

## Science Advice for Newton Presbyterian Church

**Introduction:** This series is meant to provide timely science-based information on issues of concern for this community. These articles are not meant to shape political and social views or offer medical advice, but to inform and help community members make informed decisions.

### Article 1: What is COVID-19

COVID-19 is the name given to the airborne illness that has created a global pandemic. It's caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).

Viruses are made of proteins and DNA or RNA sequences covered with a protein coat that enables the virus to attach to healthy cells. Once attached, viruses send a DNA sequence into the healthy cells that forces them to make copies of the virus. Once enough copies of the virus are made inside affected cells, the cell bursts (lysis), and new viruses are released into the body. Viruses are also used as vectors in gene therapy and other biotech-based treatments which are beneficial in treating many diseases.

The appearance of the virus under a microscope makes it look like a crown. That's why they are known as Coronaviruses. Viruses are usually much smaller than the cells they infect and are not easily detected by our immune cells. A virus is about ten times smaller than a typical bacteria cell, and at least 100 times smaller than a typical human body cell. Viruses are different from bacteria and microorganisms and are treated with vaccines, not antibiotics.

Coronaviruses are a common form of virus, including viruses that cause headcolds and runny noses. Think of Coronavirus as a coat that is common to many other viruses. SARS-CoV-2 is different from other Coronaviruses because it is very infectious, and we currently have few countermeasures to stop the infection in the body and the public. The virus can be transmitted from person to person by breathing in droplets that carry the virus; these droplets are known as bioaerosols.

#### How can we protect ourselves?

Bioaerosol contact can be reduced by a combination of ventilation controls, personal protective equipment (PPE), and administrative controls such as social distancing and sheltering in place.

The general strategy for reducing the chance of transmission for COVID-19 is similar to the strategy used by hazardous materials professionals to reduce exposure to any hazardous environmental agent. Exposure controls are managed by – in order of preference-

- Engineering controls such as ventilation systems and air scrubbers
- Administrative controls such as social distancing, sheltering, and universal precautions such as handwashing.
- PPE such as masks, face shields, eyeglasses, goggles, respirators, gloves, and protective clothing are usually the last resort in contamination management.

Bioaerosol droplets that contain the virus can also be picked up in the soft tissues in your eyes. If you cover your eyes with glasses or face shields or goggles, you can reduce your chance of getting infected. If you rub your eyes after touching bioaerosols forming on the inside of a mask, you increase your risk of infection, so don't touch your eyes with your bare hands after touching your mask. This is why covering your nose, mouth, eyes and hands can protect yourself and others in controlling infection and transmission of the virus.

The same measures that are being used to manage SARS-CoV-2 follow the protocols of OSHA (Occupational Safety and Health Administration), NIH (National Institutes of Health), and CDC (Centers for Disease Control and Prevention) for reducing exposure to any chemical, radiation, and biohazard agent.

Daily updates on COVID-19 and protective measures can be found on the CDC, FDA (Food and Drug Administration), NIH and Public Health Service websites.

As of this writing December 12, 2020 the first vaccine against COVID-19, Pfizer-BioNTech COVID-19 Vaccine has been issued under an Emergency Use Authorization (EUA). Pfizer will be required to monitor for adverse events (side effects) for the lifetime of the product. Meanwhile, FDA has issued specific guidances for manufacture of COVID Vaccines. More vaccine candidates will follow.

**About the writer:**



Richard Tharin, MS, RAC, is a scientist with The Cerneos Group, LLC. He provides scientific and regulatory advice to biotech, diagnostic and drug companies to develop innovative products to treat, diagnose, and mitigate exposure to infectious disease agents. He has more than 20 years in industry and government service with the FDA and NIH in development of vaccines and diagnostics. He has published articles on biodefense and infectious disease management.

## **Links for further information**

Virtual Press Conference: First COVID-19 Vaccine - 12/12/2020:

<https://www.youtube.com/watch?v=L0K3RsIZIP0&feature=youtu.be>

Covid-19 Resource Center provided by AIHA (American Industrial Hygiene Association, which works to provide information and resources to Industrial Hygienists and Occupational Health Professionals):

[https://www.aiha.org/public-resources/consumer-resources/coronavirus\\_outbreak\\_resources](https://www.aiha.org/public-resources/consumer-resources/coronavirus_outbreak_resources)

OSHA (Occupational Safety and Health Administration) standards for PPE and hazardous materials management: <https://www.osha.gov/SLTC/covid-19/>

## **Research on COVID-19 and treatments – FDA and NIAID/NIH:**

Food and Drug Administration:

<https://www.fda.gov/news-events>

NIH images of the Coronavirus:

<https://www.niaid.nih.gov/news-events/novel-coronavirus-sarscov2-images>

NIH research on Coronavirus:

<https://www.niaid.nih.gov/>

## **Information on disease spread and public health measures:**

Public Health Professionals recommendations from NACCHO (National Association of County Health Officials):

<https://www.naccho.org/programs/our-covid-19-response>

Centers for Disease Control and Prevention (CDC):

<https://www.cdc.gov/coronavirus/2019-ncov/index.html>

Massachusetts Health Department information on Coronavirus:

<https://www.mass.gov/resource/information-on-the-outbreak-of-coronavirus-disease-2019-covid-19>

Reference articles on COVID-19 from NCBI (National Center for Biotechnology Information):

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7180649/>