University of Utah
UNDERGRADUATE RESEARCH JOURNAL

ZINC BINDING AS A METHOD OF INHIBITION FOR RNA-DEPENDENT RNA POLYMERASE

Brandt Graham (Matthew Kieber-Emmons)
Department of Chemistry

Zinc has been shown to exhibit antiviral activity in a variety of viruses, including Hepatitis C virus, Human papilloma virus, and Rhinovirus. In the order *Nidovirales*, zinc plays an important role in arresting the replication cycle of the viruses. RNA-dependent RNA polymerase (RdRp) is the genome replicating enzyme used by all RNA viruses. Zinc is known to inhibit RdRp in Coronaviruses such as poliovirus and influenza virus, but there is still an extremely large gap in the fundamental biochemical knowledge about how these processes occur. Towards this end, a novel fluorescence assay was developed to demonstrate zinc inhibition of SARS-CoV-2 RdRp in real time. This is a powerful tool in monitoring polymerase activity, as it allows for high-throughput screening as well as quantitative analysis of the efficacy of zinc inhibition. Results of this assay indicate an inverse correlation between concentration of zinc and activity of SARS-CoV-2 RdRp *in vitro*. We aim to use this result to increase the scope of our study by (1) evaluating the efficacy of Zn(L) inhibition of SARS-CoV-2 RdRp as a function of (L) and (2) measuring the binding constant of Zn^{2+} and Zn(L) to SARS-CoV-2 RdRp. This work provides evidence that a zinc-based medication could be useful in combatting RNA viruses until a vaccine is developed, while simultaneously progresses our understanding of the role of zinc homeostasis in antiviral activity.