A Message from Ved Srivastava, APS President, on COVID-19 Inclination

To the members of the American Peptide Society,

In these unprecedented times of COVID-19, I hope you and your family are in good health and staying safe. The total number of COVID-19 worldwide cases reached over 1,000,000 recently, with total worldwide deaths of over 64,000 (Figure 1; www.bloomberg.com/graphics/2020-coronavirus-cases-world-map). In the United States, viral spread is increasing with over 277,000 cases and over 6,500 deaths (www.cdc.gov/coronavirus/2019-ncov/cases-updates/cases-in-us.html). I have included the highlighted websites for updated information as these numbers are increasing by the hour.

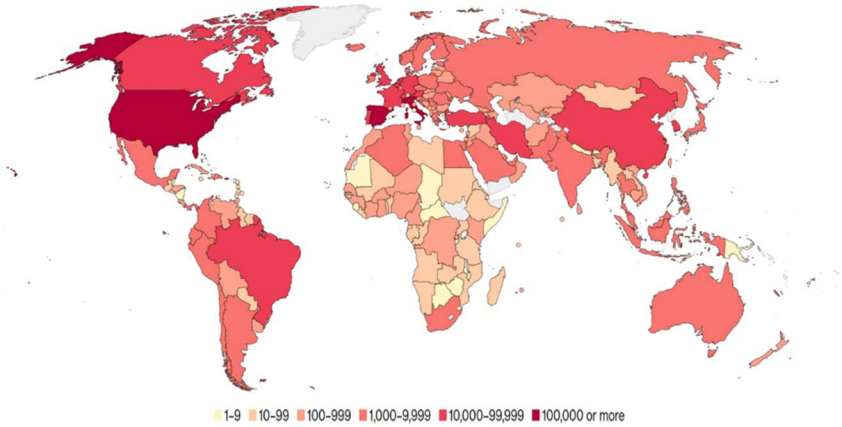
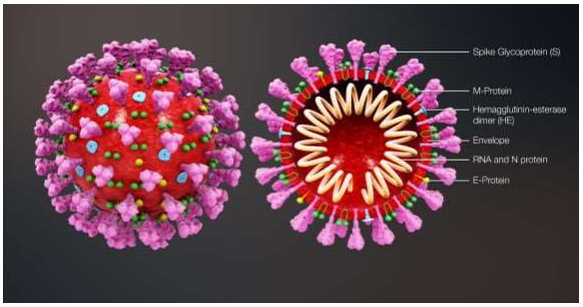


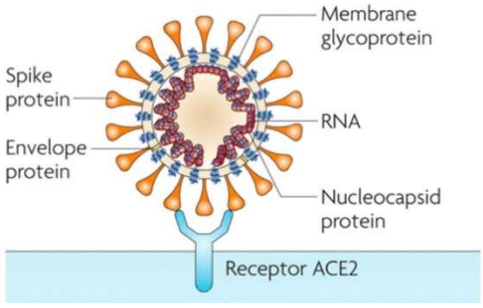
Figure 1. Global COVID-19 pandemic, confirmed cases as of April 4, 2020

Keep our Peptide Engine Running to Combat COVID-19

COVID-19 is an opportunity and challenge for our peptide scientists. Repurposing of lab research toward the development of COVID-19 diagnostic kits, vaccines, or peptide-based drug discovery and development, is currently taking place in many research groups/companies around the world. There are many scientific publications just recently surfacing related to COVID-19, but only a few relating to peptide research (e.g. ACE2 Substrates, Protease Inhibitors, SARS, Angiotensin, etc.).



The viral membrane is studded with glycoprotein spikes that give coronaviruses their crownlike appearance.
www.scientificanimations.com



Cartoon of the coronavirus structure and viral receptor ACE2 on the host cell surface.
Nature Reviews Microbiology 7(3), 226–236.

To encourage our peptide scientists to get on this mission, below are a few examples of current peptide-based research; it is by no means a full list or detailed description.

1. One of the key assets for the development of COVID -19 therapy, is the work of Prof. Wrapp et al of the University of Texas, Austin for solving the Cryo-EM structure and uncovering the biophysical basis of the 2019-nCoV spike in the prefusion conformation. The CoV spike (S) glycoprotein is a key target for vaccines, therapeutic antibodies, and diagnostics. 2019-nCoV S protein binds angiotensin-converting enzyme (ACE2) with higher affinity than does severe acute respiratory syndrome (SARS)-CoV S (Science 367, 1260–1263, 2020).
2. Prof. Brad Pentelute's Lab at MIT has come up with a first-in-class peptide binder to the SARS-CoV-2 spike protein. It is a 23-amino acid peptide sequence based on the alpha helix of the ACE2 receptor. It may potentially interact with the viral protein and inhibit coronaviruses' ability to enter human lung cells (http://news.mit.edu/2020/peptide-drug-block-covid-19-cells-0327).
3. Cel-Sci, in partnership with Prof. Ted Ross of the University of Georgia, plans to aim Ligand Epitope Antigen Presentation System (LEAPS) peptides against antigens in the SARS-CoV-2/COVID-19 nucleoprotein, or NP, which is critical to the virus' ability to replicate. Targeting the NP protein could prompt T cells to attack the virus "factories" inside infected cells, thus eliminating the source of COVID-19 and tamping down the infection (https://cel-sci.com).
4. Regeneron is designing antibodies that target the spike protein on COVID-19 in the hopes of preventing the virus from interacting with the host (https://www.regeneron.com/covid19).
5. Prof. Bo-Jian Zheng of the University of Hong Kong, China, has come up with four 20-mer synthetic peptides (S protein fragments), outside the spike protein heptad repeat regions, as potent inhibitors of SARS-associated coronavirus (Antivir Ther. 2005;10(3):393-403).
6. Prof. Wang of Peking Union Medical University, China has identified a Hydrocarbon-Stapled Short α-Helical Peptide P21S10 effective to Middle East Respiratory Syndrome Coronavirus (MERSCoV) which is a spike protein-mediated cell−cell fusion inhibitor (J. Med. Chem. 2018, 61, 2018−2026).
7. Cove Bio have discovered a small peptide IPTNFT to COVID-19. It shares homology to a region of the virus that acts as a *molecular ratchet* when the virus spike binds to the host cell and stops cellular entry of the virus (https://www.linkedin.com/feed/update/urn:li:activity:6649037268403175424/).
8. There are some peptide/protein-based development efforts in the pre-clinical space already underway, see table below.

Modalities	Clinical Stage	Companies	Target
Thymosin peptide + Antibodies	Phase 2	1. Incyte and 2. Shanghai Hengrui	COVID-19
Peptide Vaccine	Pre-clinical	1. Flow Pharma, 2. Vaxil Bio, 3. Generex, and 4. University of Saskatchewan	COVID-19/SARS-COV
Peptide therapeutics	Pre-clinical	CEL-SCI	COVID-19

Thank you again for your patience, your strength, and your resilience. We are confident that we will get through these challenges.

We look forward to returning stronger than ever!

Stay safe,

Ved Srivastava, Ph.D.
President, American Peptide Society
www.americanpeptidesociety.org

Vice President of Chemistry
Intarcia Therapeutics Inc
6 Davis Drive | Research Triangle Park, NC 27709