

Coronavirus-A Review Article

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Abstract

A strain of coronavirus. The new virus has been named SARS-CoV-2 and the disease it causes, Covid-19. The WHO has declared the outbreak a Public Health Emergency of International Concern. The disease was first identified in 2019 in Wuhan, China and has since spread globally, resulting in the 2019-20 coronavirus pandemic. Common symptoms include fever, cough, and shortness of breath. Muscle pain, sputum production and sore throat are less common. While the majority of cases result in mild symptoms, some progress to severe pneumonia and multi-organ failure. At present it is now a great concern.

Keywords: Coronavirus; SARS-CoV-2; MERS; COVID-19

Introduction

Coronaviruses are a group of related viruses that cause diseases in mammals and birds. In humans, coronaviruses cause respiratory tract infections that can be mild, such as some cases of the common cold and others such as SARS, MERS and COVID-19 are lethal. Coronaviruses constitute the subfamily Orthocoronavirinae. They are enveloped viruses with a positive-sense single-stranded RNA genome and a nucleocapsid of helical symmetry [1]. The genome size of coronaviruses ranges from approximately 27 to 34 kilobases, the largest among known RNA viruses. The name coronavirus is derived from the Latin corona, meaning "crown" or "halo", which refers to the characteristic appearance reminiscent of a crown or a solar corona around the virions (virus particles) when viewed under two-dimensional transmission electron microscopy [2].

Origin

The most recent common ancestor (MRCA) of all coronaviruses has been placed at around 8000 BCE. The MRCA of the alphacoronavirus line has been placed at about 2400 BCE, the betacoronavirus line at 3300 BCE, the gamma coronavirus line at 2800 BCE and the delta coronavirus line at about 3000 BCE. It appears that bats and birds, as warm-blooded flying vertebrates, are ideal hosts for the coronavirus gene source to fuel coronavirus evolution and dissemination [3].

The most related bat coronavirus and SARS-CoV diverged in 1986. A path of evolution of the SARS virus and keen relationship with bats have been proposed. The authors suggest that the

coronaviruses have been coevolved with bats for a long time and the ancestors of SARS-CoV first infected the species of the genus Hipposideridae, subsequently spread to species of the Rhinolophidae and then to civets and finally to humans.

Alpaca coronavirus and human coronavirus 229E diverged before 1960.

Discover

Human coronaviruses were first discovered in the late 1960s. The earliest ones discovered were an infectious bronchitis virus in chickens and two in human patients with the common cold (later named human coronavirus 229E and human coronavirus OC43). Other members of this family have since been identified, including SARS-CoV in 2003, HCoV NL63 in 2004, HKU1 in 2005, MERS-CoV in 2012 and SARS-CoV-2 (formerly known as 2019-nCoV) in 2019. Most of these have involved serious respiratory tract infections [8,9].

Morphological features

Coronaviruses are large pleomorphic spherical particles with bulbous surface projections. The diameter of the virus particles is around 120 nm [11]. The envelope of the virus in electron micrographs appears as a distinct pair of electron dense shells.

The viral envelope consists of a lipid bilayer where the membrane (M), envelope (E) and spike (S) structural proteins are anchored [9].

Inside the envelope, there is the nucleocapsid, which is formed from multiple copies of the nucleocapsid (N) protein, which are bound to the positive-sense single-stranded RNA genome in a continuous beads-on-a-string type conformation. The genome size for coronaviruses ranges from approximately 27 to 34 kilobases. The lipid bilayer envelope, membrane proteins, and nucleocapsid protect the virus when it is outside the host cell [9].

Classification of human coronaviruses strains [9]

1. Human coronavirus OC43 (HCoV-OC43).
2. Human coronavirus HKU1.
3. Human coronavirus NL63 (HCoV-NL63, New Haven coronavirus).
4. Human coronavirus 229E (HCoV-229E).
5. Middle East respiratory syndrome-related coronavirus (MERS-CoV), previously known as novel coronavirus 2012 and HCoV-EMC.
6. Severe acute respiratory syndrome coronavirus (SARS-CoV or "SARS-classic").
7. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), previously known as 2019-nCoV or "novel coronavirus 2019".

Below I am going to discuss about novel coronavirus 2019.

Coronavirus disease 2019 is an infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The disease was first identified in 2019 in Wuhan, China, and has since spread globally, resulting in the 2019-20 coronavirus pandemic [11].

As of 20 March 2020, the rate of deaths per number of diagnosed cases is 4.1%; however, it ranges from 0.2% to 15% depending on age and other health problems.

World Health Organization (WHO) declared the 2019-20 coronavirus outbreak a pandemic and a Public Health Emergency of International Concern (PHEIC).

Symptoms

Signs and symptoms of COVID-19 may appear two to 14 days after exposure and include:

- Fever
- Cough
- Shortness of breath or difficulty breathing
- Tiredness

- Aches
- Runny nose
- Sore throat.

The severity of COVID-19 symptoms can range from very mild to severe. Some people have no symptoms. People who are older or have existing chronic medical conditions, such as heart or lung disease or diabetes, may be at higher risk of serious illness [10].

Diagnosis

The standard method of testing is real-time reverse transcription polymerase chain reaction (rRT-PCR). The test can be done on respiratory samples obtained by various methods, including a nasopharyngeal swab or sputum sample [15]. Results are generally available within a few hours to two days. Blood tests can be used, but these require two blood samples taken two weeks apart and the results have little immediate value. Chinese scientists were able to isolate a strain of the coronavirus and publish the genetic sequence so that laboratories across the world could independently develop polymerase chain reaction (PCR) tests to detect infection by the virus [16].

As of 26 February 2020, there were no antibody tests or point-of-care tests though efforts to develop them are ongoing.

Prevention

- Wash your hands frequently for at least 20 seconds at a time with warm water and soap [11].
- Don't touch your face, eyes, nose, or mouth when your hands are dirty [11].
- Don't go out if you're feeling sick or have any cold or flu symptoms [11].
- Stay at least 3 feet from Source away from anyone who is coughing or sneezing [11].
- Cover your mouth with the inside of your elbow whenever you sneeze or cough. Throw away any tissues you use right away [11].
- Clean any objects you touch a lot. Use disinfectants on objects like phones, computers, utensils, dishware and doorknobs [11].

Conclusion

The majority of cases result in mild symptoms, some progress to severe pneumonia and multi-organ failure. At present it is now a great concern.

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