COVID-19 Research at the University of Florida

Delta Variant & Vaccine Breakthrough Cases in Florida

David P. Norton
Vice President for Research

SARS-CoV-2 Delta Variant Genomic Epidemiology of Vaccine Breakthrough Cases in Florida

University of Florida - Marco Salemi, PhD and Michael Lauzardo, MD
Partner Institution: University of Central Florida

- In mid-2021, the US experienced a dramatic resurgence in infections and hospitalizations due to the SARS-CoV-2 Delta variant.
  - Simultaneously, there was an increase in so-called breakthrough infections of vaccinated individuals.
- Three important questions emerged
  - Is the Delta variant responsible for this increase in vaccine breakthrough cases?
  - What fraction of patients with breakthrough infections have a viral load (VL) above the transmissibility threshold during acute infection?
  - Do fully vaccinated people, infected by the Delta variant (or other variants), effectively transmit the infection?
- UF researchers within the COVID-19 Genomic Epidemiology Network (CGNet) collected and sequenced SARS-CoV-2 positive samples
  - Identified which variants of SARS-CoV-2 are present
  - Relationship of variant to vaccine breakthrough cases.

Findings

- In July 2021, the sudden spike in vaccine breakthrough cases caused by the Delta variant
- At the same time (June-July 2021) the Delta variant began to spread and became dominant in the state.
- The majority of breakthrough cases occurred approximately 3 months after the patients were fully vaccinated.
- Fortunately, infected vaccinated individuals had minimal or only mild illness (none hospitalized), highlighting efficacy of vaccine against severe COVID.
- However, large fraction (45%) of the Delta-infected vaccinated patients exhibited a broad viral load (VL) above the so-called transmissibility threshold, above which the amount of virus in the upper respiratory system is considered sufficient for transmission.
- Instances of Delta variant transmission between fully vaccinated individuals were identified.

Conclusions and Future Work

- While current vaccines are extremely effective in reducing morbidity and mortality, in cases of breakthrough infections, they do not prevent a viral load capable of transmission in a significant fraction of subjects.
- Open Question: What host (patient) factors, such as variability in the immune response to vaccination, may contribute to risk of breakthrough infections?
- Our research highlights the need to examine the genomic epidemiology of SARS-CoV-2 in order to track the emergence and penetrance of viral variants, understand the impact of vaccination on controlling viral spread, and gain insights into the biology of vaccine breakthrough infections.
- Efforts to characterize the immune response in vaccinated individuals with breakthrough infections are underway at our university.