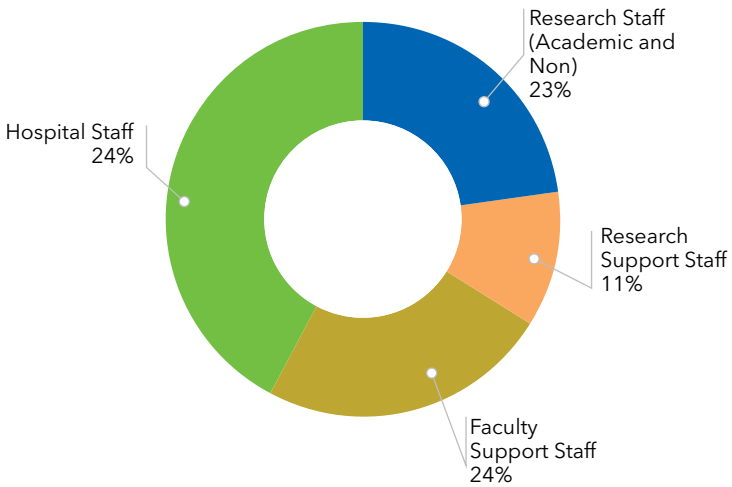
INPATIENT CASES



HUMAN RESOURCES

In 2015, a total of 820 staff were working in the Faculty. The largest proportion of these were healthcare and administrative staff in the Hospital for Tropical Diseases. The two categories of support staff, Research and Faculty, together made the next largest group. This group includes many different roles, such as laboratory technician, maintenance staff, and administrative staff. The support staff enable the Faculty to run as smoothly as possible, allowing Research and Teaching Staff to concentrate on their work.

FACULTY STAFF

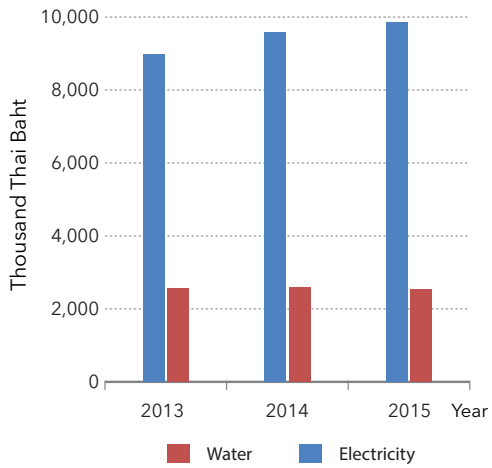


INFRASTRUCTURE AND ENERGY USE REDUCTION

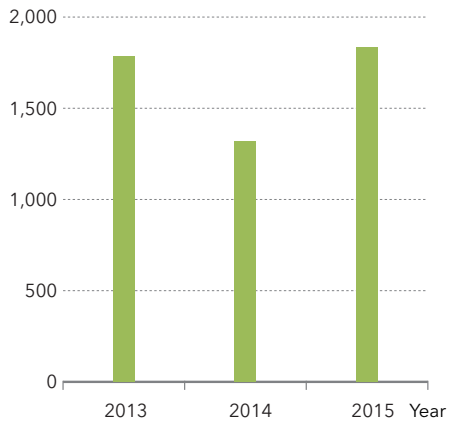
In 2015, the Faculty continued to raise awareness of environmentally beneficial behaviors and work towards reducing its use of electricity, water, and paper. A World Environment Day event included presentations, motivational speakers and showcases of green technologies.

With the expansion of the Hospital and research facilities spending on electricity and paper increased in 2015, but a reduction in water use was achieved.

Spending on Electricity & Water



Number of Sheets of Paper Used



Departments

The Faculty was first established in 1960 with just five departments, but with increased specialization this number is now eleven. Covering a broad range of Tropical Medicine areas, the departments conduct research, teach students at the Bangkok School of Tropical Medicine, and provide services to both academic and healthcare communities.

The following pages highlight the main research areas of each department, and their work and achievements in 2015.

Clinical Tropical Medicine

Asst. Prof. Weerapong Phumratanaprapin - Head

Professor Emeritus Khunying Tranakchit Harinasuta founded the Department of Clinical Tropical Medicine in 1960. It now consists of twelve subunits, and conducts research in a wide range of areas – from tropical diseases like malaria and parasitic diseases to HIV/AIDS and skin diseases.

As well as research, the Department provides training and education for medical professionals and students at the Faculty. In addition, the Department is home to vaccine trials for HPV, HIV, cholera, and shigella infections.

The Department has a large number of international collaborators, including the Research Institute for Microbial Diseases, Osaka University, Japan; the Department of Pediatrics, Columbia University, U.S.A.; and the Laboratory of Parasitology and Medical Mycology, Cayenne, French Guiana.

❝ The Department now consists of twelve subunits, and conducts research in a wide range of areas – from tropical diseases like malaria and parasitic diseases to HIV/AIDS and skin diseases ❞

MAIN RESEARCH AREAS

- Malaria
- Dengue
- Melioidosis
- Scrub typhus
- Toxoplasmosis
- Travel medicine
- HIV/AIDS
- Skin diseases
- Vaccine trials


2015 SOCIAL IMPACT

Dr Kesinee Chotivanich, in collaboration with WWARN, developed and updated the "Guidelines for the Cryopreservation of field isolates". The document hopes to standardize the methodology for cryopreservation of malaria parasites using glycerolyte, leading to homogeneous quality in the pre-analytical phase of studies. This in turn will help provide evidence to track malaria drug resistance, and improve drug efficacy.

The Department contributed to new Thai guidelines for malaria treatment. The Center for Disease Control publication "Clinical guidelines for the treatment of patients with malaria" will help standardise malaria treatment for better health outcomes for patients.

2015 HIGHLIGHTS

Publication in The New England Journal of Medicine, a journal with an impact factor of 55.873. The publication described a study to assess a candidate tetravalent dengue vaccine, which included a trial carried out by the Department. The study found the risk of dengue among children 2 to 16 years of age was lower in the vaccine group than the control group.

Prof. Punnee Pitisuttithum received the **"Most Outstanding Researcher in Medical Science 2015" award from the National Research Council of Thailand**. As well as being part of the Department of Clinical Tropical Medicine, Prof Punnee is also the Deputy Dean for Translational Medicine and Innovation and the Head of the Vaccine Trial Center.

Opening of the new Clinical Tropical Medicine laboratory. The facility is a BSL 2 laboratory and is an excellent new resource for research and teaching. Current research areas in the lab include pathophysiology, serological profiles in dengue patients, diagnosis of hepatitis and host- parasite interactions in malaria.

2015 FACTS AND FIGURES

Number of publications	63	Number of oral presentations	2
Number of poster presentations	11	Awards	6
Number of academic staff	26	Number of support staff	17
Number of students	43		

Helminthology

Assoc. Prof. Paron Dekumyoy - Head

The Department was established in 1960 and has long been involved in both teaching and research. The Department now also offers key helminthology-related services, including the Immunodiagnosis Unit, established in 1987, and the International Reference Centre for Food and Water Borne Parasitic Zoonoses, a public database to provide information about the identification, transmission, diagnosis, and treatment of helminthic diseases.

> ❝ The Department now also offers key helminthology-related services. The Kato-Katz test kit for fecal examination, produced by the Department, is now used in 10 countries across Africa and Asia. ❞

The Department of Helminthology conducts research in six areas of medically important helminths: morphology, epidemiology, immunodiagnostics, bio-diversity, host-parasite therapy, and molecular biology. The Department carries out research across a range of helminth-caused diseases, including angiostrongyliasis, taeniasis, gnathostomiasis, soil-transmitted helminthiases, paragonimiasis and small fluke infections, as well as running international training programs in practical, clinical, and diagnostic helminthology for physicians, medical students and health professionals.

MAIN RESEARCH AREAS

- Morphology
- Epidemiology
- Host-parasite relationship and therapy
- Immunodiagnostics
- Population genetics and bio-diversity

2015 SOCIAL IMPACT

The Kato-Katz test kit for fecal examination, produced by the Department, is now used in 10 countries across Africa and Asia. The year 2015 saw several new customers, including organisations in Madagascar and Lao PDR. The test kit allows healthcare workers in low-resource settings to diagnose helminth infections quickly and easily by counting and identifying eggs in a stool sample under a microscope.



The Department continued to work with schools outside Bangkok, to test and treat students for helminth infections. This ongoing project provides valuable data on infection in school-aged children to inform public-health planning and policy.

In 2015, the Department provided training for healthcare professionals working in district-level hospitals in Thailand. The training focussed on the accurate diagnosis of helminth infections. Increasing the diagnostic skills of these professionals means patients are more likely to receive the correct treatment the first time.

2015 HIGHLIGHTS

Research funded by the Agricultural Research Development Agency, Thailand, led to the **discovery of a herbal extract** that successfully kills the tissue helminth, *Gnathostoma*.

Development of a **new serodiagnostic service** to detect helminthiases. As well as being available for patients in the Faculty's Hospital for Tropical Diseases, the service was used by a number of off-site and international consultants.

The Immunodiagnosis Unit carried out **1,819 tests** for helminthic infections in 2015.

Funding was secured for a **3-year project to discover secretory biomolecules from the parasitic nematode, *Trichinella spiralis*,** that can regulate and modulate host immunity by inhibition of host inflammation. The biomolecules, once discovered, will be useful in the development of alternative therapies against inflammation-related diseases.

2015 FACTS AND FIGURES

Number of publications	20	Number of oral presentations	0
Number of poster presentations	1	Number of academic staff	5
Number of support staff	11	Number of students	16

Medical Entomology

Assoc. Prof. Narumon Komalamisra - Head

As one of the first five original Departments of the Faculty of Tropical Medicine, the Department of Medical Entomology has a long history of research, education, and public service. The Department has expertise on the taxonomic identification of important insect vectors and arthropods, and Department scientists have discovered many new species.

The Department also conducts studies in a wide range of research areas, from basic to applied science, biology and ecology, vector-parasite relationships, molecular entomology and vector control via chemical and plant-derived insecticides and other bio-agents.

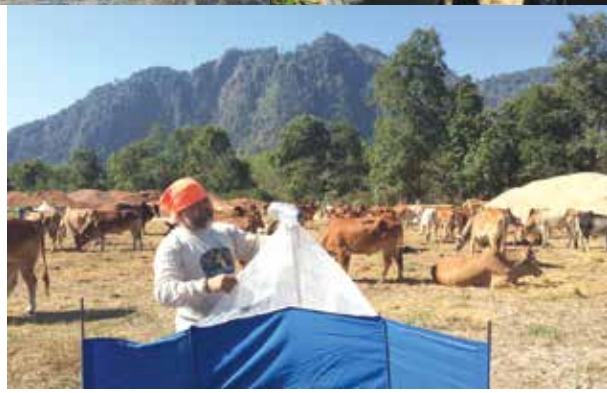
The Department of Medical Entomology also houses an insect vector-rearing laboratory, a service that helps scientists study various strains of mosquito vectors, and a comprehensive mosquito museum and reference center.

> “The Department of Medical Entomology also houses an insect vector-rearing laboratory, a service that helps scientists study various strains of mosquito vectors, and a comprehensive mosquito museum and reference center.”

MAIN RESEARCH AREAS

- Malaria
- Dengue
- Chikungunya
- Scrub Typhus



2015 SOCIAL IMPACT

In collaboration with the Department of Disease Control, Ministry of Public Health, Thailand, the Department worked on epidemiological investigations of outbreaks of vector-borne diseases. Data from these studies were shared to help design and implement public-health policies and interventions.

2015 HIGHLIGHTS

Collaborating with Kao Corporation, a Japanese consumer product manufacturer, **to develop a novel insect repellent** by understanding the sensory mechanism underlying the host seeking behaviors of female mosquitoes.

Evaluating the **efficacy of insecticide-treated clothing** (ITC) in collaboration with the Malaria Consortium. This research led to a recommendation to use ITC to reduce the transmission of mosquito-borne diseases.

Developing **a rapid diagnostic test** using mouse monoclonal antibodies that react with chikungunya virus envelope proteins.

Conducting a **training program for the Asia Pacific Malaria Elimination Network on biochemical techniques** to detect insecticide resistance mechanisms and methods for monitoring malaria vectors.

2015 FACTS AND FIGURES

Number of publications	11	Number of oral presentations	3
Number of poster presentations	9	Number of academic staff	10
Number of support staff	16	Number of students	18

Microbiology and Immunology

Asst. Prof. Pornsawan Leaungwutiwong - Head

> ❝ The Department runs a diagnostic service providing identification of pathogens responsible for a range of diseases, including melioidosis, dengue fever, hepatitis, viral gastroenteritis, influenza and just recently, Zika fever. ❞

A multidisciplinary department with a broad array of research interests, the Department of Microbiology and Immunology was founded in 1966 and is active in research, education and providing diagnostic services. Three international graduate programs are offered: a M.Sc. and PhD programs in Tropical Medicine and a Diploma of Tropical Medicine and Hygiene (D.T.M. & H.), which between them have brought in foreign graduate students from more than 42 countries. The Department also places strong emphasis on research, studying a range of bacterial, parasitic and viral pathogens, as well as the human immunological response to these infections. In addition, the Department runs a diagnostic service providing identification of pathogens responsible for a range of diseases, including melioidosis, dengue fever, hepatitis, viral gastroenteritis, influenza and just recently, Zika fever.

MAIN RESEARCH AREAS

- Dengue
- Melioidosis
- Zika Virus
- Chikungunya
- ESKAPE pathogens (*Enterococcus faecium, Staphylococcus aureus, Klebsiella pneumoniae, Acinetobacter, Pseudomonas aeruginosa* and *Enterobacter*)
- Sexually Transmitted Diseases
- Dengue
- Melioidosis
- Food- and water-borne bacteria
- Leptospira
- Emerging Tropical Mycoses

2015 SOCIAL IMPACT

Due to public concern over this year's Zika virus outbreak in the Americas, the Department provided briefings and interviews to Thai news organizations to provide more information about this virus and explain differences in symptoms and epidemiology between it and those caused by dengue and chikungunya.

The Department has an active Medical Mycology Laboratory which offers clinical diagnosis of medical mycoses, carries out drug susceptibility tests and is investigating potential anti-fungal properties of plant extracts and traditional Thai herbal remedies.

A recent collaboration with German researchers from Bernhard Nocht Institute for Tropical Medicine (BNI), Department of Virology now allow the Department to begin offering routine testing for suspected Zika virus infections.



In June, the Department hosted "Advanced Immunology Course 2015" in cooperation with Siriraj Hospital, Chiang Mai University, Khon Kaen University, and the London School of Hygiene and Tropical Medicine, which was attended by over 65 students and faculty.

HIGHLIGHTS OF 2015

Associate Professor Dr. Narisara Chantratita was awarded a major **5-year grant from the US NIH/NIAID** for "Determinants of outcome and recurrent infection in melioidosis" a large-scale study of the immune response to melioidosis infection (see Special Section on Melioidosis).

The **fungus-like pathogen** *Pythium insidiosum* is responsible for devastating ulcerative disease. Assistant Professor Thareerat Kalambaheti was part of a study that provided genetic and immunological characterization of a major protein from the organism, Exo1, which could be used as a diagnostic target and possible vaccine candidate.

Assistant Professor Dr. Natthanej Luplertlop received a **3-year JEAI grant from the French IRD** (Institut de Recherche pour le Développement) for a project entitled: "Epidemiological survey for Dengue and Chikungunya co-infection in southern Thailand."

A study examining the importance of human skin in the entry of **Zika virus** and its role in antiviral immune response identified innate immune responses that may be important in devising strategies to better understand and protect against this emerging flavivirus.

Faculty from the Department of Microbiology and Immunology collaborated with the Department of Tropical Hygiene and the Thailand Ministry of Public Health (MOPH) to measure the prevalence and genotype distribution of **human papillomavirus (HPV)** among low- and high-risk, HIV-negative populations. They found significantly higher prevalence of HPV among men who have sex with men (MSM) and MSM sex workers than among the general female population and female sex workers but the prevalence of HPV high-risk (cancerous) genotypes was significantly higher among female sex workers and MSM, whereas low-risk genotypes and genital warts were significantly higher among MSM sex workers.

2015 FACTS AND FIGURES

Number of publications	25	Number of oral presentations	10
Number of poster presentations	10	Number of academic staff	12
Number of support staff	17	Number of students	31

Molecular Tropical Medicine and Genetics

Prof. Songsak Petmitr

This is the youngest department of the Faculty of Tropical Medicine. Established in 2010, it is already a driving force in bioinformatics, genomics, and proteomics. Their research is broad, covering a wide number of diseases and research areas, from the molecular biology of drug resistance in malaria to the epidemiology of scrub typhus and leptospirosis.

> “ This is the youngest department of the Faculty of Tropical Medicine. Established in 2010, it is already a driving force in bioinformatics, genomics, and proteomics. ”

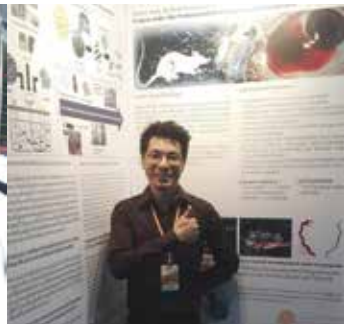
The Department has an international network of collaborating institutions, including Oxford University in the UK, the Wellcome Trust Clinical Research Unit in Lao PDR, the Calcutta School of Tropical Medicine in India, and the Walter and Elisa Hall Institute in Australia. They also have strong ties with the research community in Thailand, working with 12 national universities and institutes.

In this forward-thinking Department, the team are always looking at how to translate their work into public-health benefits and new technologies, but are aware that this can be a challenging area.

MAIN RESEARCH AREAS

- Malaria
- Scrub typhus
- Melioidosis
- Cancer
- Helminths
- Leptospirosis
- Leptospirosis





2015 SOCIAL IMPACT

The Department's research findings in both malaria and scrub typhus were presented to Thailand's Ministry of Public Health, to help inform policy and planning accurately.

2015 HIGHLIGHTS

Publication in The Lancet Infectious Diseases, a journal with an impact factor of 22.443. The study, led by Assoc. Prof. Mallika Imwong, showed, through working with large sets of samples from 55 sites, that artemisinin resistance has extended across Myanmar.

A study provided the basis for **determining the potential of Reticulocyte Binding Proteins in vaccine development** against blood-stage *P. vivax*. Dr. Wang Nguitragool and his colleagues explored the molecular mechanism of *P. vivax* invasion by characterising the expression and immune response of the *Plasmodium vivax* Reticulocyte Binding Protein family.

Provided much needed information about epidemiology of zoonotic infections of *O. tsutsugamushi*, the causative agent of scrub typhus. Assist. Prof. Piengchan Sonthayanon and her colleagues worked with *O. tsutsugamushi* in Lao PDR and Northeast Thailand to determine population distribution data.

Prof. Songsak Petmitr received the **Alumni Role Model Award** from the Faculty of Education, Burapha University, Thailand.

2015 FACTS AND FIGURES

Number of publications	18	Number of oral presentations	3
Number of poster presentations	5	Awards	3
Number of academic staff	11	Number of support staff	5
Number of students	25		

Protozoology

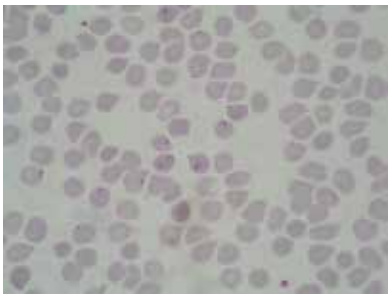
Assoc. Prof. Porntip Petmitr - Head

One of the five original departments at the founding of the Faculty of Tropical Medicine in 1960, the Department of Protozoology is focused on teaching, training, research and services in the field of medical protozoa, which includes such infective organisms as *Plasmodium falciparum, Toxoplasma gondii*, and *Entamoeba histolytica,* among others. The Department plays a particularly important role within the Thai medical and research community in providing diagnoses of protozoal diseases and supplying protozoal specimens to other institutions for their own research or teaching needs.

❝ Diagnostic services for such medically important protozoans as *Plasmodium* (all five species), *Entamoeba histolytica, Entamoeba dispar, Entamoeba moshkovskii* and *Toxoplasma gondii* are provided by the Research-based Diagnostic Unit of the Department of Protozoology. ❞

RESEARCH AREAS

- Malaria
- Toxoplasmosis
- Entamoeba
- Giardia
- Blastocystis



2015 SOCIAL IMPACT

The Department of Protozoology offered two workshops in 2015: **"Diagnosis of Intestinal Pathogenic and Opportunistic Protozoa"** and **"Laboratory Diagnosis of Malaria and Leishmaniasis in Blood Specimens."** Both workshops were well attended with more than 120 participants attending in total.



Diagnostic services for such medically important protozoans as *Plasmodium* (all five species), *Entamoeba histolytica*, *Entamoeba dispar*, *Entamoeba moshkovskii* and *Toxoplasma gondii* are provided by the **Research-based Diagnostic Unit** of the Department of Protozoology.

HIGHLIGHTS OF 2015

Phylogenetic analysis of blastocystis infections in villages on the Thai-Myanmar border showed a relatively high number of human infections with many clustered together with those from domestic pigs and cattle, suggesting the potential for zoonotic infection and the need for better health education on parasite prevention.

Published a method based on **loop-mediated isothermal amplification (LAMP)** to enable rapid and inexpensive diagnosis of water and clinical samples of the amoebic parasite *Naegleria fowleri*, which could be useful in resource-poor settings.

Research is ongoing to develop a more specific, **sensitive test for *Entamoeba histolytica***, to distinguish it from closely related but nonpathogenic amoeba, to avoid unnecessary treatment.

2015 FACTS AND FIGURES

Number of publications	5	Number of poster presentations	2
Number of academic staff	8	Number of support staff	6
Number of students	9		

Social and Environmental Medicine

Assoc. Prof. Kamolnetr Okanurak - Head

One of the most diverse departments at the Faculty of Tropical Medicine, the Department of Social and Environmental Medicine was founded in 1994. The Department focuses on three broad areas of research: 1) Social medicine, which includes a focus on treatment-seeking behavior, adherence to treatment and behaviors related to the prevention of disease; 2) Environmental health and toxicology, which is involved with environmental health assessments, lending academic expertise to the investigation of health impacts from large scale projects that may lead to chemical contamination, high water use, and climate change and guiding public participation; and 3) Malacology, which specializes in mollusks of medical importance; snails that harbor parasitic worms responsible for diseases such as schistosomiasis. Their expertise plays an important role in evaluating the health impacts of large projects, for example, investigating the altered ecology associated with dam construction to evaluate whether it could increase the number of parasite-bearing snails. In addition, this unit hosts the Mollusk Museum of the Southeast Asian Centre for Medical Malacology, which stores and displays nearly 250 species of freshwater and brackish water mollusks from every part of Thailand.

The Department provides postgraduate courses leading to M.Sc. and Ph.D. degrees in Tropical Medicine as well as short training courses on environmental and health impact assessment and has projects ranging from field investigations to biotechnology.

> ❝ The Environmental Health Social Impact Assessment Unit has been established to provide environmental and health impact assessments of development projects, both those dealing with water resources as well as industrial development projects. ❞

RESEARCH AREAS

- Health behaviors
- Environmental health
- Gastro-intestinal infectious diseases
- Chikungunya
- Medical malacology
- Occupational health and safety
- Dengue
- Cancer

2015 SOCIAL IMPACT

Assoc. Professor Kraichat Tantrakarnapa is participating in the Research University Network for Climate Change & Disaster Management (**RUN-CCDM**), focusing particularly on the problem of haze and its effect on respiratory disease.



HIGHLIGHTS OF 2015

The **Environmental Health Social Impact Assessment Unit** has been established to provide environmental and health impact assessments of development projects, both those dealing with water resources as well as industrial development projects. The unit also provides a short training course on environmental and health impact assessment.

Schistosomiasis is a continuing threat in Thailand, given its endemicity in neighboring countries. Reflecting the critical role that snails play in this parasite's life cycle, DSEM malacological researcher Assist. Prof. Yanin Limpanont was involved in a number of studies, such as an analysis of proteins which might play roles in snail-parasite interplay, another which screened parasite antigens to obtain potential candidate proteins for diagnostic development, and another that examined a virulence factor involved in immune evasion, which might be a novel vaccine candidate and chemotherapeutic target. Finally, population dynamics of one of the important snail hosts for *S. mekongi* were explored using DNA phylogenetics in a study that identified both greater distribution and previously unknown habitat for this species.

The **GeoHealth Thai Platform (GeoHTP)** project is a new initiative to promote the use of Geographic Information Systems (GIS) and remote sensing better to understand geographical and environmental contributions to health inequalities. It will gather experts for needs assessment, provide training in the use of GIS and remote sensing, and build a web-based geo-catalog to facilitate access to spatial data. This project is being funded by a grant from the Thai-Franco Fund Cooperation Program in Higher Education and Research.

The influence of temperature on bacterial virulence is of increasing interest given climate change. A study by DSEM researchers of the bacteria enteroaggregative *Escherichia coli* (EAEC) a leading cause of watery diarrhea, showed that rising temperature had a variable effect on virulence depending on the *E. coli* strain.

EBA-175 is a *Plasmodium falciparum* protein which plays a crucial role in human red blood cell invasion. A phylogenetic analysis of *P. falciparum* EBA-175 from infected Thai patients found that human population dispersal out of Africa appears to have greatly increased the genetic diversity of this protein.

2015 FACTS AND FIGURES

Number of publications	19	Number of oral presentations	2
Number of poster presentations	2	Number of awards	2
Number of academic staff	13	Number of support staff	13
Number of students	21		

Tropical Hygiene

Prof. Srivicha Krudsood – Head

> ❝ Much of its activity relates to public-health problems among rural populations in Thailand. ❞

Founded in 1960, the Department of Tropical Hygiene is one of the original units of the Faculty and serves as the focus of epidemiological research at the Faculty of Tropical Medicine. Much of its activity relates to public-health problems among rural populations in Thailand. To this end, the Department conducts studies in geo-spatial epidemiology, community studies, and statistical modeling, and has developed a Geographic Information System (GIS) used to track and model the spread of several diseases. Tropical Hygiene researchers lend their expertise in data analysis and statistical modeling to a great number of units at the Faculty, including the Centre of Excellence for Biomedical and Public Health Informatics (BIOPHICS) and the Mahidol-Oxford Tropical Medicine Research Unit (MORU). Due to the highly specialized knowledge held by this Department, it provides many external organizations with training in these fields. Its findings are often used by the Thai Ministry of Public Health (MOPH) to inform policy decisions. The Rajanagarindra Tropical Disease International Center (RTIC) provides free health services to rural populations in the malaria-endemic region along the Thai-Myanmar border.

RESEARCH AREAS

- Malaria
- Zoonotic diseases
- Biostatistics
- GIS and field research
- Dengue
- Epidemiology
- Public-health informatics

2015 SOCIAL IMPACT

With a grant from the Rockefeller Foundation, the Department and BIOPHICS have collaborated for the last three years to offer an annual international **Master of Science in Biomedical and Health Informatics (BHI)** program. Taught in English, the course focuses on using IT to manage healthcare as well as conduct public-health informatics research and is open to students of all nationalities.

Assoc. Prof. Dr. Pratap Singhasivanon won the Mahidol University Award for Teaching Excellence.



2015 HIGHLIGHTS

Dr. Direk Limmathurotsakul, along with researchers with the Mahidol-Oxford Tropical Medicine Research Unit (MORU) and others, published an important article in the journal *Nature Microbiology*, which redefines the relative impact and extent of the bacterial disease **melioidosis**. Long thought to be largely restricted to northeast Thailand, Dr. Direk and his colleagues found through meta-analysis of existing literature that melioidosis is in fact far more common than previously imagined and predict that it may be relatively ubiquitous throughout the world's tropical regions.

Department researchers contributed to a number of drug trials of **anti-malarials**: for example, a paper published in the journal *Lancet Infectious Disease*, found promising results in their trials of the new synthetic anti-malaria drug Artefenomel, finding that it had a long half-life, suggesting that it might have a possible use in single-dose treatments in combination with other drugs. Another paper focused on using older anti-malarial drugs in new combinations for more effective multi-drug treatment and thus avoiding drug resistance.

Also malaria-related, a large study among children living in the malaria-endemic region along the Thai-Myanmar border around the **Rajanagarindra Tropical Disease International Center** found no evidence of a history of malaria infection having a long-term effect on school performance. This stands in contrast to evidence from Africa, an important distinction which illustrates the utility of region-specific studies in malaria.

The Department is collaborating with BIOPHICS on the use of **mobile phone technology** to increase immunization coverage among local hill tribes; for example, an innovative solution to the challenge of maintaining accurate immunization records due to language differences has been to create an ongoing audio-visual record of children's appearance using photos and a record of the child's name by recording the mother's pronunciation.

2015 FACTS AND FIGURES

Number of publications	41	Number of awards	3
Number of academic staff	10	Number of support staff	20
Number of students	23		

Tropical Nutrition and Food Science

Assoc. Prof. Karunee Kwanbunjan - Head

Nutrition and diet have grown into areas of great public health importance over the past decades, and the Department of Tropical Nutrition and Food Science conducts research in both nutritional disorders and food science.

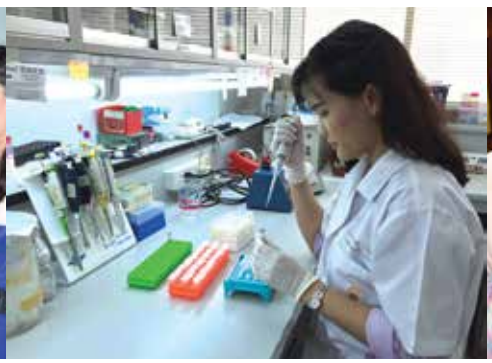
Areas of interest in Tropical Nutrition include obesity, malnutrition, coronary disease, diabetes, and dyslipidemia. An interesting but challenging area of the Department's work is the crossover with the behavioural and social sciences, looking at interventions for behavioral and attitudinal change.

Recent research in Food Science has focused on microbiology, including probiotics, glycosidase enzymes, and the use of extracts from medicinal plants. The Department works closely with the Ministry of Public Health and regional policy makers, making them influential in shaping policy and treatment in Thailand and ASEAN. The Department also has collaborations with food production companies, where they provide information and advice on nutritional content.

> "The Department of Tropical Nutrition and Food Science conducts research in both nutritional disorders and food science, researchers work with the Ministry of Public Health and regional policy makers, making them influential in shaping policy and treatment in Thailand and ASEAN."

MAIN RESEARCH AREAS

- Diabetes
- Obesity
- Malnutrition
- Metabolic syndrome
- Cancer





2015 SOCIAL IMPACT

As part of their ongoing studies, the Department worked closely with community health centers, and through this they are able to provide much needed health counselling, advice and services.

A student researcher established an equation to accurately estimate body height from knee height. This is especially useful when working with patients with mobility or posture issues, or who are bed-ridden. The tool is now frequently used with older patients in the Faculty's hospital.

2015 HIGHLIGHTS

The **completion of an obesity intervention study** that showed significant increases in weight loss with a structured, intensive program that looked at knowledge, attitude and behaviour changes as well as nutrition. The study, developed in collaboration with colleagues in social sciences, has the potential to inform future public weight-loss intervention programs.

The Department had **an increased number of students and graduates.** With increases in obesity and non-communicable diseases in the region, it seems more and more students want to specialise in this area.

Published **the first study of expressing, purifying, and characterizing the mosquito salivary a-glucosidase in *P. pastoris***. This research can be applied when screening for compounds that possess a-glucosidase inhibition properties, providing new avenues for insecticide development.

2015 FACTS AND FIGURES:

Number of publications	8	Number of oral presentations	5
Number of poster presentations	11	Awards	2
Number of academic staff	8	Number of support staff	6
Number of students	14		

Tropical Pathology

Asst. Prof. Urai Chaisri - Head

The Department of Tropical Pathology was founded in 1968, and is composed of three units: Diagnostic Pathology, Electron Microscopy, and Tissue Culture and Immunocytochemistry. The Department provides diagnostic services to the Hospital for Tropical Diseases, and due to its state of the art microscopy equipment and expertise, it can provide SEM and TEM training and services for national and regional health personnel. Research at the Department is centred on histopathology, immunohistochemistry and ultrastructural studies of tropical diseases, especially malaria and other parasitic diseases.

> “Research at the Department is centred on histopathology, immunohistochemistry and ultrastructural studies of tropical diseases, especially malaria and other parasitic diseases.”

MAIN RESEARCH AREAS

- Malaria
- Parasitic diseases
- Infectious diseases

2015 SOCIAL IMPACT

Sumate Ampawong’s study into the toxicity of Phikud Navako, a Thai traditional medicine used for the alleviation of cardiovascular and cerebrovascular symptoms, was able to determine a no-observed-adverse-effect-level of 100 mg/kg/day. This finding allows traditional medicine practitioners to make safe dosage recommendations.



2015 HIGHLIGHTS

Dr. Parnpen Viriyavejakul, an Associate Professor and Researcher with the Department, **received recognition from the National Research Council of Thailand** for her outstanding work.

The Department, with colleagues from the University of Sydney and MORU, **published a study that investigated the potential role for interleukin-33 and γ-epithelium sodium channel** in the pathogenesis of human malaria-associated lung injury. The results suggested that IL-33 may play a role in lung injury during severe malaria. This was an important step in determining the factors that lead to pulmonary edema in malaria patients.

Dr. Parnpen Viriyavejakul's study investigated the response of mast cells in the skin of patients with *Plasmodium falciparum* malaria, and was published in *Malaria Journal*. The study found that mast cells in the skin dermis are activated during malaria infection, **adding to the undertanding of the immune response to *P. falciparum*.**

FACTS AND FIGURES

Number of publications	9	Number of oral presentations	0
Number of poster presentations	5	Awards	1
Number of academic staff	12	Number of support staff	3
Number of students	6		

Tropical Pediatrics

Assoc. Prof. Chukiat Sirivichayakul - Head

Founded in 1974, the Department of Tropical Pediatrics is headed by Dr. Chukiat Sirivichayakul. The Department conducts research in the broad area of tropical pediatrics, with a particularly active role in vaccine evaluation. The Department played an important part in the most important achievement in dengue research in 2015; the introduction of the first vaccine against dengue fever. Additional vaccine trials either underway or under development include another tetravalent dengue vaccine as well as a candidate inactivated quadrivalent influenza vaccine.

> “ The Department played an important part in the most important achievement in dengue research in 2015; the introduction of the first vaccine against dengue fever. ”

The Department also carries out considerable epidemiological research. For example, faculty in the Department authored a paper in 2015 examining the hypothetical price that people in the dengue-endemic countries of Vietnam, Thailand, and Colombia were willing to pay for a dengue vaccine, thus providing critical information on pricing and the allocation of public health resources. In addition, all departmental staff are medical doctors whose responsibilities include clinical rotations along with their research and teaching responsibilities. In the latter capacity, Department staff provides training to both domestic and international health personnel pursuing Masters and Ph.D. degrees at the Faculty of Tropical Medicine.

MAIN RESEARCH AREAS

- Dengue
- Toxoplasmosis
- Influenza
- Vaccine development

2015 SOCIAL IMPACT

The Department of Tropical Pediatrics established the **Tropical Medicine Dengue Diagnostic Center (TDC)** with support from the Pediatric Dengue Vaccine Initiative (PDVI) and Armed Forces Research Institute for Medical Science (AFRIMS). The TDC can now perform both serologic and virologic dengue diagnosis.

2015 HIGHLIGHTS

Under the direction of Prof. Arunee Sabchareon, the Department carried out long-term follow-up of the **first available dengue vaccine**; demonstrating that the vaccine was well tolerated and provided protection against severe dengue symptoms.

A survey administered to 400 households in Vietnam, Thailand, and Colombia to determine **"willingness to pay"** for dengue vaccines demonstrated significant demand and provided valuable information to policy-makers on vaccine pricing and healthcare priorities.

Distributed and analysed a questionnaire on the prevalence of **congenital toxoplasmosis** in Thailand. The disease was found to be uncommon but associated with poor outcomes due to delayed diagnosis and treatment.

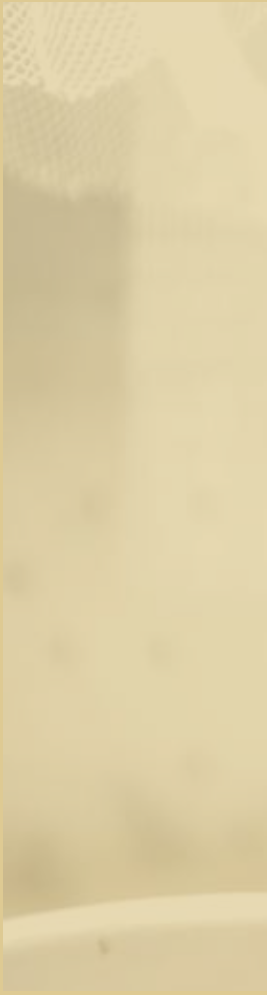
2015 FACTS AND FIGURES

Number of publications		Number of oral presentations	2
Number of poster presentations	1	Number of academic staff	7
Number of support staff	11		

Centers of Excellence

The Faculty has four Centers of Excellence – The Center of Excellence for Biomedical and Public Health Informatics (BIOPHICS), the Vaccine Trial Center (VTC), the Center of Excellence for Antibody Research (CEAR), and the Center of Excellence for Malaria Research. The latter is divided into three sub-units – Mahidol Vivax Research Unit (MVRU), the Genomics and Evolutionary Medicine Unit (GEM), and the Clinical Malaria Research Unit (CMRU).

The following pages provide further detail on each center and unit, including their areas of focus and recent achievements.



Center of Excellence for Biomedical
and Public Health Informatics (BIOPHICS)

Center of Excellence for Antibody
Research (CEAR)

The Genomics and Evolutionary
Medicine Unit (GEM)

Mahidol Vivax Research Unit **(MVRU)**

Clinical Malaria Research Unit **(CMRU)**

Vaccine Trial Centre **(VTC)**

Center of Excellence for Biomedical and Public Health Informatics (BIOPHICS)

Assoc. Prof. Jaranit Kaewkungwal - Head

BIOPHICS is a unique organization providing academic assistance through a range of development, management, and consulting services to public and private organizations in Thailand and beyond. Led by Director, Assoc. Prof. Jaranit Kaewkungwal, this Center of Excellence originally grew out of the need to develop an infrastructure for Thailand to begin carrying out clinical and vaccine trials. It has now expanded to encompass all aspects of support for quality biomedical research. Today, BIOPHICS manages databases for several large clinical trials, as well as the National Electronic Malaria Information System (eMIS). Currently, BIOPHICS is working with hospitals and institutions in Southeast Asia, the UK and USA, in collaborative projects supported by international granting agencies including APMEN, WRAIR, US NIAID, Oxford University, Wellcome Trust, and WHO. The Center also conducts several large-scale health informatics initiatives with support from the Global Fund, WHO, Rockefeller Foundation, Bill and Melinda Gates Foundation, US DoD. It is a key player in monitoring the spread of various diseases in Thailand. BIOPHICS works closely with the Vaccine Trial Centre (VTC) and the Department of Tropical Hygiene, both at FTM, and has been central to the development of the Faculty's new MSc. and Diploma programs in Biomedical and Health Informatics, established in 2013.

> ❝ BIOPHICS manages databases for several large clinical trials, as well as the National Electronic Malaria Information System (eMIS). In addition BIOPHICS has created a new, large database to track tuberculosis for the Thailand Ministry of Public Health (MOPH). ❞

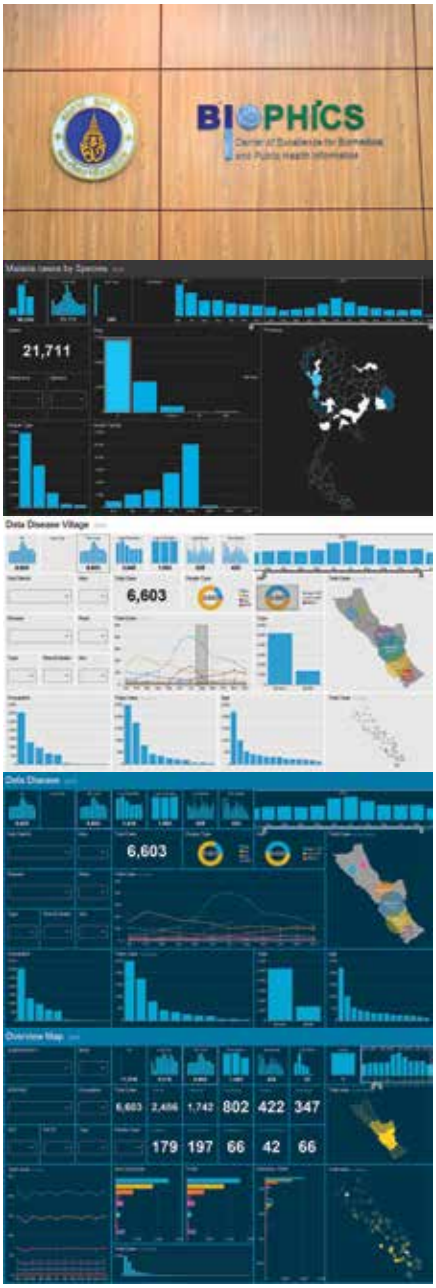
MAIN RESEARCH AREA

- Biostatistics
- Epidemiology
- Data analysis
- Health informatics
- Public health informatics
- Clinical data management
- Training & consultation
- Surveillance systems

2015 SOCIAL IMPACT

With funding from the Thailand Center of Excellence for Life Science (TCELS), BIOPHICS hosted more than 120 participants in a "Hands on Workshop on Data Management and Preparation for Analysis of Medical and Healthcare Research" at Siam@Siam Design Hotel, Pathumwan, Bangkok, 16th-18th September 2015

The clinical trial researcher team from Bumrungrad International Hospital visited BIOPHICS on 9th November 2015 for sharing and to learn GCDMP (Good Clinical Data Management Practices) as well as how to set up their computer systems to be compliant with the US Federal Drug Administration rules on electronic record keeping.



2015 HIGHLIGHTS

Projects, such as the **rotavirus vaccine study** conducted in Indonesia with Murdoch University, Perth, Australia and a study comparing **malaria treatment outcomes** in Kenya, Peru, and Thailand, carried out for the Global Emerging Infections Surveillance and Response System (GEIS), a division of the US Armed Forces Health Surveillance Center, are good examples of the international scope of the work carried out by BIOPHICS.

In addition to the **electronic Malaria Information System (eMIS)**, developed and maintained by BIOPHICS, which currently hosts the national malaria database, BIOPHICS has created a new, large **database to track tuberculosis** for the Thailand Ministry of Public Health (MOPH).

A close collaboration with Bhutan's Vector-Borne Disease Control Programme to replicate BIOPHICS' eMIS system has resulted in an electronic malaria monitoring system that produces real-time fever incidence rates for the Bhutan public health ministry, as well as tools for spatial and temporal mapping of malaria cases. The **Bhutan Febrile and Malaria Information System (BFMIS)**, developed by BIOPHICS, has now been expanded for use across the country and malaria elimination is close to being achieved nationwide.

BIOPHICS carried out a study of the effectiveness of using **mobile phone camera applications** to capture health-related data and demonstrated greater data quality and completeness compared with current practices.

Responding to their previous success in creating animated "edutainment" videos on vaccinations and to adapt successfully to the ASEAN Economic Community (AEC) environment, the Thai MOPH asked BIOPHICS to produce the same information in a booklet form translated into 5 more additional languages used by ethnic groups on the Thai-Myanmar border.

Center of Excellence for Antibody Research (CEAR)

Assoc. Prof. Pongrama Ramasoota - Head

CEAR is focused on the use of monoclonal antibodies as therapeutic agents against a wide range of infectious diseases. Founded in 2009, the Center currently employs 6 full-time staff and is equipped with state-of-the-art facilities, including apparatus necessary for flow cytometry, viral culture and real-time PCR. Notable progress has been made in particular in developing therapeutic neutralizing human monoclonal antibodies (NhuMAbs) against dengue virus. Recently, CEAR demonstrated successful neutralization of all four serotypes of dengue, which has resulted in numerous patents and awards for the Center and its Director, Assoc. Prof. Pongrama Ramasoota. Other accomplishments include MAbs developed as diagnostic tools for influenza, and foot-and-mouth disease viruses.

❝ CEAR demonstrated successful neutralization of all four serotypes of dengue, which has resulted in numerous patents and awards for the Center ❞

MAIN RESEARCH AREAS

- Dengue virus
- Foot and mouth disease virus
- Influenza virus
- Rabies virus

2015 SOCIAL IMPACTS

A Rapid Diagnostic Kit for Foot-and-mouth disease has been tested and shown to have extremely high sensitivity. Patents have been applied for and discussions are underway with a Japanese pharmaceutical company for commercial development.

A Rapid Diagnostic Test Kit for dengue is currently under development.

HIGHLIGHTS OF 2015

A particular problem with potential dengue vaccines is that they generate both protective *neutralizing* antibody as well as undesirable *enhancing* antibody. CEAR used a **plasmid delivery system** to engineer neutralizing antibody that eliminated all enhancing activity, a strategy that could improve dengue vaccines currently under development.

In addition to their application to vaccines, **antibodies can be used through passive immunization** to protect dengue infection or reduce virus levels. CEAR researchers demonstrated that mutations introduced into anti-dengue antibodies could both boost their protective effects and reduce possible harmful effects.

CEAR carried out **phylogenetic analysis on Rabies virus collected from rabid dogs** in Bangkok and surrounding provinces. They found that Thai dog RABV isolates share a common ancestor with the rabies virus circulating in the endemic regions of China and other Southeast Asian countries such as Cambodia, Vietnam and Laos.

Assoc. Prof. Ramasoota and CEAR staff gave a **presentation at the IP Innovation and Technology Expo – IPITEx** entitled "Therapeutic Human MAbs against 4 serotypes of DENV" as well as a poster presentation entitled "Development of Rapid Immunochromatography Strip Test for Dengue Virus", which they presented at the RRi Congress, the Thailand Research Fund.

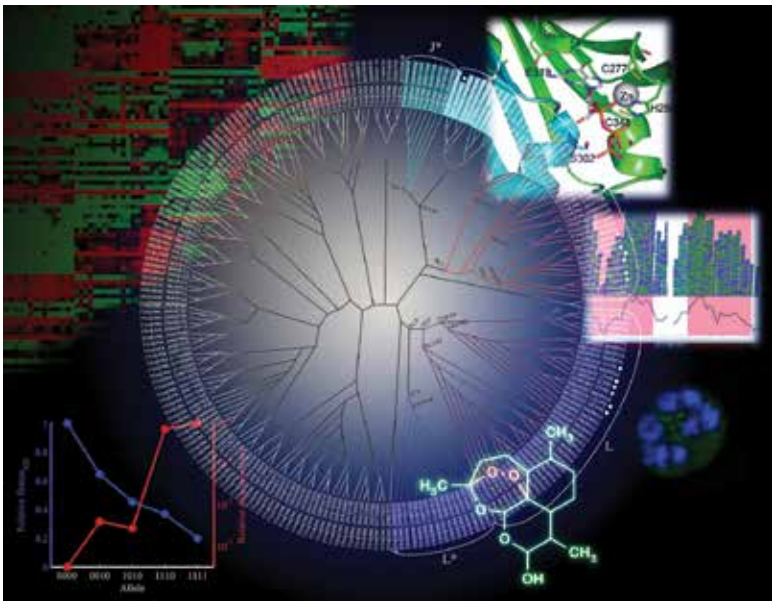
CEAR staff researcher Dr. Pannamthip Pitaksajjakul was awarded First Place in the "Final Business Pitching" category, Leaders in Innovation Fellowships, from the Royal Academy of Engineering, United Kingdom in March.

The Genomics and Evolutionary Medicine Unit (GEM)

Asst. Prof. Thanat Chookajorn - Head

The **Genomics and Evolutionary Medicine Unit (GEM)**, a subunit of the Center of Excellence for Malaria Research, is bringing cutting-edge tools for molecular evolution, genome biology and drug discovery to bear on this disease. As a multidisciplinary team, GEM members and collaborators range from physicists to physicians, and in addition to research, participate in teaching activities especially how to adopt functional genetic and genomic approaches in biomedical research. Much of GEM's recent focus has been on examining the fitness costs to *Plasmodium* parasites in developing drug resistance. For example, increased resistance appears to come at the price to the parasite of reducing its ability to metabolize critical amino acids – a finding that could lead to an efficient assay of artemisinin resistance. Similar studies of fitness costs entailed by resistance to other anti-malarials are suggesting how to tailor drugs specifically to target these defects and slow the spread of drug resistance. A new area of research will examine the Zika virus and the Dengue virus in Thailand, to shed more light on their interactions.

> ❝ The Genomics and Evolutionary Medicine Unit (GEM), a subunit of the Center of Excellence for Malaria Research, is bringing cutting-edge tools for molecular evolution, genome biology and drug discovery to bear on this disease. ❞



RESEARCH AREAS

- Malaria
- Virus evolution
- Anti-malarial drug resistance
- Drug development

2015 SOCIAL IMPACT

Members of the GEM lab are assembling a Thai-language book on using CRISPR/Cas gene editing technology, which will make this technology more accessible to the Thai biomedical community and help inform the public on the important ethical issues posed by its use.

GEM members also participated in teaching activities, especially how to adopt functional genetic and genomic approaches in biomedical research.

HIGHLIGHTS OF 2015

GEM researchers have discovered an **assay that measures an enzyme used by parasites to evade anti-malarial drugs**, opening the way for development of a new category of inhibitors and offering a new strategy for fighting malaria drug resistance.

A study of the ***Plasmodium* genes responsible for processing the hemoglobin** in human red blood cells examined their roles in developing drug resistance and in malaria pathogenesis.

Utilizing recent advances in genome editing and predictive modeling, GEM investigated the probability of various **evolutionary pathways for chloroquine resistance**.

Mahidol Vivax Research Unit (MVRU)

Dr. Jetsumon (Sattabongkot) Prachumsri - Head

With 2015 marking the 4th anniversary of its founding, MVRU continues its original mission of addressing the special problems of working with the parasite *Plasmodium vivax*. Increasingly recognized as a significant cause of malaria in SE Asia, *P. vivax* provides a particular challenge by being virtually impossible to culture its blood stage continuously in the laboratory. This has presented a significant obstacle to its study and prevented essential research on host-parasite interactions, vaccine development and drug trials. MVRU arose out of the need to meet that challenge and today is unique in being one of the only laboratories in the world capable of working with every stage of the *P. vivax* life cycle. Its in-house insectary allows MVRU to work with *P. vivax* in the mosquito, their novel developments in *in-vitro* cell culture allow for the study of human liver stages and *in-vivo* humanized mouse models offer new opportunities for testing anti-malarial drugs and vaccines. MVRU has also been active in setting up field stations and rural clinics throughout Kanchanaburi and Tak provinces, which provide researchers valuable access to human samples of infection and a base from which to conduct studies of malaria transmission and mosquito vectors. While *P. vivax* continues to be its focus, MVRU is truly multi-disciplinary and works on all facets of malaria, doing pioneer work in areas such as transmission-blocking vaccines that prevent parasite reproduction within the mosquito and developing methods for extending sporozoite survival, a life stage that was otherwise impossible to study without constant access to newly infected patients.

“ MVRU is truly multi-disciplinary and works on all facets of malaria, doing pioneer work in areas such as transmission-blocking vaccines that prevent parasite reproduction within the mosquito and developing methods for extending sporozoite survival, a life stage that was otherwise impossible to study without constant access to newly infected patients. ”

RESEARCH AREAS

- Malaria: all developmental stage biology
- Transmission-blocking vaccine
- Drug efficacy against liver stages
- Sporozoite transcriptome and proteomic studies
- Acquired immunity
- Serological markers

2015 SOCIAL IMPACT

MVRU field stations in Tak and Kanchanaburi provinces play a critical role in providing epidemiological information for local public health staff, which helps guide appropriate malaria management strategies in these endemic areas.

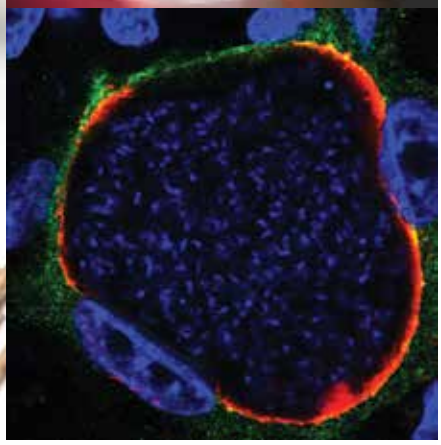
Training of new students and young researchers played an important role in 2015, with one Bachelor student, 2 Masters, 12 PhD students and 2 post-docs coming primarily from Thailand and other ASEAN countries, all of which helps MVRU in its important mission of disseminating knowledge of dealing with *P. vivax* to the next generation in the region.

HIGHLIGHTS OF 2015

A study of **malaria-transmitting mosquitoes along the Thai-Myanmar border** confirmed a shift in malaria from *Plasmodium falciparum* to *P. vivax* and identified an unexpected role of mosquito species composition in extending the malaria transmission season to year-round.

Continuing progress in ***in-vitro* culturing methods** now allows MVRU to extend *P. vivax* viability to more than 26 months. The previous lack of a robustly propagating, continuous culture of this parasite has been a significant impediment to the study of the biology, transmission, and pathogenesis of this parasite, so this is an important milestone.

MVRU has developed and disseminated information regarding the use of **membrane feeding assays** to standardize the infection of malaria-bearing mosquitoes. This method allows for comparisons of malaria infectivity and improves the ability to study transmission-blocking drugs.



Clinical Malaria Research Unit (CMRU)

Prof. Srivicha Krudsood - Head

The Clinical Malaria Research Unit was established in late 2013 and conducts malaria research particularly focused on clinical care, both in the hospital and the field. Such research includes determining the pathophysiology of severe malaria, investigations of new malaria treatments, including adjuvant therapies, and reviewing the safety and efficacy of malaria treatments.

RESEARCH AREAS

- Malaria
- Anti-malarial drug trials
- Clinical care
- Pathogenesis of severe malaria

2015 SOCIAL IMPACT

In August 2015, CMRU hosted the **13th International Training Course on Management of Malaria** in collaboration with the World Health Organization Regional Office for Southeast Asia Region and the Mekong Malaria Programme. Objectives of the course included management of severe and uncomplicated malaria, updates on malaria diagnosis, recent advances in anti-malarial drugs and a review of the latest research on malaria pathogenesis. Attendance was limited to 35 participants, comprising medical doctors and healthcare personnel responsible for malaria management.

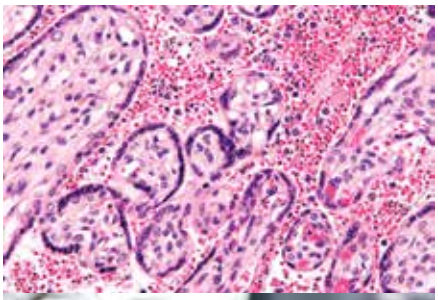
> ❝ Research includes determining the pathophysiology of severe malaria, investigations of new malaria treatments ❞

HIGHLIGHTS OF 2015

Accurate diagnosis of **glucose-6-phosphate dehydrogenase (G6PD)** deficiency is required to avoid the risk of acute hemolysis associated with such critical antimalarial drugs as primaquine. Researchers with CMRU collaborated in an evaluation of the rapid test kit BinaxNOW G6PD with *Plasmodium vivax*-infected subjects in Brazil, Peru, Thailand, and India. Unfortunately, they found that, compared with spectrophotometry (the gold standard), the sensitivity of G6PD detection was only 54.5%. Room temperatures inadvertently falling outside the range required to perform the rapid test (18-25°C) together with subtlety of color change and insufficient training could partially explain the low sensitivity found.

Severe malaria can include **neurological complications**, such as convulsion, delirium, and coma. Researchers with CMRU investigating the cause of such symptoms, focused on abnormalities in the release of neurotransmitters, particularly Synapsin I, which they found increased with severity of infection. This suggests that a Synapsin I inhibitor be investigated as a target for a therapeutic intervention, to alleviate neurological symptoms in severe malaria.

The prediction of **clinical outcomes in *Plasmodium falciparum* infection is still poorly understood**. One important question is the process by which immunity to malaria can be acquired. CMRU researchers compared profiles of monocytes, neutrophils and pro/anti-inflammatory cytokines with clinical outcomes in both single infections and prior repeated malaria infections. Their results suggest different functions for these immune mediators in single versus repeated infections, and in addition, that a low monocyte : neutrophil ratio might be regarded as a risk factor in developing complications in primary malaria infections.



Vaccine Trial Centre (VTC)

Prof. Punnee Pitisuttithum - Head

The VTC is a clinical facility for testing newly developed vaccines for which evaluation in human volunteers is needed. It is the first and only facility of its kind in both Thailand and the region. The Vaccine Trial Centre began as a joint responsibility of Mahidol University and the Ministry of Public Health (MOPH), operated by the Faculty of Tropical Medicine, Mahidol University on their behalf. Subsequently, the Vaccine Trial Centre was established as one of the Faculty of Tropical Medicine Centers of Excellence.

> "The Vaccine Trial Centre began as a joint responsibility of Mahidol University and the Ministry of Public Health (MOPH)"

RESEARCH AREAS

- HIV/AIDS
- HPV
- Influenza
- Dengue

2015 SOCIAL IMPACT

Prof. Punnee won the 2015 Outstanding National Researcher Award in Medical Sciences from the National Research Council of Thailand for her long-time contributions to academia and the country's development.

President of Mahidol University and Vice President for Research and International Relations congratulated to Prof. Punnee Pitisuttithum on receiving the Award of Most Outstanding Researcher in Medical Science 2015 from National Research Council of Thailand.

Previous work by the VTC on an avian influenza H5N2 vaccine (Fluvac H5) for potential pandemic use has resulted in licensure this year by the Thai FDA.

The VTC, in collaboration with Sanofi-Pasteur, played a key role in testing the CYD14 tetravalent dengue vaccine, conducting trials that found the CYD14 dengue vaccine to be safe, moderately efficacious, with an overall 81% reduction in risk of severe dengue infection. The vaccine, called *Dengvaxia*, is now on the market for use with children over 9 years old, in Mexico, Brazil, and the Philippines, and should become available in Thailand sometime in 2016.

Vaccine Trial Centre Team

HIGHLIGHTS OF 2015

The **RV144 HIV vaccine trial** was an historic breakthrough as it was the first to show that an HIV vaccine was actually possible. And although the active clinical phase of this trial ended in 2009, new discoveries and further analysis continue. VTC published a number of RV144-related papers this year, including those on computational methods to enable predictive modeling of antibody features, an analysis of genomes of the HIV viruses that infected some participants of the trial, structural analysis of antibody isolated from a trial vaccine, and an examination of HLA class II variation in the Thai population.

Prof.Punnee Pitisuttithum received the Award of Most Outstanding Researcher in Medical Science 2015 from National Research Council of Thailand.

VTC is building on RV144 with a new trial called RV305 in collaboration with Thailand Ministry of Public Health (MOPH) and the Armed Forces Research Institute of Medical Sciences (AFRIMS): original RV144 volunteers were called back 7 years after their initial vaccination to receive 2 boosters. These volunteers are now being followed to understand better their immune response to this booster but already there is evidence that this additional boost regimen does activate immune memory, demonstrating that a **renewed immune response** to an HIV vaccine can be elicited.

VTC is also continuing its **RV306 HIV vaccine trial**. This repeats RV144 but compares the effect of additional vaccine boosts, and gathers more immunogenicity data from 360 new volunteers. The goal is to determine whether broader immune responses could be achieved. This trial will last for 2 years, and will be another important milestone in the development of an effective HIV vaccine.

Research with **a completely new HIV vaccine** are also just beginning; called HIV-A-A004, this vaccine, developed by the Johnson and Johnson pharmaceutical company, differs in using adenovirus as the "vector" into which HIV genes are inserted.

Vaccine Trial Centre New Year activity

Collaborations

International academic collaboration is central to the work at the Faculty. There are currently seven international organizations or units hosted, across a range of research and activity areas. The following pages describe the work of each collaboration and their highlights and impacts in 2015.

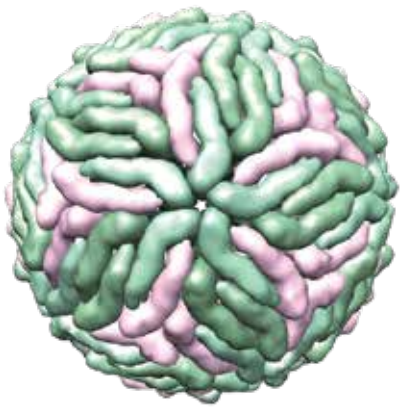

PHICS
malaria
consortium
disease control, better health

BIKEN Endowed Department of Dengue Vaccine Development (BIKEN)

Prof. Eiji Konishi - Head

The BIKEN-Endowed Department of Dengue Vaccine Development is a joint collaboration between the Research Institute for Microbial Diseases, Osaka University and the Faculty of Tropical Medicine, Mahidol University, focusing on the dengue virus and the human immune response to dengue infection. Headed by Prof. Eiji Konishi, BIKEN is a strictly research-focused collaboration working on a six-year timeline (currently in its 5th year). Their work is providing critical new insights into improving dengue vaccines; for example looking into why dengue vaccines vary in their ability to promote a strong immune response and developing new cell lines to improve the testing of vaccine efficacy. BIKEN made significant strides in 2015 translating such research into immediate medical benefit with a recent patent for a method of manipulating dengue vaccine antigens – the proteins that initiate the production of protective antibody. This method could have a major impact in improving the protective effect of dengue vaccines. In addition to conducting research, BIKEN has continued its mission of fostering increased international collaboration through training graduate and post-graduate students from Thailand and other countries.

> “Their work is providing critical new insights into improving dengue vaccines”



RESEARCH AREAS

- Dengue
- Vaccine development

2015 SOCIAL IMPACT

As the range of dengue fever infection continues to expand, the need for effective vaccines is greater than ever. BIKEN research complements this research by focusing on ways to make both existing and possible future dengue vaccines more effective.

2015 HIGHLIGHTS

BIKEN has applied for a patent that provides a **method for modifying dengue vaccine proteins** so that they promote a more effective immune response.

Improvements in diagnostic cell lines should result in assays that can provide a more accurate assessment of dengue vaccine efficacy.

Developed a simple, rapid system to produce **infectious particles that carry dengue surface proteins** which can be used as a safer alternative to authentic dengue virus.

Published one of the first reports showing epidemiological evidence for **the role of antibody in "enhancing" infection** in response to genetic differences in the dengue virus; a critical finding that may help explain differences in disease severity.

Mahidol-Osaka Center for Infectious Diseases (MOCID)

Prof. Tatsuo Shioda - Head

MOCID is an initiative to increase collaboration between the Faculty of Tropical Medicine, Mahidol University, and Osaka University, Japan, on the study of mosquito-borne infectious diseases, particularly dengue and chikungunya. These viral diseases are frequently difficult to distinguish from one another as their clinical symptoms may be similar and they co-circulate in many parts of the world, including Thailand. However, because the two diseases may have very different medical outcomes, there has been an urgent need for effective yet low-cost diagnostic methods. MOCID recently developed a low-cost rapid diagnostic kit for chikungunya that can be used with little training. Having succeeded in developing the kit to the "proof-of-concept" phase, MOCID is now exploring how best to package the kit and ramp up its production to the point that it can be commercially available. Other research includes work on screening compounds that could be used as drugs to treat dengue virus infections and investigating the link between dengue viral load and disease severity.

MOCID works in 5-year phases. 2015 saw the beginning of the second 5-year phase with the departure of Dr. Tamaki Okabayashi who has been promoted to Associate Professor in the Laboratory of Veterinary Microbiology, Department of Veterinary Medicine, Faculty of Agriculture, University of Miyazaki and the appointment of a new director, Prof. Tatsuo Shioda. Principal Research Scientist and Professor at the Research Institute of Microbial Diseases, Osaka University, Dr. Shioda has a long history of work in Thailand, having had several collaborations on HIV/AIDS research with Thailand researchers since 1999.

> ❝ MOCID recently developed a low-cost rapid diagnostic kit for chikungunya that can be used with little training ❞

RESEARCH AREAS

- Dengue
- Chikungunya
- Diagnostics

2015 SOCIAL IMPACT

MOCID's development of a new rapid diagnostic test kit for chikungunya will finally allow physicians to differentiate this disease from dengue properly, and thus offer more accurate and timely treatment.

Professor Shioda lectured on dengue and demonstrated the prototype MOCID chikungunya rapid test kit at the Faculty's Tropical Medicine Training Course on Infectious Diseases Control, 2015, which was attended by physicians and nurses from Japan.

HIGHLIGHTS OF 2015

Appointment of new director, **Prof. Tatsuo Shioda**

Implementation and commercial development of **rapid diagnostic kit for chikungunya**

Discovery of possible **chikungunya "immune escape variants"**, which implies that the ability of the chikungunya virus to evade the human immune system is greater than previously expected.

Mahidol Oxford Tropical Medicine Research Unit (MORU)

Prof. Nicholas Day - Director

MORU is funded by the Wellcome Trust and is one of the Faculty's longest standing collaborations and one of the most productive units at the Faculty. The Unit was founded in 1979, with the main MORU office located on the Faculty of Tropical Medicine campus. MORU has grown considerably since its foundation and now has additional study sites and laboratories located throughout Asia and Africa. Their goal continues to be to fight infectious tropical diseases affecting rural communities in Asia and elsewhere in the developing world. MORU is mainly focused on malaria, melioidosis, leptospirosis, rickettsial and other zoonotic diseases, sepsis and fever research, and it has fast-growing pharmacology and mathematical and economic modelling groups.

Roughly half of MORU's work is on malaria. Having established the extent of artemisinin resistance in SE Asia as part of their original TRAC study, MORU launched a follow-up study in 2015 called TRAC II, which will investigate how far artemisinin resistance has spread westward into Myanmar, Bangladesh and India, and the extent of resistance to other antimalarial drugs in South and Southeast Asia. MORU has also initiated the TACT (Triple Artemisinin-based Combination Therapies) study, which it is hoped will both restore antimalarial efficacy in resistant areas and prevent the spread of artemisinin resistance in those areas where it has not yet emerged.

> ❝ MORU has grown considerably since its foundation and now has additional study sites and laboratories located throughout Asia and Africa ❞

RESEARCH AREAS

- Malaria
- Antimalarial/Antibiotic resistance
- Rickettsioses/Zoonoses
- Pharmacology
- Medicine quality
- Disease epidemiology and mapping
- Melioidosis
- Undifferentiated fever
- Sepsis
- Mathematical and economic Modelling


2015 SOCIAL IMPACT

Previous research by MORU on improving the detection of extremely low levels of malaria parasites is now being used in the field to identify "hot spots" of asymptomatic malaria carriers – individuals without external signs of malaria who are nonetheless capable of spreading and maintaining malaria in a community.

A program on the Thai-Myanmar border is looking at how to improve pregnancy outcomes by carrying out pre-conception trials; for example by checking to see whether providing mothers with a course of anti-helminthics or treatment to clear *P. vivax* from the liver can result in better post-natal health.

A recent study by MORU researchers demonstrated that an assay based on C-reactive protein – produced by the body as part of the defense against infection – can accurately distinguish between bacterial and viral infections. Since only bacterial infections can be treated with antibiotics, this test could both provide better diagnosis – and thus treatment – but also decrease drug pressure leading to antibacterial resistance.

HIGHLIGHTS OF 2015

Following up on the successful TRAC study, which documented antimalarial resistance in SE Asia, **TRAC II** is investigating the spread of artemisinin resistance to other malaria areas.

Launched the **TACT study** to investigate the safety and efficacy of Triple Artemisinin-based Combination Therapies to slow the spread of artemisinin resistance and restore effective treatment in those areas where resistance has taken hold.

Developing tools for **local elimination of malaria,** which include strategies such as mass drug administration, along with bed nets, targeted spraying of mosquitoes, and early diagnosis and treatment. Begun in rural Myanmar, this program has now expanded into Lao PDR, Cambodia, and Vietnam.

Began a double-blind, randomized clinical trial called **IMPROV** in Afghanistan, Sumatra, and Vietnam, focused on establishing the proper dosage for **primaquine**, a drug that is particularly effective against the mature forms of malaria and essential in preventing relapse infections caused by *P. vivax* but which can cause the breakdown of red blood cells in a significant number of patients with a specific enzyme deficiency. The goal is to generate data that will lead to a radical cure of *P. vivax*.

Malaria Consortium Asia

Mr. Henry Braun - Head

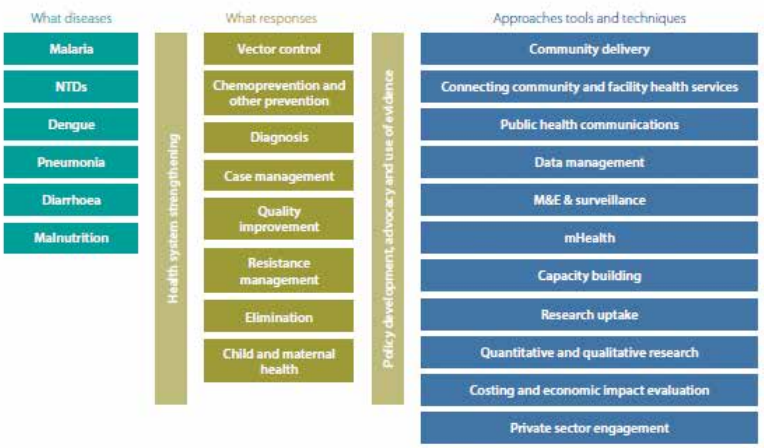
malaria consortium
disease control, better health

Malaria Consortium has been engaged in malaria and disease control in Asia since 2003, with a regional office based in Bangkok, Thailand. Malaria Consortium has focused on a range of health burdens in this area, including malaria, pneumonia, dengue and neglected tropical diseases, and other factors that affect child and maternal health. This engagement grew out of long-term collaborations within the region, targeting the particular health challenges faced by vulnerable populations in Asia. They have six offices across three countries, including Thailand (Chiang Mai), Cambodia (Phnom Penh, Ratanakiri, Pailin) and Myanmar (Yangon). Malaria Consortium's work in the region has stretched to cover all countries in the Greater Mekong Subregion, including Cambodia, Lao PDR, Myanmar, Thailand, Vietnam, and Yunnan Province, China.

The organisation's mission is to improve lives in Africa and Asia through sustainable, evidence-based programmes that combat targeted diseases and promote child and maternal health.

❝ Malaria Consortium has focused on a range of health burdens in Asia, including malaria, pneumonia, dengue and neglected tropical diseases ❞

Our expertise




2015 SOCIAL IMPACT

In 2015, Malaria Consortium continued to work to reduce the incidence and mortality from malaria and dengue by helping governments to tailor, innovate, adopt and apply interventions best suited to their country's needs. Activities included -

- Collaborating with the Cambodia National Malaria Control Programme and other stakeholders to establish a regional cross-border surveillance platform in the Greater Mekong Subregion.
- Addressing outdoor malaria transmission in Myanmar, where many forest workers are exposed to infection while working outdoors at night. Their findings will inform a scale-up of the project, leading to better distribution of insecticide-treated materials to the populations at risk.
- Working with the national dengue programme in Cambodia, to evaluate low-cost, effective alternative methods of vector control to reduce the burden of dengue using behaviour and knowledge change interventions for prevention and control.

In addition, Malaria Consortium worked on developing and implementing interventions for early and accurate diagnosis and treatment for malaria, pneumonia and diarrhea, with particular focus on resource-limited areas.

HIGHLIGHTS OF 2015

Leading the **World Pneumonia Day** campaign. A call to action for universal access to pneumonia prevention and care by Malaria Consortium and partners was published by the prestigious British medical journal, *The Lancet*. Alongside the call to action, Malaria Consortium's work on tools for pneumonia diagnostics has also been very successful, and is contributing to important efforts to reduce deaths through early identification and treatment of childhood pneumonia at the community and outpatient level.

Data collection for **the first Malaria Indicator Survey in Myanmar** was successfully carried out. The survey, which was led by the National Malaria Control Programme (NMCP) in partnership with Malaria Consortium, will help to fill gaps in current malaria data in the country.

Over 6000 people completed the Thailand Knowledge, Attitude and Practice survey. Results from the survey about the coverage and usage of malaria prevention methods and associated malaria risk factors will inform the national malaria program's plans.

Malaria Consortium **joined the Dengue Tribe campaign**, a partnership with Break Dengue, a global social movement giving communities a platform to voice their concern about the threat of dengue and mobilise key stakeholders to address this disease.

Silom Community Clinic @TropMed

Dr. Timothy Holtz - Head

Founded in 2005 as a partnership between the Thailand Ministry of Public Health and the U.S. Centers for Disease Control and Prevention (TUC), Silom Community Clinic (SCC) moved to the Faculty in 2013. SSC is located on the 12th floor of the Hospital for Tropical Diseases. From the outset, the Silom Community Clinic was created as an LGBTQI-friendly sexual health clinic for men who have sex with men (MSM) and transgender women (TGW).

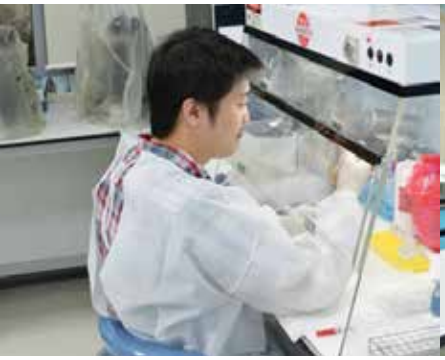
> “ Silom Community Clinic, now called Silom Community Clinic @TropMed, integrates research with the provision of services and has been involved in many important research studies, including the 5-year Bangkok MSM Cohort Study ”

The Clinic provides rapid HIV antibody testing with results returned in 30 minutes, HIV virus-based testing for diagnosis of very early HIV infection, personalized counselling and testing and treatment of sexually transmitted infections. The services are confidential and provided free-of-charge in an open and understanding environment by staff who are familiar with working with men and transgender women who have sex with men.

Silom Community Clinic, now called Silom Community Clinic @TropMed, integrates research with the provision of services and has been involved in many important research studies, including the 5-year Bangkok MSM Cohort Study and a recent clinical trial assessing the adherence, coverage and behaviors associated with non-daily pre-exposure prophylaxis (PrEP) to prevent HIV infection (HPTN 067). To learn more information on the research at SCC @TropMed please see pages 76.

RESEARCH AREAS:

- HIV/AIDS prevention
- Sexually transmitted infections (STI)
- Infection prevention for MSM and TGW



2015 SOCIAL IMPACT

The ongoing dissemination of SCC @TropMed's scientific results through publications helps support biomedical and behavioral prevention approaches for Thailand and globally. For example, in early 2015, data collected from clients attending the clinic for voluntary counselling and testing services and from the Bangkok MSM Cohort Study were published in Lancet HIV.

The results of the clinic's recent study, HPTN 067, a study that evaluated the feasibility of non-daily pre-exposure prophylaxis (PrEP) regimens, were shared widely through abstracts at conferences, and creation of accurate media messages to be used by the Ministry of Public Health and others.

HPTN 067 showed that people are most likely to take PrEP as directed, and that they maintain significantly higher levels of preventive medication in their blood when prescribed a daily dose. The findings also indicated that some MSM and TGW can adhere to these non-daily PrEP regimens, which may lower number of pills needed for coverage. This type of information is valuable to public health professionals, allowing them to make informed recommendations.

The clinic provided direct healthcare benefits to many people in 2015. 1,217 new clients attended voluntary counselling and testing, with 7,219 visits and 2,844 follow-up visits at the clinic.

HIGHLIGHTS OF 2015

A notable highlight was **celebrating the clinic's 10 year anniversary**. The anniversary was commemorated during the June LGBTQI Pride Month. SCC opened its doors to its first client on 30 September 2005 and has had over 10,000 clients in ten years.

More than **60 participants joined a symposium** focused on "Challenges: Ethics and Research in MSM and TG population" and "Ethics and Roles of the Community on Clinical Research in MSM and TG population". The event, in October 2015, was for people interested in conducting clinical trials and community research in HIV/AIDS prevention, especially among vulnerable populations. As well as being a learning opportunity, participants could exchange their experiences and lessons learned.

A new study was started in June. **The GenVar Study: Identification of Genetic Variants that Associate with HIV Acquisition in a Highly Exposed HIV Cohort**, seeks to examine the role of differences in human leukocyte antigen (HLA) and killer cell immunoglobulin (KIR) types in influencing susceptibility to infection. The results will be used to identify mechanisms that can help prevent new HIV infections.

Southeast Asian Ministers of Education Organization (SEAMEO) Tropical Medicine and Public Health (TROPMED) Network

Prof. Dr. Pratap Singhasivanon, Secretary General/Coordinator, SEAMEO TROPMED Network.

Founded in 1966, SEAMEO TROPMED Network is a regional cooperation network for education, training and research in tropical medicine and public health, under the Southeast Asian Ministers of Education Organization (SEAMEO). The primary mandate of the organization is capacity building for individuals and institutions of the 11 Member Countries.

This mission of the Network is accomplished through its three Regional Centres: (i) TROPMED Malaysia (Institute of Medical Research, Kuala Lumpur); (ii) TROPMED Philippines (College of Public Health, University of the Philippines, Manila), and (iii) TROPMED Thailand (Faculty of Tropical Medicine, Mahidol University). The Network Coordinating Office is based in Bangkok, Thailand.

KEY ACTIVITY AREAS

- Academic degree programs
- Short training courses
- Research and publications
- Knowledge management
- Technical assistance in Member Countries
- Health Policy development
- Monitoring and Evaluation of programs

> “The primary mandate of the organization is capacity building for individuals and institutions of the 11 Member Countries”

2015 SOCIAL IMPACT

Increased the number of public health professionals in the region who have improved technical and managerial capacity to deliver quality health programs and carry out research.

Published work of regional researchers in the Network's journal "The Southeast Asian Journal of Tropical Medicine and Public Health", helping findings reach a wider audience.

Helped facilitate the harmonisation of medical and nursing curricula across ASEAN, which will increase the mobility of healthcare professionals.

Organized meetings and conferences that enhanced translation of research findings into policies and programs as well as increased collaborations across countries and sectors in the region.

HIGHLIGHTS OF 2015

Awarding **28 scholarships** to academic degree programs in the three Centres

Organizing **60 training courses** and awarding fellowships for these courses.

Starting celebrations and events to **commemorate 50 years** of the Network.

Involved in organisation-wide **training activities** to increase staff capacity to evaluate development programs.

Expanding our **mentoring and coaching** within the regional team to help build the strength of the Network.

WorldWide Antimalarial Resistance Network (WWARN)

Mr. Jeffery Smith - Director

WWARN's vision is to provide the information necessary to prevent or alleviate antimalarial drug resistance and therefore reduce malaria morbidity and mortality. To help achieve this, WWARN provides a platform for collaboration and the sharing of information about clinical trials and the efficacy of antimalarial drugs. WWARN's collaborative approach enables researchers to identify trends or sub-population effects with greater certainty through pooled analyses of individual participant data from multiple clinical trials. Data are standardized so that they can then be combined into much larger sample sizes, enabling findings that are not possible with smaller cohorts.

One of WWARN's key activities is to provide support for harmonized protocol design and data and sample collection, to promote high-quality research and facilitate comparative and pooled analyses across studies. WWARN's External Quality Assurance (EQA) Programme, based in the Faculty of Tropical Medicine, collaborates with over 100 laboratories in more than 35 countries. As part of the EQA Programme, WWARN operates a proficiency testing scheme across six continents, whereby labs are given blinded samples, report their findings and are given feedback to help them ensure proficiency. A complementary reference material scheme further supports standardization by providing accurately measured materials for use in validation experiments or as calibrators. The EQA team is actively engaged in quality assurance of specimen collection, processing, and testing, by providing training and quality control based on procedures available on the WWARN website.

> "WWARN provides a platform for collaboration and the sharing of information about clinical trials and the efficacy of antimalarial drugs"

2015 SOCIAL IMPACT

Results from WWARN Dose Impact Study Groups provided evidence for the revised recommendations for optimal use of artemisinin combination therapies included in the updated World Health Organization 'Guidelines for the Treatment of Malaria', published in May 2015. The aim of the revised guidelines is to promote the optimal use of safe and effective antimalarial treatments to cure and protect patients, and to slow drug resistance.

WWARN researchers working together with a group of other experts and organizations developed a microscopy manual for the detection, identification, and quantification of malaria parasites on stained thick and thin blood films in research settings. The manual is designed to help researchers working in drug or vaccine efficacy trials or in diagnostics to deliver consistent and reliable data and to promote standardization in reports.

WWARN's collaborative work has resulted in 23 peer-reviewed publications, many of which include public-health recommendations. These include the results from the Artemether-lumefantrine (AL) Study Group, which suggested that a higher dose of AL could improve treatment outcomes for young children in Asia and underweight children in Africa.

2015 HIGHLIGHTS

The WWARN **K13 Molecular Surveyor went live** in May. The surveyor visualizes the prevalence of this marker in both Southeast Asia (where it was first identified) and in other parts of the world. The Kelch13 (K13) gene was identified late in 2014 and is a marker associated with artemisinin resistance.

Prof Joel Tarning, Head of the Department of Pharmacology at the Mahidol-Oxford Tropical Medicine Research Unit and of the Pharmacometric Modelling Group at WWARN, was **awarded the Giorgio Segré Prize by the European Federation for Pharmaceutical Sciences (EUFEPS)** for his research on the pharmacokinetic and pharmacodynamic properties of antimalarial drugs in vulnerable populations, such as pregnant women and young children.

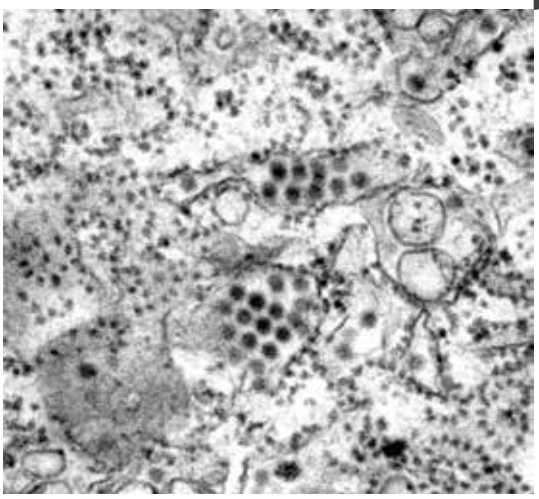
A **prototype vivax surveyor was developed** and is expected to be live in early 2016. Although chloroquine is still the recommended treatment for *P. vivax* in most locations, there are sites in Indonesia where chloroquine is no longer effective and other regions where resistance is suspected; the surveyor will help convey this important information.

The **new WWARN website was launched** in March. The new site is mobile-ready to cater for the increasing numbers of users accessing the website via phones and tablets, and there's also a low-bandwidth version for users with limited or slow internet access. The website, www.wwarn.org, is the heart of WWARN's data-sharing activities, providing a platform for researchers, policy-makers, and other interested parties, to share data, identify collaborative opportunities, view research results, find and use relevant tools and procedures, and keep up-to-date with the latest developments.

Research Areas

"The Faculty's departments, centers, units and collaborations cover a wide range of research areas in Tropical Medicine. The following pages give background information on the diseases and other areas of research covered by the Faculty, as well looking at recent publications."

Dengue



Dengue virus (DENV) is the single-most significant disease-causing mosquito-borne virus in tropical and subtropical regions of the world today, producing outcomes as varied as mild fever to hemorrhage and shock leading to death. In spite of considerable research, no antiviral drugs are currently available and the only available therapy is essentially supportive. This is against a background in which rates of DENV transmission continue to increase yearly. The CDC estimates that almost 400 million infections occur annually worldwide. Thailand alone recorded some 140,000 cases of infection in 2015, with 126 deaths, and Thailand's Public Health Ministry suggests that dengue cases may increase by more than 16% this year (2016).

Transmitted by mosquitoes of the *Aedes* genus, DENV is a member of the Flavivirus genus, a group that includes viruses responsible for Yellow Fever, Japanese Encephalitis, and Zika virus infections. The causes for the increase in dengue cases are many but certainly include rapid urbanization and more frequent air travel, both of which increase the chances of transmission, the expansion of mosquito breeding habitats, and possibly climate change, which is allowing the mosquito vector to extend its range into new territory. Dengue infection can lead to a range of symptoms, ranging from non-apparent, to shock and even death. Yet the mechanism by which dengue causes disease and why clinical disease shows such considerable variation remains unclear. The dengue virus is divided into 4 major strains or "serotypes"; infection with one serotype provides life-long immunity to that specific serotype but does not protect against the other three, in fact, subsequent infection with a different serotype is a significant risk factor for more serious disease. Other possible risk factors include viral strain variation; genetic differences in host immune response; and differences in mosquito transmission efficiency.

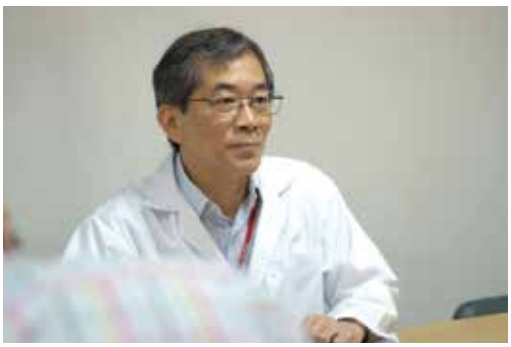
VACCINES

Thai researchers and clinicians have long been in the forefront of efforts to better understand and treat dengue infections and the Faculty of Tropical Medicine has played a particularly key role over the years, perhaps most notably in what is the single most important development in the field of dengue research in the last decade: 2015 saw the commercial licensure of the world's first dengue vaccine, *Dengvaxia* (CYD-TDV), a live recombinant tetravalent dengue vaccine developed by the company Sanofi Pasteur. A safe, effective and affordable vaccine

against dengue has been long-sought and progress in bringing it about has been fraught with difficulty, but fortunately the goal has been achieved and the Faculty of Tropical Medicine played an important role in making it happen. Researchers from the Department of Clinical Tropical Medicine, the Department of Tropical Pediatrics and the Vaccine Trial Center, together played a key role in testing the vaccine in Thai children between the ages of 2 and 16 years, conducting trials that found the dengue vaccine to be safe, moderately efficacious, with an overall 81% reduction in risk of severe dengue infection. The *Dengvaxia* vaccine is now on the market for use in children over 9 years old in Mexico, Brazil, and the Philippines, and should become available in Thailand sometime in 2016.

Other vaccines against dengue are in the pipeline and work with international collaborators is ongoing at the Faculty of Tropical Medicine in order to improve vaccine efficacy. The BIKEN Endowed Department of Dengue Vaccine Development is a collaboration between Osaka University and the Faculty of Tropical Medicine. Instead of using attenuated viruses, as with the Sanofi-Pasteur vaccine, BIKEN is focusing on chimeric DNA vaccines, which have the advantage of remaining stable at warm temperatures, have lower manufacturing costs, and offer greater security, because live attenuated viruses are more likely to change and regain their virulence. BIKEN published a paper this year describing their construction and testing of a key recombinant plasmid-based vaccine component, which used a genetically distinct strain of dengue from that used by the Sanofi-Pasteur vaccine. The goal is to improve immunogenicity against dengue serotype 2, a common serotype in Thailand and the one serotype which the Sanofi-Pasteur vaccine showed the least efficacy against. BIKEN is also collaborating with colleagues in the Department of Social and Environmental Medicine and the Center of Excellence for Antibody Research (CEAR) in developing a method that could be used to enhance existing vaccines. Optimum vaccine protection occurs when it causes a robust antibody response; generating only low levels of antibody can actually enhance infection. This group is investigating an approach that uses genetically engineered antibodies in order to avoid infection enhancement; a method that could have broad applicability for better dengue vaccine development.

For vaccinations to be most effective, they must be administered at the proper age; because young children have a less-developed immune system, a balance must be struck between giving the vaccine early enough to provide protection, but late enough that the child's immune system is robust enough to mount an effective and long-lasting response. This is complicated in the case of dengue, because antibodies against the virus transfer from the mother to fetus in pregnancy. This confers protection at birth and shortly thereafter, but as maternal antibody subsides the baby becomes more vulnerable to infection. Fortunately, research by the Faculty of Tropical Medicine is underway to address this problem. Investigators with the Department of Tropical Hygiene and the Department of Tropical Pediatrics conducted a cross-sectional study with 141 pregnant women who delivered at



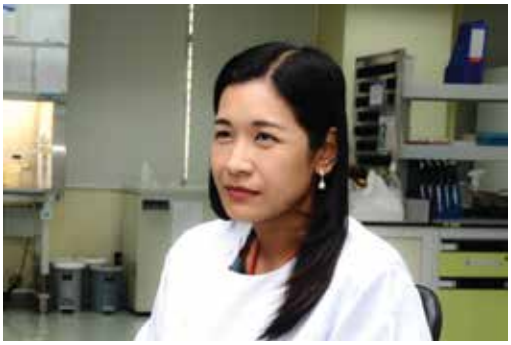
Ban Pong Hospital, Ratchaburi, Thailand. Their study compared maternal antibody levels with those in umbilical cord blood and found that 97.2% of pregnant women giving birth in a dengue-endemic area had evidence of previous dengue infection. All umbilical cord blood from fetuses had the same proportion of positive tests for the presence of dengue antibodies, but had a higher dengue antibody levels compared to their mothers. Thus the period of protection provided by maternally transferred dengue antibodies might affect the disease burden among infants and offer a better understanding of the optimal age for dengue vaccination.

A practical consideration for any vaccine is that in addition to being safe and effective, it must also be affordable. Yet affordability can vary from country to country. Researchers with the Department of Tropical Pediatrics collaborated in a multi-country survey that interviewed households in Vietnam, Thailand, and Colombia on their willingness to pay for a dengue vaccine. The study discovered significant demand, although such demand was strongly related to vaccine price and personal income. This study should contribute to a more effective decision on dengue vaccine introduction and provide valuable information to both policy-makers and manufacturers on vaccine pricing and healthcare priorities.

EPIDEMIOLOGY

The Faculty of Tropical Medicine carried out a number of epidemiological studies on dengue. One interesting example was carried out by faculty in the departments of Clinical Tropical Medicine and Tropical Hygiene. They took advantage of RV 144, a large community-based HIV vaccine efficacy trial conducted with HIV-uninfected adults in Thailand. Their goal was to test the accuracy of clinically diagnosed dengue episodes reported as serious, and examine whether dengue serology would support the clinical diagnosis. The study found that the sensitivity and specificity of clinical dengue diagnosis were 90.9% and 74.4%, respectively, when compared to the control population, and with a positive predictive value of 82.6% and negative predictive value of 84.7% when compared to dengue serology, thus demonstrating that clinical diagnosis of dengue is an accurate method of dengue diagnosis in adults in Thailand. This is also a good example of how Faculty of Tropical Medicine scientists are thinking synergistically about how to leverage large-scale clinical trials to systematically study other infectious diseases such as dengue that may occur during the trial.

The Faculty of Tropical Medicine is also lending its expertise to public health agencies in other countries where dengue is becoming an emerging threat. A collaborative study by the Department of Microbiology and Immunology along with the Bhutan Ministry of Health and the Armed Force Research Institute of Medical Sciences (AFRIMS), delineated the epidemiological and molecular features of dengue virus currently circulating in two southwestern districts of Bhutan, establishing that the current serotype probably originated from northern India. Unfortunately, it appears that dengue has become endemic in southern Bhutan. Research such as this will establish a foundation for the necessary dengue surveillance required to ameliorate the impact of this disease-causing virus.



DIAGNOSTICS

Rapid and accurate diagnosis of dengue infection is critical for a number of reasons: the broad variety of clinical outcomes - from asymptomatic to death by shock – mean that clinicians must literally make life and death decisions on the likelihood of disease outcome, often with little data. And because as many

as 80% of dengue infected patients show no sign of illness – yet are capable of transmitting the virus to a mosquito – accurate diagnosis is key to surveillance and control. Here again Thailand has been a world-leader, particularly Thai clinicians whose careful study of disease symptoms have led to a tremendous drop in dengue-related mortality. The Faculty of Tropical Medicine continues this tradition with a broad array of studies on diagnosis. For example, the Department of Clinical Tropical Medicine, the Department of Microbiology and Immunology, the Information Technology Unit, and the Hospital for Tropical Diseases recently collaborated on a prospective study of adults with dengue admitted to the Hospital for Tropical Diseases in Bangkok in order to identify the clinical factors associated with the development of severe dengue. Such information is critical as clinicians are starting to see an epidemic shift of dengue from mainly affecting children to affecting more adults with increased severity, requiring new diagnostic criteria appropriate to this age group. The study identified several clinical factors independently associated with the development of severe dengue among hospitalized adults with dengue, which promise to aid in the early recognition and prompt management of at-risk patients to reduce morbidity and mortality.

Research into other, more subtle diagnostic markers is also being carried out by the Faculty of Tropical Medicine investigators. Department of Tropical Hygiene faculty examined whether microparticles, tiny bag-like structures generated during apoptotic cell death and associated with many pathological conditions, might be used as diagnostic biomarkers. They found that elevated levels of red blood cell-derived microparticles directly correlated with dengue disease severity, a discovery that could potentially offer a means of differentiating dengue fever from the more serious dengue hemorrhagic fever.

TREATMENT

Developing effective drug treatments for dengue infection is challenging. Most individuals are generally asymptomatic during the early stages of infection and often by the time symptoms do appear the body's immune system has already begun clearing the virus from the system. This then presents a very narrow window for which treatment can be of any utility. And fortunately, increasingly accurate diagnosis allows clinicians to identify those patients most at risk for serious disease. Nevertheless, a safe and effective treatment for dengue infection would be a tremendous boon to physicians and patients alike. Researchers with the Department of Social and Environmental Medicine have collaborated with the Center of Excellence for Antibody Research (CEAR) are investigating the use of monoclonal antibodies, which in addition to their application to vaccines, can be used through passive immunization to protect against dengue infection or reduce virus levels. CEAR researchers demonstrated that mutations introduced into anti-dengue antibodies could both boost their protective effects and reduce possible harmful effects.

The disease associated with dengue infection continues to be a major threat to human health, both in Thailand and worldwide. While the introduction of the first commercial tetravalent vaccine is a huge milestone, there is still tremendous work to be done. Work carried out by scientists with the Faculty of Tropical Medicine will continue to be necessary before dengue fever is no longer considered a threat.

Helminths

Helminths are a broad category of medically important parasitic worms, generally large enough to be seen with the naked eye. The term "heliinths" is commonly used to refer to worms of medical significance.

Helminths pose significant public-health challenges in many countries of Southeast Asia, with about one-third of the world's cases of helminth-associated disease occurring in the 11 major Southeast Asian countries, including Thailand. Although improvements in water and sanitation, along with large deworming campaigns, have sharply reduced prevalence, rural and poorer areas remain at risk.

The Department of Helminthology is the lead department in the Faculty of Tropical Medicine in investigating helminthic infections and is carrying out research across a number of fields, including diagnosis, epidemiology, and taxonomy of both parasite and host.

TRANSMISSION

The majority of helminths have complex life cycles that may require multiple hosts over time, such as snails, rodents, fish, etc. Thus, understanding the sources of transmission and infection increasingly require ecological investigation. A novel collaborative investigation, which included members of the Department of Helminthology, examined the impact on rodents and their helminth parasites in Thailand of deforestation and habitat fragmentation. While they found no evidence that rapid fragmentation affected helminth species richness *per se*, the study did suggest that fragmentation resulted in less connected rodent-helminth networks, suggesting that parasite-sharing among host species may become more difficult to maintain with increasing habitat disturbance.

A study by Kittipong Chaisiri of the Department of Helminthology and colleagues examined the worm-burden among wild rats and mice trapped in four categorized habitats - forest, non-flooded land, irrigated land, and human settlement, in 7 localities of Thailand, Cambodia, and Lao PDR. They found that about 30% were infected by one or more medically-important helminth species, while one rat species, *Rattus tanezumi* hosted seven zoonotic helminth species. As this rat is found ubiquitously in all types of habitats, they suggest that it might act as an important bridge species, carrying parasites across different habitats.

Oesophagostomum anterior part

Oesophagostomum egg

While the usual helminthic hosts, such as rats, snails, and fish, are subjects of intense study, other wild animals may also be potential sources of zoonotic infection; an interesting example emerged from a collaborative research project between the Departments of Helminthology and Entomology, who screened for helminth infections among Asian wild elephants in the Salakpra Wildlife Sanctuary, Kanchanaburi, Thailand. They found a high worm burden among these elephants, consisting primarily of *Oesophagostomum aculeatum*, which might act as a reservoir for human infection. This helminth appears to be increasingly utilizing humans as hosts and can cause intestinal nodules and dysentery.

Studies such as these, and others carried out by FTM researchers, are an example of the One Health concept that recognizes that the health of humans is connected to the health of animals, both domestic and wildlife, and the overall environment.

TAXONOMY

While the term "helminth" has no taxonomic connotation and indeed generally describes a number of phyla, many of which are completely unrelated, understanding the taxonomy of medically important helminthic parasites is critical to accurate diagnosis and treatment as well as preventing transmission. The Department of Helminthology carried out a number of interesting taxonomic studies in 2015.

Paragonimus is a genus of lung flukes that can infect the lungs of humans after eating infected raw or undercooked crab or crayfish. Symptoms of infection can often be misdiagnosed as tuberculosis. More than 50 species of the genus have been described, based on morphology. However, Urusa Thaenkham of the Department of Helminthology and fellow researchers are re-examining this taxonomy using molecular techniques and are finding for example, that individual "species" might be better described as separate populations. Similarly, departmental researchers examined genetic differences among rat lungworms, *Angiostrongylus cantonensis*, collected throughout Thailand. This parasite causes inflammation of the central nervous system in humans, who are accidental hosts. It has a complex life cycle and its intermediate and definitive hosts are snails and rats, respectively. Interestingly, the low genetic variation and geographical distribution of *A. cantonensis* in each location suggests that separate populations may have multiple independent origins, indicating parasite migration via human-related activities; important clues to controlling its transmission.

DIAGNOSIS

Due to the relatively large size of most parasitic helminths, diagnosis has generally relied upon simple microscopic examination for eggs and larvae in stool samples. However, this method has relatively low sensitivity and may miss lower-intensity infections. This can be critical in the case of some infections, such as the liver fluke (*Opisthorchis viverrini*), a common parasite in Southeast Asia, whose presence is a high risk factor for cholangiocarcinoma, a malignant tumor of the biliary tract. Poom Adisakwattana of the Department of Helminthology and Onrapak Reamtong of the Department of Molecular Tropical Medicine and Genetics, along with colleagues, have been examining cytoplasmic membrane proteins associated with invasive cholangiocarcinoma that appear to facilitate cancer progression. Their research has identified a novel protein, ALCAM, which could be used as a biomarker for development of diagnosis, prognosis, and drug or antibody-based targeted therapies in the future.

Another study of *Opisthorchis viverrini* examined its presence in its host, freshwater snails of the family Bithyniidae, with a survey in Thailand that clarified the specific infected species of this freshwater snail, and their geographic range.

A significant complication in the accurate diagnosis of *Opisthorchis viverrini* is that its range overlaps that of the minute intestinal fluke *Haplorchis taichui,* and in fact, co-infections are common. Since the eggs of both are morphologically similar, molecular methods of diagnosis are particularly important. The Department of Helminthology participated in cross-sectional investigations in two villages in rural Lao PDR that examined the burden of infection by both *O. viverrini* and *H. taichui*. The survey found high rates of infection; 82.1% for *H. taichu*i and 31.4% for *O. viverrini*, commonly as co-infections. They found that fish-borne infections were more prevalent among adults, and that the fish in these villages harbored these helminthes, meaning that anyone could consume them and become infected. The researchers concluded that if people who work in rice fields could limit the species of fish they consume, or avoid consuming raw fish during the month of November, they might reduce their risk of *O. viverrini* infection.

While the burden of helminthic infections has decreased, there is still much work to be done, particularly in rural and less economically-advantaged parts of Southeast Asia. The Faculty of Tropical Medicine is in the forefront of these efforts, working in many areas to improve the current situation through improvements in diagnosis and the better delivery of treatment.

HIV/AIDS

Departments and Centers involved: Vaccine Trial Center, Clinical Tropical Medicine, Tropical Hygiene, BIOPHICS

Collaborations : Silom Community Clinic @ TropMed

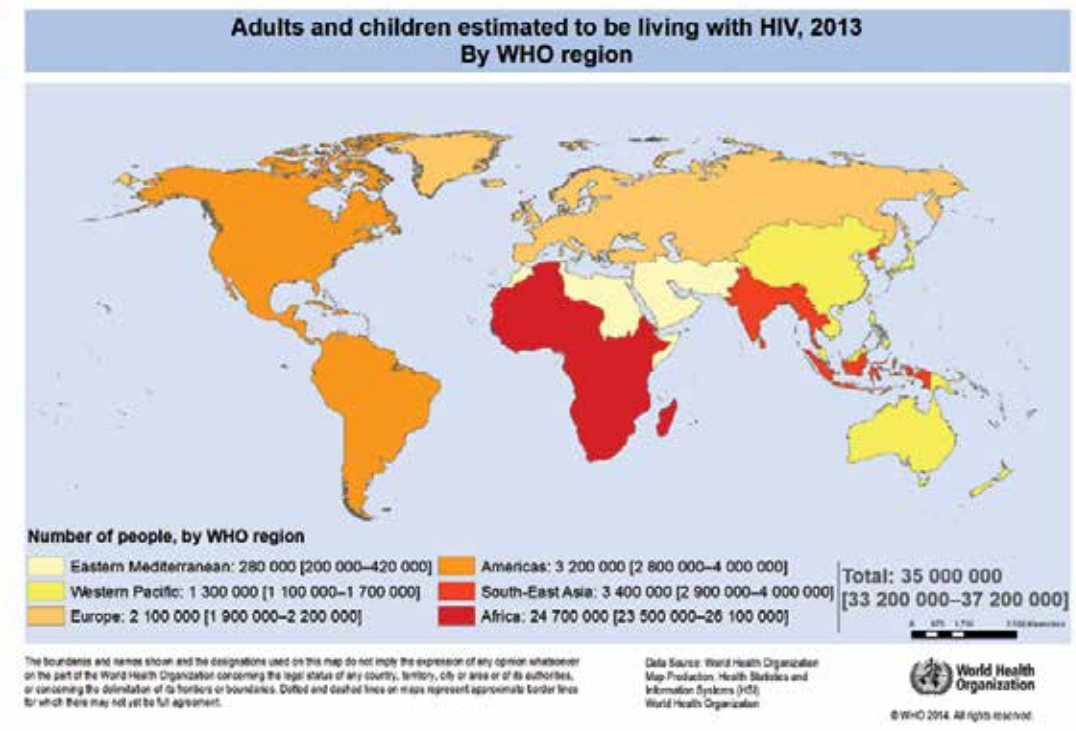
BACKGROUND

The human immunodeficiency virus (HIV) infects cells of the immune system, impairing or destroying their function. Infection with the virus leads to immune deficiency and opportunistic infections take advantage of the weakened immune system. Acquired immunodeficiency syndrome (AIDS) is defined by the occurrence of any of more than 20 opportunistic infections or HIV-related cancers.

HIV can be transmitted through unprotected sex with an infected person; sharing of needles and syringes, and the transfusion of contaminated blood. It can also be transmitted between mother and her child during pregnancy, childbirth and breastfeeding.

DISEASE IMPACT

According to 2014 estimates by WHO and UNAIDS, 36.9 million people were living with HIV globally. In the same year, 2 million people became newly infected, and 1.2 million died of HIV-related causes. Although the disease is not confined to tropical regions, many countries in the Tropics are severely affected. After sub-Saharan Africa, the Asia and Pacific region has the largest number of people living with HIV.



KEY WORK AT THE FACULTY

Since the RV144 clinical trial, published in 2009, the Faculty has worked on improving the understanding of both epidemiological and immunological factors of HIV. The RV144 trial, which showed an estimated vaccine efficacy of 31% for protecting low-risk Thai volunteers against the acquisition of HIV-1, was the first ever trial to demonstrate any efficacy of a vaccine regimen.

RECENT WORK

In 2015, the Faculty published 13 articles related to HIV/AIDS. These included -

Jaranit Kaewkungwal of BIOPHICS and Punnee Pitisuttithum of the Vaccine Trial Centre participated in a study that built on the RV144 trial and tested whether human leukocyte antigen (HLA) class II genotypes affected HIV-1–specific antibody levels and HIV-1 acquisition in 760 individuals. The study was successfully published in the journal *Science Translational Medicine*. As stated in the paper, the increased understanding of how variation in the host relates to vaccine-induced responses gained through the study "can help in the interpretation of vaccine efficacy studies and could prospectively improve vaccine design".

Jaranit Kaewkungwal and Punnee Pitisuttithum were also part of the trial and clinical team of a study published in *Nature Medicine*. The paper described that the trial found, in two different cohorts, that more diverse HIV-1 populations in early infection were associated with significantly higher viral load one year after HIV-1 diagnosis.

Srisin Khusmith of the Department of Microbiology and Immunology contributed to a paper in *AIDS Research and Human Retroviruses*. The study aimed to identify host genetic polymorphisms affecting the rate of lipoatrophy onset in Thai HIV patients. The results of the study suggested a novel candidate gene involved in the development of lipoatrophy, something that will be further investigated in the future.

SILOM COMMUNITY CLINIC @TROPMED

Silom Community Clinic @TropMed (SCC @TropMed) integrates research with the provision of services and has been involved in many important studies. In 2015, there were 5 HIV/AIDS related publications including -

The paper "Temporal trends in HIV-1 incidence and risk behaviours in men who have sex with men in Bangkok, Thailand, 2006-13: an observational study" was published in *The Lancet HIV*. The study assessed temporal trends in HIV-1 incidence and behavioral risk factors among MSM in Bangkok, Thailand, from 2006 to 2013. The paper concluded that with the sustained high HIV-1 incidence and increasing drug use among MSM in Bangkok, there is an urgent need for innovative and acceptable HIV prevention interventions, especially for young MSM.

A publication in *Archives of Sexual Behavior*, "Longitudinal analysis of key HIV-risk behavior patterns and predictors in men who have sex with men, Bangkok, Thailand", described a longitudinal analysis that included 1,569 MSM who were enrolled from 2006 to 2010 in the Bangkok MSM Cohort Study (BMCS). The study found a decrease in odds for the three HIV-risk behaviors (unprotected anal intercourse (UAI), 2%; recreational drug use, 1%; and multiple sexual partners i.e., more than four male/transgender partners, 1%) over time for each four-month visit and significant predictors associated with three HIV-risk behaviors, such as binge drinking, participation in group sex, and use of erectile dysfunction drugs.

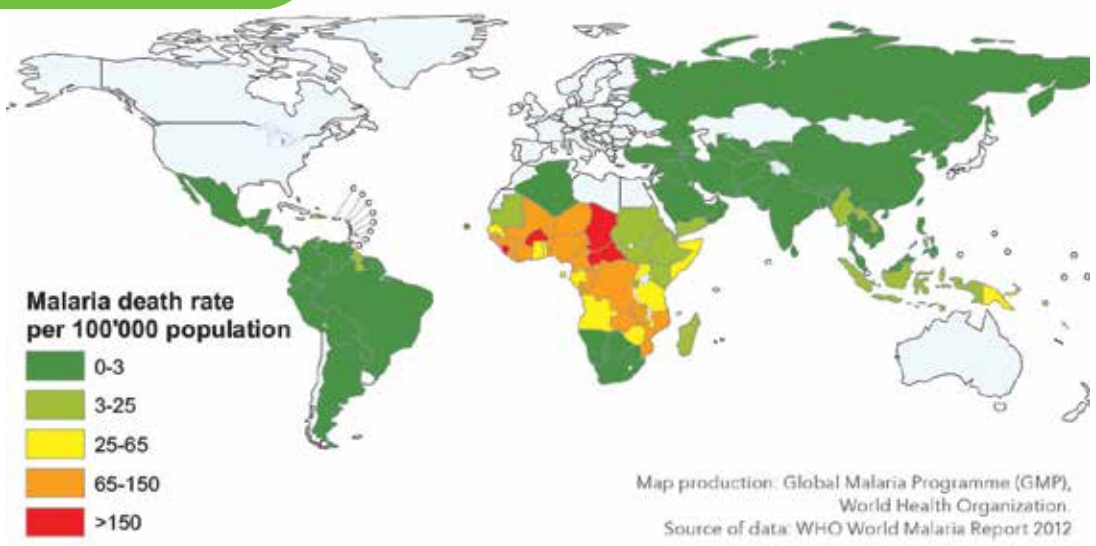
A paper in *Sexually Transmitted Diseases* described the prevalence and correlates of *Chlamydia trachomatis* (CT) and *Neisseria gonorrhoeae* (NG) in three anatomical sites (rectal, urethral, and pharyngeal) among Bangkok MSM Cohort Study participants. The authors found that CT and NG infections are highly prevalent among MSM in Bangkok, most frequently affect the rectum, and are most often asymptomatic. Rectal CT and NG infections were mutually associated and independently associated with HIV infection.

In addition, SCC @TropMed has several ongoing HIV and STI studies, including –

The Alloimmunization Study which seeks to investigate the role of immunologic cross-exposure between serodiscordant sexual partners in influencing the risk of HIV transmission by examining the role of partner-specific antibodies.

The Enhanced Gonoccocal Antimicrobial Surveillance Programme (EGASP) – Thailand which is a collaboration between the Thailand MOPH; TUC; the World Health Organization (WHO); and the U.S. CDC Division of STD Prevention (DSTDP) to conduct a surveillance activity which collects specimens from men with urethritis to assess for resistant gonorrhea. They are partnered with the Hospital for Tropical Diseases, Mahidol University, Microbiology Department, to lead the culture and antimicrobial resistance testing for this activity.

Malaria



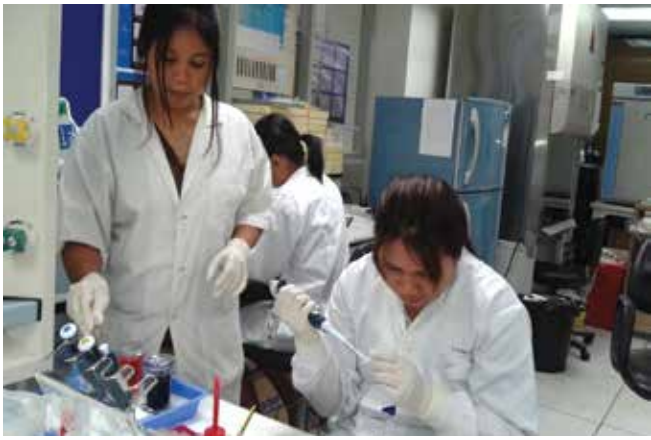
One of humanity's most historically significant diseases, and still today a major cause of worldwide mortality, malaria results from the transmission of the single-cell parasite *Plasmodium* via the bite of an infected *Anopheles* mosquito. Malaria is primarily a disease of the tropical and subtropical regions of the world. About 3.2 billion people – almost half of the world's population – are at risk of malaria and more than 200 million people are affected by malaria each year, resulting in an estimated 584,000 malaria deaths. At least 90% of those deaths were in Africa, with the heaviest mortality concentrated in children under the age of 5.

Southeast Asia by comparison has seen considerable reductions in malaria cases over the course of the past decades. Nevertheless, malaria still has a serious impact on this region. The WHO reports that in 2010 there were 4.3 million cases and 2,426 deaths due to malaria in Southeast Asia. Most malaria infections are caused by either *Plasmodium falciparum* or *P. vivax* and are concentrated among those living on the border of Thailand and in neighboring countries where the disease most affects poor and vulnerable populations, such as migrant workers, subsistence farmers, and ethnic communities. Given the impact of malaria, it should be no surprise that the Faculty of Tropical Medicine has been leading research into the disease in Asia for well over 50 years, and is currently engaged in many projects and collaborations seeking to eliminate malaria. In the period 2009-2013, Mahidol University was ranked 5th in the world with regards to publications on malaria research.

ANTIMALARIAL RESISTANCE

A subject of particularly intense study concerns the ongoing problem of anti-malarial resistance which, for many reasons, has repeatedly originated in Southeast Asia. The region was the origin of anti-malarial resistance to chloroquine and the same process is now reoccurring with resistance to the latest drug, artemisinin, having been recently detected in Cambodia, Myanmar, Thailand, Laos, and Vietnam. As artemisinin is the current cornerstone of malaria drug treatment, rising rates of resistance threaten to rollback worldwide gains against this disease. There is thus a great need to better our understanding of the mechanisms behind anti-malarial resistance. Kesinee Chotivanich of the Department of Clinical Tropical Medicine and the Mahidol-Oxford Tropical Research Unit (MORU) recently collaborated with others to undertake a study of artemisinin-sensitive and-resistant strains of *Plasmodium falciparum* taken directly from the field in a region where resistance is developing. In the study, they compared field-caught strains with those from the lab that had been engineered with either mutant or wild-type resistance mutations. The group found that in artemisinin-sensitive *P. falciparum*, the drug-induced growth retardation and accumulation of cell proteins targeted for degradation by ubiquitin, indicating that the artemisinin activates the cellular stress response. Resistant parasites, on the other hand, exhibit reduced protein ubiquitination and delayed onset of cell death. Thus, it appears that inhibition of the ubiquitin-proteosome protein degradation pathway strongly synergizes artemisinin activity, offering a means of overcoming artemisinin resistance. Such research provides deeper insights into the mechanism behind resistance and important clinical data indicating that artemisinin treatment should be extended from the standard 3-day treatment to a 4-day treatment.

Another study by the Department of Clinical Tropical Medicine and MORU, published in the journal *Nature*, took a somewhat opposite approach in attempting to understand the biochemical targets of artemisinin better. Their study identified a key role for the signaling enzyme phosphatidylinositol-3-kinase (PfPI3K), whose downstream lipid product phosphatidylinositol-3-phosphate (PI3P) appears to be predictive of artemisinin resistance. Thus, PI3P may be a key mediator of artemisinin resistance and PfPI3K bears examination as an important target for malaria elimination.



In a paper by Mok et al. published in the journal *Science*, members of the Department of Clinical Tropical Medicine, the Department of Molecular Tropical Medicine and Genetics, and MORU, focused on mutations in a gene region that codes for a kelch domain-carrying protein called K13 in order to understand the mechanisms that underlie artemisinin resistance better. There is considerable evidence that mutations in the K13 protein are predictive for artemisinin resistance in Southeast Asia. Faculty of Tropical Medicine researchers, with their collaborators, used transcriptome analysis to look at patterns of gene expression in parasites isolated from more than 1000 patients sampled in Africa, Bangladesh, and the Mekong region. They found that artemisinin resistance was associated with increased expression of cellular stress response pathways as well as a retarded developmental cycle. Most significantly, this range of mutations affecting protein repair and the timing of the parasite's developmental cycle were only found in parasites from the Mekong region.

To improve our understanding of the scope of the problem, Mallika Imwong and other members of the Faculty of Tropical Medicine researchers examined the spread of artemisinin-resistant *P. falciparum* in Myanmar. Their study, published in *The Lancet Infectious Diseases*, looked at the relative prevalence of *P. falciparum* parasites carrying the K13-protein mutations. After carrying out a cross-sectional survey at malaria treatment centers at 55 sites in Myanmar, and relevant border regions in Thailand and Bangladesh, they entered the data into geostatistical models to produce predictive maps of the estimated prevalence of mutations of the K13 protein across Myanmar. They found that overall, 39% of samples carried a K13 protein mutation of 26 different types. In seven of the ten administrative regions of Myanmar, the combined K13-mutation prevalence was more than 20%. Geospatial mapping showed that the overall prevalence of K13 mutations exceeded 10% in much of the east and north of the country. From this study it is clear that artemisinin resistance extends across much of Myanmar. The authors recommend that therapeutic regimens should be tested urgently and implemented comprehensively if the spread of artemisinin resistance to other regions is to be avoided.

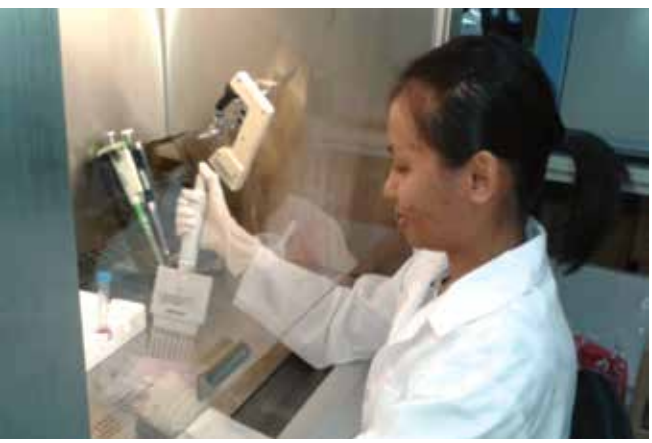
Interestingly, while artemisinin-resistance appears to be widespread throughout the Mekong region, and in all cases arising from mutations in a kelch protein encoded on *P. falciparum* chromosome 13 (K13), these mutations nonetheless appear to have arisen independently throughout the region. In a paper published in the *Journal of Infectious Diseases,* researchers with the Department of Molecular Tropical Medicine and Genetics and MORU carried out genotyping of *P. falciparum* infections from efficacy trials carried out in Bangladesh, Cambodia, Laos, Myanmar, and Vietnam of the drug artesunate – a semisynthetic derivative of artemisinin. The goal of the genotyping was to test associations between parasite genotypes and parasite clearance half-lives following artesunate treatment. K13 mutations were tested for association with artemisinin resistance, and extended haplotypes on chromosome 13 were examined to determine whether mutations arose focally and spread or whether they emerged independently. They found that *P. falciparum* with a mutation in any of the K13 kelch domains displayed longer parasite clearance half-lives than wild-type parasites and their haplotype analysis revealed both population-specific emergence of mutations and independent emergence of the same mutation in different geographic areas. Thus, while there is some evidence of spreading resistance, no evidence was found of resistance moving westward from Cambodia into Myanmar.

The amount of current research into the growing threat of artemisinin-resistance is a testimony to the seriousness of the threat that it poses. The historical spread of chloroquine resistance resulted in millions of deaths in Africa and there is tremendous concern that artemisinin resistance could follow the same historical paths -- spreading antimalarial drug resistance from Southeast Asia through India and into Africa. More research is urgently needed into the mechanisms behind resistance and the development of new therapeutic strategies in preserving the use of this critical therapy in areas experiencing artemisinin resistance.

CLINICAL

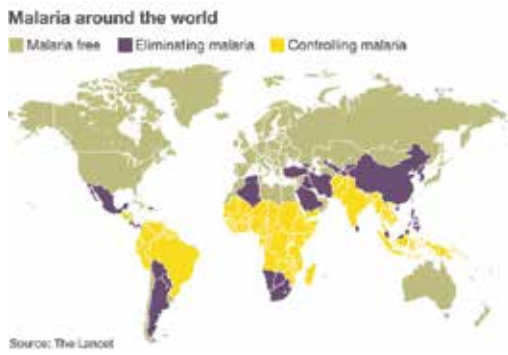
The *Plasmodium* parasites that cause malaria have complicated life cycles that involve infection of both red blood cells and liver cells. Within the red blood cells, the parasites multiply in tremendous numbers, periodically breaking out to invade fresh red blood cells. Several such amplification cycles occur, generating fever from each wave of parasites escaping and infecting new red blood cells. However, as infected red blood cells circulate, they are filtered out and destroyed by the spleen. To avoid this fate, the parasite generates adhesive proteins on the surface of the infected blood cells, causing the cells to stick to the walls of small blood vessels. This blockage of the microvasculature has been long known as a contributor to malarial morbidity and mortality but the degree of its association with disease severity and death has never been evaluated. Therefore, faculty with the Department of Clinical Tropical Medicine and MORU undertook to quantify microvascular blood flow in adults hospitalized with severe falciparum malaria while simultaneously measuring plasma biomarkers of endothelial function. The relationship between these indices and the patients' clinical findings and in-hospital course was also examined. This detailed clinical study demonstrated a clear relationship between microvascular obstruction and risk of death, and an association with multi-organ dysfunction and acute kidney injury. In addition, plasma lactate was identified as a biomarker that could be used as a powerful predictor of subsequent mortality. This research has the potential to offer new therapeutic pathways to reduce malaria injury and death.

Related research by the Department of Clinical Tropical Medicine and MORU found other organic acids, in addition to plasma lactate, that appear to be elevated in cases of severe malaria. They describe using liquid chromatography-mass spectrometry to measure organic acids in plasma and urine in malaria patients whose ultimate outcome was followed until either recovery or death. They found a number of newly identified acids, in addition to plasma lactate, that were highly predictive of fatal outcomes and could also be used as helpful biomarkers for disease prognosis.



Malaria caused by the parasite *Plasmodium falciparum* receives the most research focus because of the high mortality associated with their infections. Yet *P. vivax* malaria affects more people in a wider geographical range and is extending its range in response to successful *P. falciparum* elimination. Furthermore, *P. vivax* differs significantly from *P. falciparum* in that *P. vivax* has a dormant liver stage in its life cycle. In this *hypnozoite* stage, the parasite can be activated weeks, months, or even years after the primary mosquito-transmitted infection. Yet while the importance of *P. vivax* research is apparent there are significant challenges to its research, most particularly in the lack of an animal model, which

has seriously retarded drug development. Jetsumon Sattabongkot, Head of the Mahidol Vivax Research Unit, Wanlapa Roobsoong, also of MRU, and their colleagues report on their efforts to utilize a mouse that supports engraftment and long-term survival of human primary liver cells. They demonstrate complete *P. vivax* liver-stage development as well as the formation and persistence of hypnozoites *in vivo* within the FRG KO huHep mouse model. This represents an important step forward for *P. vivax* research, and promises new insights into the unique biology of this parasite and should hopefully accelerate drug development efforts as well.



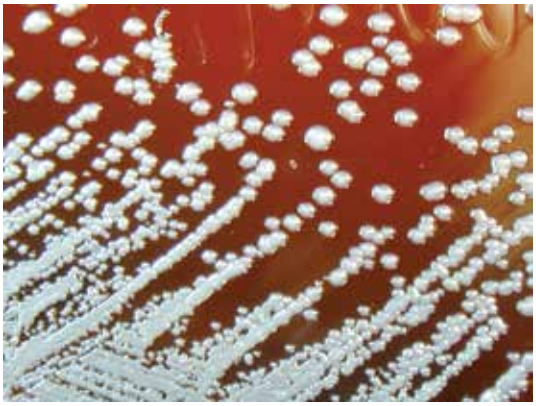
DIAGNOSIS

In malaria-endemic areas, *P. falciparum* infections are common in apparently healthy children, while severe malaria is commonly misdiagnosed in patients with low parasite loads. Previous studies have shown that nearly 25% of children diagnosed with cerebral malaria actually died from other causes, resulting in the under-diagnosis of other treatable severe infections. Mallika Imwong with the Department of Clinical Tropical Medicine, and her colleagues in the Department of Molecular Tropical Medicine and Genetics and MORU assessed whether plasma *P. falciparum* DNA concentration could be used to distinguish between uncomplicated and severe malaria. They reported on their findings in Imwong et al., *Plasma Concentration of Parasite DNA as a Measure of Disease Severity in Falciparum Malaria,* in the *The Journal of Infectious Diseases*. DNA concentrations of *P. falciparum* were measured with Real-time PCR in 224 African children (111 with uncomplicated malaria and 113 with severe malaria) and 211 Asian adults (100 with uncomplicated malaria and 111 with severe malaria) all presenting with acute falciparum malaria. The diagnostic accuracy of plasma *P. falciparum* DNA concentrations in identifying severe malaria was 0.834 for children and 0.788 for adults, at least as good as other diagnostic markers and substantially superior to measurements of parasite densities, thus demonstrating that the use of quantitative real-time PCR could be a useful method for diagnosing severe falciparum malaria.

The Government of Thailand has set a target to achieve >75% reduction in malaria case incidence by 2015 and for 80% of the country areas to be free of locally acquired malaria transmission by 2020. To achieve such a goal, rapid detection and treatment of symptomatic infections, as well as identification of asymptomatic individuals and treatment of malaria reservoirs are paramount. Asymptomatic carriers are a particular challenge to malaria control efforts because they harbor the parasite and perpetuate transmission within the community, yet are often undetectable using the conventional diagnostic method of using light microscopy blood smears. Therefore, if complete elimination of malaria from Southeast Asia is to be achieved, detection methods must be improved. Researchers with the Mahidol Vivax Research Unit report on their use of quantitative PCR and serology to assess the prevalence of asymptomatic and submicroscopic infections of falciparum and vivax malaria in western Thailand. They found that parasite prevalence was significantly higher than currently estimated using microscopic screening of blood smears from community mass blood surveys or patients in clinics. They suggest that as transmission levels drop in Thailand, it will be imperative to employ high-throughput methods with higher sensitivity for parasite detection in the phase of malaria elimination.

Melioidosis

Melioidosis is an infectious disease caused by the flagellated gram-negative bacterium *Burkholderia pseudomallei*, an environmental saprophyte that is found in soil and water. Infection usually takes place with the inoculation of the bacteria into the body via cuts and wounds in the skin or via inhalation of dust or droplets and very rarely by ingestion of contaminated water. The disease exists in both acute and chronic forms, however, the disease symptoms may vary tremendously, in terms of incubation period, length of illness, and organs involved. Common signs and symptoms can include fever, pain in the chest, bones, or joints; cough; skin infections, lung nodules and pneumonia.



EPIDEMIOLOGY

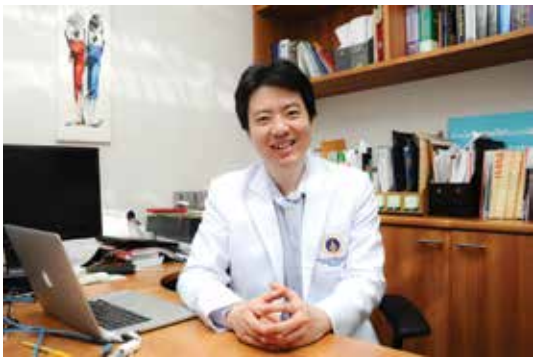
A classic "neglected tropical disease", melioidosis has long been seen as an endemic disease limited to Northern Australia and Southeast Asia but most particularly to northeast Thailand, which has the highest incidence of melioidosis recorded in the world (21.3 cases of melioidosis per 100,000 people per year) and where 80% of children in this region have tested positive for antibodies against *B. pseudomallei* by the age of four.

The Faculty of Tropical Medicine has been in the forefront in investigating this disease and it is largely because of this work that we are now beginning to understand that the true global burden of melioidosis is actually greatly underestimated due to the lack of adequate diagnostic microbiological facilities. A groundbreaking paper published this year in the journal *Nature Microbiology* by Assistant Professor Direk Limmathurotsakul and colleagues reports on their review of documented human and animal cases and the records of environmental *B. pseudomallei*. After combining this data into a formal modeling framework, they estimated the global burden of melioidosis to be severely underreported in the 45 countries in which it is known to be endemic, and predict that the bacteria is probably endemic in a further 34 countries that have never previously reported the disease. The paper, entitled "*Predicted global distribution of Burkholderia pseudomallei and burden of melioidosis*" has already been widely cited as it is now clear that melioidosis is indeed a major public health threat worldwide.

PATHOGENESIS

To underscore the threat of this pathogen, *B. pseudomallei* is intrinsically resistant to a wide range of antibiotics and even with appropriate drugs, treatment takes months: at least 10-14 days of intravenous therapy followed by 3-6 months of oral treatment. Nonetheless, even with such treatment over 40% of melioidosis patients in northeast Thailand still die. And of those who do survive initial infection, about 13% develop recurrent infection, which is associated with further mortality (24%).

Understanding the factors behind such high mortality has been a particular focus of the Faculty of Tropical Medicine researchers for many years. Such efforts have been recognized in a significant way this year with



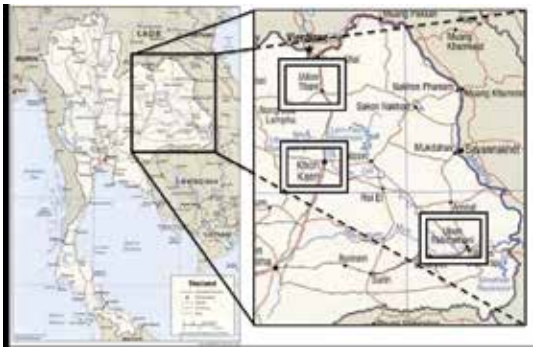
the award of a 5-year, multi-million dollar grant from the US National Institutes of Health /NIAID to Associate Professor Narisara Chantratita to fund a large-scale study of the immune response to melioidosis infection. Her project, entitled "Determinants of outcome and recurrent infection in melioidosis" is using this funding to create a major research consortium made up of both Thai and international melioidosis investigators working with patient cohorts recruited from hospitals across northeast Thailand. The goal is create a multi-center, longitudinal cohort study that can generate a massive clinical dataset of patient immune response as well as a biorepository of samples for further analysis. This study will yield a wealth of data that can be probed to answer questions about clinical issues, host factors, or bacterial characteristics. A key aspect of the project is that while a large number of clinical studies have been conducted on melioidosis, very little is known about the host inflammatory response in melioidosis or biological determinants of outcome. Thus, this study will address the need to gain a deeper understanding of the host response in melioidosis in order to identify new therapeutic targets and improve outcomes.

Other research on host immune response to *B. pseudomallei* infection is being carried out by Faculty of Tropical Medicine researchers. For example, the Department of Microbiology and Immunology, the Department of Tropical Hygiene and MORU recently collaborated on a study that examined the relationship between immune responses to the bacteria and death by studying a cohort of 200 patients admitted to hospital with acute melioidosis and following the patients for up to one year, where possible. They found that people with fatal cases of melioidosis had lower T-cell response in comparison with survivors. T cells are a white blood cell critical in the immune response. Diabetics had a lower T-cell response than people without diabetes, and those patients with higher levels of neutrophils - another important immune cell - on admission to hospital showed lower T-cell responses both during illness and three months later in survivors. This highlighting of T-cell responses to melioidosis is important for the design of vaccines against melioidosis and this study another good example of the collaborative nature of melioidosis research at the Faculty of Tropical Medicine.

TRANSMISSION AND PREVENTION

As mentioned, skin inoculation is considered the main route of infection, particularly among agricultural workers, most especially with the flooding of rice paddies and planting at the commencement of the monsoonal season. Ingestion of food contaminated with soil or dust or drinking untreated water can also be significant routes of infection. In spite of these risks, precautions can be taken to minimize exposure: persons with open skin wounds, particularly those with diabetes or chronic renal disease are at increased risk for melioidosis and should avoid contact with soil and standing water. Agricultural workers should wear boots, to prevent infection

through the feet and lower legs. Water should be treated and food to be eaten raw should be washed using boiled or bottled water.



However, recognizing that many people in Thailand currently do not follow the recommendations, researchers with the Department of Tropical Hygiene and the Mahidol-Oxford Tropical Medicine Research Unit developed a questionnaire to evaluate public awareness of melioidosis and its prevention. The questionnaire was delivered to five randomly selected adults in each of 928 districts in Thailand. In addition, a contest was run to generate video clips on the theme "Melioidosis, an infectious disease that Thais must know" with the best 12 video clips shown to people at risk from melioidosis (diabetics). Focus group interviews were used to evaluate their perceptions of the video clips. The results were striking; of the more than 4,000 Thais who completed the questionnaire, 74% had never heard of melioidosis, and 19% had heard of the disease but had no further knowledge. On a more positive note, most participants in the video clip focus groups felt that videos were beneficial and could positively influence them to increase their precautions. Participants also provided useful suggestions: that video clips should be presented in the local dialect with simple words rather than medical terms, in a serious manner, with a doctor as the one presenting the facts, and having detailed pictures of each recommended prevention method.

DIAGNOSIS

One of the factors responsible for the high mortality rate associated with melioidosis is its difficult diagnosis. The disease has a wide range of clinical signs and symptoms and can easily be mistaken for other diseases, such as tuberculosis or more common forms of pneumonia. The current diagnostic "gold standard" is growing the bacteria in culture; this can take 5 to 7 days however, and because melioidosis can progress so rapidly, confirmatory diagnosis is often too late. In addition, *B. pseudomallei* is often misidentified as a contaminant or as another species, especially by laboratory staff unfamiliar with this organism. There are currently no commercially available and reliable rapid diagnostic tests for melioidosis. Serologic tests, while widely used, are neither sensitive nor specific. Recognizing the need for more rapid and accurate diagnosis of melioidosis, Faculty of Tropical Medicine researchers helped organize a Melioidosis Diagnostic Workshop, held in Bangkok and sponsored by the US Centers for Disease Control and Prevention, to discuss the current state of melioidosis diagnostics, diagnostic needs, and future directions. A summary of the workshop was published this year as an informative diagnostic guide for clinicians and laboratory staff and will hopefully contribute to more timely and accurate treatment for this disease.

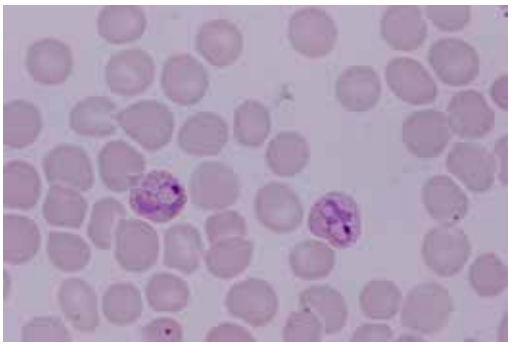
Protozoa

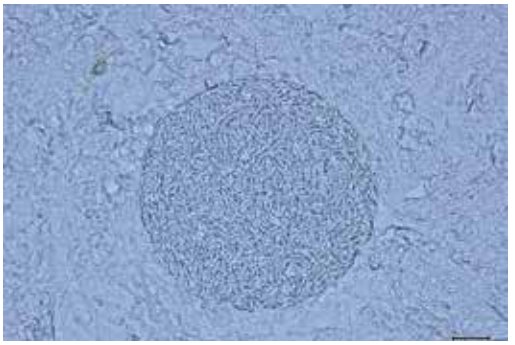
Departments and Centers involved: Protozoology, Helminthology, Medical Entomology, and Tropical Pediatrics

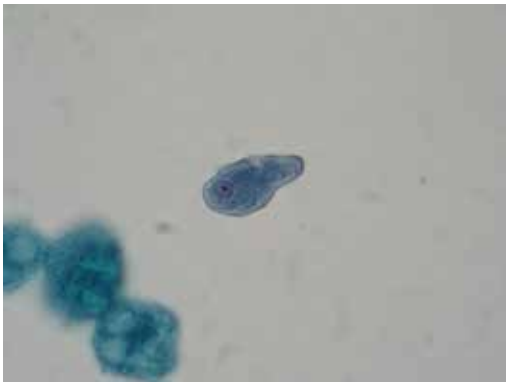
BACKGROUND

Protozoa are one of the three main classes of parasites that cause diseases in humans. Protozoan diseases infect people all around the world, though many tend to be particularly common in the Tropics and developing countries. Infections caused by protozoa are contagious.

Important protozoan diseases include: amebiasis, giardiasis, African sleeping sickness, leishmaniasis, toxoplasmosis, malaria, blastocystosis and trichomoniasis.







DISEASE IMPACT

The global impact of the protozoan diseases is large; WHO estimates that malaria alone caused 438,000 deaths in 2015.

The impacts of other protozoan diseases are variable. There were 3796 new cases of African sleeping sickness in 2014, the lowest level since the start of systematic global data-collection. A 2014 study concluded that 30–50% of the global population are infected with *Toxoplasma gondii* but are mostly considered asymptomatic. Blastocystosis is a common disease, frequently misdiagnosed as IBS (irritable bowel syndrome). The 2013 Global Burden of Disease Study estimated there were 58 million cases of trichomoniasis worldwide.

KEY WORK AT THE FACULTY

In 2003, the Department of Protozoology contributed to the global *Evaluation of a Candidate International Standard Preparation for Human Anti-Toxoplasma Immunoglobulin G*. Based on the results of this study, the serum preparation was established as the first international standard for human anti-*Toxoplasma* Immunoglobulin G by the World Health Organization.

RECENT WORK

In 2015, the Faculty published 7 articles related to Protozoa (excluding malaria, for more information on malaria see pages 76-80). These included -

Faculty members from the Departments of Protozoology, Helminthology and Medical Entomology published a cross-sectional study of *Blastocystis* sp in *The Korean Journal of Parasitology*. *Blastocystis* sp. is a common zoonotic intestinal protozoa with 17 subtypes. The study was conducted to determine the prevalence and subtype distribution of *Blastocystis* among villagers living on the Thai-Myanmar border. The study found subtype (ST) 3 to be the most common, followed by ST1. The prevalence of infection was 37.2%. The information found suggests that increased health education and improved sanitation is needed in the area to reduce the prevalence of infection.

Six members of the Department of Protozoology, in collaboration with colleagues from other universities and faculties, published their recently developed and tested method of detecting *Naegleria fowleri* in water samples. The method, published *PLoS ONE*, is rapid, simple and has high-sensitivity. The novel loop-mediated isothermal amplification (LAMP) assay targets the virulence-related gene for *N. fowleri* and the amplification products are easily seen using hydroxy naphthol blue. The authors suggest this new method is ideal for use in a resource-poor setting where current PCR methods are less suitable.

Porntip Petmitr, of the Department of Protozoology, and colleagues from the Faculty of Public Health, published the results of their study to develop a method for concentrating Group A rotaviruses to assess the detection rate, and to characterize the genotype of naturally occurring rotavirus in bivalve shellfish species. The article, in *Food Microbiology*, demonstrated that an adsorption-twice elution-extraction method was a less-time consuming method of concentrating the rotaviruses. The study also found the harvesting areas of the selected shellfish species had been polluted fecally by humans and/or animals.

Other Research Areas

With eleven departments and over 190 researchers in the Faculty, the range of research areas is very broad. These pages highlight a few of the other areas covered by the work of Faculty staff.

NON-COMMUNICABLE DISEASES

Non-communicable diseases are becoming ever more prevalent in Thailand and other tropical countries and research at the Faculty reflects this. In 2015, published work included -

Obesity

A study investigating whether fat mass and obesity-associated (FTO) gene variants are associated with obesity in Thais was carried out by researchers at the Department of Tropical Nutrition and Food Science collaborating with scientists from other departments in the university. The study analysed ten variants in the FTO gene across 12 families. They found three single nucleotide polymorphisms (SNPs) were associated with increased risk in the study and that these SNPs are important genetic factors in the development of obesity.

Faculty researchers, with colleagues from the UK's Liverpool John Moores University, found that the prevalence of plasma small dense LDL is increased in obesity among a Thai population. This has been previously observed in European and American populations, but this study was the first in Thailand and one of only very few in Asia.

Diabetes

Researchers in the Department of Tropical Nutrition and Food Science, working with international colleagues, conducted a comprehensive metabolomic profiling of liver tissue from adiponectin-knockout mice fed on a high-fat diet. Mice were either with or without adiponectin supplementation; adiponectin mediates anti-diabetic effects via increasing hepatic insulin sensitivity and direct metabolic effects. From this the researchers were able to derive insight into the mechanisms and consequences of insulin resistance.

Allergies

Previous epidemiological surveys have demonstrated that helminth infections are negatively related to atopic diseases, including asthma. Kamolnetr Okanurak and researchers from Sun Yat-sen University, China, conducted a study to determine the effects of AcCystatin, a cystatin protease inhibitor of *Angiostrongylus cantonensis*, on an ovalbumin/aluminium hydroxide induced rat model of asthma. Their findings demonstrated, for the first time, that AcCystatin is effective in the prevention and treatment of the airway inflammation associated with asthma.

Cancer

A study from Faculty researchers working with colleagues from Chulalongkorn and Khon Kaen Universities showed that the activated leukocyte cell adhesion molecule (ALCAM) could be used as a biomarker for

diagnosis and prognosis of bile duct cancer, and in drug or antibody-based targeted therapies for the disease in the future. The incidence of bile duct cancer in Southeast Asia is high and liver fluke infection, and nitrosamine consumption are the main risk factors associated its development.

Punnee Pitisuttithum, working with the pharmaceutical company Merck & Co., tested a second-generation 9-valent human papillomavirus (HPV) vaccine and published the results in the *Expert Review of Vaccines*. HPV causes nearly all cervical cancers as well as a large proportion of anal, vulvar, vaginal, penile and oropharyngeal cancers. Through this HPV is responsible for approximately 5% of all cancers globally. The study found the new vaccine has the potential to prevent 90% of cervical cancers and the potential to prevent 85–95% of HPV-related vulvar, vaginal and anal cancers.

OTHER INFECTIOUS DISEASES

A large number of diseases can be classified as neglected, emerging or re-emerging. While these sometimes do not receive the political, media and financial attention of other diseases, they are important areas of research. The Faculty's 2015 publications included -

Tuberculosis

The Mahidol Vivax Research Unit participated in a study that discovered that the Beijing strains of *Mycobacterium tuberculosis* can better resist autophagic killing by host cells. This was found to be due to the ability of the Beijing strains to evade host autophagy. This finding may have important implications for tuberculosis treatment, especially in regions where the Beijing genotype is prevalent.

Scrub typhus

An article published in *The Lancet Global Health* described work by members of the Mahidol-Oxford Tropical Medicine Research Unit and international colleagues to find out if scrub typhus, murine typhus and leptospirosis contribute to CNS infections in Lao PDR. The findings established that, in Lao PDR, these neglected diseases are important causes of CNS infections and that antibiotics, such as tetracycline, needed for the treatment of murine typhus and scrub typhus, are not routinely advised for treatment of CNS infections.

Another study in Lao PDR aimed to find out more about the genetics of *Orientia tsutsugamushi,* the causative agent of scrub typhus. Faculty researchers, working with others from the UK and Laos, were able to characterise, using multilocus sequence typing (MLST), 74 clinical isolates from three geographic locations and confirm high levels of diversity and recombination within the *O. tsutsugamushi* population. The researchers suggest that these data highlight how land use, as well as the movement of hosts and vectors, may impact on the epidemiology of zoonotic infections.

Faculty researchers and a colleague from Chiang Rai Prachanukroh Hospital were able to determine the optimal cut-off titers in admission and convalescent-phase samples for scrub typhus indirect immunofluorescence assay (IFA). While IFA is considered a good serological reference test for the disease, the cut-off titer to use has been previously a controversial topic.

Rabies

Watcharapong Piyaphanee contributed to an international study of 2,697 travelers receiving care for animal-related exposures and requiring rabies post-exposure prophylaxis. It was found that these travellers were not differentiated from other travellers by demographic characteristics; the median travel duration was relatively short, contrary to previously held ideas. The paper recommended that all travellers to rabies-endemic regions, regardless of demographics or length of stay, should be informed about rabies and the benefits of vaccination.

Influenza

Kobporn Boonnak with US and UK colleagues compared the efficacy of two intranasally delivered non-replicating influenza virus vaccines (H1 and H5 S-FLU). It was found that two doses of either vaccine protected mice and ferrets from lethal challenge with homologous, heterologous, and heterosubtypic influenza viruses. Both vaccines are thought to be promising candidates for further evaluation in humans. A study aiming to quantify mortality due to seasonal influenza in Thailand was published in the *American Journal of Epidemiology* helping to meet the need for more information on seasonal influenza mortality in developing countries in the Tropics. The study found that seasonal influenza infections are associated with substantial mortality in Thailand, but did not find the strong relationship between influenza activity and circulatory disease mortality that is often reported in temperate countries.

PUBLIC AWARENESS, PERCEPTION AND POLICY

Increased understanding of how health and disease are perceived and how health policies are implemented is important in ensuring progress. In 2015 publications from the Faculty included -

Awareness and Perception

MORU researchers, with others from the University of Oxford, carried out a qualitative study of pregnant migrant and refugee women's perceptions of mental illness on the Thai-Myanmar border. Focus-group discussions were conducted with pregnant migrants, pregnant refugees and antenatal clinic staff. The researchers found that mental illness was recognized as a concept by the majority of participants and there was a general willingness to discuss it. Participants believed the main causes of mental illness were economic and family-related difficulties. They also thought mental illness was more common during and following pregnancy due to a lack of family support and worries about the future.

Faculty researchers explored the impact of health education on the acceptance of and willingness to pay for influenza vaccination among older people in Bangkok. Health education, given via a video, was found to increase acceptance significantly, especially among those whose highest education level was primary school and who had not previously received an influenza vaccine. The video also significantly increased knowledge and positive attitudes. The researchers suggest that health education may lead to increased sustainability of Thailand's influenza immunization program.

Video as an education tool was also part of another study. An investigation by Faculty and MORU researchers, with colleagues from Thailand and the UK, evaluated Thai public awareness of melioidosis using a questionnaire, video clips and focus groups on these video clips. Of the 4,203 people who completed the questionnaire, 74% had never heard of melioidosis and 19% had heard of the disease but knew nothing about it. Most participants felt that video clips were a good way to share information about prevention methods especially if presented by a doctor using local, non-clinical language.

Policy

Researchers from Thailand, Lao PDR and Japan aimed to identify factors that have influenced implementation of the National School Health Policy (NSHP), based on the Global School Health Initiative, in Lao PDR. Document reviews and interviews with implementers were used to collect data. The results showed that

nationwide implementation was limited due to nine interlinked factors. The authors recommend that, for sustainable and nationwide implementation, there needs to be a clear long-term vision, increased planning, human resource management, well-organized training and improved monitoring.

RESEARCH METHODS

How to carry out research, including topics of ethics, consent and new technologies, is an important area of development. The Faculty produced a variety of work in 2015, including -

Ethics

Phaik Yeong Cheah and a colleague from the University of Oxford argued that consent by mature minors to research participation is acceptable in some situations and should be allowed. This position was taken as currently mature minors, particularly in low-income settings, are out of research participation because their parents are unavailable or refuse to provide consent, leading to this population being underrepresented.

Faculty researchers produced a paper, published in *Malaria Journal* examining the review process for malaria research proposals submitted to the Ethics Committee. Ethical issues raised by reviewers were counted and analysed. Among other results it was found that drug trials had the highest proportion of questions for most ethical issues, studies involving vulnerable populations were more likely to attract concerns related to study rationale and studies involving stored data attracted more issues around privacy and confidentiality.

New Technologies

BIOPHICS conducted a study aimed at evaluating the effectiveness of mobile-phone camera applications in capturing health-related data. Data collected was compared to existing immunization information collection methods in terms of completeness and consistency. The new method was found to be useful in increasing completeness and consistency. The authors suggest it can and should be used to improve data integrity and give more reliable statistics, both in research and in healthcare provision.

TRADITIONAL THAI MEDICINE

In recent years, there has been an increased interest in research into Traditional Thai Medicine. In 2015 Faculty papers included –

Natthanej Luplertlop and colleagues from other faculties investigated different colored rice extracts, looking at their biological content, their antioxidative activity, and their ability to reduce pro-inflammatory cytokines and matrix metalloproteinase expression. The study found that red rice exhibited high anti-oxidative activity and reduced pro-inflammatory cytokines and MMP-2 expression, giving new insights into the potential medical use of Thai colored rice extracts.

Pattaneeya Prangthip and a colleague from Phranakhon Si Ayutthaya Rajabhat University evaluated the effect of high hydrostatic pressure, ultra-sonic and thermal processing on phenolic contents and antioxidant capacities of honey from the longan flower. The study found that a significant increase in antioxidative compounds and capacity was obtained through high pressure processing.

Facilities and Services

In addition to the research divisions, the Faculty has an important set of facilities and services, for researchers, students and the general public. The following pages give more information on the work and achievements of –

◂ Bangkok School of Tropical Medicine

◂ The Hospital for Tropical Diseases

◂ Support Offices

◂ Central Equipment Unit

◂ TropMed Diagnostic Reference Center

◂ The Joint International Tropical Medicine Meeting (JITMM)

Bangkok School of Tropical Medicine

The Bangkok School of Tropical Medicine has long provided excellent real-world education in Tropical Medicine. Now in its 55th year, the School remains focused on providing the best possible training and experience for all its students.

2015 IN NUMBERS

- 87 students enrolled
- 68% international students
- 15 nationalities
- 10 courses on offer
- 15 Faculty scholarships awarded
- 29 international scholarships received
- 93% of students satisfied with their education at the School
- 34 student events
- 13 outbound exchange students

Prof. Sasithon Pukrittayakamee
Deputy Dean for Education

Asst. Prof. Kasinee Buchachart
Assistant Dean for Student Affairs and Special Activities

2015 HIGHLIGHTS

The School was able to award its **largest ever number of scholarships.** Awarding 8 scholarships, funded by MORU and distributed by the Dean, to deserving and high-achieving students from low- and middle-income countries is something the School is proud of and hopes to be able to replicate in the future.

Hosting **'International Night', a celebration of the diversity of the School's students**. This well-attended event included performances, national foods and traditional clothing. The night was an opportunity to highlight the international reputation of the School.

Starting the revision of its curricula to **move to an outcome-based approach** – a style of education that leads to more independent and practical learners. So far, two modules have been converted and the process will continue through 2016.

KEY FEATURES OF BANGKOK SCHOOL OF TROPICAL MEDICINE

Location – Located in an area with many endemic tropical diseases, the School makes frequent use of the Faculty's field sites. Facilities in Ratchaburi and Ubon Ratchathani allow students to gain a better understanding of the practical, cultural, and economic issues facing rural communities and healthcare providers.

Hospitals – The Hospital for Tropical Diseases is onsite and Mahidol University's Ramathibodi Hospital is nearby. Both facilities are used in student rounds, which are a very effective way to gain hands-on experience.

International Recognition – The School's Diploma in Tropical Medicine and Hygiene and Master of Clinical Tropical Medicine are certified by the American Society for Tropical Medicine and Hygiene.

Diverse Cohort - In 2015, the student population was 32% Thai and 68% international, including students from 15 countries. This diverse student body helps individuals become familiar with different cultural norms, traditions, and perspectives, as well as diseases and health issues specific to certain areas.

Student support – The School prides itself on providing well-rounded support to students during their time at the Faculty. Different avenues of support, from admissions and scholarships to careers advice and social activities are provided for all students. Social, cultural and sporting events ensure that students have balanced lives and are able to make the most of the international environment during their studies.

Opportunities – Every year there are exchange programs to help students experience a wide range of institutes and countries. In 2015, 9 students visited other countries. These exchanges provide valuable learning and networking opportunities. The School also assists many students in finding worthwhile volunteering activities. For example, this academic year students provided HIV/AIDS training at Ratchasuda College, a college of higher education for disabled adults; participated in the Hospital's blood-donation drive and carried out fundraising activities. One of the fundraising activities raised enough money to provide 60 Nepali families with much-needed food supplies in the aftermath of the huge Nepal Earthquake on 25th April 2015.

Courses Offered by the Bangkok School of Tropical Medicine
Diploma in Tropical Medicine and Hygiene
Master of Clinical Tropical Medicine
Master of Clinical Tropical Medicine (Tropical Pediatrics)
Doctor of Philosophy in Clinical Tropical Medicine
Diploma in Biomedical and Health Informatics
Master of Science in Biomedical and Health Informatics
Master of Science in Tropical Medicine
Doctor of Philosophy in Tropical Medicine
Master of Science in School Health
Residency in Travel Medicine

The Hospital for Tropical Diseases

Asst. Prof. Udomsak Silachamroon - Director

The Hospital for Tropical Diseases has been part of the Faculty of Tropical Medicine for over 50 years, and during this time it has grown into a national center for tropical-disease treatment and a pioneer in travel medicine. The hospital has 250 beds, divided between in-patient treatment and research.

As well as being a center for excellent medical care, the Hospital is a resource of the departments of the Faculty. There are strong research and training connections with all departments and the presence of the Hospital adds to the strength of the Faculty's education and research programs.

2015 IN NUMBERS

- 39,608 outpatient cases
- 2,289 inpatient cases
- 26 specialists
- 3,845 visits to the Travel Clinic
- 9 international elective medical students, residents and fellows hosted

2015 HIGHLIGHTS

The main highlight of the year was **the Hospital receiving re-accreditation**. The results of the renewal inspection were extremely high and mean that the Hospital keeps its accreditation for a further three years. Being accredited means the Hospital has demonstrated its commitment to patient-centered quality improvement and that the hospital has systems in place to minimize risk and assure quality that ensures appropriate professional practice and upholds medical ethics.

2015 saw an **outbreak of dengue** in Thailand. The Hospital was able to manage the large increase of cases successfully through coordination and collaboration with other hospitals. Many dengue patients were transferred to the Hospital from other places, highlighting its important role as a specialist institution.

KEY FEATURES OF THE HOSPITAL FOR TROPICAL DISEASES

High Quality Healthcare

In 2013, the Hospital received prestigious accreditation from the Thai Healthcare Accreditation Institute. This accreditation is given to high-quality healthcare providers, and is a mark of efficiency and quality in care, safety, and data management. In 2015, this accreditation was retained following a successful renewal inspection.

Since moving three years ago to the new facilities, complete with state-of-the-art equipment, the Hospital has continued to develop its services and improve its quality of care, and it is quickly becoming a national center of expertise in dengue, malaria, parasitic infections, and other infectious diseases. Patients from around the country are being referred to the specialists at the Hospital.

Travel Medicine

The Hospital's Travel Clinic is a hub for travel medicine in Bangkok. In 2015, 3,845 people, both local and international, attended the Travel Clinic for a range of services, including vaccinations, health certificates, and traveler-health advice.

In 2013, the Clinic developed a residency training program in Travel Medicine, the first of its kind in the world. This training program had seven residents in 2015 and is proving to be a popular option for people interested in the fast-growing field of Travel Medicine.

High Quality Research and Education

The Hospital has always prided itself of working closely with both researchers and students at the Faculty – students conduct ward rounds at the Hospital as part of their clinical training, and researchers support clinicians with various lab-related services and expertise. The Hospital also contains the Nursing Assistant School, which trains over 150 participants each year.

Collaborations with some the world's leading Tropical Medicine researchers working in the Faculty's departments are likely to bring about important public-health benefits and innovations.

Support Offices

The Faculty's six support offices provide crucial administrative support to the Faculty's core research and teaching activities allowing for efficient and effective day-to-day operations.

2015 IN NUMBERS

- 7 successful international grant applications
- 9 projects successful for domestic grant applications (TRF-6 projects/NSTDA - projects)
- 36 projects awarded for internal grant that include Government budget, MU and FTM (Government budget 10 projects, MU - 4 projects and FTM - 22 projects)
- 12 international grants under management
- 22 Faculty grants awarded
- 7 international affiliations managed and maintained
- 4 issues of TROPMED Inter News
- 464 annual health checks carried out
- 193 documents edited
- 9 international courses organised
- 12 projects supported by the Laboratory Animal Science Unit
- 33 collaboration MOUs maintained
- 45 student exchanges organised
- 733 participants in the annual conference

OFFICE OF RESEARCH SERVICES (ORS)

The ORS is a 'one stop shop' and supports key components of research at the Faculty. These include managing research grants (domestic and international sponsored research), ethics, biosafety, conference and event planning and maintaining the publication database. The Office provides publication and graphic design services (e.g. producing the Faculty's Annual Review) and also the Laboratory Animal Science and Central Equipment Units.

OFFICE OF INTERNATIONAL COOPERATION AND NETWORKING

Responsible for supporting the Faculty in international cooperation, networking and alliance management. The Office has diverse activities ranging from facilitating student exchanges and visiting professors to organising cultural performances and publishing *TROPMED Inter News*.

OFFICE OF THE DEAN

Called the 'administrative nerve center' of the Faculty, the Office ensures legal compliance, effective financial management and supportive infrastructure. The Office has a broad range of activities including Procurement, Asset Management and Human Resources.

OFFICE OF EDUCATIONAL ADMINISTRATION

Coordinating all necessary efforts to ensure the smooth running of both the Bangkok School of Tropical Medicine and the Practical Nursing School, the Office has many responsibilities, including finance, communications, registration, laboratory management, and extra-curricular activities.

OFFICE OF POLICY AND STRATEGIC PLANNING

The Office is in charge of planning the strategic development of the Faculty as well as other duties. The other areas include producing institutional policies, data collection, and budgeting.

TM360 SERVICES

A Customer Services office for the Faculty's service recipients, such as collaborative offices, and other external stakeholders. This office also takes a lead in the Faculty's intellectual asset management.

SPECIAL FOCUS - OFFICE OF THE DEAN - VALUE CREATION

Value Creation gives an organization a focus for building long-term competiveness, often by investing in innovation, people, ideas and branding. In 2015, Prof Polrat Wilairatana, Deputy Dean for Value Creation, focused on human resource development. With the HR team, he developed a 14-point strategy to increase personnel capacity, strengthen the career paths in the Faculty and increase personnel engagement. Human resource development was chosen as the focus as Prof Polrat believes it will have the greatest impact on Value Creation within the Faculty.

- In 2015, several activities were carried out in the following areas -
- Project Management Training for supervisory and executive staff
- Service Training for Hospital Staff
- Health check-ups for all Faculty staff
- Staff Mobility Program – for staff to gain work experience overseas
- Establishing Faculty welfare guidelines

Central Equipment Unit

Asst. Prof. Poom Adisakwattana – Head

The Central Equipment Unit has two main functions; providing researchers in the Faculty with laboratory facilities and purified water, and providing specialized equipment plus practical training in its use. The Unit is found on the 6th floor, Chalermprakiat Building and the 8th floor of the Rajanagarindra Building, and is a vital service for many researchers. The facilities and equipment are a shared resource of the Faculty, for the benefit of all.

2015 IN NUMBERS

- 80 different types of equipment
- More than 4000 visits to the laboratory facilities by researchers
- Over 200 pieces of equipment
- 7000 liters of distilled water and over 1000 liters of double distilled water
- 2000 liters of deionized water
- 5 specialized training sessions

2015 HIGHLIGHTS

A number of new pieces of equipment were purchased in 2015; the most significant was the **motorized stage fluorescence microscope**. This microscope is capable of producing high-resolution images for use in both education and research. The microscope has also been used to produce images for publications, posters, and the new Discovery Museum of Tropical Diseases. Prior to its purchase, researchers who wanted to use a motorized stage fluorescence microscope had to travel to other faculties, using up valuable time.

Five people attended **advanced training in confocal microscope use**. The training, held in Singapore, was provided by the manufacturer and gave the researchers additional insight into how to use the confocal microscope most effectively. These researchers will now apply the training to their own work and train others in new techniques.

KEY FEATURES OF THE CENTRAL EQUIPMENT UNIT

Range of equipment available

The range of equipment in the Unit allows for both fundamental research to advanced, in Tropical Medicine and other life sciences. A wide variety of project areas can be catered for, including work with nucleic acids, proteins, imaging, environmental systems, pharmacology, and immunology.

The Unit has a large range of high-level equipment available. This includes a bioanalyzer (often known as a 'lab-on-a-chip'), an ultra-high performance liquid chromatography system, a liquid-handling robot, gel imagers and a confocal microscope. The Unit also has equipment for surface plasmon resonance, ion torrent deep sequencing, and mass spectrometry.

The broad range means that no researcher should have to travel to use equipment at another faculty. When research aims require an additional piece of equipment, the Unit's committee will consider the request and make a decision based on a range of factors, including budget and need.

Training available

Training in how to safely, accurately and appropriately use the different equipment in the Unit, is held three times yearly for each item, and on demand if needed. It is available to everyone – students, researchers and academics. Initially, the training is provided by the manufacturer, but over time the training role is taken on by lecturers. Training by lecturers has the added advantage of being tailored towards the needs of Tropical Medicine researchers.

Easy access and short waiting times

The Unit has adequate laboratory facilities and equipment, so waiting times are very short, often within one day. The facilities and most equipment are also very easy to access, as they are available 24 hours a day, via keycard entry. There is no charge for the use of the facilities and equipment, but departments do need to provide their own supplies and consumables.

Tropical Medicine Diagnostic Reference Laboratory (TMDR)

Asst. Prof. Pornsawan Leaungwutiwong – Head

Building upon the research strengths of the Faculty of Tropical Medicine, the Tropical Medicine Diagnostic Reference Laboratory (TMDR) is consolidating as the first unit of its kind in Thailand. The mission of TMDR is to provide analysis and specific diagnosis of tropical diseases such as dengue, malaria, leptospirosis, toxoplasmosis and gnathostomiasis (a disease of the parasitic worm *Gnathostoma*). With the use of real-time PCR and serology and a staff made up of specially trained experts, diagnosis can be carried out quickly and accurately.

Diagnostic services will be provided to patients in the Hospital for Tropical Diseases, as well as to other external organizations and institutions. Centralizing diagnosis will provide a more complete picture of the location and prevalence of several tropical diseases in Thailand thus providing better information to both clinicians and public health officials.

In addition to diagnostics, the Lab will focus on sharing knowledge and skills with others, while collaborating with other centers to ensure best practice and cutting-edge processes. Healthcare staff at the Hospital for Tropical Diseases and other the Faculty of Tropical Medicine departments will have access to training workshops in carrying out and interpreting tests. This will help close the gap between the research and development phase and the use of new technology and methods in clinical settings, thus providing better care for patients. Research and development will also be a focus of the reference lab.

Currently, TMDR is preparing for ISO 15189 and ISO 15190 accreditation, which will ensure that it meets the highest standards applicable to medical laboratories. As Dr. Pornsawan Leaungwutiwong points out, "Accreditation assures our patients as well as doctors and other institutes – including those from other countries – that they can trust the results of our tests."

RESEARCH AREAS:

- Dengue
- Malaria
- Leptospirosis
- Toxoplasmosis
- Gnathostomiasis

HIGHLIGHTS OF 2015:

Submission for ISO 15189 and ISO 15190 accreditation is planned for Spring 2016.

An internal audit to prepare for accreditation has already been completed successfully.

Laboratory Animal Science Unit

Asst. Prof. Yanin Limpanont – Head

The Laboratory Animal Science Unit at the Faculty of Tropical Medicine (FTM-LAU) is responsible for management of FTM's animal facilities. Recognizing the important role that animals play in research, drug testing, biological product and education in the field of medical science, the Laboratory Animal Science Unit exists to ensure that such animals are treated with the greatest possible care. Thus the aim of FTM-LAU is to monitor laboratory animal well-being, and to assure the highest quality of animal research and personnel safety according to ethical and scientific standards.

Management responsibilities of FTM-LAU include: providing a supply of diets specifically tailored to the animal species, water and bedding material, daily animal observation, cleaning and disinfection of animal room and working area, cage washing, and waste disposal.

More specialized and technical services for researchers include providing animal restraint, marking, blood and organ collection, necropsy, anesthesia and euthanasia.

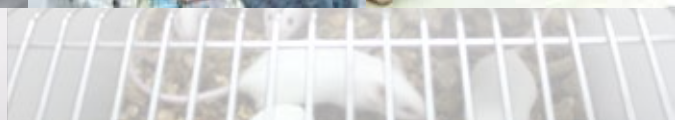
In 2015, FTM-LAU provided services to a total of 12 research and teaching projects, seven of which belonged to Faculty of Tropical Medicine (Department of Helminthology, Department of Social and Environmental Medicine, Department of Protozoology, Department of Medical Entomology, and Mahidol Vivax Research Unit), three projects from other Faculties in Mahidol University and two projects from other research institutes.

Another important component of FTM-LAU is the Animal care and use committee (FTM-ACUC) which has the responsibility of overseeing the use of laboratory animals, carrying out the review and approval of animal use protocols, post-approval monitoring, and regular inspection of both the facilities and the animal use areas. Membership of the FTM-ACUC is made up of doctors in veterinary medicine, researchers experienced in research involving animals and members of the public with a nonscientific background.

Education is another important component of the FTM-LAU mission. For example, 2015 saw the presentation of the training program "Handling and Basic Techniques in Mice" and a special seminar about the Laboratory Animals Act in Thailand. FTM-LAU will continue to improve the quality of animal facilities and services follow the mission of our faculty.





The Joint International Tropical Medicine Meeting (JITMM)

JITMM2015, which was held 2-4 December at the Amari Watergate Hotel in Bangkok, was a busy, informative and positive event. This international conference, which is held every year, is a great example of different departments and offices in the Faculty working together to achieve something impactful.

The conference is jointly organized by the Faculty, the Parasitology and Tropical Medicine Association of Thailand, the TROPMED Alumni Association, and the SEAMEO TROPMED Network, and thus also highlights the Faculty's commitment to collaboration and cooperative working.

The conference aims are to –

(1) provide a platform for Tropical Medicine, Global Health and Infectious Diseases researchers and practitioners to share and discuss latest developments and trends

(2) be a networking and relationship-building occasion for international researchers and practitioners

(3) encourage promising young researchers by providing an opportunity for them to present their work in an international setting

The organizers achieve this by selecting a diverse range of topics for the sessions, building social and discussion time into the conference program and providing Travel and Student Awards.

2015 FACTS AND FIGURES

Participants	733	Posters	89
Nationalities	30	Sessions	32
Speakers	176	Travel Awards	19

2015 Awards

There were many awards and other types of recognition for Faculty staff throughout the year**.** Starting the year strongly, seven Faculty members were made MU Brand Ambassadors by Mahidol University, while at the end of the year the National Research Council's award of "Most Outstanding Researcher in Medical Science" was given to Professor Punnee Pitisuttithum.

The list of external awards is impressive, and includes three international awards from the UK, ASEAN and Japan. In September, Professors Songsak Petmitr and Rungsunn Tungtrongchitr were given the highest honor of The Most Exalted Order of the White Elephant for their services to Medicine.

MAHIDOL UNIVERSITY

Date	Person	Award
15-January	Jaranit Kaewkungwal	MU Brand Ambassador
	Songsak Petmitr	MU Brand Ambassador
	Noppadon Tangpukdee	MU Brand Ambassador
	Kamolnetr Okanurak	MU Brand Ambassador
	Jetsumon Prachumsri	MU Brand Ambassador
	Punnee Pitisuttithum	MU Brand Ambassador
	Sasithon Pukrittayakamee	MU Brand Ambassador
21-February	Yaowalark Sukthana	Outstanding Alumni Award
	Sasithon Pukrittayakamee	Outstanding Alumni Award
2- September	Nicholas Day	Honorary PhD in Clinical Tropical Medicine
	Sasithon Pukrittayakamee	Research Award
	Pratap Singhasivanon	Teaching Award
	Pornpimon Adams	Service Award

EXTERNAL

Date	Person	Award	From
5- February	Parnpen Viriyavejakul	Outstanding Award	National Research Council of Thailand
	Arunee Subchareon and research team	2014 Sujarti Jatanasen Award for Outstanding Achievement in Epidemiology	Ministry of Public Health, Thailand
6-March	Pannamthip Pitaksajjakul	First Place – Leaders in Innovation	The Royal Academy of Engineering, UK
7-May	Sompan Srinukham	SEAMEO Service Award	SEAMEO (Southeast Asian Ministers of Education Organization)
2- September	Songsak Petmitr	Knight Grand Cordon (Special Class)	HM the King of Thailand
	Rungsunn Tungtrongchitr	Knight Grand Cordon (Special Class)	HM the King of Thailand
24 – September	Songsak Petmitr	Alumni Role Model Award	Burapha University
12 - November	Direk Limmathurotsakul	Best Researcher in Web of Science	Office of Higher Education Commission
20 – November	Yaowalark Sukthana	Appointed Collaborative Professor	Osaka University
28 December	Punnee Pitisuttithum	Most Outstanding Researcher in Medical Science	National Research Council of Thailand

PHOTO CREDITS

Pages	
42	GEM: Graphic - Theerarat Kochakarn / Thanat Chookajorn
45	MVRU: Maternal malaria placenta Wikimedia Commons/Nephron
47	CMRU: Malaria rapid diagnostic test 3.jpg – Wikimedia Commons: USAID; *Anopheles minimus*- US Centers for Disease Control and Prevention
56-57	MORU: Mass drug administration crowds in Laos - © 2016 Lorenz von Seidlein/Mahidol Oxford Tropical Medicine Research Unit (MORU); Targeted Malaria Elimination program in Kyainseikgyi Township, Karen State, Myanmar - © Medical Action Myanmar; all rights reserved.
59	Malaria Consortium: all photos © Malaria Consortium; all rights reserved.
67	Dengue: *Aedes albopictus* mosquito – www.cdc.gov; dengue virus particles in tissue - Frederick Murphy, Cynthia Goldsmith, US Centers for Disease Control and Prevention;
71-73	Helminths: *Ascaris lumbricoides* egg - Wikimedia Commons/GrahamColm; High magnification micrograph of a pinworm in cross section in the appendix. H&E stain – Wikimedia Commons/ Ed Uthman, MD; Scanning electron micrograph of a pair of *Schistosoma mansoni* – Wikimedia Commons/Davies Laboratory Uniformed Services University, Bethesda, MD
76	Malaria: Malaria map with *An. gambiae* – International Association for Medical Assistance for Travellers; *An. minimus* a-malaria-vector-of-the-orient-from-a-lateral-perspective – www.public-domain-image.com
81	Melioidosis: *Burkholderia pseudomallei* grown on sheep blood agar for 48 hours - CDC/ Courtesy of Larry Stauffer, Oregon State Public Health Laboratory
84-85	Protozoa: *Naegleria fowleri* trophozoites - www.cdc.gov
86-89	Other Areas: scrub mite – Eric Erbe–ARS/USDA; *Mycobacterium tuberculosis* – www.niaid.nih.gov; Red rice – www.irri.org

Appendices

List of Publications 2015

1.	Abdulla S*, Ashley EA, Bassat Q, Bethell D, Bjorkman A, Borrmann S, D'Alessandro U, Dahal P, Day NP, Diakite M, Djimde AA, Dondorp AM, Duong S, Edstein MD, Fairhurst RM, Faiz MA, Falade C, Flegg JA, Fogg C, Gonzalez R, Greenwood B, Guerin PJ, Guthmann JP, Hamed K, Hien TT, Htut Y, Juma E, Lim P, Martensson A, Mayxay M, Mokuolu OA, Moreira C, Newton P, Noedl H, Nosten F, Ogutu BR, Onyamboko MA, Owusu-Agyei S, Phyo AP, Premji Z, Price RN, Pukrittayakamee S, Ramharter M, Sagara I, Se Y, Suon S, Stepniewska K*, Ward SA, White NJ, Winstanley PA, Grp WPCS. Baseline data of parasite clearance in patients with *Falciparum malaria* treated with an artemisinin derivative: an individual patient data meta-analysis. Malar J 2015 Sep;14:359.
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** = corresponding author*

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241.	Tun KM, Imwong M*, Lwin KM, Win AA, Hlaing TM, Hlaing T, Lin K, Kyaw MP, Plewes K, Faiz MA, Dhorda M, Cheah PY, Pukrittayakamee S, Ashley EA, Anderson TJC, Nair S, McDew-White M, Flegg JA, Grist EPM, Guerin P, Maude RJ, Smithuis F, Dondorp AM, Day NPJ, Nosten F, White NJ, Woodrow CJ. Spread of artemisinin-resistant Plasmodium falciparum in Myanmar: a cross-sectional survey of the K13 molecular marker. Lancet Infect Dis 2015 Apr;15(4): 415-21.
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250.	Vorasan N, Pan-Ngum W, Jittamala P, Maneeboonyang W, Rukmanee P, Lawpoolsri S*. Long-term impact of childhood malaria infection on school performance among school children in a malaria endemic area along the Thai-Myanmar border. Malar J 2015 Oct;14: 401.
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267.	Yamanaka A, Pitaksajjakul P, Ramasoota P, Konishi E*. Expression of enhancing-activity-free neutralizing antibody against dengue type 1 virus in plasmid-inoculated mice. Vaccine 2015 Nov;33(45): 6070-7.
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CLINICAL TROPICAL MEDICINE

International (Oral Presentations)

1. Mood M.A, Easterhoff D, Williams L, Saunders K, Yates N, Karasavvas N, Sawant S, Vanderorift N, Kucas J, Howington R, Kim J, Michael N, Robb M, O'Connell R, Vasan S, Excler L.J, Rerks-Ngarm S, Pitisuttithum P, Nitayaphan S, Kepler T, Alam M, Ferrari G, Monterfiori D, Liao H-X,Jaumes B. Impact of repetitive protein boosting on rv305 hiv-1 vaccine-induced antibodies. International Antiviral Society February 23 – 26, 2015 Seattle, Washington, USA
2. Poovorawan K, Pan-ngum W, Soonthornworasiri N, Kittitrakul C, Wilairatana P, Treeprasertsuk S, Kitsahawong B, Phaosawasdi K. Current burden of liver abscess and factors affecting patient survival in Thailand: a nationwide study. American Society of Tropical Medicine & Hygiene 25-29 October 2015, Pennsylvania, USA

International and National (Poster Presentations)

1. Awab R. G, lmwong M, Pukrittayakamee S, Dondorp A , Day P. N, White J. N, Kaker F, Woodrow J. C. Maintained efficacy a decade after the introduction of artesunate plus sulphadoxine-pyrimethamine for *P. falciparum* malaria in Afghanistan. American Society of Tropical Medicine & Hygiene (ASTMH) 25-29 October 2015, Pennsylvania, USA
2. Oo S. K, Tangpukdee N, Paohintang K, Putraprasert K, Chonsawat P, Pengruksa S, PooNgoen A, Wilairatana P, Krudsood S. A study of different methods for estimating of blood malaria parasite density. American Society of Tropical Medicine & Hygiene (ASTMH) 25-29 October 2015, Pennsylvania, USA
3. Subramony H, Tangpukdee N, Pengruksa C, Phophak N, Duangdee C, Raknam T, Pengruksa S, Wilairatana P, Krusood S. The effectiveness of chloroquine and primaquine for the treatment of vivax malaria; a study in a tertiary care hospital in Thailand. American Society of Tropical Medicine & Hygiene (ASTMH) 25-29 October 2015, Pennsylvania, USA
4. Sriboonvorakul N , Leepipatpiboon N, Pukrittayakamee S, Wongravee K, Yutavorasit S, Sukthana Y, Day P.J.N, Lindegardh N , White J. N , Dondorp M. J, Tarning J. Assessment of acidosis profile in patients with severe malaria using innovative technique. American Society of Tropical Medicine & Hygiene 25-29 October 2015, Pennsylvania, USA
5. Hanboonkunupakan B, Jittamala P, Phyo P. A, Nosten H. F, Pukrittayakamee S, Imwong M, White J. N, Duparc S , Macintyre F, Baker M, Möhrle J. J. Therapeutic efficacy of oz439 in patients with malaria infection. Joint International Tropical Medicine Meeting 2015, 2-4 December 2015, Amari Watergate, Bangkok, Thailand
6. Luvira V, Piyaphanee W, Leaungwutiwong P, Chierakul W, Silachamroon U, Wattanagoon Y. Etiology of non-malaria acute undifferentiated febrile illness: The experience of the Hospital for Tropical Diseases. Joint International Tropical Medicine Meeting 2015, 2-4 December 2015, Amari Watergate, Bangkok, Thailand
7. Poovorawan K, Pan-ngum W , White J. L , Soonthornworasiri N , Wilairatana P, Akkarathamrongsin S, Tangkijvanich P, Poovorawan Y. Treatment coverage and allocation predict future burden of chronic hepatitis C in novel antiviral agent era, Thailand. Joint International Tropical Medicine Meeting 2015, 2-4 December 2015, Amari Watergate, Bangkok, Thailand
8. Sriboonvorakul N, Leepipatpiboon N, Pukrittayakamee S, Chotivanich K, Wongravee K, Yutavorasit S, Sukthana Y, Day P.J. N, Lindegardh N, White J. N, Dondorp M. A, Tarning J. Acids causing metabolic acidosis in patients with severe malaria (assessing by novel method). Joint International Tropical Medicine Meeting 2015, 2-4 December 2015, Amari Watergate,Bangkok, Thailand
9. Piyaphanee W, Choovichian V, Matsee W, Palakul K, Olanwijitwong J, Chinanarat N, Chaiyakul T. Efficacy of ipomea *pes – caprae* ointment as an add-on therapy in patients with jellyfish dermatitis. The 14th Conference of the International Society of Travel Medicine 24 – 28 May 2015, Quebec City, Canada

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	CLINICAL TROPICAL MEDICINE (*Continued*)
	International and National (Poster Presentations)
10.	Poovorawan K. Estimating the direct cost and survival benefit of chronic hepatitis C treatment in novel antiviral agent era, Thailand. 15th International Symposium on Viral Hepatitis and Liver Disease (ISUHLD) 26-28 June 2015, Berlin, Germany
11.	Poovorawan K. Predicting survival in liver abscess : a risck score based on 8,423 patients hospitalized with liver abscess in Thailand. The American Association for the Study of Liver Diseases ,13–17 November 2015, San Francisco, USA

	HELMINTHOLOGY
	International (Poster Presentations)
1.	Akkarin P, Orawan Ph, Poom A, Yudthana S, Patchara S. Molecular survey of parasitic filaria in domestic cats and potential vectors from Surat Thani, Thailand. Joint International Tropical Medicine Meeting 2015, Bangkok, Thailand, 2-4 December 2015.

	MEDICAL ENTOMOLOGY
	National (List of Proceedings)
1.	PattamaY, Ronald EMV, Tamaki O, Pimtip S, Noppawan PhM. Optimization of Microcarrier Cell Culture for Free Radical Detection in Microglia Cell Line. Proceedings of the 37th Congress of Pharmacology of Thailand. Pag: 160-165.
2.	Natthinee J, Ronald EMV, Tamaki O, Noppawan PhM. Liquid Chromatography Technique for Fractionation, Identification and Biological Activity Analysis of Salivary Gland Extract of Aedes aegypti. Proceedings of the 37th Congress of Pharmacology of Thailand.Pag: 195-200.
	List of Presentations International (Poster Presentations)
1.	Narumon K. Detection of arboviral genomes in vector mosquitoes using novel dried RT-LAMP. Joint International Tropical Medicine Meeting 2015 at Amari Watergate Bangkok, 2-4 December 2015.
2.	Ronald EM Vargas. Molecular phylogenetic analyses of mosquito flavivirus in Thailand. Joint International Tropical Medicine Meeting 2015 at Amari Watergate Bangkok, 2-4 December 2015.
3.	Poodeepiyasawat A, Phuphisut, Adisakwattana P, Samung Y, Sriwichai P. Molecular survey of parasitic filarial in domestic cats and potential vectors from Surat Thani, Thailand. Joint International Tropical Medicine Meeting 2015 at Amari Watergate Bangkok, 2-4 December 2015.
4.	Noppawan PhM, PattamaY, Pimtip S, Tamaki O, Yamada Ken-ichi, Ronald EMV. Kinetics of ROS generation in microglia cultured on microcarrier using ESR-spin trapping and fluorescence techniques. The7th Biennial Meeting of Society for Free Radical Research Asia at The Royal Princess Hotel, Chiang Mai, Thailand. Nov.29th – Dec.2nd 2015.
5.	Oranicha Kh, Ronald EMV. New Insights on the oviposition container type selection of *Aedes mosquito* species in dengue transmission foci of Bangkok, Thailand. The Joint International Tropical Medicine Meeting 2015 at Amari Watergate Bangkok, 2-4 December 2015.
6.	Sirikalayanee M, Ronald EMV. Biting Fly Fauna Composition in Different Farming Practices Areas in Central Region of Thailand. The Joint International Tropical Medicine Meeting 2015 at Amari Watergate Bangkok, 2-4 December 2015.
7.	Natsumi K, Ronald EMV, Yuko KM, Yasue M, Jun N, Katsuro H. Preparedness for the Invader Mosquito *Aedes* (Finlaya) *japonicus*: Its Winter Biology and Bacterial Microbiota Diversity. The Joint International Tropical Medicine Meeting 2015 at Amari Watergate Bangkok, 2-4 December 2015.

	MEDICAL ENTOMOLOGY (*Continued*)
	National (Poster Presentations)
1.	Pattama Y, Ronald EMV, Tamaki O, Pimtip S, Noppawan PhM. Optimization of Microcarrier Cell Culture for Free Radical Detection in Microglia Cell Line. The 37th Congress of Pharmacology of Thailand. UbonRatchathani, May 28-30, 2015.
2.	Natthinee J, Ronald EMV, Tamaki O, Noppawan PhM. Liquid Chromatography Technique for Fractionation, Identification and Biological Activity Analysis of Salivary Gland Extract of *Aedes aegypti*. The 37th Congress of Pharmacology of Thailand. Ubon Ratchathani, May 28-30, 2015.
	International (Oral Presentations)
1.	Sungsit S. *Toxorhynchoites splendens*: A potential supportive method for dengue and chikungunya vectors in Southeast Asia. Joint International Tropical Medicine Meeting 2015 at Amari Watergate Bangkok, 2-4 December 2015.
2.	Suchada Samruayphol. Morphometric and genetic diagnosis within closely related species of dengue and chikungunya vectors in Thailand: *Aedes aegypti*, *Aedes albopictus* and *Aedes scutellaris*. Joint International Tropical Medicine Meeting 2015 at Amari Watergate Bangkok, 2-4 December 2015.
3.	Sriwichai P, Karl S, Samung Y, Sumruayphol S, Kiattibutr K, Payakkapol A, Mueller I, Yan G, Cui L, Sattabongkot J. Is CDC light trap really effective for mosquito surveillance?: Lessons in a malaria endemic area on the Thai-Myanmar border. Joint International Tropical Medicine Meeting 2015 at Amari Watergate Bangkok, 2-4 December 2015.

	MICROBIOLOGY AND IMMUNOLOGY
	International (Poster Presentations)
1.	Maneerattanasak S, Gosi P, Krudsood S, Tongshoob J, Lanteri CA, Snouno G, Khusmith S. Genetic diversity of Pvmsp1F3 and Pvcsp among *Plasmodium vivax* isolates along the borders of Thailand. RGJ-Ph.D. Congress XVI, "ASEAN: Emerging Research Opportunities". Jomtien Palm Beach Hotel & Resort, Pattaya, Chonburi, Thailand, June 11-13, 2015.
2.	Maneerattanasak S, Gosi P, Krudsood S, Tongshoob J, Lanteri CA, Snouno G, Khusmith S. High genetic diversity of Pvmsp1F3 and Pvcsp among *Plasmodium vivax* Isolates along the Thai-Myanmar and Thai-Cambodian borders of Thailand. Joint International Tropical Medicine Meeting 2015 (JITMM 2015). Amari Watergate, Bangkok Thailand, December 2-4, 2015.
3.	Saiprom N, Amornchai P, Wuthiekanun V, Day NPJ, Limmathurotsakul D, Peacock SJ, Chantratita N. Trimethoprim/sulfamethoxazole resistance in clinical isolates of *Burkholderia pseudomallei* from Thailand. European Melioidosis Congress 2015. University of Cambridge, March 26-27, 2015.
4.	Leaungwutiwong P, Kelley JF, Sachair A, Jittmittraphap A, Luplertlop N. Relationship between MMP expression and virulence of dengue virus type-2 infected mosquito and mammalian cells. American Society of Tropical Medicine and Hygiene, 64th Annual Meeting. Philadelphia Marriott Downtown, Philadelphia, Pennsylvania, USA, October 25-29, 2015.
5.	Sookrung N, Poolphol R, Indrawattana N, Reamtong O, Zhalim N, Seesuay W, Tantilipikorn P, Bunnag C, Chaicumpa W, Tungtrongchitr A. Allergenicity of *Periplaneta americana* glutathione-s-transferase (per a 5) among the cockroach allergic Thais. The 10th International Symposium of the Protein Society of Thailand. Convention Center, Chulabhorn Research Institute Thailand, July 15-17, 2015
6.	Pumipuntu N, Hinthong W, Santajit S, Kulpeanprasit S, Promsatit S, Buranasinsup S, Jangsangthong A, Indrawattana N. Incidence of *Stapylococcus* spp. and *Streptococcus* spp. in subclinical bovine mastitis in dairy farms in Kaeng Khoi, Saraburi, Thailand. Joint International Tropical Medicine Meeting 2015. Amari Watergate Bangkok, Thailand, December 2-4, 2015.

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	MICROBIOLOGY AND IMMUNOLOGY (*Continued*)
	International (Poster Presentations)
7.	Suwanmanee S, Luplertlop N. The effect of dengue viral N-myristoyltransferase on vascular endothelial cell integrity associated to dengue virus pathogenesis. Young Scientist Award 2015, Faculty of Pharmacy, Chulalongkorn University, Bangkok, Thailand, November 5, 2015.
8.	Pumirat P, Reamtong O, Chantratita N, Korbsrisate S. The role of cycle-inhibiting factor in *Burkholderia pseudomallei*. Learning from each other- improving the clinical management and prevention of melioidosis and tuberculosis in the UK and South East Asia. Pullman Khon Kaen Raja Orchid Hotel, Thailand, January 6-7, 2015.
9.	Pumirat P, Vanaporn M, Boonyuen U, Luplertlop N, Chantratita N. Effects of NaCl on heat resistance, oxidative susceptibility, motility and biofilm formation of a potential biothreat agent *Burkholderia pseudomallei*. ASM Biodefense and Emerging Diseases Research Meeting. Washington Marriott Wardman Park, USA, February 9-11, 2015.
10.	Pumirat P, Reamtong O, Chantratita N, Korbsrisate S. The role of *Burkholderia pseudomallei* cycle-inhibiting factor on host protein expression. European Melioidosis Congress 2015. University of Cambridge, England, March 26-27, 2015.
	International (Oral Presentations)
1.	Khusmith S. Towards the paradigm shift in biorisk management: Challenges and Opportunities. A-PBA Conference 2015: Asia- Pacific Biosafety – Into a New Era of Collective Ownership and Leadership. Jpark Island Resort & Waterpark, Lapu-Lapu City, Cebu, Philippines, June 23-26, 2015.
2.	Chantratita N. Competition between *Burkholderia pseudomallei* and *B. thailandensis*. Improving the clinical management and prevention of melioidosis and tuberculosis in the UK and Southeast Asia 2015, University of Khon Kaen, Thailand, January 8, 2015.
3.	Chantratita N. Impact of bacterial diversity and host determinants on infections and outcomes. Wellcome Trust Review 2015. Faculty of Tropical Medicine, Mahidol University, March 18, 2015.
4.	Burtnick MN, Heiss C, Wikraiphat C, Roberts RA, Azadi P, Chantatita N, Brett PJ. Structural analysis of *Burkholderia pseudomallei* OPS mutants reveals the presence of a third O-acetyltransferase. European Melioidosis Congress 2015. University of Cambridge, UK, March 26-27, 2015.
5.	Suttisunhakul V, Wikraiphat C, Wuthiekanun V, Douglas Z, Day NPJ, Limmathurotsakul D, Chantratita N, Brett PJ, Burtnick MN. Evaluation of polysaccharide-based latex agglutination assays for the rapid diagnosis of melioidosis. ASM 2015. New Orleans Ernest N. Morial Convention Center, New Orleans, Louisiana, 30 May-2 June 2015.
6.	Norris MH, Chirakul S, Chantratita N, Randall L, Rhodes K, Allender CJ, Keim P, Schweizer HP, Limmathurotsakul D, Tuanyok A. Pen A-mediated ceftazidime resistance in a large collection of *Burkholderia pseudomallei*. International Conference of Antimicrobial Agents and Chemotherapy 2015. San Diego, California, USA, September 17-21, 2015.
7.	Chantratita N. New diagnostic developments for melelioidosis. South Asian Melioidosis Congress 2015. Manipal University, India, November 20-22, 2015.
8.	Chantratita N. Application of new technologies to the problem of bacterial infections and antibiotic resistance. Joint International Meeting in Tropical Medicine 2015. Amari Watergate Hotel, Bangkok, Thailand, December 2-4, 2015.
9.	Leaungwutiwong P, Thippornchai N, Kelly JF. Nerurkar VR. Tropical infectious disease research and training in Thailand for students and postdocs from non-endemic countries . Joint International Tropical Medicine Meeting 2015. Amari Watergate Bangkok, Thailand, December 2-4, 2015.
10.	Maneewatcharangsri S, Soonthornworasiri N, Reamtong O, Boonyeun U, Sonthayanon P, Pumirat P, Vanaporn M, Chaisri U, Limmathurotsakul D, Adisakwattana P, Ampawong S, Ritthisunthorn N. Genome-wide in-silico secretomic analysis of *Leptospira* spp.: Focuses on virulent-associated secretome. Joint International Tropical Medicine Meeting 2015. Amari Watergate Bangkok, Thailand, December 2-4 2015.

PROTOZOOLOGY

International (Poster Presentations)

1. Suparut S, Hirotake M, Rapeepun P, Ai-rada P, Chalit K, Tanasak Ch, Supaluk P, Aongart M. Survey of intestinal protozoa in pigs and their in-contact humans in Nakhon Pathom Province, Thailand. Joint International Tropical Medicine Meeting 2015, December 2-4, at Amari Watergate, Bangkok, Thailand.
2. Supaluk P, Duangdao P, Aongart M, Yaowalark S, Attakorn P. Distribution of *Blastocystis* subtypes in villagers in central part of Thailand. Joint International Tropical Medicine Meeting 2015, December 2-4, at Amari Watergate, Bangkok, Thailand.

SOCIAL AND ENVIRONMENTAL MEDICINE

International (Poster Presentations)

1. Hinthong W, Indrawattana N, Pitaksajjakul P, Pipattanaboon C, Kongngeon T, Tharnpoophasiam P, Worakhunpiset S. Effect of temperature on fimbrial gene expression and adherence of enteroaggregative *Escherichia coli*. Joint International Tropical Medicine Meeting 2015. 2-4 December 2015. Amari Watergate Bangkok, Thailand.
2. Hathairad H, Anong K, Benjaluck Ph, Sangchai P, Rungsunn T. Association of Low Density Lipoprotein Receptor Related Protein 5 Genetic Variations and BMD in Thai Menopausal Women. Joint International Tropical Medicine Meeting 2015. 2-4 December 2015. Amari Watergate Bangkok, Thailand.

TROPICAL HYGIENE

Presentations

-None-

TROPICAL NUTRITION AND FOOD SCIENCE

International and National (Oral Presentations)

1. Kwanbunjan K. Folate and Cancer Prevention (Symposium). The 12th Asian Congress of Nutrition. 14-18 May 2015, Yokohama, Japan.
2. Panprathip P, Tungtrongchitr R, Sappajit T, Anannamcharoen S, Ngamsirimas B, Kwanbunjan K. Folate, MTHFR C677T polymorphism and risk of colorectal cancer among Thais. The 12th Asian Congress of Nutrition. 14-18 May 2015, Yokohama, Japan.
3. Chumpathat N, Rangsin R, Soonthornworasiri N, Changbumrung S, Durongrittichai V, Kwanbunjan K. Height Estimation in Thai Women from different South East Asian equations. The 12th Asian Congress of Nutrition. 14-18 May 2015, Yokohama, Japan.
4. Pipatthana M, Chankhamhaengdecha S, Janvilisri T, Aroonnual A. Inhibitory effects of antibacterial substances against Clostridium difficile. An exchange workshop on antibiotic resistance ATI 2014/15 0621. July 6-7, 2015, University of South Australia, Adelaide, Australia.
5. Pipatthana M, Chankhamhaengdecha S, Ounjai P, Janvilisri T, Aroonnual A. Bacteriocin-like substances produced by Bifidobacterium isolated from infant feces. The 10th Conference on Science and Technology for Youths 2015. June 19-20, 2015, Bangkok, Thailand.

International and National (Poster Presentations)

1. Thiabpho C, Soonthornworasiri N, Yoddummern-Attig B, Thaboot P, Nissayan P, Kwanbunjan K. Outcome of the Intensive Weight Management Program in Thai Obesity. The 12th Asian Congress of Nutrition, 14-18 May 2015, Yokohama, Japan.

List of Presentations

	TROPICAL NUTRITION AND FOOD SCIENCE (*Continued*)
	International and National (Poster Presentations)
2.	Valeeratana K. Sinsawasdi, Simonne A, Kwanbunjan K. Color Properties of Sappanwood (Caesalpinia sappan L.) Water Extract. The 12th Asian Congress of Nutrition. 14-18 May 2015, Yokohama, Japan.
3.	Pipatthana M, Chankhamhaengdecha S, Ounjai P, Janvilisri T, Aroonnual A. Bacteriocin-like substances produced by Bifidobacterium isolated from infant feces. The 10th Conference on Science and Technology for Youths 2015. June 19-20, 2015. Bangkok, Thailand
4.	Pipatthana M, Chankhamhaengdecha S, Janvilisri T, Aroonnual A. Screening of a bacteriocin-producing Bifidobacterium with antibacterial activity against *Clostridium difficile*. The 43rd Annual Scientific Meeting and Trade Exhibition of the Australian Society for Microbiology.12-15 July 2015, Canberra, Australia.
5.	Nonthasila P, Janvilisri T, Chankhamhaengdecha S, Panbangred W, Aroonnual A. Potential use of *Pediococcus sp.* isolated from Thai fermented sausage as probiotics. The 43rd Annual Scientific Meeting and Trade Exhibition of the Australian Society for Microbiology. 12-15 July 2015, Canberra, Australia.
6.	Jintaridth P, Surarit R, Pattanapanyasat K, Srichan R, Klaihmon P, Mitirangura A. Comparison of regulation of cell proliferation, viability and apoptosis in replication versus premature senescence in HGF and PDL cells" The 10th International Symphosium of the Protein Society of Thailand. 15-17 July 2015, Bangkok, Thailand.
7.	Jintaridth P, Tungtrongchitr R, Preutthipan S, Mutirangura A. Alu Hypomethylation in post-menopausal women in Osteoporosis. 6th Epigenetic Congress. 21-23 July 2015, Boston, America.
8.	Mosikanon K, Arthan D, Kettawan A, Tangtrongjitr R , Prangthip P. Yeast β-glucan supplementation decrease waist circumference and ameliorate hyperlipidemia in overweight subjects. 4th International Conference and Exhibition on Obesity and Weight Management. December 7-9, 2015 Atlanta, USA.
9.	Hananantachai H, Kitjaroentham A, Phonrat B, Preutthipan S, Tungtrongchitr R. Association of Low Density Lipoprotein Receptor Related Protein 5 Genetic Variations and BMD in Thai Menopause Women. JITMM 2015, Bangkok, Thailand.
10.	Wannaiampikul S, Phonrat B, Tungtrongchitr A, Limwongse C, Chongviriyaphan N, Tungtrongchitr R, Santiprabhob J. Genetic Variation Analysis of Melanocortin-3 Receptor and Melanocortin-4 Receptor: A Perspective of Early-Onset Obesity in Thai Obese Family Based Study. The RGJ-Ph.D. Congress XVI, Chonburi, Thailand, June 11-13, 2015.
11.	Kulanuwat S, Santiprabhob J, Phonrat B, Limwongse C, Tungtrongchitr A, Chongviriyaphan N, Tungtrongchitr R. Effects of *PCSK1* gene variations on obesity-related traits of obese Thai children; a family-based study. Congress XVI, Chonburi, Thailand, June 11-13, 2015.

	TROPICAL PATHOLOGY
	National (Poster Presentations)
1.	Ampawong S, Kengkoom K**.** Chronic ingestion of high doses of Phikud Navakot extraction induces mesangiolysis in rats with AQP-1 downregulation. The 31st Annual Meeting of the Japanese Society of Toxicologic Pathology and the 27th Slide Conference, Tokyo, Japan. Jan 28 - 31, 2015.
2.	Maneerat Y, Prasongsukarn K, Benjathammaraksa S, Chaisri U. Upregulated alpha-defensin expression in Thai patients after coronary artery bypass grafting: A feasible inflammatory marker predicts the risk of CHD in Thai hyperlipidemia patients. 83rd European Atheosclerosis Society Congress**.** Mar 22-25, 2015**.**
3.	Maneewat S, Chaicumpa W, Saengjaruk P, Chaisri U. Therapeutic property, epitopes characterization and molecular mechanisms of neutralization. 17th International Conference on Immunology, London, United Kingdom. Sep 25-26, 2015.
4.	Dechkajorn W, Benjathammarak S, Eshita Y, Kumsiri R, Nuamtanong S, Kalambaheti T, Waikagul J, Viseshakul N, Maneerat Y. Third stage *Gnathostoma spinigerum* larva excretory secretory antigens alter function of Fc gamma Receptor I mediated monocytes in peripheral blood mononuclear cell culture. Joint International Tropical Medicine Meeting, Amari Watergate 2015, Bangkok, Thailand, Dec 2-4 2015.

	TROPICAL PATHOLOGY (*Continued*)
	National (Poster Presentations)
5.	Dechkajorn W, Nuamtanong S, Chaisri U, Maneerat Y. Third stage *Gnathostoma spinigerum* larva excretory secretion induce apoptosis in human peripheral blood mononuclear cell culture. Joint International Tropical Medicine Meeting Amari Watergate 2015, Bangkok, Thailand, Dec 2-4 2015.

	TROPICAL PEDIATRICS
	International (Oral Presentations)
1	Hattasingh W, Liulak W, Pengsaa K, Lawpoolsri S, Kaewkungwal J, Thisyakorn U. Evaluation of child vaccination coverage in the Bangkok Metropolitan Administration, 2012-2013. Annual Meeting of The Pediatric Infectious Disease Society of Thailand, May 1-3, 2015, Royal Cliff Hotel Group, Pattaya, Chon Buri, Thailand
2	Sirivichayakul C, Chanthavanich P, Limkittikul K, Siegrist CA, Petre J, Wijagkanalan W, Chinwangso P, Chauhan M, Pham HT, Viviani S. Safety and immunogenicity of recombinant acellular pertussis vaccines (aP) and combined tetanus, diphtheria, recombinant acellular pertussis (TdaP) vaccine in 18-35 years old healthy adults in Thailand. 9th Vaccine & ISV Annual Global Congress, October 20, 2015, Lotte Hotel, Seoul, South Korea
	International (Poster Presentations)
1.	Chatchan S, Pongsakul N, Changtong C, Chokchaichamnankit D, Hongeng S, Sabchareon A, Srisomsap C, Svasti J, Chutipongtanate S. Proteomic analysis of renal tubular cell responses upon ceftriaxone crystal interaction. 79th General Meeting of Pediatrics of Thailand, April 22-24, 2015, Dusit Thani Pattaya Hotel, Thailand

	MOLECULAR TROPICAL MEDICINE AND GENETICS
	National and International (Oral)
1.	Reamtong O, Mass spectrometry based proteomics of parasitic diseases. Genomics, Bioinformatics, and System Biology Conference; Sep 10-11,2015, Bangkok.
2.	Maneewatchararangsri S. Leptospira Lipl32-Specific Antibodies: Therapeutic Property, Epitopes Characterization and Molecular Mechanisms of Neutralization. ICI2015: 17th International Conference on Immunology, Sep 25-26, 2015, London, United Kingdom.
3.	Maneewatchararangsri S, Genome-wide in-silico secretomic analysis of Leptospira spp.: Focuses on virulent-associated secretome. Joint International Tropical Medicine Meeting 2015, Dec 2-4, 2015, Amari Watergate Bangkok, Thailand.
	International (Poster presentations)
1.	Reamtong O. Protein profile of *Schistosoma mekongi* using GeLC-MS/MS based proteomics. 63rd ASMS Conference on Mass Spectrometry & Allied Topics, May 31 - June 4, 2015, America's Center Convention Complex, MO, USA.
2.	Reamtong O. Towards high-throughput analysis of Salmonella serotypes: A fundamental look at protein profiles, proteomes and secretomes of Salmonella typhimurium and enteritidis. 63rd ASMS Conference on Mass Spectrometry & Allied Topics, May 31 - June 4, 2015, America's Center Convention Complex, MO, USA.
3.	Topanurak S. Discovery of Lipid acquisition mechanism of *Plasmodium vivax* in Liver Stage by Interactome Technique. 63rd ASMS Conference on Mass Spectrometry & Allied Topics, May 31 - June 4, 2015, America's Center Convention Complex, MO, USA.
4.	Boonyuen U. Functional Characterization of Short-Chain Dehydrogeenase/Oxidoreductase (SDR) From Protential Biothrest Agent, *Burkholderia pseudomallei*. ASM Biodefense and Emerging Diseases Research Meeting, Feb 9-11, 2015, USA.
5.	Nguitragool W. Gene models, expression, and immune response of *Plasmodium vivax* Reticuloyte Binding Proteins. 64th Annual Meeting American Socienty of Tropical Medicine & Hygeine, October 25-28, 2015, USA.

List of Presentations

VACCINE TRIAL CENTER

International (Oral Presentations)

1. Tomaras G, Moody A, Easterhoff D, Williams L, Saunders K, Yates N, Karasavvas N, Sawant S, Vandergrft N, Lucas J, Howington R, Kim J, Michael N, Robb M, O'Connell RJ, Vasan S, Excler JL, Rerks-Ngarm S, Pitisuttithum P, Nitayaphan S, Kepler T, Alam M, Ferrari G, Montefiori D, Hua-Xin Liao H-X, and Haynes B. Impact of Repetitive Protein Boosting on RV305 HIV-1 Vaccine-Induced Antibodies. Conference on Retroviruses and Opportunistic Infections, Seattle. Washington, Feburary 23-26, 2015.
2. Akapirat S, Karnasuta C, Vasan S, Ngauy V, Pitisutthithum P, Rerks-Ngarm S, Michael NL, de Souza M, Excler JL, Robb ML, Kim JH, O'Connell RJ and Karasavvas N. Durability of HIV-specific IgG Responses in RV305 Anogenital Secretions. Keystone Symposia Global Health Series: HIV Vaccines, Alberta, Canada, 22-27 March 2015.
3. H. Prentice, G. Tomaras, D. Geraghty, R. Apps, Y. Fong, P. Ehrenberg, M. Rolland, G. Kijak, W. Nelson, A. DeCamp, X. Shen, N. Yates, S. Zolla-Pazner, S. Nitayaphan, S. Rerks-Ngarm, P. Pitisuttithum, G. Ferrari, D. Montefiori, J. McElrath, R. Bailer, R. Koup, R. O'Connell, M. Robb, N. Michael, J. Kim, R. Thomas. HIV-1 specific IgG antibody levels correlate with presence of a specific HLA class II allele to impact acquisition and vaccine efficacy. 8th IAS Conference on HIV Pathogenesis, Treatment & Prevention, Vancouver, Canada, 19-22 July 2015.

International (Poster Presentations)

1. Easterhoff D, Moody A, Bowen S, Cheng H, Kim Jerome H, Michale N, Connell R, Excler J, Robb M, Vasan S, Rerks-Ngarm S, Kaewkungwal J, Pitisuttithum P, Nitayaphan S, Sinangil F, Phogat S, Kepler T, Ackerman M, Montefiori D, Tomaras G, Liao H and Haynes B. Induction of antibodies with long variable heavy third complementarily determining regions and glycan binding by repetitive boosting with a HIV vaccine. Keystone Symposia Global Health Series: HIV Vaccines, Alberta, Canada, 22-27 March 2015.

CEAR

National (Poster Presentations)

1. Pongrama Ramasoota, Panamthip Pitaksajjakul, Tadahiro Sasak, Takeshi Kurosu, Kazuyushi Ikuta. Therapeutic Human MAbs against 4 serotypes of DENV. IP Innovation and Technology Expo – IPITEx. July 18-20, 2015. Bangkok International Trade & Exhibition Centre: Thailand.
2. Khadijah Chiemthia, Chonlatip Pipttanboon, Pongrama Ramasoota, Panamthip Pitaksajjakul. Development of Rapid Immunochromatography Strip Test for Dengue Virus. Poster Presentation , RRi Congress, The Thailand Research Fund, July 22 2015, Bangkok International Trade & Exhibition Centre: BITEC, Thailand.
3. Patthamaphong Jaiklom, Panamthip Pitaksajjakul, Chonlatip Pipttanboon, Waranya Wongwit, Pongrama Ramasoota. Poster Presentation , RRi Congress, The Thailand Research Fund, July 22 2015, Bangkok International Trade & Exhibition Centre: BITEC, Thailand.
4. Pongrama Ramasoota, Panamthip Pitaksajjakul, Tadahiro Sasak, Takeshi Kurosu, Kazuyushi Ikuta. Therapeutic Human MAbs against 4 serotypes of DENV. Medi Thai Fair (Mediacal Innovation of Thailand Fair) August 18-20, 2015. IMPACT Exhibition and Convention Center, Muang Thong Thani, Thailand.
5. Khadijah Chiemthia, Chonlatip Pipttanboon, Pongrama Ramasoota, Panamthip Pitaksajjakul. Development of Rapid Immunochromatography Strip Test for Dengue Virus. Poster Presentation, Bioscience (Thailand), Merck Millipore November 5th 2015, Chulalongkorn University, Thailand.
6. Subenya Injampa, Chonlatip Pipttanboon, Waranya Wongwit, Pongrama Ramasoota, Panamthip Pitaksajjakul. Production of neutralizing human monoclonal antibody for four serotypes of dengue virus without enhancing activity and cellular immune response characterization. Bioscience (Thailand), Merck Millipore November 5th 2015, Chulalongkorn University, Thailand.

	MVRU
	National (Poster presentations)
1.	Roobsoong W, Rachaphaew N, Puasri P, Chobson P, Saeseu T, Schofield L, Adams JH and Sattabongkot J. *In vitro* continuous culture system for *Plasmodium vivax*. The 5th International Conference of Research on Plasmodium vivax Malaria, 20-22 May 2015, Intercontinental Bali Resort, Bali-Indonesia.
2.	Roobsoong W, Puasri P, Adams JH, Sattabongkot J. Field based *in vitro* invasion inhibition assay of *Plasmodium vivax*. American Society of Tropical Medicine and Hygeine, 64th Annual Meeting 25-29October 2015 Philadelphia Pennsylvania, USA.
3.	Roobsoong W, Puasri P, Adams JH, Sattabongkot J. Field based *in vitro* invasion inhibition assay of *Plasmodium vivax*. Joint International Tropical Medicine Meeting 2015 Bangkok, Thailand.
	International (Oral presentations)
1.	Kirakorn Kiattibutr, Patchara Sriwichai, Jiraporn Ruangsittichai, Chayanut Suansomjit, Nattawan Rachaphaew, Apisak Duangmanee, Nongnuj Maneechai, Sataporn Thongpoon, Teerawat Saeseu, Sureemas Buates, Wang Nguitragool, Jetsumon Sattabongkot. Contribution of asymptomatic population to *Plasmodium vivax* transmission in endemic areas of western and northwestern Thailand. 5th International Conference of Research on *Plasmodium vivid* malaria 19-22 May 2015 Intercontinental Bali Resort, Bali-Indonesia.

Research in Progress

FACULTY OF TROPICAL MEDICINE RESEARCH PROJECTS, FISCAL YEAR 2015

(October2014 - September2015)

NO.	RESEARCH TITLE	GRANT	PRINCIPAL INVESTIGATOR
Department of Clinical Tropical Medicine			
1	Effect of primaquine and its metabolite on the infectivity of *P. falciparum* gametocyte : validation technique	Wellcome Trust of Great Britain	Assoc. Prof. Kesinee Chotivanich
2	Bioequivalence study of 4 mg Perindopril tablets preparations in healthy Thai male volunteers	International Bio Service Co., Ltd	Assist. Prof. Weerapong Phumratanaprapin
3	In vivo bioequivalence study of 160 mg Fenofibrate film-coated tablet preparation in healthy Thai male volunteers	International Bio Service Co., Ltd	Asst. Prof. Weerapong Phumratanaprapin
4	VNTR-based PCR (VNTR Typing for *Plasmodium falciparum* and *Plasmodium vivax*	Biotech	Assoc. Prof. Mallika Imwong
5	Molecular characterization of drug resistance in the Human malarias	Intermediate Level Fellowship, Welcome Trust of Great Britain	Assoc. Prof. Mallika Imwong
6	A Phase III Trial of Aventis Pasteur Live Recombinant ALVAC-HIV (vCP1521) Priming with VaxGen gp120 B/E (AIDSVAX B/E) Boosting in HIV-uninfected Thai Adults (Clinic)	The Henry M. Jackson Foundation for The Advancement of Military Medicine, Inc. and The Government of Thailand Ministry of Public Health	Prof. Punnee Pitisuttithum
7	Detection of artemisinin resistance *P. falciparum* : in vitro	Mahidol-Oxford Tropical Medicine Research Unit	Assoc. Prof. Kesinee Chotivanich
8	Safety and efficacy study of *Impomea pes-caprae* ointment produced by Faculty of Tropical Medicine	Faculty of Tropical Medicine, Mahidol University	Dr. Watcharapong Piyaphanee
9	A Phase III Clinical Trial to Study the Immunogenicity, Tolerability, and Manufacturing Consistency of V503 (A multivalent Human Papillomavirus [HPV] L1 Virus-Like Particle [VLP] Vaccine) in Preadolscents and Adolescents (9 to 15 year olds) with a Comparison to Young Woman (6 to 26 year olds)	Merck & Co., Inc	Prof. Punnee Pitisuttithum
10	Efficacy of moisturizing lotion containing Licochalcone for xerosis in chronic hemodialysis [HD] patients: a double blinded randomized- intra-individual comparator controlled study: a pilot study	Department of Clinical Tropical Medicine and DKSH	Dr. Vorada Choovichian
11	Novel invention of induced pluripotent stem cells for prediction of drug toxicity in human	Government Budget	Assist. Prof. Apichart Nontprasert
12	Incidence and spectrum of health problems among travellers to Lao PDR	Department of Clinical Tropical Medicine and Travel Medicine Unit	Dr. Watcharapong Piyaphanee

NO.	RESEARCH TITLE	GRANT	PRINCIPAL INVESTIGATOR
Department of Clinical Tropical Medicine *(Continued)*			
13	Rabies exposure risk among foreign backpackers from non-ASEAN countries traveling in Southeast Asia	-none-	Dr. Watcharapong Piyaphanee
14	The efficacy of antimalarial treatment for *Plasmodium vivax* at Thai -Cambodia border, Thailand.	Dean's Research Fund, Faculty of Tropical Medicine, Mahidol University	Dr. Prakaykaew Charunwatthana
15	Etiology and outcome of acute fever cases attending Hospital for Tropical Diseases	Faculty of Tropical Medicine, Mahidol University	Dr. Viravarn Luvira
16	The efficacy of moisturizing lotion with Lichochalcone in treatment of dryskin and pmritus in End-Stage renal disease patients	Department of Clinical Tropical Medicine, Faculty of Tropical Medicine	Dr. Vorada Choovichian
17	Plasma antioxidant power and vitamin C level in patients with dengue infection	Faculty of Tropical Medicine, Mahidol University	Dr. Borimas Hanboonkunupakarn
18	The study of chronic kidney disease in elderly	Mahidol University (Government Budget)	Asst. Prof. Weerapong Phumratanaprapin
19	The efficacy antimalarial *Plasmodium vivax* patient	Mahidol University (Government Budget)	Dr. Prakaykaew Charunwatthana
20	Influenza vaccine in the elderly	Mahidol University (Government Budget)	Prof. Punnee Pitisuttithum
21	Measurement of hemoglobin in adult patients with dengue viral infection using non-invasive method	Dean's Research Fund, Faculty of Tropical Medicine, Mahidol University	Dr. Supat Chamnanchanunt
22	Causative agents of fever among patients presenting at urban Thai hospital	Dean's Research Fund, Faculty of Tropical Medicine, Mahidol University	Assist. Prof. Udomsak Silachamroon
23	Hemodynamic parameters in adult patients with dengue	Dean's Research Fund, Faculty of Tropical Medicine, Mahidol University	Dr. Vipa Thanachartwet
24	Construction and characterization of recombinant full-length enterovirus-71 and coxsackievirus A16 encoding green fluorescences protein (GFP) viruses and its application for pathogenesis studies	Faculty of Tropical Medicine, Mahidol University	Dr. Kobporn Boonnak
25	Treatment seeking behavoirs of dengue patients	Faculty of Tropical Medicine, Mahidol University	Dr. Viravarn Luvira
26	The prevalence and correlates of self - reported anxiety and depression: a cross – sectional study in pruritic skin diseases patients	Faculty of Tropical Medicine, Mahidol University	Dr. Vorada Choovichian
27	Novel diagnostic test for communicable tropical enteric pathogen in human to diagnose and exploit epodemiology to helminth, protozoa, viral depatitis E and Salmonella typhi in Bangkok Hospital for Tripical Diseases	Faculty of Tropical Medicine, Mahidol University	Mr. Sant Muangnoicharoen
28	Cardiac evaluational in adult with dengue infention by serial echocardiography	Faculty of Tropical Medicine, Mahidol University	Ms. Chayasin Mansanguan

NO.	RESEARCH TITLE	GRANT	PRINCIPAL INVESTIGATOR
Department of Clinical Tropical Medicine *(Continued)*			
29	Scrub Typhus comparision of specificity of various diagnostic tests and kinetics of antibodies response in patients	Faculty of Tropical Medicine, Mahidol University	Assoc. Prof. Yupaporn Wattanagoon
30	Effects of hypo-and hyper body temperature on the erythocytic stage-development of *Plasmodium falciparum*	Faculty of Tropical Medicine, Mahidol University	Ms. Yutatirat Singhaboot
31	Kinetic study of unmeasured organic acids for the assessment of cause and correlation to acidosis in severe malaria using innovative technique	Faculty of Tropical Medicine, Mahidol University	Dr. Natthida Sriboonvorakul
Department of Helminthology			
1	Health status of immigrant children and environmental survey of the children day care centre in Samutsakorn Province	Faculty of Tropical Medicine, Mahidol University	Mr. Surapol Sa-nguankiat
2	Identification and characterization of Trichinella spiralis-derived immunomodulatory molecules for novel therapies of inflammatory diseases	Faculty of Tropical Medicine, Mahidol University	Assist. Prof. Poom Adisakwattana
3	Experimental co-infection study of high virulence pathogenic Leptospira in helminth infected hamster	Faculty of Tropical Medicine, Mahidol University	Mr. Kittipong Chaisiri
4	Proteomics studies of cytoplasmic membrane proteins expressed on TNF-a induced cholangiocarcinoma cell line	The Thailand Research Fund, Commission on Higher Education and Mahidol University	Assist. Prof. Poom Adisakwattana
5	Development of technique for discriminating species and estimating numbers of metacercariae of fish-borne trematodes in an area of mixed infection between Opisthorchiid liver flukes and Heterophyid intestinal flukes by using multiplex real-time PCR	The Thailand Research Fund, Commission on Higher Education and Mahidol University	Dr. Urusa Thaenkham
6	Production of recombinant Cathepsin L from *Paragonimus pseudoheterotremus* for diagnostic development of paragonimiasis	The Thailand Research Fund and Mahidol University	Dr. Tippayarat Yoonuan
7	Proteomics and immununomics analysis of excretory-secretory products from infective *Gnathostoma spinigerum* for development of immunodiagnosis	Faculty of Tropical Medicine, Mahidol University	Mrs. Supaporn Nuamtanong
8	Pilot study: community-based comprehensive, multi-disciplinary surveillance of enteric/food and waterborne pathogens in Kanchanaburi and Nakhon Pathom Provinces, Thailand.	Faculty of Tropical Medicine, Mahidol University	Assoc. Prof. Chalit Komalamisra

NO.	RESEARCH TITLE	GRANT	PRINCIPAL INVESTIGATOR
Department of Helminthology *(Continued)*			
9	Transcriptomics and proteomics analysis of potential secretory proteins of *Schistosoma mekongi* for development of immunodiagmosis and vaccine	Faculty of Tropical Medicine, Mahidol University	Dr. Poom Adisakwattana
10	Study on the effect of phytochemical compounds in Stemona root from Thailand to *Gnathostoma spinigerum*	Agricultural Research Development Agency (Public Organization) : ARDA	Dr. Urusa Thaenkham
11	Development of multiplex isothermal Polymerase Chain Reaction to detect *Ascaris lumbricoides*, *Trichuris trichiura* and hookworms	Faculty of Tropical Medicine, Mahidol University	Mr. Akkarin Poodeepiyasawat
Department of Medical Entomology			
1	Feeding behavior, ecological studies, and molecular identification of *Anopheles dirus* complex in man-made habitat	Faculty of Tropical Medicine, Mahidol University	Dr. Sungsit Sungwornyothin
2	Tropic bebavior and ecological characteristics of *Anopheles dirus* complex in man-made habitat	The Thailand Research Fund	Dr. Sungsit Sungwornyothin
3	DNA barcode: the technical challenge for *Anopheles* mosquito blood meal identification to reverse host from laboratory model versus field.	Faculty of Tropical Medicine, Mahidol University	Dr. Patchara Srivichai
4	Comparison and evaluation of Loop-mediated isothermal amplification (LAMP) and RT-PCR as diagnostic tool for dengue virus detection in *Aedes* among epidemic area	Faculty of Tropical Medicine, Mahidol University	Dr. Rawewan Srisawat
5	Climate changes effects on mosquito-borne viruses maintenance : Dynamic population of the vectors of Dengue and Chikungunya viruses	Faculty of Tropical Medicine, Mahidol University	Dr. Ronald Enrique Morales Vargas
6	Effect of temperature on development and insecticide susceptibility of dengue vectors.	Faculty of Tropical Medicine, Mahidol University	Assoc. Prof. Narumon Komalamisra
7	Application of morphometrics and molecular biology to identify *Ae. scutellaris* in Thailand	Faculty of Tropical Medicine, Mahidol University	Dr. Suchada Samruaypol
8	Quantitative transovarial tranmission to dengue-2 virus in both sexes of dark- and pale-form *Ae. Aegypti*	Faculty of Tropical Medicine, Mahidol University	Mr. Teerawit Panpoowong
9	The effects of different temperatures on the interaction between *Aedes* mosquitoes and dengue virus especially viral susceptibility, dissemination, transmission and disease pathogenesis.	Dean's Research Fund, Faculty of Tropical Medicine, Mahidol University	Assoc. Prof. Supatra Thongrungkiat
10	*Plasmodium knowlesi* the fifth species of human malaria : investigaton for mosquito vector in Thailand	The Thailand Research Fund, Commission on Higher Education and Mahidol University	Dr. Patchara Srivichai

NO.	RESEARCH TITLE	GRANT	PRINCIPAL INVESTIGATOR
Department of Medical Entomology *(Continued)*			
11	Exploring transmission-blocking vaccine target in *Anopheles dirus* for inhibition of malaria transmission	Dean's Research Fund, Faculty of Tropical Medicine, Mahidol University	Dr. Patchara Srivichai
12	Production and characterization of rhamnolipid, biosurfactant, from *Pseudomonas aeruginosa* B189 for mosquitoes control	Faculty of Tropical Mecicine, Mahidol University	Dr. Siriluck Attrapadung
13	The study of mosquito vectors with emphasis on Lorrainea, Sukusea and Stegomyia inhabiting mangrove forest of Thailand by morphometrics and molecular biology	Mahidol University	Dr. Suchada Sumruaypol
14	Detection of viral disease and molecular distinguish of the natural Bat Bug species from the cave	Mahidol University	Dr. Rutcharin Potiwat
15	Stability enhancement of mosquito repellency from Zngthoxy limonella oil by using encapsulation technique	Mahidol University	Dr. Siriluck Attrapadung
16	Identification of transmission-blocking compounds from the Malaria Box	Dean's Research Fund, Faculty of Tropical Medicine, Mahidol University	Dr. Suchada Sumruaypol
17	Herbal mosquito repellents masts	Faculty of Tropical Mecicine, Mahidol University	Mrs. Keawmala Palakul
18	A surveillance of Bat Bug species and discovery of genetic relationships among human Bed Bugs	Faculty of Tropical Mecicine, Mahidol University	Dr. Rutcharin Potiwat
19	Study of the physiological sensitivity to chemical stimuli in different species of mosquitoes	Kao Corporation, Japan	Assoc. Prof. Narumon Komalamisra
20	Mekong Outdoor Transmission Initiative (MOTIve) : Evaluation of the protective efficacy of premethrin-treated clothing in the laboratory	Malaria Consortium, UK	Assoc. Prof. Narumon Komalamisra
Department of Microbiology and Immunology			
1	Associations between genetic polymorphisms, innate immune responses and outcomes from sepsis in Thai patients with melioisosis and *S. aureus* infection	Welcome Trust of Great Britain	Assist. Prof. Narisara Chantratita
2	The role of treahalase in stress response and virulence of *Burkholderia pseudomallei*	The Thailand Research Fund, Commission on Higher Education and Mahidol University	Dr. Muthita Vanaporn
3	Role of cycle inhibiting factor (Cif) in host protein expression and prevalence of Cif in *Burkholderia pseudomallei*	The Thailand Research Fund, Commission on Higher Education and Mahidol University	Dr. Pornpan Pumirat
4	Surveillance of emerging and re-emerging aoonotic diseases in wildlife and domestic animals in the areas of forest, residences, and agricultures interface in Thailand	Faculty of Tropical Mecicine, Mahidol University	Dr. Nathamon Kosoltanapiwat

NO.	RESEARCH TITLE	GRANT	PRINCIPAL INVESTIGATOR
Department of Microbiology and Immunology *(Continued)*			
5	Immunoproteomics for identification of MHC class I-restricted epitopes of enterovirus 71	Dean's Research Fund, Faculty of Tropical Medicine, Mahidol University	Dr. Nathamon Kosoltanapiwat
6	Ultrasonic observation and 'Omics technological application for invasive virulence factors identification, cytokines and secreted extracellular reactive oxygen species expression that provokes the pathogenesis of *Trichophyton rubrum* in primary dendritic cells and continuous monocyte derived cells model	Dean's Research Fund, Faculty of Tropical Medicine, Mahidol University	Assist. Prof. Natthanej Luplertlop
7	The antibiotic resistance profile and its mechanisms in *Escherichia coli* and *Klebsiella pneumoniae* from hospital isolations in 2007-2012	Faculty of Tropical Medicine, Mahidol University	Dr. Muthita Vanaporn
8	Detection of hepatitis E virus in raw pork, pig liver and pork products	Faculty of Tropical Medicine, Mahidol University	Mr. Narin Thippornchai
9	Development of monoclonal antibody-based dot-blot ELISA for the detection of Listeria monocytogenes in food	Faculty of Tropical Medicine, Mahidol University	Assist. Prof. Nitaya Indrawattana
10	Determination of antibody titer among children vaccinated with heptavalent pneumococcal conjugate vaccine by Opsonophagocytic Killing Assay	Faculty of Tropical Medicine, Mahidol University	Assist. Prof. Tareerat Kalambaheti
11	The potential implications of Nisin in common dermatological problems on the *in vitro* characterizations	Faculty of Tropical Medicine, Mahidol University	Assist. Prof. Natthanej Luplertlop
12	Variation of *Burkholderia pseudomallei* lipopolysaccharide and impact on innate immune response	Faculty of Tropical Medicine, Mahidol University	Assoc. Prof. Narissara Chantratita
13	Role of biofilm in antifungal drug resistance in *Aspergillus fumigatus* and other species	Faculty of Tropical Medicine, Mahidol University	Assist. Prof. Natthanej Luplertlop
14	Analysis of protein profiling, virulence and immune activation of *Burkholderia pseudomallei* isolated from blood culture during the passages	Faculty of Tropical Medicine, Mahidol University	Dr. Pornpan Pumirat
15	Determinants of Outcome and Recurrent Infections in Melioidosis	NIH	Assoc. Prof. Narissara Chantratita
16	Common Dermatophytic infections and their in vitro anti-fungal susceptibility in patients attending at the Dermatological Clinic, Tropical Medicine Hospital, Faculty Tropical Medicine, Mahidol University	Faculty of Tropical Medicine, Mahidol University	Mrs. Watcharamat Muangkaew
17	Naturally acquired antibodies to *P. vivax* Duffy binding protein among malaria endemic populations in Thailand	Faculty of Tropical Medicine, Mahidol University	Mrs. Jarinee Tongshoob

NO.	RESEARCH TITLE	GRANT	PRINCIPAL INVESTIGATOR
Department of Microbiology and Immunology *(Continued)*			
18	*Pseudallescheria/Scedosporium* complex spp. in Bangkok, Thailand : From saprophytic fungi to invasive human mycoses	Center of Emerging and Neglected Infectious Disease : CENID, Mahidol University	Assist. Prof. Natthanej Luplertlop
Department of Molecular Tropical Medicine and Genetics			
1	The study of biotransformation of oseltamivir analogue by Carboxylesterase 1 (CES1).	Faculty of Tropical Medicine, Mahidol University	Dr. Usa Dokprom Boonyuen
2	The qualification and quantification of proteins of mefloquine-sensitive and mefloquine-resistant *Plasmodium falciparum* using mass spectrometry.	Faculty of Tropical Medicine, Mahidol University	Dr. Onrapak Riumthong
3	Optimization of protein sample preparation techniques for proteomic study of *Plasmodium vivax* in liver stage	Faculty of Tropical Medicine, Mahidol University	Dr. Supachai Topanurak
4	Identification of mass fingerprinting of *Leptospira* spp. Using matrix assisted laser desorption/ ionization time-of-flight mass spectrometry (MALDI-TOF MS)	The Thailand Research Fund, and Mahidol University	Assist. Prof. Piengchan Sonthayanon
5	Prevalence of pathogenic *Leptospira* spp. from rodents in Thailand	Dean's Research Fund, Faculty of Tropical Medicine, Mahidol University	Assist. Prof. Piengchan Sonthayanon
6	Molecular epidemiology of drug resistance in human malarias in Thailand	Mahidol University (Government Budget)	Assoc. Prof. Mallika Imwong
7	Discoery of Lipid Acquisition Machinery of Plasmodium in Liver Stage with Host-Parasite Interactome Technology for New Antimalarial Targeting	National Science and Technology Development Agency (NSTDA)	Dr. Supachai Topanurak
8	Development of magnetic nanoparticles as the prototype for the enrichment of *Leptospira* spp.	Dean's Research Fund, Faculty of Tropical Medicine, Mahidol Universityy	Dr. Charin Thawornkuno
9	Molecular characterization of antigenic surface protein genes of *Plasmodium malariae*	Dean's Research Fund, Faculty of Tropical Medicine, Mahidol Universityy	Dr. Naowarat Tanomsing
10	Discovery of essential host factors for the development of *P. falciparum* and *P. vivax* in liver stage	Dean's Research Fund, Faculty of Tropical Medicine, Mahidol Universityy	Dr. Supachai Topanurak
11	Expression profiling of reticulocyte binding proteins of *Plasmodium vivax*	Dean's Research Fund, Faculty of Tropical Medicine, Mahidol Universityy	Dr. Wang Nguitragool
12	Elucidating the function of plasmodium perforin-like proteins in infection of *Anopheles mosquitoes*	Dean's Research Fund, Faculty of Tropical Medicine, Mahidol Universityy	Dr. Wang Nguitragool

NO.	RESEARCH TITLE	GRANT	PRINCIPAL INVESTIGATOR
Department of Molecular Tropical Medicine and Genetics *(Continued)*			
13	Transfection of liver-stage *Plasmodium vivax* for studies of parasite biology, drug screening, and vaccine development	The Thailand Research Fund	Dr. Wang Nguitragool
14	Identification of novel biomarker genes for cholangiocarcinoma detection	Faculty of Tropical Medicine, Mahidol University	Dr. Panee Chaksangchaichot
15	Molecular detection and typing of *Orientia tsutsugamushi* in chigger mites from wild-caught rodents in Thailand	Faculty of Tropical Medicine, Mahidol University	Assist. Prof. Piengchan Sonthayanon
16	The identification and characterization of the target proteins of a candidate antimalarial drug	Faculty of Tropical Medicine, Mahidol University	Dr. Onrapak Riumthong
17	Elucidating the mechanism of reticulocyte-specific invasion by *Plasmodium vivax*	Wellcome Trust of Great Britain, UK	Dr. Wang Nguitragool
18	Biochemical characterization of the most common G6PD variants in Thailand	Mahidol University	Dr. Usa Dokprom Boonyuen
19	Roles of the cytoplasmic domain of reticulocyte binding protein homologs of malaria parasites	Mahidol University : Talent Management	Dr. Wang Nguitragool
20	Use of mapl and csp DNA sequences as genetic markers for *P. ovale curtisi* and *P. ovale wallikeri*	Mahidol University : Talent Management	Dr. Naowarat Saralamba
21	Characterization of IgM/IgG-specific LipL32 immunodominant epitopes of Leptospira spp.	Faculty of Tropical Medicine, Mahidol University	Dr. Santi Maneewatchararangsri
22	Identification of host proteome caused by human papillomavirus (HPV) E7 protein interaction for host-virus interaction study	Faculty of Tropical Medicine, Mahidol University	Dr. Supachai Topanurak
23	Functional Characterization of BPSS2232, a putative tubulin acetyltransferase (TAT), from *Burkholderia pseudomallei*	Faculty of Tropical Medicine, Mahidol University	Dr. Usa Dokprom Boonyuen
24	Identification of Specific Biomarker Genes for Separation Intrahepatic Cholangiocarcinoma Subtype	Faculty of Tropical Medicine, Mahidol University	Ms. Thitiluck Swangsri
25	Determinaton of whole antigen profiles in *Schistosoma mekongi* eggs by proteomics approach	Faculty of Tropical Medicine, Mahidol University	Ms. Tipparat Thiangtrongjit
26	Production of ELISA test kit for quantifying human collagen alpha-1 (XI) chain of Thai breast cancer patient	Faculty of Tropical Medicine, Mahidol University	Ms. Nonglucksanawan Ritthisunthorn
27	Monthly dynamics of five-species malaria infection on the Thai-Myanmar border	Center of Emerging and Neglected Infectious Disease : CENID, Mahidol University	Dr. Wang Nguitragool

NO.	RESEARCH TITLE	GRANT	PRINCIPAL INVESTIGATOR
Department of Protozoology			
1	*Toxoplasma gondii* genotyping in domestic and wild felids in Thailand	Commission on Higher Education	Assoc. Prof. Yaowalark Sukthana
2	PCR assays for detection of *Toxoplasma gondii* in Thai commercial meat products	Mahidol University	Ms. Rachatawan Chiabchalard
3	Identifying the Sources of Environmental Contamination by *Cryptosporidium*	The Thailand Research Fund	Assoc. Prof. Yaowalark Sukthana
4	Conmparative proteomic study of *Entamoeba histolytica* and *Entamoeba moshkovskii;* causative agent of muman amoebiasis	The Thailand Research Fund, Commission on Higher Education and Mahidol University	Dr. Saengduen Moonsom
5	Development Technique of Differentiation of Free-living Amoebae	The Thailand Research Fund	Assoc. Prof. Yaowalark Sukthana
6	The role of marine bivalves as a sentinel organism for monitoring food-and water-borne Protozoa-related diseases in coastal waters	The Thailand Research Fund	Assoc. Prof. Yaowalark Sukthana
7	The Detection and Quantification of *Toxoplasma gondii* Captive Wildlife in Thailand	Department of Protozoology	Dr. Ongart Mahitikorn
8	Development of a loop-mediated isothermal amplification (LAMP) for rapid identification of *Naegleria fowleri*	Faculty of Tropical Medicine, Mahidol University	Dr. Ongart Mahitikorn
9	Development of nested PCR and real-time PCR assays for diagnosis of *Plasmodium knowlesi*	Faculty of Tropical Medicine, Mahidol University	Mr. Pongrut Ratprasert
10	Development of differential diagnosis of *Entamoeba histolytica, E. moskovskii,* and *E. dispar* by specific monoclonal antibodies	Dean's Research Fund, Faculty of Tropical Medicine, Mahidol University	Dr. Saengduen Moonsom
11	Antiprotozal acitivity of essential oil from Thai medical plants against *Giardia duodenalis*	Mahidol University	Dr. Supaluk Popruk
Department of Social and Environmental Medicine			
1	Development of Microorganism Killing Activity for Electronic Air Filter	The Thailand Research Fund	Assoc. Prof. Pongrama Ramasoota
2	Development of monoclonal antibody specific to 3 ABC protein of foot and mouth disease virus using phage display technology	The Thailand Research Fund	Assoc. Prof. Pongrama Ramasoota
3	Effect of climate change on Gastro-intestinal Infectious Diseases	The Commission on Higher Education (National Research University)	Assist. Prof. Suwalee Worakunpiset
4	Variable of infection rate of intermediated host of liver fluke, *Opisthorchis viverrini* at endemic areas in Chacheongsao Province, Thailand.	Department of Social and Environmental Medicine, Faculty of Tropical Meidicine, Mahidol University	Mrs. Yupa Chusongsang

NO.	RESEARCH TITLE	GRANT	PRINCIPAL INVESTIGATOR
Department of Social and Environmental Medicine *(Continued)*			
5	Therapeutic and diagnostic human monoclonal antibodies against Chikungunya virus.	Dean's Research Fund, Faculty of Tropical Medicine, Mahidol University	Dr. Pannamtip Pitaksajakul
6	Recombinant human IgG monoclonal antibody production with cross-neutralizing activity to all serotypes of Dengue virus	The Thailand Research Fund, Commission on Higher Education and Mahidol University	Dr. Pannamthip Pitaksajjakul
4	Epitope mapping of neutralizing human monoclonal antibody against Dengue viruses	The Thailand Research Fund and Mahidol University	Assoc. Prof. Pongrama Ramasoota
8	Dengue vaccine development based on epitope from human monoclonal antibodies that nutrallized all 4 serotype of Dengue virus	National Research Consil of Thailand (NRCT)	Assoc. Prof. Pongrama Ramasoota
9	Social and Environmental Factors Affecting The Preventive Behaviors of Dengue Hemorrhagic Fever	Faculty of Tropical Medicine, Mahidol University	Mr. Wiwat Wanarangsikul
10	Health Risk Assessment of Heavy Metals Contamination in the Environment Near Industrial Estate Area, Ayutthaya	Faculty of Tropical Medicine, Mahidol University	Ms. Rachaneekorn Mingkhwan
11	Distribution and seasonal variation of *Neotricula aperta*, snail intermediate host of blood fluke *Schistosoma mekongi*, along Mekong River, Thailand	Faculty of Tropical Medicine, Mahidol University	Dr. Yanin Limpanon
12	Reduction of ADE activity for neutralizing human monoclonal antibody against dengue virus by Fc modification	Faculty of Tropical Medicine, Mahidol University	Dr. Pannamthip Pitaksajjakul
13	Assessment of the carcinogenic potential of chemicals release from plastic food containers and packaging through cell transformation assay	Faculty of Tropical Medicine, Mahidol University	Assist. Prof. Suwalee Worakunpiset
14	Critical Proteins of Non-Alcoholic Fatty Liver Disease After Bisphenol A Exposure	Faculty of Tropical Medicine, Mahidol University	Dr. Prapin Tharnpoophasiam
15	Development of Rapid Immunochromatography strip test for Dengue virus	The Thailand Research Fund	Dr. Pannamthip Pitaksajjakul
16	Development of competitive ELISA test for differentiate between foot and mouth disease infected animal from vaccinated animal	The Thailand Research Fund	Assoc. Prof. Pongrama Ramasoota
17	Strengthen Research Collaboration on Dengue between Thailand and Lao PDR	Mahidol University (AEC)	Assoc. Prof. Pongrama Ramasoota
18	Contstruction of scFv antibody phage library and selection of dengue virus-specific monoclonal antibodies using phage display technology	Faculty of Tropical Medicine, Mahidol University	Ms. Hathairad Hananantachai
19	Dynamic Modeling of Loading Capacity for Fecal Coliform Bacteria of the Mekong River in Chaing Khong City, Chiang Rai Province	Asia Research Center, Chulalongkorn University	Assist. Prof. Voranuch Wangsuphachart

NO.	RESEARCH TITLE	GRANT	PRINCIPAL INVESTIGATOR
Department of Social and Environmental Medicine *(Continued)*			
20	Development of procedures for laboratory maintaining of blood fluke (*Schistosoma mansoni*) life cycle in snail intermediate host (*Biomphalaria glabrata*)	Faculty of Tropical Medicine, Mahidol University	Mrs. Yupa Chusongsang
21	Development of technique for *Schistosoma mekongi* infection in Laboratory mice	Faculty of Tropical Medicine, Mahidol University	Mr. Phiraphol Chusongsang
22	Environmental Variation of Particulate Matters in Respiratory Disease in the Northern part of Thailand	Mahidol University (Postdoctoral Fellowship Program)	Assoc. Prof. Kraichat Tantrakarnapa/ Dr.Apaporn Ruchiraset
Department of Tropical Hygiene			
1	A phase II,randomized, open label, multicentre study to assess the antimalarial efficacy and safety of arterolane (RBx11160) maleate and piperaquine phosphate coadministration and Coartem in patients with acute uncomplicated *Plasmodium falciparum* malaria	Ranbaxy Laboratories Ltd., India	Prof. Srivicha Krudsood
2	Proteomics characterization of *Aedes aegypti*	Bourse Scholarship, IRD, France	Assist. Prof. Natthanej Luplerdlop
3	Evaluation of fosmidomycin, when administered concurrently to adult subjects with acute uncomplicated Plasmodium malaria	Jomaa Pharma GmbH, Hamburg, Germany	Prof. Srivicha Krudsood
4	Th1 and Th2 cytokine expression in common mosquito borne infected samples in Thailand	The Thailand Research Fund	Assist. Prof. Natthanej Luplerdlop
5	Role of phosphoinositide 3-kinase and matrix metalloproteinases induce chronic arthritis in Chikungunya pathogenesis	Faculty of Tropical Medicine, Mahidol University	Ms. Suntaree Sangmukdanun
6	Dynamics of microscopic and submicroscopic *P. falciparum* gametocytemia after early treatment of artesunate-mefloquine	The Thailand Research Fund	Dr. Saranath Lawpoolsri
7	Production of human VL complementary single-variable domain that interfere and/or neutralize IL-17 biological functions	Faculty of Tropical Medicine, Mahidol University	Dr. Santi Maneewatchararangsri
8	Investigating Urine Protein Markers in Acute Renal failure Complicating Severe Malaria	The National Research Concil of Thailand	Assist. Prof. Natthanej Lublertlop
9	Diagnosis of ARF in severe malaria by neutrophil gelatinase-associated lipocalin (NGAL) and liver fatty acid binding proteins (L-FABP)	The National Research Concil of Thailand	Prof. Srivicha Krudsood
10	Surveillance and spatial-temporal distribution of Chikungunya and its impact among residents living in an area along Thai-Myanmar border of Ratchaburi Province.	Faculty of Tropical Medicine, Mahidol University	Mr. Pitak Wutisen

NO.	RESEARCH TITLE	GRANT	PRINCIPAL INVESTIGATOR
Department of Tropical Hygiene *(Continued)*			
11	Effect of land use change on malaria transmission in Suanphung district Ratchaburi.	Faculty of Tropical Medicine, Mahidol University	Mr. Patiwat Sa-angchai
12	Forecasting model of malaria incidence with climate variables: a case study in Ratchaburi, Thailand.	Mahidol University	Dr. Ngamphol Soonthornworasiri
13	Study of lipopolysaccharide and biofilm formation in relapsing meliodosis	The Thailand Research Fund, Commission on Higher Education and Mahidol University	Assist. Prof. Direk Limmathurotsakul
14	Impact of diabetes mellitus on treatment response for tuberculosis among pulmonary tuberculosis patients in Upper North Thailand	Dean's Research Fund, Faculty of Tropical Medicine, Mahidol University	Dr. Saranath Lawpoolsri
15	The comparative epidemiology of *P. falciparum* and *P. vivax* transmission in Papua New Guinea, Thailand and Brazil	Barcelona Center for International Health Research, Spain	Assoc. Prof. Pratap Singhasivanon/ Dr. Jetsumon Prachumsri
16	DENFREE - Dengue Research Framework for Resisting Epidemics in Europe	Institute Pasteur, France	Assoc. Prof. Pratap Singhasivanon
17	Effectivenessof oral ivermectin for the treatment of human head lice in rural community	Faculty of Tropical Medicine, Mahidol University	Dr. Surapon Yimsamran
Department of Tropical Nutrition and Food Sciences			
1	Development of health behaviors and nutritional status of tsunami victims in Phang-nga Province	Brescia University, Italy	Assoc. Prof. Karunee Kwanbunjan
2	Screening and identification of antimicrobial compound from *Bifidobacterium* with inhibitory activity against *Clostridium difficle*	The Thailand Research Fund, Commission on Higher Education and Mahidol University	Dr. Amornrat Aroonnual
3	A novel *Solanum torvum* GH3 beta-glucosidase: molecular characterization, physiological functions, structural elements responsible for its natural substrate specificity, its applications	Dean's Research Fund, Faculty of Tropical Medicine, Mahidol University	Assist. Prof. Damrongkiat Art-harn
4	Effects of a weight loss program on anthropometric parameters, metabolic syndrome parameters and quantity of energy and nutrients intake among obese women	Faculty of Tropical Medicine, Mahidol University	Assoc. Prof. Karunee Kwanbunjan
5	The study of methylation level in osteoporosis in menopause by pyrosequencing	Faculty of Tropical Medicine, Mahidol University	Dr. Pornrutsami Jintaridth
6	Case control study of diet, lifestyle, insulin resistance, inflammatory markers, and risk of developing type-2 diabetes mellitus in rural Thais	Dean's Research Fund, Faculty of Tropical Medicine, Mahidol University	Assoc. Prof. Karunee Kwanbunjan
7	Effect of lactic acid bacteria on immunomodulation of human colon cell against *Clostridium difficile* infection	Faculty of Tropical Medicine, Mahidol University	Dr. Amornrat Aroonnual

NO.	RESEARCH TITLE	GRANT	PRINCIPAL INVESTIGATOR
Department of Tropical Nutrition and Food Sciences *(Continued)*			
8	Survey of dietary pattern and nutritional status particularly multivitamin deficiencies in relation to cardiovascular disease and diabetes in Thai elderly	Faculty of Tropical Medicine, Mahidol University	Dr. Sarunya Kaewprasert
9	Identification of plant natural products with inhibition of recombinant mosquito alpha-glucosidase	Faculty of Tropical Medicine, Mahidol University	Assist. Prof. Damrongkiat Art-harn
10	Prospective study of diet, lifestyle, insulin resistance, inflammatory markers and risk of developing Type 2 Diabetes Mellitus in rural Thais	Mahidol University (Government Budget)	Assoc. Prof. Karunee Keanboonjan
11	The mathylation study in replicative periodontal cellular aging and gene expression modification in the development of novel treatment modalities	The Thailand Research Fund	Dr. Pornrutsami Jintaridth
12	Comparison of anti-HIV activity of plastocyanin protein from plants and cyanobacterium	The Thailand Research Fund	Dr. Apanchanid Thepouyporn
13	Health benefit effects of Mao-Luang (*Antidesma bunius*) crude extract against cardiovascular disease in hyperlipidemic rats	Faculty of Tropical Medicine, Mahidol University	Dr. Pattaneeya Prangthip
14	DNA Methylation Signatures within the Human Brain Cell during Aging	Faculty of Tropical Medicine, Mahidol University	Dr. Pornrutsami Jintaridth
15	Effectiveness of β – glucan supplementation to interleukin-6, interleukin-10 and tumour necrosis factor-alpha levels in overweight and obese subjects	Core Chematis Co., Ltd., Thailand	Dr. Pattaneeya Prangthip
16	Production of Coconut Alpha-Galactosidase in Yeast for Hydrolyzing Raffinose in Soymilk to Increase Nutritional Value and Decrease Soymilk-Allergy	Faculty of Tropical Medicine, Mahidol University	Ms. Kriyaporn Songmuaeng
Department of Tropical Pathology			
1	Investigating Causes of Acute Renal Failure in Severe Malaria by Histopathology and Immunohistochemistry	The National Research Concil of Thailand	Assoc. Prof. Parnpen Viriyavejakul
2	Induction of apoptosis in human peripheral blood mononuclear cells in vitro by excretory secretory products from the third stage *Gnathostoma spinigerum* larvae	Faculty of Tropical Medicine, Mahidol University	Assoc. Prof. Yaowapa Maneerat
3	Investigating endothelial cell permeability in severe *P. falciparum* malaria and exploring the role of sphingosine 1 phosphate as a therapeutic agent in protecting severe malaria complications	Faculty of Tropical Medicine, Mahidol University	Assoc. Prof. Parnpen Viriyavejakul
4	Comparison of Protein C System Expression in the Lung between Pulmonary Edema and Non Pulmonary Edema Cases in Severe (Falciparum) Malaria	Faculty of Tropical Medicine, Mahidol University	Dr. Sumate Ampawong
5	Exploring Pancreatic Pathology in Severe Malaria Patients	Faculty of Tropical Medicine, Mahidol University	Ms. Supattra Glaharn

NO.	RESEARCH TITLE	GRANT	PRINCIPAL INVESTIGATOR
Department of Tropical Pediatrics			
1	Evaluation of long-term immunity against Japanese encephalitis in children vaccinated with Japanese encephalitis vaccine	Department of Tropical Pediatrics	Assoc. Prof. Pornthep Chanthavanich
2	Favirab™ post prescription event monitoring	Sanofi Pasteur Co., Ltd.	Assoc. Prof. Pornthep Chanthavanich
3	The comparison of immunogenicity and adverse reactions after immunization with Japanese encephalitis vaccine produced by BIKEN and Government Pharmaceutical Organization (GPO) in healthy Thai children (JE0150)	Government Pharmaceutical Organization	Assoc. Prof. Pornthep Chanthavanich
4	Efficacy and safety of Dengue vaccine in healthy children aged 4 to 11 years in Thailand (CYD23)	Sanofi Pasteur Co., Ltd.	Prof. Arunee Sabchareon
5	Protective Antibodies Against Erythrocyte Invasion Ligands in *Plasmodium falciparum* in Thailand	Faculty of Tropical Medicine, Mahidol University	Assist. Prof. Watcharee Chokejindachai
6	Immunogenicity and safety of activated vero cell devired Japanese Encephalitis vaccine in Thai children	Liaoning Cheng Da Biotechnology Co., Ltd. China	Assoc. Prof. Pornthep Chanthavanich
7	Accuracy assessment of using WHO criteria in diagnosis of dengue infection	Department of Tropical Pediatrics	Assoc. Prof. Pornthep Chanthavanich
8	Immunogenicity and Safety of Inactivated Vero Cell Derived Japanese Encephalitis Vaccine in Thai Children (Phase II)	Bionet Asia co., Ltd., Thailand & Liaoning Cheng Da Biotechnology Co., Ltd. (CDBIO), China	Assoc. Prof. Pornthep Chanthavanich
9	A Phase III, observer blind, randomized, non-influenza vaccine comparator-controlled, multi-country and multi-centre study of the efficacy of GSK Biologicals quadrivalent, inactived, split virion, seasonal influenza vaccine candidate, GSK2282512A (FLU QQIV), administered intramuscularly in healthy children 3 to 8 years of age	GlaxosmithKline (Thailand) Ltd.	Assoc. Prof. Pornthep Chanthavanich
10	EPI coverage survey in Thai and foreign children, since birth to grade 6, in Bangkok	Mahidol University	Dr. Weerawan Hattasingh
11	Ant hypersensitivity in Thailand : Species identification and development of appropriate allergens for skin testing	The Thailand Research Fund, Commission on Higher Education and Mahidol University	Dr. Raweerat Sitcharungsri
12	A Phase II, Randomized, Observer-Blind, Multi-Center, Study to Evaluate Safety, Tolerability and Immunogenicity of an Adjuvanted Cell Culture-Derived H5N1 Subunit Influenza Virus Vaccine at Two Differenct Formulations in Healthy Pediatric Subjects (V89_11)	Novartis Thailand	Assoc. Prof. Pornthep Chanthavanich
13	A Phase II, Randomized, Observer-Blind, Multi-Center, Study to Evaluate Safety, Tolerability and Immunogenicity of an Adjuvanted Cell Culture-Derived H5N1 Subunit Influenza Virus Vaccine at Two Differenct Formulations in Healthy Adult Subjects (V89_04)	Novartis Thailand	Assoc. Prof. Pornthep Chanthavanich

NO.	RESEARCH TITLE	GRANT	PRINCIPAL INVESTIGATOR
Department of Tropical Pediatrics *(Continued)*			
14	Burden of dengue infection in children and adults of Bang Phae district, Ratchaburi Province, Thailand	IVI, South Korea	Assoc. Prof. Pornthep Chanthavanich
15	A Phase II, open, randomized, control, multicenter study to assess the immunogenicity and reactogenicity of GSK Biologicals' meningococcal serogroups A, C, W-135, Y tetanus toxoid conjugate vaccine (MenACWY-TT) administered alone as compared to MenACWY-TT co-administered with GSK Biologicals' HPV vaccine Cervarix or co-administered with Cervarix and GSK Biologicals' tetanus toxoid, reduced diphtheria toxoid and acellular pertussis vaccine adsorbed (Tdap) (Boostrix) in female adolescents and young adults at 9-25 years of age	GlaxosmithKline (Thailand) Ltd.	Assoc. Prof. Pornthep Chanthavanich
16	Long-Term Follow-Up of Hospitalized Dengue and Safety in Thai Children Who Were Included in an Efficacy Study of a Tetravalent Dengue Vaccine	Sanofi Pasteur Co., Ltd.	Assist. Prof. Kriengsak Limkittikul
17	A Phase I/II, Randomized, Observer-Blind, Multi-Center, Study to Evaluate Immunogenicity and Safety of Four Influenza Vaccine in Healthy Pediatric Subjects 6 to < 48 Months of Age Protocol No. V58P16	Novartis Thailand	Assoc. Prof. Pornthep Chanthavanich
19	A Double-Blind, Randomized, Placebo-Controlled, Age Descending and Expansion Phase 2 Study to Investigate the Safety and Immunogenicity of a Tetravalent Chimeric Dengue Vaccine in Healthy Volunteers Between the Ages of 1.5-45 years	Inviragen Inc., USA	Assoc. Prof. Chukiat Sirivichayakul
20	Detection of asymptomatic dengue infection in school children in Muang district, Ratchaburi Province, and dengue serotype2-specific and cross reactive antibody	National Science and Technology Development Agency (NSTDA)	Assoc. Prof. Chukiat Sirivichayakul
21	A phase I/II randomized, observer-blind, controlled study to assess safety and immunogenicity of acellular Pertussis vaccine given alone or in combination with Tetanus-diphtheria vaccine in healthy adults aged 18-35 years	Bionet Asia co., Ltd., Thailand	Assoc. Prof. Chukiat Sirivichayakul
22	A Phase III, Stratified, Randomized, Observer Blind, Controlled, Multicenter Clinical Study to Evaluate the Safety, Immunogenicity and Efficacy of an Adjuvanted Quadrivalent Subunit Influenza Virus Vaccine Compared to Non-Adjuvanted Comparator Influenza Vaccine in Children ≥6 to < 72 Months of Age" V118_05	ICON Clinical Research (Thailand) Limited	Assoc. Prof. Pornthep Chanthavanich

NO.	RESEARCH TITLE	GRANT	PRINCIPAL INVESTIGATOR
Vaccine Trial Centre			
1	A Randomized, International, Double-Blinded (With In-House Blinding), Controlled With GARDASILTM,Dose-Ranging, Tolerability, Immunogenicity, and Efficacy Study of a Multivalent Human Papillomavirus (HPV) L1 Virus-Like Particle (VLP) Vaccine Administered to 16 to 26 Year Old Women	Merck & Co., Inc	Prof. Punnee Pitisuttithum
2	Phase II/III safety and immunogenicity of pandemic live attenuated influenza vaccine (PLAIV) candidate strain A/17/CA/2009//38 (HIN1) in healthy Thais	Thai Health Promotion Foundation	Prof. Punnee Pitisuttithum
3	Phase III Clinical Trial to Study the Immunogenicity, Tolerability, and Manufacturing Consistency of V503 (A Multivalent Human Papillomavirus [HPV] L1 Virus-Like Particle [VLP] in Preadolescents and Adolescents (9 to 15 years old) with a Comparison to Young Women (16 to 26 years old)	Merck & Co., Inc	Prof. Punnee Pitisuttithum
4	Phase I safety and immunogenicity of live attenuated influenza H5 candidate vaccine strain A/17/turkey/05/133 (H5N2) in healthy Thai volunteers	World Health Organization	Dr. Supachai Rueknga m/ Prof. Punnee Pitisuttithum
5	A phase III trial of Aventis Pasteur live recombinant ALVAC-HIV (VCP1521) priming with Vaxgen gp 120 B/E (AIDSVAX B/E) boosting in HIV-uninfected Thai adults	Walter Reed Army Institute of Research	Dr. Supachai Rueknga m/ Prof. Punnee Pitisuttithum
6	Randomized, Double Blind Evaluation of Late Boost Strategies for HIVuninfected Participants in the HIV Vaccine Efficacy Trial RV 144: "Aventis Pasteur Live Recombinant ALVAC-HIV (vCP1521) Priming with VaxGen gp120 B/E (AIDSVAX® B/E) Boosting in HIV-uninfected Thai Adults	-none-	Dr. Supachai Rueknga m/ Prof. Punnee Pitisuttithum
Mahidol Vivax Research Unit (MVRU)			
1	Development of an Invasion inhibition Assay for Vaccine Screening against *Plasmodium vivax*	Faculty of Tropical Medicine, Mahidol University	Dr. Wanlapa Roobsoong
2	Identification of *Plasmodium* species in oocysts of infected *Anopheles mosquitoes*	Faculty of Tropical Medicine, Mahidol University	Mr. Chalermpon Kumpitak
3	Discovery & validation of novel *P. vivax* antigens for identification and monitoring of transmission 'hot spots'	NIH	Dr. Jetsumon Prachumsri
4	Production of *P. vivax* infected mosquitoes to support in vitro liver-stage research	Bill & Melinda Gates Foundation	Dr. Jetsumon Prachumsri
5	Secretome of hepatocyte cell line (HC04) injected with *Plasmodium vivax*	Mahidol University : Talent Management	Dr. Rapatbhorn Patrapuvich
6	A mouse model for human malaria infection	Seattle Biomedical Research Institute, USA	Dr. Jetsumon Prachumsri

NO.	RESEARCH TITLE	GRANT	PRINCIPAL INVESTIGATOR
Mahidol Vivax Research Unit (MVRU) *(Continued)*			
7	Investigation of infectivity of *P. vivax* sporozoite during development in mosquito's salivary glands	Faculty of Tropical Medicine, Mahidol University	Dr. Rapatbhorn Patrapuvich
8	*Plasmodium* detection in saliva by real-time PCR	Faculty of Tropical Medicine, Mahidol University	Mr.Teerawat Saeseu
9	*In vitro* assay of anti PV liver stage compounds	MMV Medicines for Malaria Venture, Switzerland	Dr. Jetsumon Prachumsri
10	Southeast Asia Malaria Research Center : ICEMR	NIH/ The Pennsylvania State University	Dr. Jetsumon Prachumsri
11	Enhancing Vivax Malaria Research in Thailand : D43	NIH/ The Pennsylvania State University	Dr. Jetsumon Prachumsri
12	Plasmodium-specific nanoparticles for live-imaging and gene expression analysis of *P. vivax* liver-stage parasites	Center of Emerging and Neglected Infectious Disease : CENID, Mahidol University	Dr. Rapatbhorn Patrapuvich
Center of Excellence for Antibody Research (CEAR)			
1	Development of scFv-antibodies against Rabies virus using phage display technology	Faculty of Tropical Medicine, Mahidol University	Mr. Surachet Benjathummarak
2	Epitope mapping of neutralizing human monoclonal antibody against Dengue virus using Escape Mutant Strategy	Faculty of Tropical Medicine, Mahidol University	Ms. Sujitra Keadsanti
Malaria Research Center			
1	Development of scFv-antibodies against Rabies virus using phage display technology	Grand Challenges Canada, Canada	Assist. Prof. Thanat Chookajorn
2	Development of strategies to prevent and contain artemisinin resistance	Center of Emerging and Neglected Infectious Disease : CENID, Mahidol University	Assist. Prof. Thanat Chookajorn
3	Hit-to-Lead development for the inhibitor against malarial GTP Cyclohydrolase I	National Science and Technology Development Agency (NSTDA)	Assist. Prof. Thanat Chookajorn
Hospital for Tropical Diseases			
1	Incidence of bacteria infection and their antibiogram in the Hospital for Tropical Diseases	Faculty of Tropical Medicine, Mahidol University	Ms. Chatnapa Duangdee
2	A Study of Blood Hemoglobin in Hypertriglyceridemia	Faculty of Tropical Medicine, Mahidol University	Ms. Benjamaporn Wongphan
Laboratory Animal Unit, Office of Research Services			
1	The Study of Microbiological Air Quality of Laboratory Animal Unit, Faculty of Tropical Medicine, Mahidol University	Faculty of Tropical Medicine, Mahidol University	Ms. Thanyaluk Krasae

Bangkok School of Tropical Medicine

THESIS TITLES

Master of Science Program in Biomedical and Health Informatics [M.Sc.(B.H.I.)]

DEPARTMENT	NAME	TITLE OF THESIS	ADVISOR
Tropical Hygiene	Dr.Win Min Han 5838284 TMBI/M	Mathematical modelling of multidrug-resistant tuberculosis and the impact of shorter duration of mdr-tb treatment	Asst. Prof. Dr. Wirichada Pan-Ngum
Tropical Hygiene	Mr. Nguyen Khac Hai 5838285 TMBI/M	Knowledge, attitude and practice regarding security and confidentiality of HIV-related information among staff at OPC in Vietnam	Assoc. Prof. Dr. Jaranit Kaewkungwal
Tropical Hygiene	Miss Aliyah Lou Arriola Evangelista 5838286 TMBI/M	Developing a model of community of practice among health informatics professionals in south and southeast asia	Assoc. Prof. Dr. Jaranit Kaewkungwal
Tropical Hygiene	Mr. Jakir Hossain Bhuiyan Masud 5838287 TMBI/M	Investigating factors associated with recurrent malaria in Thailand using data mining	Asst. Prof. Dr. Saranath Lawpoolsri Niyom
Tropical Hygiene	Dr. Ye Yint 5838288 TMBI/M	Identification of a predictive model for dengue incidence with climatic factors in Myanmar using time series analysis	Lect. Dr. Ngamphol Soonthornworasiri
Tropical Hygiene	Mr. Nugroho Joko Mulyanto 5838289 TMBI/M	Assessment of delays in delivery of health data within the health information system in Indonesia	Assoc. Prof. Dr. Jaranit Kaewkungwal
Tropical Hygiene	Miss Thazin Myint 5838290 TMBI/M	Hotspot areas and factors associated with road traffic accidenst on the Yangon -Nay Phi Taw - Mandalay Expressway, Myanmar	Asst. Prof. Dr. Saranath Lawpoolsri Niyom
Tropical Hygiene	Dr. Hnin Yu Lwin 5838291 TMBI/M	Medical data sharing using social messaging applications; usage and perception among health professionals in Thailand	Asst. Prof. Dr. Wirichada Pan-Ngum
Tropical Hygiene	Miss Viphavanh Soulaphy 5838292 TMBI/M	Satisfaction with and use of health insurance among civil servants who are SASS users in Lao PDR.	Asst. Prof. Dr. Saranath Lawpoolsri Niyom
Tropical Hygiene	Mr. Wuttichai Kitpremthaworn 5838526 TMBI/M	Identification of hospital characteristics associated with the use of Facebook in Thailand	Lect. Dr. Ngamphol Soonthornworasiri
Tropical Hygiene	Mr. Sai Wai Yan Myint Thu 5838281 TMBI/M	Assessment of the use of paper based dental records and perception of electronic dental records among dental professionals in Myanmar	Asst. Prof. Dr. Wirichada Pan-Ngum

Master of Science Program in Tropical Medicine [M.Sc. (Trop. Med.)]

DEPARTMENT	NAME	TITLE OF THESIS	ADVISOR
Clinical Tropical Medicine	Mr. Parsakorn Tapaopong	In vitro measurement of organic acids produced by Plasmodium falciparum (Unofficial)	Assoc. Prof.Dr. Kesinee Chotivanich

Doctor of Philosophy in Clinical Tropical Medicine Program [Ph.D. (Clin. Trop. Med.)]

DEPARTMENT	NAME	TITLE OF THESIS	ADVISOR
Tropical Medicine	Mr. Nyan Oo 5838367 TMCT/D	Clinical pharmacology of anti-tuberculosis drugs	Lect. Dr. Sant Muangnoicharoen
Tropical Medicine	Mr. Nestor Jr. Salcedo Arce 5838368 TMCT/D	Sentinel surveillance of chikungunya infection among suspected dengue patients in the Philippines	Lect. Dr. Prakaykaew Charunwatthana

Doctor of Philosophy in Tropical Medicine Program [Ph.D. (Trop. Med.)]

DEPARTMENT	NAME	TITLE OF THESIS	ADVISOR
Social and Environmental Medicine	Mr. Surachet Benjathummarak 5837933 TMTM/D	Development of DNA vaccine that producing human monoclonal antibody against 4 serotypes of Dengue virus.	Assoc. Prof. Dr. Pongrama Ramasoota

Master of Science Program in School Health [M.Sc.(SH.)]

DEPARTMENT	NAME	TITLE OF THESIS	ADVISOR
Tropical Hygiene	Ms. Channa Touch 5838357 TMSH/M	Prevalence of Intestinal parasitic infection among primary Schoolchildren in Aranyaprathet district, Sakaeo province, Thailand	Lect. Dr. Pannamas Maneekan
Tropical Hygiene	Mrs. Ae Mon Htun 5838358 TMSH/M	Prevalence of Common Intestinal Parasitic Infection Among Food Handlers in Government Schools, Tatkone, Naypyitaw Union Territory, Myanmar	Lect. Dr. Pannamas Maneekan
Tropical Nutrition and Food Science	Mr. Wang Norbu 5838361 TMSH/M	Obesity Prevalence And Contributing Factors Among Adolescent In Secondary Schools In Pemagatshel District, Bhutan	Lect. Dr. Pattaneeya Prangthip
Tropical Hygiene	Ms. May Thu Hlaing 5838362 TMSH/M	Occupational Risks Among Teachers in Southern District, Yangon Region, Myanmar	Lect. Podjanee Jittamala
Protozoology	Ms. Thanaphon Sripan 5838504 TMSH/M	Prevalence of Anxiety Disorders, Depression and Associated Risk Factors among High School Students in Bangkok, Thailand	Prof. Yaowalark Sukthana

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