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CORONA VIRUS: AN OVER VIEW

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INTRODUCTION

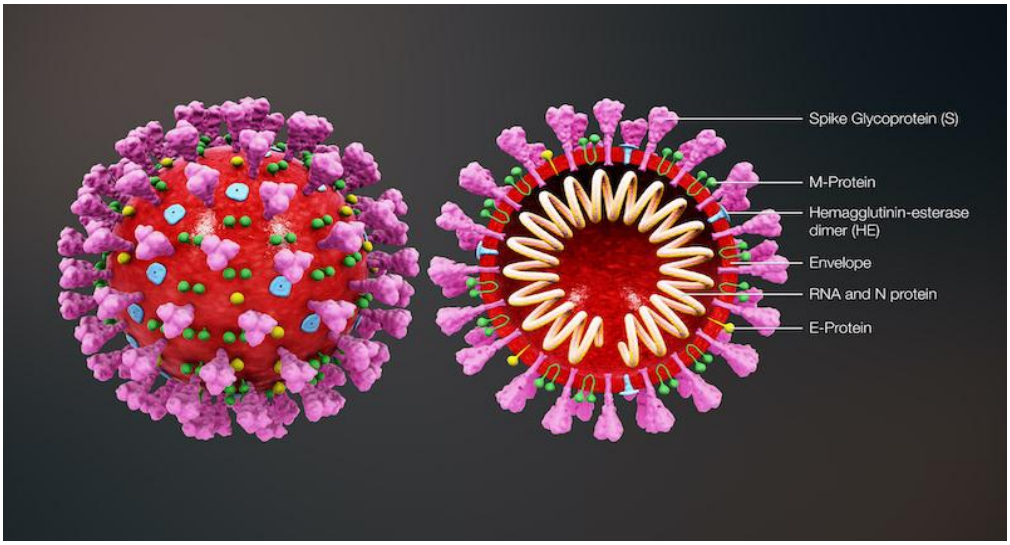
Corona virus is the large family of viruses that are common among the animals. In rare cases they are what scientists call zoonotic meaning they can be transmitted from animals to humans.

Family: Coronaviridae.

Order: Nidovirales.

Sub family: Orthocoronavirinae.

Phylum: Incertae sedies.



Symptoms: The viruses can make people sick, usually with a mild to moderate upper respiratory tract illness, similar to a common cold, middle east respiratory syndrome (MERS-CoV). A novel corona virus has not been previously identified in humans.

Diagnosis: Your health care provider may order laboratory tests on respiratory specimens and serum to detect the human coronaviruses.

Most MERS-CoV infections have been reported from countries in the Arabian Peninsula. Therefore, reporting a travel history or contact with camels or camel products is very important when trying to diagnose MERS.

*Molecular tests

*Serology tests: ELISA (Enzyme linked immune sorbate assay)

Why are coronaviruses more lethal than others?

The coronavirus is an RNA virus, and can mutate and recombine, producing strains that are different from those that the immune system remembers. This is called antigenic drift and is the reason we get colds every year-the virus changes a bit every season. The genetic makeup of these viruses is composed of RNA. Genetically, corona virus can be quite different from one another. Some types have more difference between them than humans have from elephants, Satterfield notes.

As of January 23, 2020, 2019-nCoV had infected more than 581 people. And roughly one in every four of them had become seriously ill, the WHO noted at the time. Many of these people had other illness when they became infected. That might have hurt their ability to fight the virus.

As 2019-nCoV has spread in china and to other countries, including the united states, it has become clear that people can catch the virus from one another. In Wuhan, China, where the virus was first discovered, 2019-nCoV has been able to transmit down a chain of four people.

Four major class types of these viruses exist. They're known by the Greek letter's alpha, beta, delta and gamma. Only the alpha and beta types are known to infect people. These viruses spread through the air.

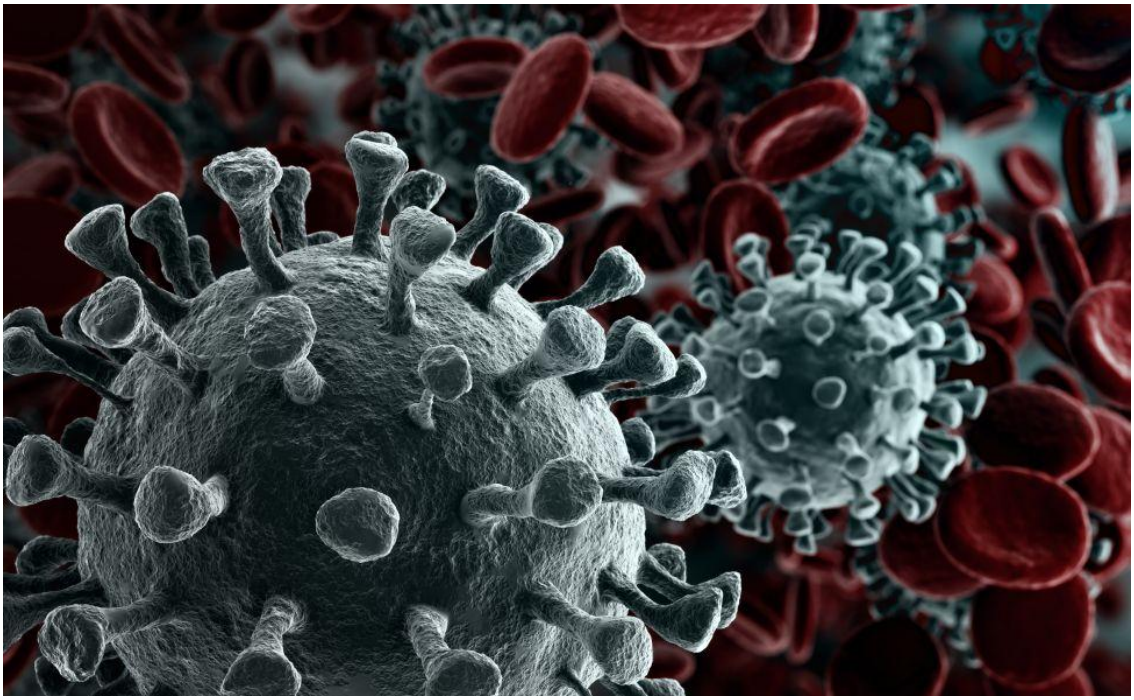
Coronavirus illnesses tend to be fairly mild and affect just the upper airways. But there are more severe cousins that can cause lethal disease

The scary coronavirus

Two of the most well-known of the deadly types are responsible for SARS and MERS. Each of these diseases has caused global outbreaks in the past. In December 2019 another virus joined these dangerous cousins. For now, the World Health Organization is calling this latest member of the family 2019 novel coronavirus or 2019-nCoV.

Mechanism of action: These coronaviruses cause severe infections by first latching onto proteins that sit on the outside of lung cells. Those attachments help the viruses penetrate far deeper into the airways than their cold-causing kin. The ability to damage the lungs can make these coronaviruses especially serious.

Prevention Measures: There are currently no vaccines available to protect you against human coronavirus infection.



Mode of transmission: Respiratory infections can be transmitted through droplets of different of different sizes. When the droplet particles are >5-10mm in diameter they are referred to as respiratory droplet, and when then are <5mm in diameter, they are referred to as droplet nuclei. According to the current evidence, COVID-19 virus is primarily transmitted between people through respiratory droplets and contact routes. In an analysis of 75,465 COVID-19 cases in china, airborne transmission was not reported.

Droplet transmission occur when a person is in close contact (within 1 m) with someone who as respiratory symptoms (e.g.: coughing or sneezing) and is therefore at risk of having his/her mucosae (mouth and nose) or conjunctiva(eyes) exposed to potentially infective respiratory droplets. Transmission may also occur through fomites in the immediate environment around the infected person. Therefore, the transmission of the COVID-19 virus can occur by direct

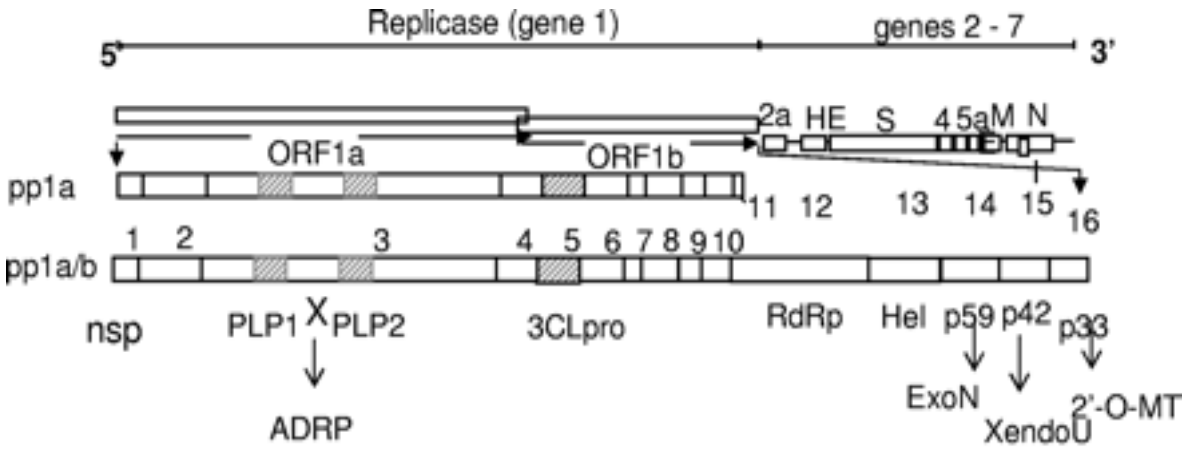
contact with infected people and indirect contact with surfaces in the immediate environment or with objects use on the infected person (e.g.: stethoscope or thermometer).

Airborne transmission is different from droplet transmission as it refers to the presence of microbes within droplet nuclei, which are generally considered to be particles,5mm in diameter, can remain in the air for long periods of time and be transmitted to others over distances greater than 1m.

There is some evidence that COVID-19 infection may lead to intestinal infection and be present in feces. However, to date only one study has cultured the COVID-19 virus from a single stool specimen. There have been no reports of fecal-oral transmission of the COVID-19 virus to date.

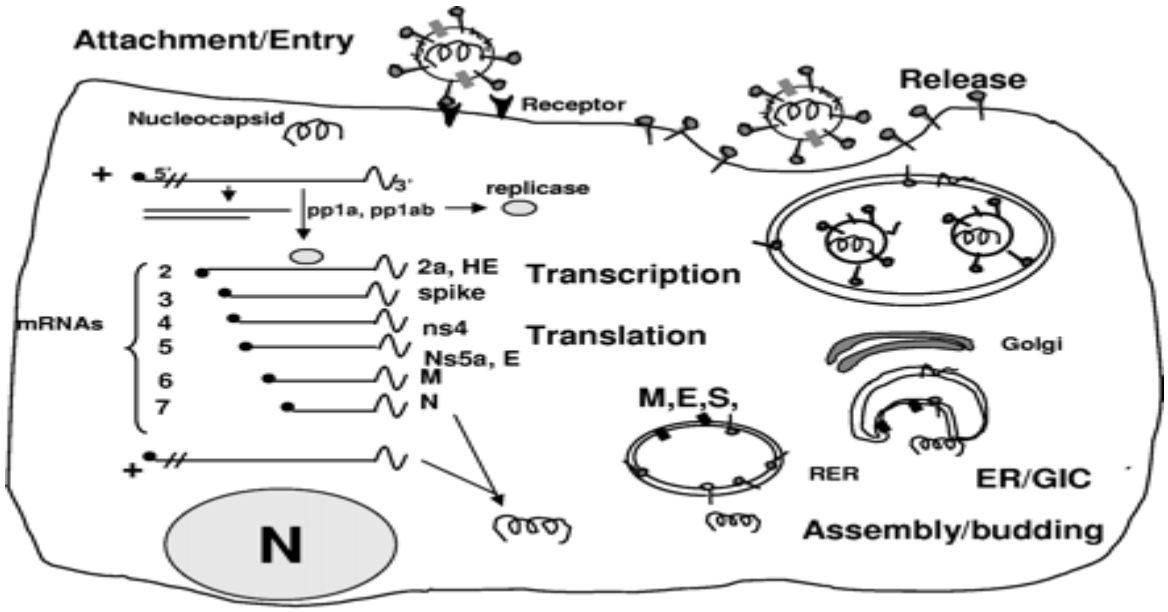
Coronavirus Pathogenesis and the Emerging Pathogen Severe Acute Respiratory Syndrome Coronavirus

1. Coronavirus virion. (A) Electron micrograph of MHV particles. (B) Schematic of virion. Viral particles contain an internal helical RNA-protein nucleocapsid surrounded by an envelope containing viral glycoproteins. Nucleocapsid (N) protein is a phosphoprotein that is complexed with genome RNA to form the nucleocapsid. Spike glycoprotein (S) forms the large glycosylated peplomers that are characteristic of coronaviruses. M, the transmembrane protein, is highly hydrophobic and spans the membrane three times. E, a membrane-spanning protein, is a minor component of the membrane. Some group II viruses express another glycoprotein, hemagglutinin-esterase (HE), which forms smaller spikes on virions.



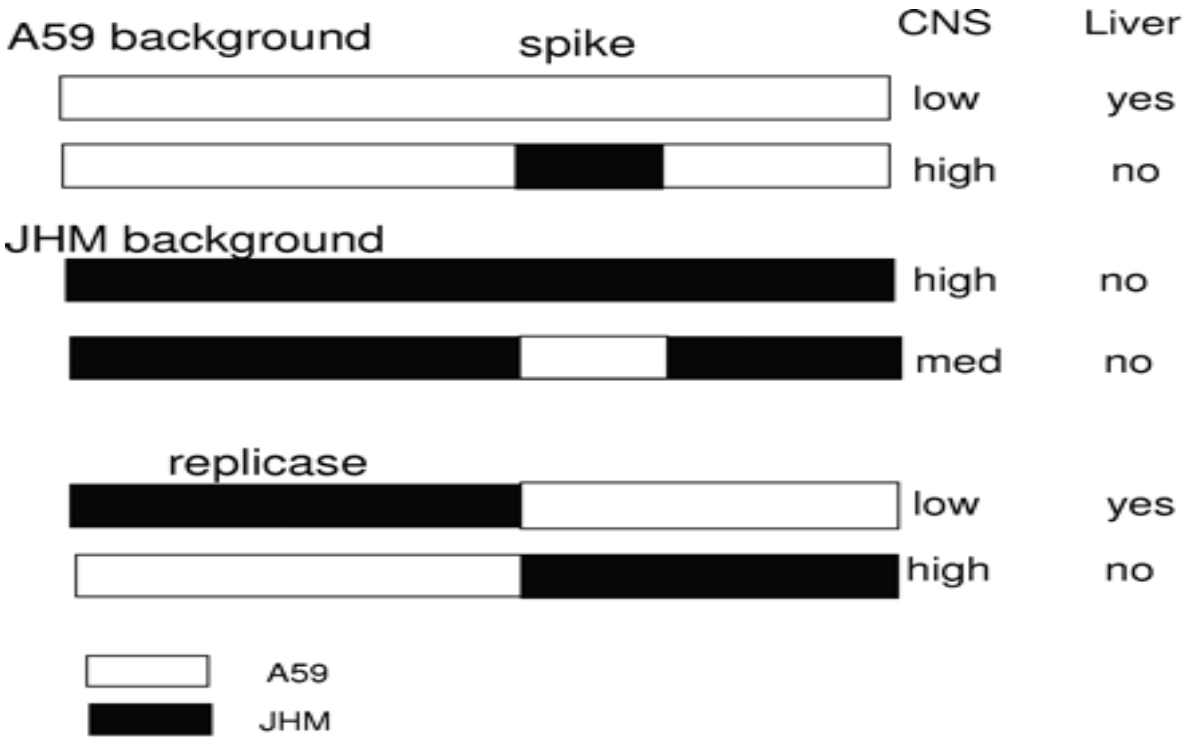
2. MHV genome organization and replicase proteins. The genome consists of seven genes. The first 22 kb contains the replicase gene, which is organized into two overlapping open

reading frames, ORFs 1a and 1b. These ORFs are translated into the ~400-kDa pp1a and the ~800-kDa pp1ab replicase polyproteins. ORF 1b is translated via a translational frameshift encoded at the end of ORF 1a. The protein domains of the replicase polyprotein are indicated by nonstructural protein numbers (nsp1 to 16) and by confirmed or predicted functions: PLP1 and PLP2, papain-like proteases; X, domain encoding predicted adenosine diphosphate-ribose 1"-phosphatase activity (ADRP); 3CLpro, 3C-like protease; RdRp, putative RNA-dependent RNA polymerase; Hel, helicase; ExoN, putative exonuclease; XendoU, putative poly(U)-specific endoribonuclease; 2′-O-MT, methyltransferase. Genes 2 to 7 are translated from sub genomic mRNA species (not shown). Relative locations of coding regions for the structural proteins HE, S, E, M, N, and I are shown, as are the coding region for the group-specific ORF 2a (encoding a predicted cyclic phosphodiesterase), 4, and 5a proteins.

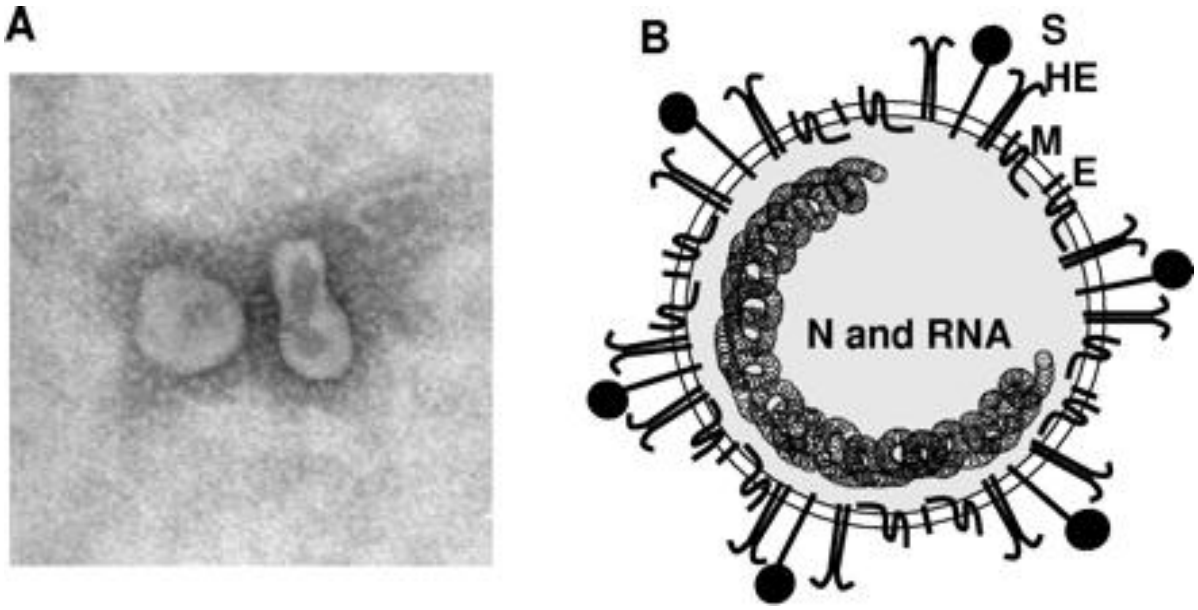


3. Model of coronavirus replication. After receptor interaction and fusion of viral and plasma membranes, virus-specific RNA and proteins are synthesized, probably entirely in the cytoplasm. Expression of coronaviruses starts with translation of two polyproteins, pp1a and pp1ab, which undergo translational proteolytic processing into the proteins that form the replicase complex. This complex is used to transcribe a 3′-coterminal set of nested sub genomic mRNAs, as well as genomic RNA, that have a common 5′ "leader" sequence derived from the 5′ end of the genome. Proteins are translated from the 5′ end of each mRNA. New virions are assembled by budding into intracellular membranes and released through vesicles by the cell secretory mechanisms. RER, rough endoplasmic reticulum; ER/GIC, endoplasmic reticulum/Golgi intermediate compartment.

4. Schematic of coronavirus spike proteins. Shown are spike proteins representative of those of all group I to III coronaviruses and of SARS-CoV. The coronavirus spike protein is synthesized as a precursor, translationally glycosylated, and, in some cases, cleaved in the approximate middle into S1 and S2 subunits at a site with dibasic amino acids (BBXBB). S1 forms the external domain containing the receptor binding domain (RBD) at its 5′ end, followed by, in the case of MHV, a hypervariable domain (HVR). A short signal sequence in cleaved from the 5′ end of the mature protein. S2 is the transmembrane subunit containing two heptad repeats (HR1 and HR2) and the transmembrane (TM) domain.



5. The molecular determinants of MHV pathogenesis. Chimeric A59/JHM recombinant viruses were selected by targeted recombination. These viruses were used to infect mice, and the abilities to infect the CNS and induce encephalitis and to infect the liver and cause hepatitis were assessed. The pathogenic phenotypes of the viruses are shown schematically and are discussed in the text.



Transmission is reduced through

- Washing your hands often with soap and water.
- Avoiding touching eyes, nose, or mouth with unwashed hands.
- Avoiding close contact with people who are sick.
- If you are mild sick, keep yourself hydrated, stay at home, and rest.

Treatment: Wuhan's corona virus can be cured by one bowl of freshly boiled garlic water. Old Chinese doctor has proven its efficacy. Many patients have also proven this to be effective. Eight cloves of chopped garlic add seven cups of water and bring to boil. Eat and drink the boiled garlic water, overnight improvement and healing.

Protease inhibitors (e.g.: Lopinavir/ritonavir) demonstrated antiviral activity against severe acute respiratory syndrome coronavirus (SARS-CoV) infections. Interferon alfa and interferon beta have activity against SARS-CoV in vitro and in animal models. Limited human data seemed to demonstrate some beneficial effect.

Although their no vaccine against the new coronavirus, tests are under the way in china to see whether two antiviral drugs used to treat HIV-could be an effective treatment.

Why already existing drugs are not having action against corona virus?

Kaletra a combination of two anti-HIV drugs, lopinavir and ritonavir, has been used on patients in a clinical trial in china since 18 January. The aim is to test it in about 200 patients, whose condition will be carefully monitored. Their outcomes will be compared with those of similar people with the same degree of illness who have not been given the drug. There are no approved treatments for illness caused by corona virus.

Remdesivir, china has begun enrolling patients in a clinical trial of ramdesivir, an antiviral medicine made by Gilead, the American pharmaceutical giant. The drugs have been given intravenously, is experimental and not yet approved for any use, and has not been studied in patients with any corona virus disease. But studies of infected mice and monkeys have suggested that remdesivir can fight against corona virus.

And it appears to be safe. It was tested without ill effects in Ebola patients, although it did not work as well against that virus, which is in a different family from coronaviruses.

In the context of COVID-19 airborne transmission may be possible in specific circumstances and settings in which procedures or support treatments that generate aerosols are performed i.e.; endotracheal intubation ,bronchoscopy, open suctioning, administration of nebulized treatment, manual ventilation before incubation, turning the patient to the prone position, disconnecting the patient from the ventilator, noninvasive positive pressure ventilation, tracheostomy, and cardiopulmonary resuscitation.