**Name : Festus-Ifode Ewomaoghene Chidera**

**Department : Anatomy**

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**Question**

COVID-19 is an ongoing viral epidemic in the world and is the reason you’re at home. Discuss the anatomical implication of this virus on the respiratory system of a human.

**Answer**

The novel coronavirus also known as SARS-CoV-2 is from a large family of viruses also known as coronaviruses which can cause illness in humans. In humans, several of these viruses can cause conditions such as Middle East Respiratory Syndrome and Severe Acute Respiratory Syndrome. It is highly contagious as it spreads through droplets of an infected person when they sneeze or cough.

The virus makes its way to the nostrils when a person who has come in contact with the virus touches their nostrils or mouths. It then makes its way to the individuals’ throat and delves deeper into the body. During this period your body recognizes the threat of a virus and responds through a fever, a dry cough and a sore throat. In rare cases, there may be a loss of smell and/or taste in infected individuals.

The coronavirus does not have much impact on the upper respiratory system due to the lower number of Angiotensin-Converting enzyme 2 (ACE2) which is the binding receptor for the coronavirus.

The virus moves through the throat down to the lower respiratory system where it has the most dramatic effect. The lungs are lined with millions of epithelial cells which are prone to infection. The virus uses a protein key to connect to the ACE2 receptor on the membrane of the cell and injects its genetic material in this process. It uses the cells replicating machinery to make more copies of it and when it reaches a critical point, it then causes the cell to self-destruct which in turn releases more viruses and the cycle continues.

During this process, the coronavirus hasn’t caused too much damage but it then causes the immune system to respond in a harsh manner. The coronavirus can also infect certain immune cells and this causes confusion. In turn, the immune system responds in frenzy and this causes the immune cells to kill both healthy and infected cells. It can get bad enough to cause permanent irreversible damage that can lead to lifelong disabilities such as fibrosis or pneumonia.

In critical cases, millions of epithelial cells will die and the lungs protective lining is gone. This leaves the alveoli which is responsible for gaseous exchange exposed to multiple infections. The dead cells slough off into the airways and fill them with debris and fluid which further clogs them and makes the exchanging of gases which makes breathing very difficult. If the inflammation process is not controlled with time, it can lead to organ failure which in turn leads to death.