Understanding SARS-CoV-2 Vaccine Design Through Multi-Level Journal Club

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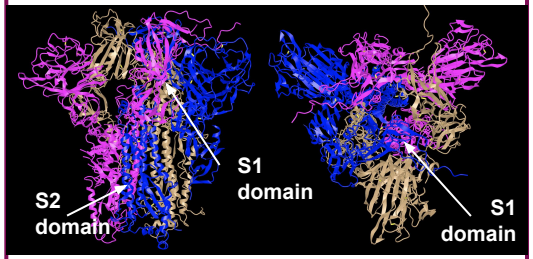
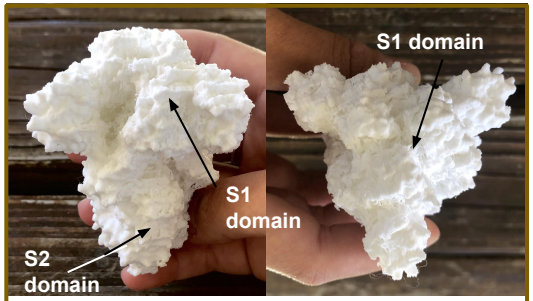
Human coronavirus Spike protein



3D images sourced from the NCBI database and rendered with iCn3d software.



Our 3D-Printed Coronavirus Spike Protein

The Spike protein (S1 and S2 subdomains) is the outermost protein of the coronavirus and plays an essential role in infection.

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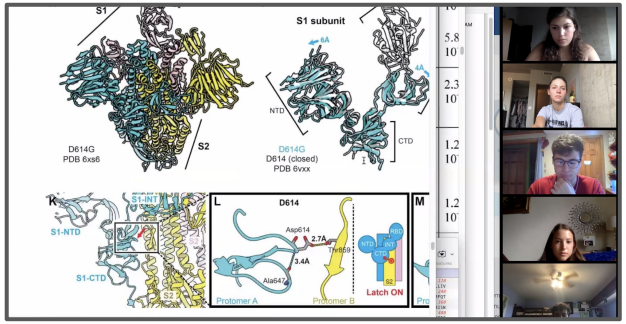
Journal Club (noun): A virtual experience in which high school seniors and college freshmen, sophomores, and juniors presented & discussed an academic paper each week with the intellectual support of established academics in the field.

"This journal club was an experiment in how a group of talented and bright students from diverse backgrounds and at different ages and experiences could tackle an evolving, deeply challenging topic that affects us all: SARS-CoV-2. The experiment was an unequivocal success, demonstrating the power of a shared mission and the ability of these brilliant individuals to push the limits." – **Jean Bennett, M.D., Ph.D.**

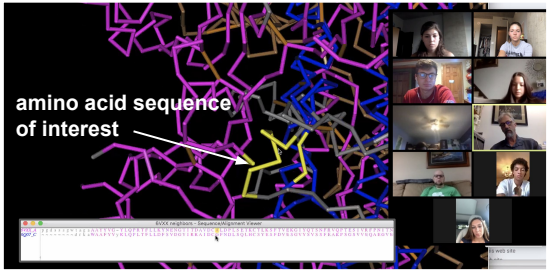


Benefits of Multi-Level Journal Club

Younger students get to expand their knowledge and understand what the field looks like for professionals.
Older students are pushed to become better scholars through explaining topics and getting back to the basics.
The lab benefits from turning 1-2 hours of reading into 10 minutes by synthesizing new papers each week. Journal club streamlines the relevant literature and allows the work happening in lab to move quickly.

A Non-Exhaustive List of Papers Discussed

“The proximal origin of SARS-CoV-2” Anderson et al., 2020.
“Immunodominant SARS Coronavirus Epitopes in Humans Elicit both Enhancing and Neutralizing Effects on Infection in Non-Human Primates” Wang et al., 2016.
“The potential danger of suboptimal antibody responses in COVID-19” Iwasaki et al., 2020.
“Constitutive resistance to viral infection in human CD141+ dendritic cells” Silvin et al., 2017.
“T-cell Responses in Patients with COVID-19” Chen and Wherry, 2020.
“Impact of Obesity on Influenza A Pathogenesis, Immune Response, and Evolution” Honce et al., 2019.
“Tailoring Subunit Vaccine Immunity with Adjuvant Combinations and Delivery Routes Using the MERS-CoV Receptor-Binding Domain as an Antigen” Lan et al., 2014.
“The role of non-viral antigens in the cotton rat model of respiratory syncytial virus vaccine-enhanced disease.” Shaw et al., 2013.
“Immunization with SARS Coronavirus Vaccines Leads to Pulmonary Immunopathology on Challenge with the SARS Virus.” Tseng et al., 2012.
“Severe Acute Respiratory Syndrome-Associated Coronavirus Vaccines Formulated with Delta Inulin Adjuvants...” Honda-Okubo et al., 2015.



BLAST aligned 3D structure and amino acid sequence of human coronavirus Spike protein used for discussion.