

COVID-19 Update

Dr Mark Cunningham-Hill

Medical Director, NEBGH

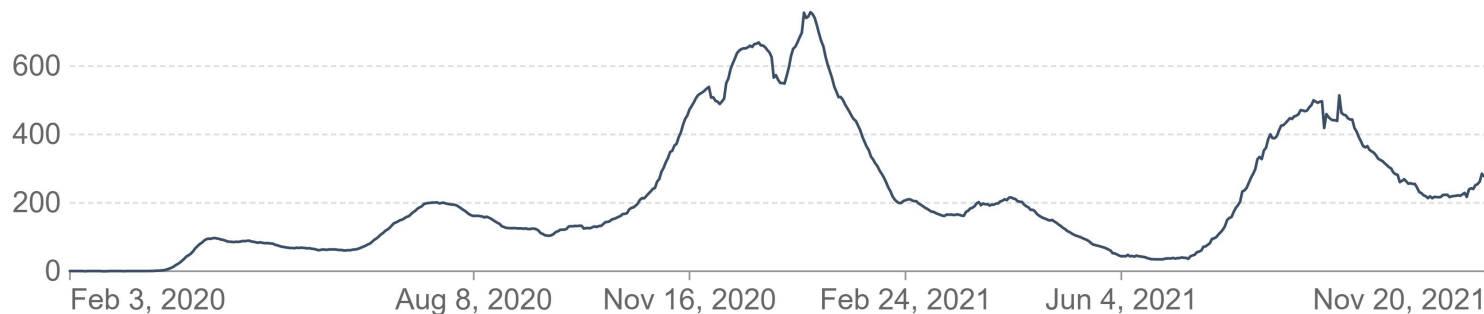
Monday, November 22nd 2021

Daily new confirmed COVID-19 cases & deaths per million people

7-day rolling average. Limited testing and challenges in the attribution of cause of death means the cases and deaths counts may not be accurate.

■ United States

New cases (per 1M)



New deaths (per 1M)



OVERALL SCORE

Global Health Security (GHS) Index

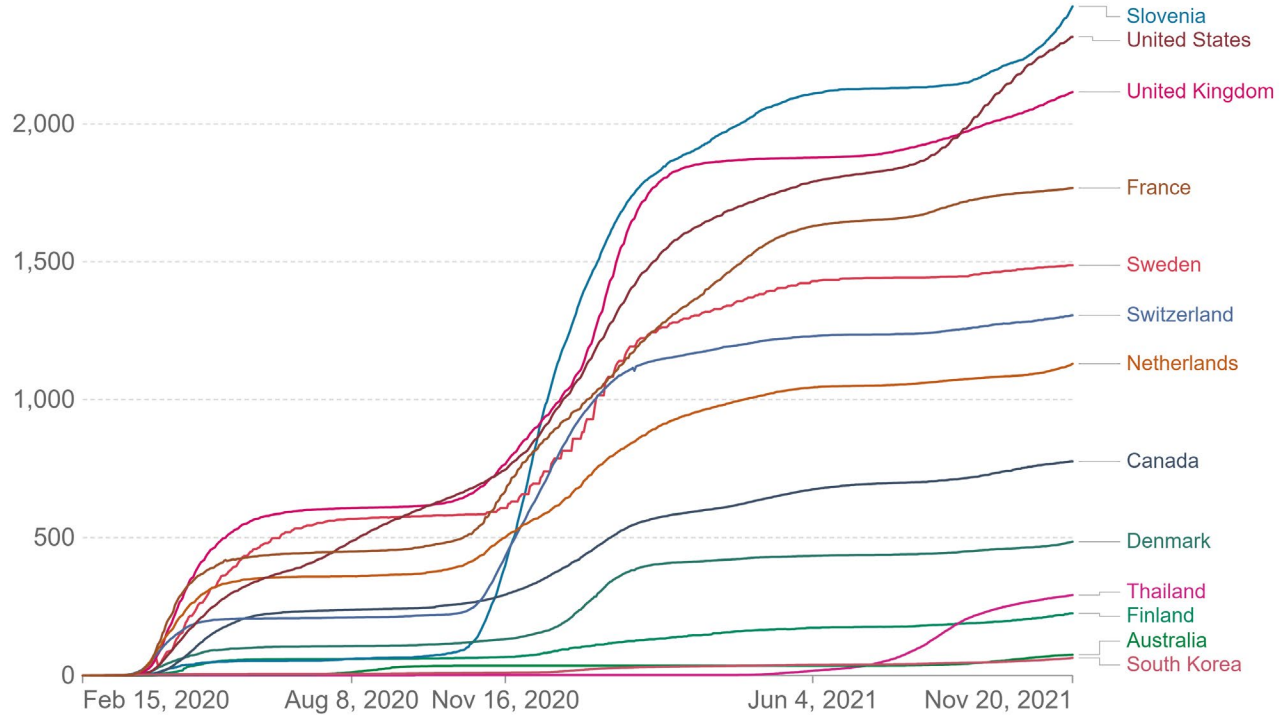
Cumulative confirmed COVID-19 deaths per million people

Due to limited testing and challenges in the attribution of the cause of death, confirmed deaths can be lower than the true number of deaths.

Our World
in Data

Rank Score

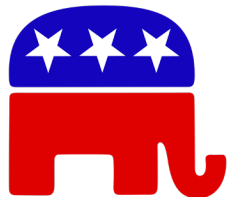
1	United States	83.5
2	United Kingdom	77.9
3	Netherlands	75.6
4	Australia	75.5
5	Canada	75.3
6	Thailand	73.2
7	Sweden	72.1
8	Denmark	70.4
9	South Korea	70.2
10	Finland	68.7
11	France	68.2
12	Slovenia	67.2
13	Switzerland	67.0



Source: Johns Hopkins University CSSE COVID-19 Data

CC BY

What are some of the reasons the US didn't do as well as expected?



New Antivirals

- **Molnupiravir** – Merck
- Take within 5 days of symptoms
- 50% effective at stopping hospitalizations
- Once in the body breaks down to a molecule (NHC) that mimics Cytosine – the NHC gets slotted into cytosine positions on the RNA when the virus replicates – goes unnoticed and crashes the system
- Works against other RNA viruses - Ebola, hepatitis C, R.S.V., and norovirus
- Being investigated to see if it can prevent infections after exposure
- Initially for high-risk patients



- **Paxlovid** – Pfizer
- Take within 3 days of symptoms
- 87% effective at stopping hospitalizations
- Taken with ritonavir to slow breakdown of the drug
- Interrupts the virus's replication by disrupting the way its proteins are constructed
- Being investigated to see if it can prevent infections after exposure
- Initially for high-risk patients



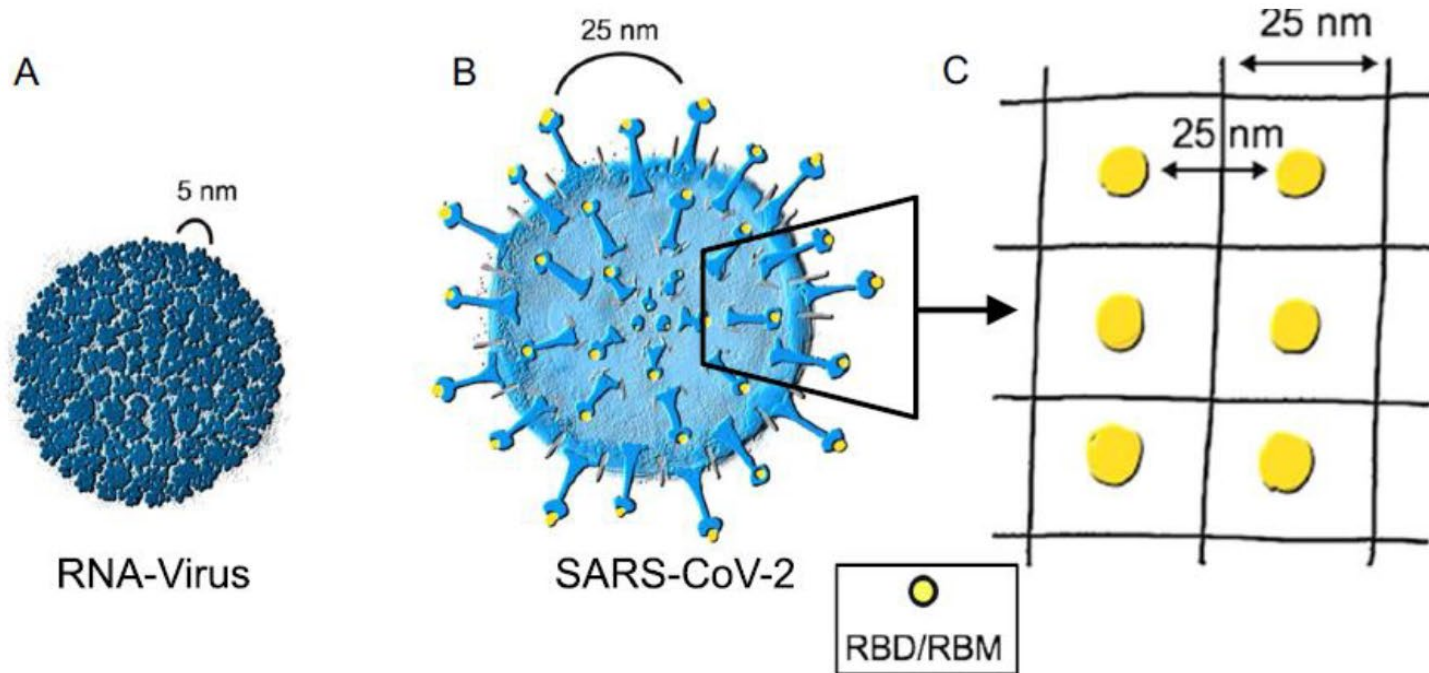
Virus-like particles (VLPs)

- Virus-like particles (VLPs) are molecules that closely resemble viruses but are non-infectious because they contain no viral genetic material
- VLPs contain repetitive, high density displays of viral surface proteins that present viral epitopes (antigenic determinants) that can elicit strong T cell and B cell immune responses
- HPV vaccines are examples of this type of vaccine – create a significant immune response which is maintained for years.

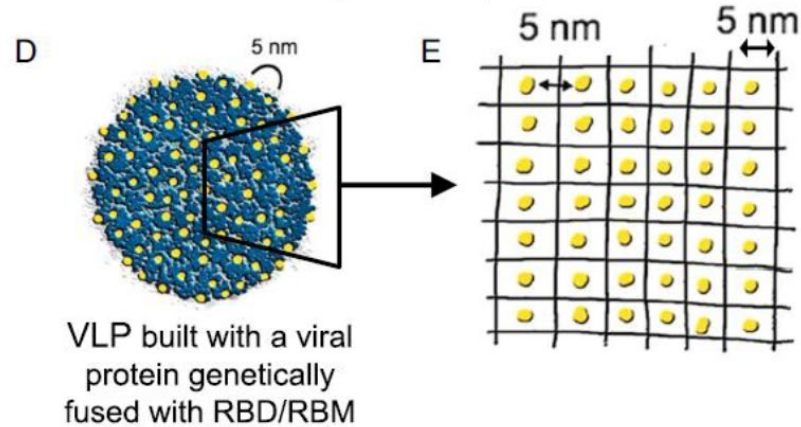
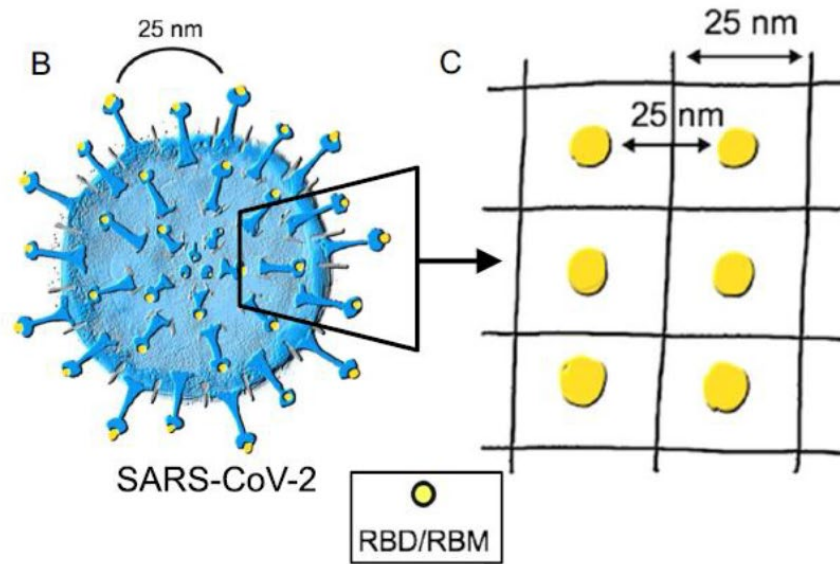
Repetitiveness

- A key feature of pathogen surfaces as viruses cannot help but have to express highly repetitive and highly ordered arrays of antigens on their surface.
- Our immune cells have evolved to respond vigorously against such Pathogen-associated molecular patterns (PAMPs) and use them for discrimination of self and foreign

How SARS-COV-2 has evolved to avoid strong immune responses



receptor-binding motif (RBM) receptor-binding domain (RBD)



Vaccines

- Novavax –
 - NVX-CoV2373 (also known as Covovax)
 - EFFICACY: 89.7%
 - DOSE: 2 doses, 3 weeks apart
 - STORAGE: Stable in refrigerator
 - Novavax created its vaccine by sticking proteins onto microscopic particles.
 - Production and quality assurance delays
 - EUA approval Indonesia
- Bavarian Nordic
 - ABNCoV2 is a next-generation COVID-19 vaccine candidate, initially developed by AdaptVac using their proprietary capsid virus like particle (cVLP) technology

Vaccine – Innovation

- Indian vaccine-maker **Zyus Cadila** began testing a DNA-based vaccine delivered by a skin patch
- The California-based company **Arcturus Therapeutics** and **Duke-NUS Medical School** in Singapore have developed an mRNA vaccine called ARCT-021. It has a “self-replicating” design that leads to a greater production of viral proteins
- **Takis Biotech** and **Rottapharm Biotech**, two vaccine companies in Italy, developed a vaccine called COVID-eVax. A special device uses a tiny electric pulse to deliver DNA through the skin
- Pennsylvania-based company **Inovio** developed DNA-based vaccines that are delivered into the skin with electric pulses from a hand-held device
- **Genova Biopharmaceuticals** in India and Seattle-based **HDT Bio** partnered to develop a vaccine based on self-amplifying RNA
- Korean biotechnology company **Eyegene** have developed an mRNA vaccine that uses a delivery system slightly different from other genetic vaccines. Instead of using a lipid nanoparticle, their vaccine uses liposomes — tiny fat bubbles
- The Canadian company **Entos Pharmaceuticals** has created a DNA vaccine for the coronavirus. Most other genetic vaccines carry the gene for the spike protein on the surface of the virus. Entos instead chose the gene for nucleocapsid on the virus shell
- Using a delivery system from **PharmaJet**, researchers at **BioNet-Asia** and Australia-based **Technovalia** have developed a DNA vaccine called COVIGEN that can be pushed through the skin without a needle. Instead, the dose is loaded into a handheld device and shot directly into cell tissue through a jet spray of fluid
- Researchers at the **University of Hong Kong** are testing a DNA vaccine against the coronavirus. Deliver a dose into the participants’ muscles and then use high-voltage electric shocks to induce cells into receiving the vaccine
- **Vaxart** specializes in developing oral vaccines. They have created and tested pills for influenza and other diseases. Last spring **Vaxart** began work on an oral vaccine for Covid-19

The background of the slide features several large, detailed, red coronavirus particles. These particles are spherical with a textured surface and are covered in numerous protruding, cone-shaped spikes. They are set against a dark red, slightly blurred background that also contains smaller, out-of-focus virus particles.

Questions

Upcoming NEBGH virtual events:

- **Nov. 29** – Monday COVID-19 Update w/ Dr. Mark
- **Dec. 9** - Pharmacy Benefits Strategies for Now - and Later
- **Dec. 16** – 27th Annual Tribute to Leadership