

M & I
Microbiology
and Immunology
University of North Carolina at Chapel Hill

DISSERTATION SEMINAR

Anne Beall

“Models of Coronavirus Pathogenesis and Immunity”

Friday, January 5, 2018
3:00 p.m.
1131 Bioinformatics

Dissertation Advisor: Dr. Ralph Baric

Presented in partial fulfillment of the requirements for the degree of
Doctor of Philosophy

ABSTRACT

Anne Beall: “Models of Coronavirus Pathogenesis and Immunity” (Under the direction of Ralph Baric)

Coronaviruses, including Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV), Middle East Respiratory Syndrome Coronavirus (MERS-CoV), and Porcine Epidemic Diarrhea Virus (PEDV) are important emerging viruses that are capable of producing sudden pandemic disease outbreaks with high morbidity, mortality, and economic losses in both animal and human populations. Severe acute respiratory syndrome (SARS) is a highly lethal human respiratory disease caused by SARS-coronavirus (SARS-CoV), a virus family marked by increasingly frequent outbreaks, pre-emergent zoonotic viruses, and high mortality rates. Though immune responses to SARS-CoV have been well studied, the role of B cells and antibody in early viral clearance and disease control is unclear. Previous studies have demonstrated robust antibody production in late-stage convalescent patients, as well as a role for SARS-CoV specific monoclonal antibodies in prophylactic protection against virus infection and disease. Using a variety of genetically B and T cell deficient mice, we show that B cell deficient mice become persistently infected with SARS-CoV and that early B cell and serum immune responses can mediate virus clearance during infection. Interestingly, convalescent sera from as early as 7 days post infection can be used as a prophylactic treatment to prevent lethality during a primary SARS-CoV infection. These findings demonstrate an important role for B cell immunity in SARS-CoV clearance and support the use of early serum transfer and antibody treatment during future coronavirus outbreaks.