Development of novel immunotherapeutic approaches for the treatment of emerging pathogens

Srividhya Swaminathan1,3, Katie Lineburg1,3, Archana Panikkar2, Jyothy Raju1, Pauline Crooks1, Rajiv Khanna2,3, Corey Smith1,3

1. QIMR Berghofer – Translational and Human Immunology, 2. QIMR Berghofer – Tumour Immunology, 3. Faculty of Medicine, The University of Queensland

Background:
• Pathogenic infection - impaired innate and adaptive immune responses during primary stages of infection
• T cells are capable of recognizing structural and non structural proteins in the host
• The establishment of effective adaptive immunity is the critical mediator for the long term control of all human pathogens including Severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2)
• Asymptomatic to mild infections - robust T cell numbers and production of neutralizing antibodies
• Severe infections - decreased T cell numbers or in some cases an uncontrolled cytokine production

Aim:
• To define SARS-CoV-2 specific immunological determinants
• To assess T cell immunogenicity towards SARS-CoV-2 in the Australian population

Result:
The immunogenicity was observed in all donors, with above 5% IFNγ+CD8+ T cell responses to ORF3A, Nucleocapsid(N), Spike(S) proteins. The 76% of CD8+ response was observed in N derived peptide pool in HLAB*07:02+, whereas 26% was observed in HLAB*07:02- individuals. This suggests that, there is a significant link between CD8+ T cell responses and HLAB*07:02+. Further studies will be carried out to identify the specific immunogenic peptide, TCR sequencing will be carried out to assess the specific clonal type.