ONE DRUG FOR ALL RNA VIRUSES

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Background

With the world currently at about 15 million cases and 600,000 deaths[1], SARS-CoV-2 has been classified as a pandemic, creating fear in the world and shifting our way of life making quarantine feel like the new norm. Compared to SARS-CoV-1 and MERS, SARS-CoV-2 has a larger viral load, making it more contagious. With cases and deaths constantly rising, and a vaccine that has yet to been developed, scientists everywhere are focusing their efforts on repurposed drugs, preexisting FDA approved drugs used to treat other viruses/illnesses, to see which ones are safely effective at treating Covid-19 patients with symptoms from mild to acute pneumonia to severe lung failure, which can lead to death.

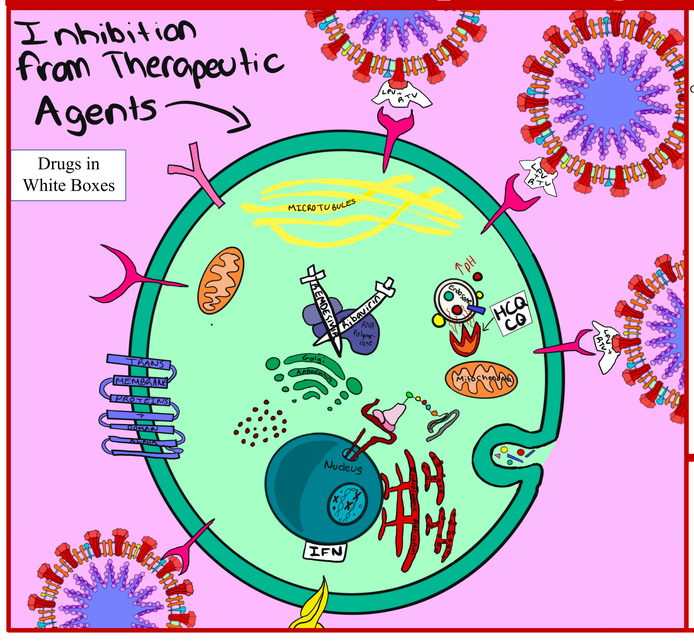
Abstract

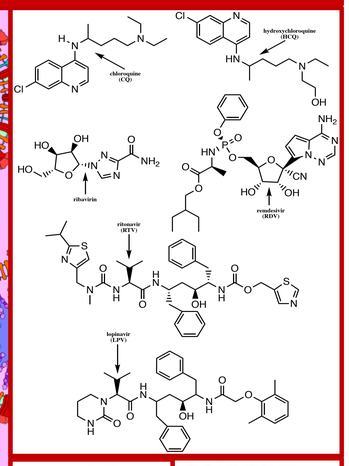
Dozens of pharma companies and scientists around the world have performed molecular docking techniques, in vitro/vivo experiments, and clinical trials to discover the prophylactic effects of repurposed drugs. Based on the CDCN Corona Registry[2], which consists of dozens of therapeutic agents used on COVID-19 patients, and the relevancy of specific drugs in recent media, Hydroxychloroquine/chloroquine (HCQ/CQ), Interferon α/β (IFN-α/β), Lopinavir/Ritonavir (LPV/RTV), Ribavirin, and Remdesivir (RDV) will be the drugs researched more thoroughly in this project.[3,4,5,6,7] The objective of this poster is to determine if there are any homologs between SARS-CoV-2 and the viruses that each of the 4 therapeutic agent treatments were originally intended to treat.

Research Purpose

Is it possible to create a universal multipurpose drug that will improve the inhibition of multiple RNA viruses by targeting multiple proteins/biological pathways simultaneously?

Therapeutic Agents

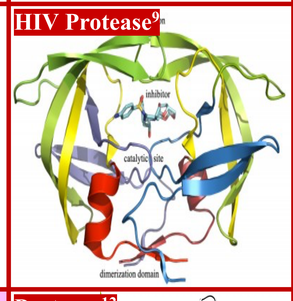
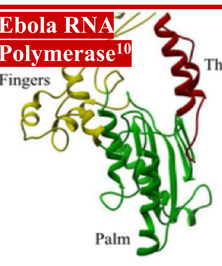
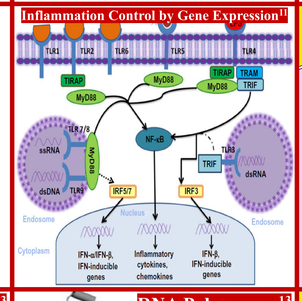
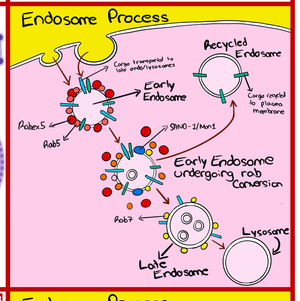
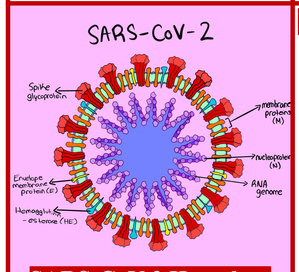
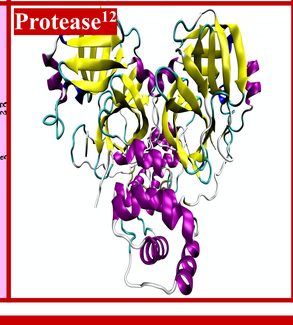
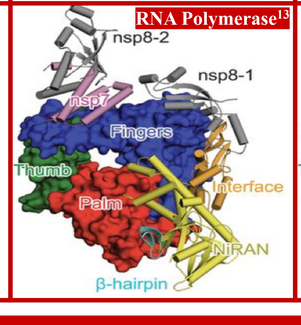
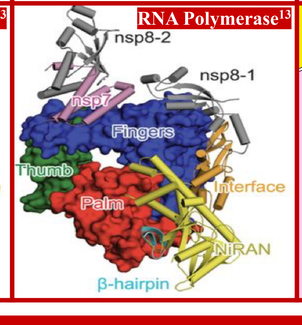
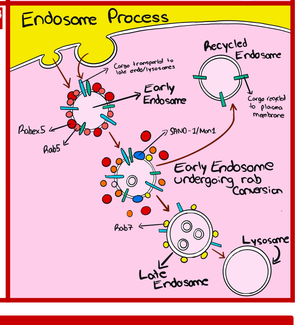





Interferon α[8]


Interferon β[8]

Findings

VIRUS	HIV	Ebola Virus	Hepatitis C	Plasmodium
DRUGS USED	LPV + RTV	RDV	IFN + RIBARVIRIN	HCQ + CQ
DRUG TARGETS	HIV Protease[9] 	Ebola RNA Polymerase[10]  Ebola virus polymerase predicted model	Inflammation Control by Gene Expression[11] 	Endosome Process 
SARS-CoV-2 Homologs 	Protease[12] 	RNA Polymerase[13] 	RNA Polymerase[13] 	Endosome Process 

Future Directions

Future steps include using cell base assay and performing in vitro experiments to test the drugs individually and in combination to determine the efficacy of each of the 4 therapeutic agent treatments. Afterwards, in vivo experiments will be performed to test the drugs individually and in combination to determine the efficacy and adverse effects of the drugs in a living biological setting. The ultimate and final goal is to design a universal and efficient multipurpose antiviral drug that targets multiple proteins/pathways of different RNA viruses. Not only can this multipurpose antiviral drug treat Covid-19 patients, but it can also inhibit a myriad of viruses, minimizing the world's reliance on dozens of repurposed drugs. A universal drug will be cost-effective and accessible to everyone due to the potential of it being the only available multipurpose drug on the market. In conclusion, medicine should remain universal and can become universal under this project.

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