

NCID MONTHLY RESEARCH MEETING

*BRINGING PEOPLE TOGETHER,
BRIDGING SCIENCE AND MEDICINE*

18 Nov 2022 | Friday | 11.00am – 12.00pm

About the Meeting

Our research meetings are held every 3rd Friday of the month, with the aim to:

- 1) Inspire research ideas and participation
- 2) Provide guidance on research studies
- 3) Foster research collaborations

Who should attend

All who are interested in research are welcome to attend.

To register

This will be a Zoom meeting. Please register using the link or QR code below.

<https://for.sg/nov22researchmeeting>



Programme

11:00 AM **Forecasting Upper Respiratory Tract Infection Burden Using High-dimensional Time Series Data and Forecast Combinations**

Asst Prof Lim Jue Tao

Assistant Professor
Lee Kong Chian School of Medicine,
Nanyang Technological University

11:30 AM **Targeting the Terminal Oxidases of *Mycobacterium tuberculosis* for Drug Development**

Dr Lee Bei Shi

Research Fellow
Lee Kong Chian School of Medicine,
Nanyang Technological University

5 to 10 mins Q&A will follow after each talk



Forecasting Upper Respiratory Tract Infection Burden Using High-dimensional Time Series Data and Forecast Combinations

by **Asst Prof Lim Jue Tao**

Assistant Professor

Lee Kong Chian School of Medicine, Nanyang Technological University

Upper respiratory tract infections (URTIs) represent a large strain on primary health resources and it is important to pre-empt forward URTI burden. Here, a new approach to forecasting URTIs is proposed. Using environmental and disease data comprising >1000 dimensions, we calibrated sub-models which optimizes predictive accuracy and combines many weaker predictors over a 2-month time horizon. We showed that forecast combinations had more consistent predictive performance than other modelling approaches. The methods proposed can be used for outbreak preparedness and guide healthcare resource planning, in both stable periods of transmission and periods where structural breaks in data occur.

Learning Points

1. Forecast combinations of 5 other forecasting models had better and more consistent predictive performance than other modelling approaches over periods with and without structural breaks in transmission dynamics.
2. The methods proposed can be used for outbreak preparedness and guide healthcare resource planning, in both stable periods of transmission and periods where structural breaks in data occur.
3. Epidemiological analysis on high dimensional data showed the dynamic association between lower temperature, increases in past relative humidity and absolute humidity and increased URTIs attendance.



Targeting the Terminal Oxidases of *Mycobacterium tuberculosis* for Drug Development

by **Dr Lee Bei Shi**

Research Fellow

Lee Kong Chian School of Medicine, Nanyang Technological University

In recent years, the *Mycobacterium tuberculosis* cytochrome *bcc:aa₃* has been identified as the binding target of various small molecules, including Telacebec, a drug candidate efficacious in a phase 2a clinical trial. However, the bactericidal potency of this inhibitor class is limited by the presence of the cytochrome *bd* oxidase (Cyt-*bd*). We ascertained the synergistic lethal relationship between the two terminal oxidases in *M. tuberculosis* and sought to exploit this vulnerability in drug development. In this talk, I will discuss the discovery and development of inhibitors that target one or both of the terminal oxidases in *M. tuberculosis*.

Learning Points

1. The two terminal oxidases in the *M. tuberculosis* oxidative phosphorylation pathway share a synthetic lethal relationship.
2. Both targets can be chemically inhibited.
3. Simultaneous chemical inhibition of the terminal oxidases quenches bacterial respiration, depletes intracellular ATP, and results in bacterial death.