C2i

Centre for
Immunology & Infection
免疫與感染研究中心

Healthy Human Global Project

Mosquito-borne Viruses
Epidemiology, Pathogenesis and Interventions

Novel Vaccine Platforms
for Influenza

Novel Platform of Human
Respiratory Tract

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C2i is the fruit of a long-standing partnership of more than 20 years between the LKS Faculty of Medicine of the University of Hong Kong (HKUMed) and the Institut Pasteur, two major institutions combining their expertise to establish this centre of excellence.

This major initiative, funded by the Innovation and Technology Commission and established in the Hong Kong Science Park, adopts innovative strategies to confront and mitigate the impact of emerging infectious diseases and transform Hong Kong and the Greater Bay Area into a global hub of knowledge and research.

RESEARCH STRATEGY

C2i's work is centered around four major research programs to face public health challenges and make Hong Kong a global center of excellence for precision medicine population strategies and innovative interventions targeting emerging infectious diseases.

We aim to characterize immune responses to infectious agents and their components in a healthy Asian population, develop new vaccine platforms for influenza, new strategies to monitor mosquito-borne viruses and new treatments for lethal respiratory virus infections.

Taken together, the four programs of C2i address major unmet global and local public health needs and enhance Hong Kong's knowledge-based economy, while providing state-of-the-art training for the local population. Ultimately, the outcomes are expected to advance health by improving the effectiveness of future public health initiatives.

C2i is led by **Professor Malik Peiris** (Managing Director, right) and **Professor Roberto Bruzzone** (Co-director, left).

Using novel technology platforms for biomarker discovery and the development of new vaccine and therapeutic strategies.

Healthy Human Global Project

The complexity of individual immune responses is such that it has not yet been possible to define the genetic and environmental parameters that determine either a healthy immune system or its natural occurring variability. Yet, knowledge of these parameters is essential to establish personalized and precision medical care.

The HHGP is based on the success of the Milieu Intérieur consortium *(www.milieuinterieur.fr/en)* which was established by the Institut Pasteur in Paris in 2011. We are applying this technological platform to develop an Immune Report Card that will provide a personalized patient management strategy that takes into account individual genetics, previous infection history, resident microbiota, as well as personal lifestyle and environmental factors to define immune health.

KEY PROJECTS

Establishment of a healthy reference population cohort and technological transfer of a standardized immunophenotyping platform.

Assessing the genetic and environmental determinants of immune response variation from the healthy donor cohort and data analysis and integration.

Application of the HHGP approach for management of public health challenges.

PRINCIPAL INVESTIGATORS

James Di Santo
Institut Pasteur

Darragh Duffy
Institut Pasteur

Novel Vaccine Platforms for Influenza

Existing commercial influenza vaccines have major drawbacks. We aim to develop the next generation influenza vaccines to overcome these limitations to confront annual seasonal outbreaks of influenza as well as influenza pandemics.

Our vaccines are designed to induce long-lasting, potent and broadly reactive immune responses against both human and animal influenza viruses. With the findings generated from this program and the novel immune correlates identified from the Healthy Human Global Project (HHGP) project developed by C2i, we will select and generate the most promising vaccine candidate.

KEY PROJECTS

Development of universal influenza vaccines mediating T-cell based broad cross subtype protection.

Development of novel platforms for live-attenuated vaccine development.

Development of neuraminidase (NA)-based vaccine to complement existing formulations, which largely elicit antibody to the virus haemagglutinin (HA).

PRINCIPAL INVESTIGATOR

Leo Poon
The University of Hong Kong

Mosquito-borne Viruses

Epidemiology, pathogenesis, and intervention

Mosquito borne viruses pose major threats to public health in Hong Kong and the region but remain a poorly researched area in Hong Kong. Japanese encephalitis is enzootic in wild birds and swine in Hong Kong, occasionally causing human disease.

There is increasing frequency of locally transmitted dengue outbreaks. Aedes albopictus mosquito, which is abundant in Hong Kong, is potentially capable of transmitting chikungunya and dengue. The unexpected change of disease pattern of Zika, a virus known for over four decades as an occasional cause of human infection to one that caused massive outbreaks with microcephaly in South and Central America, leading to the declaration of a "public health emergency of international concern", highlights the unpredictable disease potential of mosquito-borne viruses.

Furthermore, a number of mosquito borne viruses that cause human disease are documented in China, but their activities are poorly investigated in Hong Kong as well as in China. The aim of this program is to investigate mosquito borne virus threats, spanning field research, epidemiology, transmissibility, public health and basic research on virus pathogenesis.

PRINCIPAL INVESTIGATOR

Tommy Lam
The University of Hong Kong

KEY PROJECTS

Investigation of the diversity and abundance of mosquito vectors and mosquito-borne viruses found in Hong Kong and characterizing their vectorial capacity.

Investigation of host factors involved in the life cycle of mosquito-borne viruses to develop therapeutic interventions.

Investigation of the risk factors and pathogenesis of severe dengue with the aim to develop novel therapeutic interventions.

Novel Experimental Platform of Human Respiratory Tract

For Emerging Infectious Diseases and Precision Medicine

Acute lung injury and Acute Respiratory Distress Syndrome (ARDS) are major causes of morbidity and mortality worldwide. Diverse causes lead to this pathology, including severe viral infections (avian influenza H5N1; SARS; MERS) and bacterial sepsis.

Host responses such as innate immune dysregulation and resulting impaired alveolar fluid clearance contribute to the pathology; hence, therapeutic strategies that target these adverse host responses need to be developed for use in conjunction with antimicrobials.

This program aims to improve the treatment of acute lung injury by producing innovative, physiologically relevant, disease platforms for screening therapeutic candidates and developing molecules for treating acute lung injury.

KEY PROJECTS

Develop acute lung-injury screening platforms for identification of novel therapeutic targets and for screening of potential interventions.

Evaluate the use of novel synthetic ion channel compounds to treat acute lung injury.

Develop a novel "mini" 3D human respiratory system and "lung-on-a-chip" model for assessment of pathogenesis and drug screening for respiratory diseases.

PRINCIPAL INVESTIGATOR

Michael Chan
The University of Hong Kong

INSTITUT PASTEUR

The Institut Pasteur is a private, non-profit foundation. Its mission is to help prevent and treat diseases, mainly those of infectious origin, through research, teaching, and public health initiatives.

Drawing on its excellent reputation and true to its universal values, the Institut Pasteur has an ambitious international policy.

Its Department of International Affairs is responsible for animating and developing the Institut Pasteur International Network, particularly by coordinating major programs that meet current global health challenges. It is also in charge of developing new corporate and scientific partnerships to boost the worldwide presence of the Institut Pasteur and help to address human health challenges.

HKU Med LKS Faculty of Medicine
The University of Hong Kong
香港大學李嘉誠醫學院

The Faculty aspires to be a global leader in teaching and learning, research and discovery, clinical service and knowledge exchange in the professional domains of medicine, nursing, public health, pharmacy, Chinese medicine and in the biomedical and social sciences that underpin these professions.

At the same time, HKUMed aims to nurture outstanding students who would go on to serve the people locally, nationally and around the world, thus leading to sustainable social development through better health.

HKU Med LKS Faculty of Medicine
HKU-Pasteur Research Pole
香港大學-巴斯德研究中心

HKU-PRP is a medical research laboratory that brings together two world-class academic and research institutions, HKU and Institut Pasteur, for the common goal of generating biological knowledge to advance the understanding and treatment of infectious diseases.

HKU-PRP is a member of the Pasteur Network, which comprises 33 institutes sharing the same vision and engaging in collaborative work for scientific research on the curbing of infectious diseases, training of specialists and improvement of public health services.

C2i is always looking for new talents to join its team.

C2i offers a fulfilling and innovative environment with the opportunity to work on groundbreaking programs.

Have a look at our Career page to see the offers!

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