Can we be protected against COVID-19?

VIRAL IMMUNOLOGY & BIOINFORMATICS

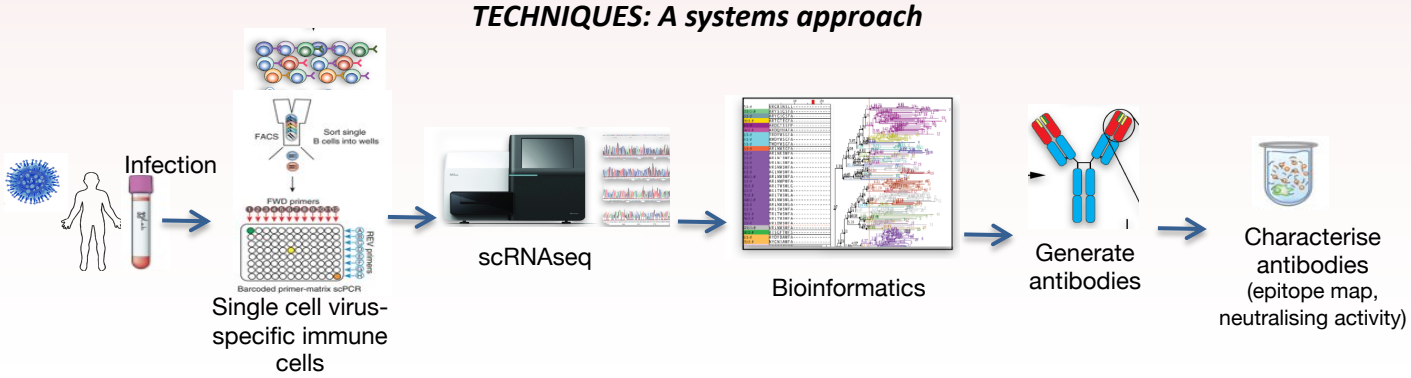
KIRBY INSTITUTE 30 YEARS STRONG — DISCOVERING EMPOWERING INNOVATING | Medical Sciences Medicine

Come meet us on zoom - 27th Aug 3:30 to 4:30pm https://unsw.zoom.us/j/91387892212

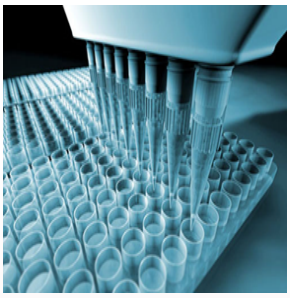
Project Overview

Vaccines to prevent infection by SARS-CoV-2, the cause of COVID-19, are currently under development. But it is predicted that long lived memory responses will be hard to develop. We have established a cohort of SARS-CoV-2 infected patients and are following them for two years. We have several exciting projects investigating both the harmful and protective role of CD4, CD8 and antibody response against COVID-19.

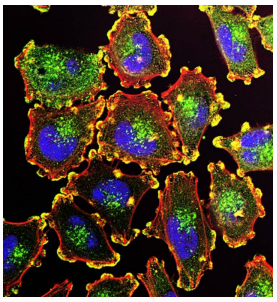
TECHNIQUES: A systems approach



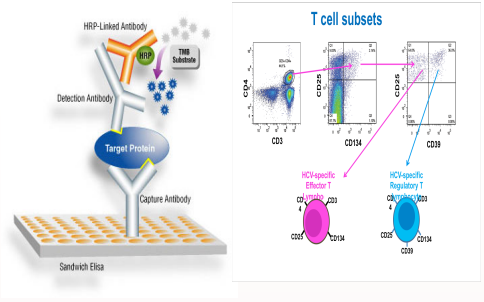
Multiplex assays



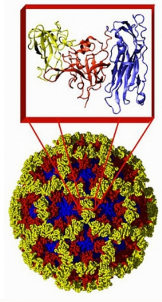
Cell culture models



Viral immunological assays



Protein structure



A number of projects are available, for both Honours and PhD candidates

Both wet and dry lab projects are available. For the dry lab project students with strong interest in quantitative methods such as Bioinformatics, Statistics, and Mathematical models are encouraged to apply, even if their background lies outside biology or Bioinformatics. For wet lab projects, students with a background/interest in virology, immunology and molecular techniques are encouraged to apply.

INTERESTED IN JOINING US? CONTACT:

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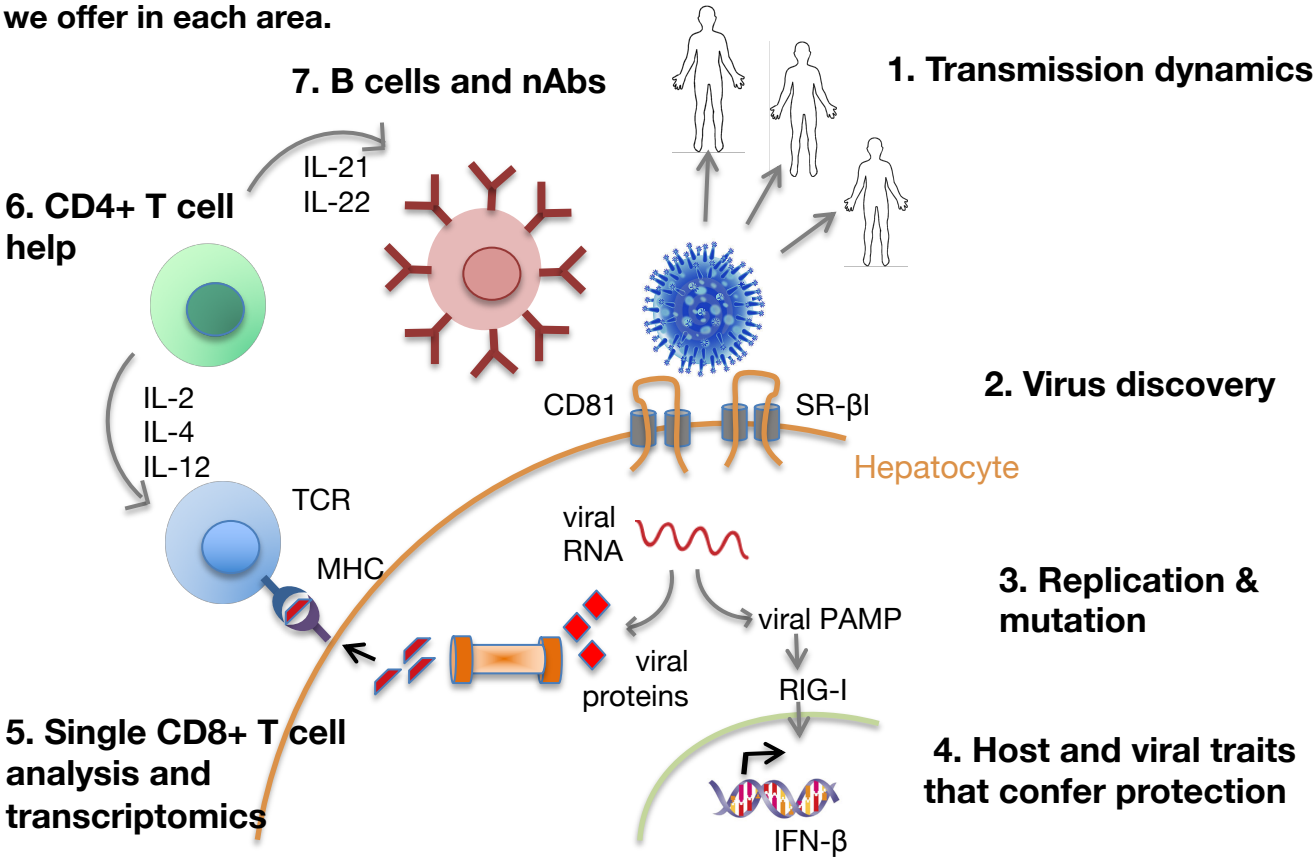
VIRAL SYSTEMS IMMUNOLOGY PROGRAM - RESEARCH PROJECTS

We are an interdisciplinary team with interests in virology, immunology and bioinformatics. We use cutting-edge technology to understand the complex interactions between host immune responses and viruses (including SARS-2, dengue and hepatitis C virus). We examine the complete cycle from disease transmission to adaptive immune responses. The figure below summaries the viral infection process and the projects that we offer in each area.



1. Transmission dynamics
HCV is a blood-borne pathogen transmitted by IDUs. We are analysing the viral and behavioral characteristics that drive HCV transmission. This project involves virus sequencing, public health data and network analysis.

2. Virus discovery
Using cutting edge RNAseq we are searching clinical specimens with undiagnosed fevers for novel viruses.

3. Replication & mutation
RNA viruses are the fastest evolving organism. This rapid evolution drives immune escape and viral persistence. Using Next Generation sequencing and cutting edge bioinformatics, we are examining viral evolution patterns of SARS-CoV-2 as it continues to spread globally.

4. Host and viral traits that confer protection
Host genetics likely confers natural resistance to viral infections and also increased disease susceptibility.

5 and 6. CD4+ and CD8+ T cell function
Using flow cytometry and single cell sequencing we are characterising the CD4 and CD8 T cells responses that are required for effective vaccine design.

7. B cells and nAbs
Neutralising antibodies (nAbs) are known for the ability to help clear viral infections and provide protection from re-infection. We are studying the viral epitopes and the B cell maturation pathway that leads to the best nAbs. This knowledge will advance vaccine design.