



NCID MONTHLY RESEARCH MEETING

*BRINGING PEOPLE TOGETHER,
BRIDGING SCIENCE AND MEDICINE*

21 Apr 2023 | Friday | 11.00am – 12.00pm

About the Meeting

Our research meetings are held every third Friday of the month, with the aim to:

- Inspire research ideas and participation
- Provide guidance on research studies
- Foster research collaborations

Who Should Attend

All who are interested in research are welcome to attend.

NCID Short Term Fellowship

The scheme, awarded by NCID with funding from Ministry of Health, aims to equip infectious disease professionals/researchers with skills and experience relevant to their area of research, encourage networking and research collaborations with overseas institutions, and provide promising young researchers with exposure to the diversity of infectious diseases research in Asia/Australasia.

Our FY22 awardees are invited to share their project findings/experience in a 10mins presentation, inclusive of Q&A.

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| 11:00 AM | Understanding Gut Colonization Resistance to <i>Klebsiella pneumoniae</i>
Ms Chang Kai Chirng |
| 11:10 AM | Single Cell RNA Sequencing of PBMCs and Neutrophils in Tuberculosis Patients
Dr Hu Ting Huey |
| 11:20 AM | What Can Biomaterials Do for Phage Therapy to Fight Anti-microbial Resistance
Asst Prof Andy Tay Kah Ping |
| 11:30 AM | Oxford University Clinical Research Unit (OUCRU) - NCID Short-term Fellowship Visit Outcome
Dr Candice Chan & Dr Yvonne Chan |
| 11:40 AM | Learning experience from NCID Fellowship Visit with A/Prof Arul Earnest
Dr Mark Chen I-Cheng |
| 11:50 AM | Single-domain Antibodies - New Biotherapeutics Against Integral Membrane Proteins of <i>Staphylococcus aureus</i>
Dr Chew Bing Liang Alvin |

To Register

Visit <https://for.sg/apr23researchmeeting> or scan QR code.

This will be a Zoom session. *CME/CNE/CPE points will be awarded

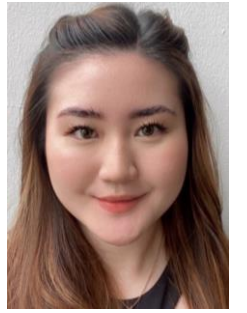


Understanding Gut Colonization Resistance to *Klebsiella pneumoniae*

by **Ms Chang Kai Chirng**

PhD Candidate

Yong Loo Lin School of Medicine, NUS



Classical *Klebsiella pneumoniae* is an opportunistic pathogen affecting immunocompromised patients. The human gut microbiome consists of trillions of microorganisms providing diverse metabolic capabilities essential for host health. A stable commensal consortium maintains homeostasis and colonization resistance against enteric pathogens such as *K. pneumoniae*. Over the years, there has been a rise in hypervirulent *K. pneumoniae* (hvKP) invasive community acquired infections even in healthy populations. Antibiotic usage is a major cause of dysbiosis by decreasing microbial abundance and diversity, increasing host susceptibility to these infections.

The gut microbiota is instrumental in breaking down dietary fibre into short-chain fatty acids (SCFA). In this talk, I show that SCFAs in physiological colonic acidic conditions have a direct inhibitory effect on growth of various enteric gut pathogens with strain and alkyl chain length-dependent variations. To examine stool communities exerting colonization resistance on pathogens, we have established the mini bioreactor array (MBRA) system which allows continuous culture and sampling from up to 48 reaction vessels for two weeks. A simplified consortium model using both murine and human stool cultures demonstrate stool-in vitro-derived communities (SIC) are able to confer resistance to growth of hvKP and other enteric pathogens. Further work is underway to identify the microbiota communities involved and the contribution of SCFA to pathogen inhibition in this system.

Single Cell RNA Sequencing of PBMCs and Neutrophils in Tuberculosis Patients

by **Dr Hu Ting Huey**

Research Fellow

Yong Loo Lin School of Medicine, NUS



Single cell RNA sequencing (scRNAseq) is a powerful method to study transcriptomics and involves sequencing ribonucleic acid (RNA) within an individual cell. The key limitation in current scRNAseq technology is the need for fresh cells which cannot be applied to samples from tuberculosis patients which require processing in a BSL-3 laboratory. With the arrival of kits that can inactivate and fix cells, we are currently optimising scRNAseq for neutrophils. Challenges remain in sequencing neutrophils which have minimal RNA and short life-span hence notoriously difficult. Learning points: Bioinformatics on scRNAseq, scRNAseq technologies for infectious TB samples; scRNAseq of neutrophils an emerging technique.

What Can Biomaterials Do for Phage Therapy to Fight Anti-microbial Resistance

by **Asst Prof Andy Tay Kah Ping**

Presidential Young Professor

Department of Biomedical Engineering, NUS



In this presentation, I will describe how bioengineered materials can be used to enhance phage therapy. The learning points to cover include controlled release and site-specific delivery of phage.

Oxford University Clinical Research Unit (OUCRU) - NCID Short-term Fellowship Visit Outcome

by **Dr Candice Chan & Dr Yvonne Chan**

Senior Consultant & Associate Consultant
Singapore General Hospital



Oxford University Clinical Research Unit (OUCRU) is a world-class centre for tropical infectious diseases clinical and laboratory research supported by the Wellcome Trust, hosted by Hospital for Tropical Diseases (HTD), a tertiary hospital specialized for infectious diseases serving Southern Vietnam. This fellowship was supported by Prof. Guy Thwaites (Director) and Dr. Sophie Yacoub (Head of Dengue Research Group).

Learning Experience from NCID Fellowship Visit with A/Prof Arul Earnest

by **Dr Mark Chen I-Cheng**

Senior Consultant
National Centre of Infectious Diseases



National Public Health Epidemiology Unit (NPHEU) hosted A/Prof Arul Earnest in his visit to NCID. Strategies on building capabilities and capacity in epidemiological analytics to support communicable disease work in Singapore were discussed. One agreed strategy was to facilitate PhD training for staff to improve technical capabilities in key areas e.g. Infectious disease modelling and spatial statistics.

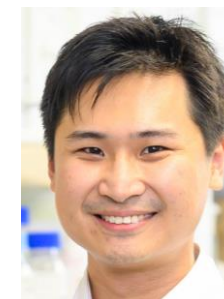
Discussion was focused on the model in Monash University where a centralised team of analysts/ statisticians were formed to provide analytical support across multiple clinical registry databases (owned by different parties), and how this model could improve organisational efficiency for analytics if replicated for ID in Singapore.

NPHEU also conducted workshops where participants from both NCID and other external agencies were given an introduction into Bayesian statistics with a follow up practical session using clinical registry data.

Single-domain Antibodies - New Biotherapeutics Against Integral Membrane Proteins of *Staphylococcus aureus*

by **Dr Chew Bing Liang Alvin**

Dean's Postdoctoral Research Fellow
Lee Kong Chian School of Medicine, NTU



Antimicrobial Resistance (AMR) was recently described as “a slow-burn pandemic” with profound impact on our healthcare systems and communities. It underscores our fundamental need for a sustained pipeline of new antimicrobials. Across the bacterial defence lines, the membrane space remains largely unexploited and are under intense investigation from understanding its structural landscape to new drug discoveries. This talk focuses on the efflux pumps and secretion systems of *Staphylococcus aureus* from a structural lens. Key outcomes of the visit to Dr Andrew Edwards lab, Imperial College London, funded by the NCID Short-Term Fellowship will also be shared.