SARS-CoV-2: Effects on the Human Body and Resulting COVID-19 Infection
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Abstract
SARS-CoV-2 is a single stranded ribonucleic acid (RNA) virus belonging to the Coronaviridae family. This virus is composed of four main structural proteins including nucleocapsid protein (N-protein), envelope protein (E-protein), membrane protein (M-protein), and spike protein (S-protein). The aggressive nature of this virus has resulted in an equally aggressive and difficult to contain illness, colloquially known as COVID-19. This disease reached pandemic level infection rates just weeks after being discovered. This poster will discuss the structure of SARS-CoV-2, how it affects the host cell, and the resulting illness and impact on our world’s population to date.

Background & History
The first cases of the SARS-CoV-2 virus were discovered in association with the Huanan Seafood Market in Wuhan, China. Due to the similarity in structure of the SARS-CoV and SARS-CoV-2 (about 70% match in genome structure), many scientists believe that this new virus was transmitted from the Hocenea virus. Although this species of bat is known to carry such similar viruses, future research is needed to claim with any level of certainty that this is the source of SARS-CoV-2. Another supposed source of SARS-CoV-2 is the pangolin. This organism is a scaly anteater found in Asia and Africa and is also known to carry similar viruses. The genome sequence of these viruses, known to be carried by the pangolin, have 85.5% to 92.4% similarity to SARS-CoV-2.

Method of Contraction
• Virus spread via respiratory droplets
• Droplets enter body and individual becomes vulnerable to viral attack
• Asymptomatic and symptomatic spread possible

Key CDC Recommendations for Reducing Spread
• Increase hand washing
• Increase sanitizing of surfaces and objects
• Avoid touching eyes, nose, mouth
• Wear face covering outside of home
• Practice social distancing
• Increase spacing of surfaces and objects
• Avoid large gatherings
• Stay home when ill

Effects on the Body
All viruses contain a set of genetic material in the form of either deoxyribonucleic acid (DNA) or ribonucleic acid (RNA). This genetic material tells the virus what to do once inside the host cell and provides the virus to replicate itself. In the case of SARS-CoV-2, the genetic material is in the form of RNA. The messenger RNA (mRNA) is made by using a strand of RNA as a template. The biologically important information found on the mRNA contains instructions for making new viral proteins with various functions and can then exit the nucleus to infect another cell.

Important Statistics

COVID-19 Health Effects
• Individual is exposed to virus via respiratory droplets
• Symptoms begin and can range from mild to severe
• Mild: fever or chills, cough, shortness of breath, fatigue, Headache, nasal congestion or runny nose, muscle or body aches, sore throat, loss of taste and/or smell, nausea, vomiting, diarrhea
• Severe: respiratory failure, septic shock, multiple organ dysfunction or failure, death

Possible Long-Term Complications
• Most individuals will be symptom-free and considered no longer contagious

Key CDC Recommendations for Reducing Spread
• Increase hand washing
• Increase sanitizing of surfaces and objects
• Avoid touching eyes, nose, mouth
• Wear a face covering when outside of home
• Practice social distancing
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Chemical Components
1. Nucleocapsid protein (N-protein): binds to RNA genome to create a housing around the genetic materials.
2. Envelope protein (E-protein): makes changes to the permeability of the host cell, aiding in viral penetration.
3. Membrane protein (M-protein): significant role in viral assembly
4. Spike protein (S-protein): allows virus to bind to host cell receptors and participates in fusion of host viral membranes

References