PROMOTE ONE-HEALTH APPROACH WITH HKU-PASTEUR RESEARCH POLE

THE WORLD IS OUR PATIENT
Rapidly circulating pathogens are damaging globally both human and economic well-being. Focusing on the interface between humans and the environment, comprising animals and microbes, HKU-Pasteur Research Pole (HKU-PRP) is committed to conduct interdisciplinary research projects to improve knowledge on diseases and promote transformative discoveries that will impact the populations most affected by epidemics.

Our grand challenge is to set up a new research paradigm for an inclusive One-Health approach that will be able to enhance human, animal and environmental health by developing multi-disciplinary research and training projects. The grand challenge aims at improving global health by 2 means:

1. **RESEARCH**

HKU-PRP will contribute to the control of viral zoonoses of regional and global concern (avian influenza, MERS, dengue) by identifying the viral and host determinants of virus transmission and pathogenesis leading to evidence-based interventions.

2. **EDUCATION**

HKU-PRP will provide students, scientists and health professionals with consistent knowledge and interdisciplinary training through its international education program. Our courses, specifically tailored around new technologies and recent evolutions in global health, will train the current and next generation of scientists to grasp, use and trigger technological innovations.

“SCIENCE KNOWS NO COUNTRY, BECAUSE KNOWLEDGE BELONGS TO HUMANITY, AND IS THE TORCH WHICH ILLUMINATES THE WORLD…”

Louis Pasteur
Recent epidemics (avian H5N1/H7N9 and pandemic H1N1 influenza, chikungunya, SARS and MERS coronaviruses, Ebola, etc.) have underscored not only the growing globalization of health issues, but also the intimate relationships among human health, animal health and our ecosystems. It is estimated that 60% of newly emerging infectious diseases are of animal origin (zoonoses). It is time for the interspecies transmission of pathogens, a major threat to human health, to be reexamined from a new integrative approach, combining the fields of animal and human health and be able to effectively confront global health challenges. All available data highlight the impact of research and education in providing evidence-based findings to inform the public, international and national policy makers, private global health stakeholders and drive the research-training agenda, between and during outbreak situations. Institut Pasteur has been engaged in global collaboration for more than 125 years and has always strived to share knowledge and expertise with the international community. HKU-PRP started in 1999 as the result of a visionary partnership between Institut Pasteur and the University of Hong Kong. Today, HKU-PRP provides superb opportunities and support for outstanding young scientists to achieve excellence in fundamental research and its applications, while also developing an advanced teaching and training program. Thanks to its membership in the Institut Pasteur International Network, which associates 32 institutes around the world linked by the same missions and values, HKU-PRP is embedded in a unique network with access to a remarkable human, animal, vector, and pathogen samples collected in all parts of the world. Studying a large biodiversity of living organisms in their very different environments will constitute an extremely efficient approach to improve the understanding of the common determinants of infectious diseases.

HKU-PRP is now taking advantage of its position as the hub of the Institut Pasteur International Network in Asia to promote the One-Health approach of infectious diseases.
**IMPROVING GLOBAL HEALTH THROUGH RESEARCH**

By its location, the HKU-PRP is well placed to be at the forefront of an early warning and response to emerging disease threats. Our research strategy has focused on the generation of biological knowledge to confront the challenges posed by viral infections and treat infectious diseases.

- How do viruses invade, replicate and escape infected cells?
- What makes a microbe pathogenic?
- How do pathogens withstand the host immune response?

We have also worked on the development of a vaccine candidate following the severe acute respiratory syndrome (SARS) outbreak in 2003 and have validated a safe diagnostic test to carry out sero-epidemiological studies on avian influenza infection and the MERS coronavirus that has recently emerged from the Arab peninsula. We are studying influenza, MERS and other emerging viral zoonoses and dengue to promote an innovative research and knowledge-based program dedicated to implement the One-Health approach to the understanding of infectious diseases.

---

### Influenza

Influenza is major threat to global public health. Hong Kong is a travel-hub situated at an epicentre of zoonotic and pandemic emergence and, therefore, particularly challenged by this emerging and re-emerging infectious disease (e.g., H5N1 from 1997; pandemic H1N1 in 2009, H7N9 in 2013). Our work aims at understanding the viral, host and environmental determinants of influenza virus transmission between human beings, and from animals to humans.

### MERS and emerging viral zoonoses

The past decade has also seen the emergence of two novel coronaviruses that have caused human outbreaks infections threatening global health security: severe acute respiratory syndrome coronavirus (SARS-CoV) in 2003 and Middle East respiratory syndrome coronavirus (MERS-CoV) in 2012. We are investigating the prevalence of symptomatic and asymptomatic MERS-CoV infection to establish algorithms for the rapid identification of infected individuals to monitor virus spread and evolution.

### Dengue, a global burden of pandemic proportions

Although incidence of dengue, the most common mosquito-borne disease, is highly underestimated in many regions, each year, there are ~50 million of new dengue cases. The virus is now knocking at the door of Hong Kong with the latest outbreak in the Guanzhou province, where more than 40,000 people have been infected. In the absence of vaccine and drugs, with the prospect of further climate changes affecting the ecology of the mosquito vector, HKU-PRP is pursuing an original approach based on novel in-house tools to understand the mechanisms of viral pathogenesis.
We have pioneered in Hong Kong the organization of advanced Master Classes for postgraduate students and young investigators from around the world. Over the past 4 years we received more than 750 applications from over 25 countries and trained 303 students with the same global geographic representation. We will further expand our educational offer by introducing training in novel disciplines that will enhance the skills of a significant and potentially influential group of scientists, clinicians, technical staff and public health officials, who will be at the forefront of biomedical and public health research in countries facing different priorities and challenges.

HKU-PRP teaching approach is unique and unrivalled in Hong Kong and in the region. Our courses rely on the excellence of our international faculty of leading scientists, including several Nobel Prize winners, who concretely prove their generosity by taking time out of their busy schedule to travel to Hong Kong while forfeiting their honorariums. There are no registration fees and we provide free accommodation to bring together students coming from countries with markedly different resources. This heterogeneity is one of the key components of our success as it promotes awareness of the inequalities in resource allocations and the fundamental Pasteurian values that scientific knowledge knows no boundaries and belongs to mankind and can be efficiently shared with an altruistic behavior. HKU-PRP offers great opportunities, through the Institut Pasteur International Network, by providing access to basic science laboratories and field projects in countries endemic for tropical and neglected diseases where trainees can apply their knowledge, collaborate with leading researchers and start building their careers through hands-on experience. It is this combination of unsurpassed quality and altruism that is one of the added values that we are able to give our students and the scientific community, setting an important example that will no doubt influence their future paths.

OUR OVERARCHING GOALS

- Provide understanding of the biological basis of virus transmission of influenza and other emerging viruses of zoonotic origin between human beings and from animals to humans;

- Assess the risk of animal viruses for the human population, and provide reagents for outbreak preparedness and containment;

- Promote the implementation of the “One-Health” concept to manage risks from zoonotic viruses and attain optimal health of humans, animals and our environment;

- Provide understanding of the pathogenesis of influenza, acute respiratory infections and dengue disease in humans;

- Facilitate the emergence of a new generation of scientists through the active training of new talents and the establishment of novel paradigms of research applications developed by HKU-PRP within the Institut Pasteur International Network;

- Promote a multidisciplinary network of skilled and experienced professionals who meet the highest international standards necessary to answer global health threats;

- Participate in knowledge exchange programs that allow engaging the public and promote scientific culture;

- Maintain and enhance Hong Kong’s world-leading status in research and education.
THE INSTITUT PASTEUR, AND ITS PRESENCE IN ASIA

A HISTORY OF EXCELLENCE
Institut Pasteur is a leading international biomedical research non-profit organization established by Louis Pasteur in 1887, in France. This leadership position is based on several historical strengths: interdisciplinary research, public health mission and international collaborations. On its Paris campus, and in the institutes around the world, more than 3000 scientists wage a constant battle against diseases threatening human health. Over the years, 10 Institut Pasteur’s scientists have been awarded the Nobel Prize in Physiology or Medicine for their research and discoveries.

MAJOR DISCOVERIES
1885. Rabies vaccine
1894. Identification in Hong Kong of the pathogen causing plague
1921. Tuberculosis vaccine
1932. Yellow fever vaccine
1970. Isolation of the first neurotransmitter receptor
1983. Discovery of the AIDS viruses: HIV1 & HIV2
1985. Recombinant vaccine against hepatitis B
2003. Identification of genes associated with autism

A SIGNIFICANT PRESENCE IN ASIA
Louis Pasteur founded the Institut Pasteur, based on a simple yet powerful idea: everyone deserves better health. With Alexandre Yersin they defeated the plague epidemic in Hong Kong in 1894 and established, in Vietnam, the first Institut Pasteur site outside of France in 1891. Since then, 31 other Institut Pasteur sites have been created, 7 of which are in Asia*. The latest inaugurated was in Laos in 2012.

*China: Shanghai; Hong-Kong
Vietnam: Hanoi; Ho Chi Minh City; Nha Trang
Laos: Vientiane
Cambodia: Phnom Penh

HKU-PASTEUR RESEARCH POLE, IS THE INSTITUT PASTEUR HUB IN ASIA