

## SARS-CoV-2, a Newly Emergent Coronavirus

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The global pandemic of coronavirus disease (COVID-19) was identified in Wuhan, Hubei Province, China. The first case in the United States was confirmed at the Centers for Disease Control and Prevention (CDC) on January 20, 2020, and an isolate was obtained from the patient's samples. The causative agent of COVID-19 is known as SARS-CoV-2 and is an enveloped positive-sense RNA virus in the *Coronaviridae* family. Electron microscopic (EM) examination of the isolate revealed typical coronavirus morphogenesis, i.e., virus particles forming by budding upon the membranes of the endoplasmic reticulum-Golgi intermediate compartment. The virions accumulate in the cisternae of these compartments which are transported to the cell surface where the membranes fuse with the plasma membrane and the virus is expelled.

The Infectious Diseases Pathology Branch at CDC received autopsy tissues from COVID-19 case-patients from across the US. EM examination revealed viral particles in the lung in type II pneumocytes and macrophages and associated with hyaline membranes or fibrin within alveolar spaces. In the upper airway, virus was found associated with ciliated cells.

There have been numerous attempts to find virus particles by EM in organs other than the lung. Many articles have been published claiming to have ultrastructural evidence of virus infection in several organs. Most have been showing subcellular structures such as coated vesicles, multivesicular bodies and cross sections through vesiculated rough endoplasmic reticulum.

The COVID-19 pandemic is a prime example of an emerging infectious disease that can rapidly and easily spread, causing disruption and damage to the global community. Morphological and pathological studies are instrumental in the understanding of the pathogenesis of this novel virus and may also provide information for the development of therapeutics.

The findings and conclusions in this report are those the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

### Reference

Martines, et al., (2020) *Emerging Infectious Diseases*, 26(9):2005