**Title**: COVID-19: Molecular Basis of Infection

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**Abstract**: This case was written in Spring 2020 during the COVID-19 pandemic. It focuses on understanding the structure and interaction of the SARS-Cov-2 viral spike protein that facilitates infection in human cells. This case discusses how the SARS-Cov-2 Spike protein binds to Angiotensin-converting enzyme 2 (ACE2), a protein found on the surface of many human cells initiating infections. After reviewing some introductory materials about coronavirus life cycle, the case begins with watching a video that introduces the structures of the SARS-Cov-2 spike protein, human ACE2 protein, and their complex. By comparing sequences and structures of the spike protein from SARS-Cov2 and SARS-Cov, the virus that caused the epidemic in 2002-2003 some insights are available for why the new virus has caused a pandemic. Understanding the molecular details of the infection process also helps design therapies and vaccines that can be used to treat and prevent COVID-19.

**Learning Objectives**: The case was developed at the interface of biology and chemistry to explore SARS-Cov-2 attachment on human cells and infection. It introduces students to various bioinformatics tools and approaches used for comparing protein structures and vaccine development. By the end of the case, students should develop some basic understanding of biomolecular structure-function relationships and how that can impact infection and disease.

**Molecules explored**: The key molecules explored here include the SARS-Cov-2 spike protein, human ACE2 protein, and the structure of their complex. Structures of SARS-Cov-2 spike protein with antibodies are also explored.

**Implementation**: The case can be implemented using either a flipped approach and/or in-class discussions.

**Subject Headings**: Biology (Introductory), Chemistry (Introductory), Biochemistry

**Keywords**: COVID19, SARS-CoV-2, BLAST, Infection

**Topical Area**: Scientific method; Molecular structure representation; Visualization

**Educational Level**: Undergraduate lower division

**Formats**: word file and Website

**Type/Method**: Flipped, Interrupted

**Language**: English

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