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Editorial

The Coronavirus Disease 2019 (COVID-19), Severe Acute Respiratory Syndrome-Coronavirus 2 (SARS-CoV-2), Omicron (B.1.1.529) Variant of Concern and the New Omicron Subvariant BA.2: What We Know So Far?

(*Pictures collected from internet)

The new Wuhan coronavirus is not completely new. Coronaviruses are surrounded by a halo of spiky proteins. These spiky proteins stick out like tips on a crown, hence the name coronavirus. The proteins help the virus attach itself and gain entry into the host cell. Coronaviruses are known to mutate easily and can jump from animals to humans. They can also spread from one human to another quite easily. So how does an animal virus infect humans? Animals infected with coronaviruses, such as bats in severe acute respiratory syndrome coronavirus type 1 (SARS-CoV-1) and camels in Middle East respiratory syndrome coronavirus (MERS-CoV), have a special protein on their cells. First, the coronavirus binds to these special proteins and then invades the cell. If we share the same cell surface receptor that viruses use in bats or other animals, then there will be a risk that the virus invades our body. The virus binds to an angiotensin-converting enzyme 2 (ACE2) receptor for cell entry[1].

The World Health Organization (WHO) was first alerted to a cluster of pneumonia of unknown aetiology in Wuhan, People's Republic of China on December 31, 2019. The virus was initially tentatively named the 2019 novel coronavirus (2019-nCoV). Subsequently, the International Committee of Taxonomy of Viruses (ICTV) named the virus SARS-CoV-2[2]. Scientists in China have sequenced the genome of 2019 novel coronavirus and made it available to the global scientific community. The genome of this new coronavirus is 96% identical to that of the bat coronavirus. The COVID-19 virus is a new virus linked to the same family of viruses as the severe acute respiratory syndrome (SARS). That is why the International Committee on Taxonomy of Viruses adopted the official name "severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)" on February 11, 2020, due to its

96% identical similarities with the SARS-Cov-1 virus, the causative agent of SARS, first identified at the end of February 2003[2].

On January 30, 2020, WHO declared a public health emergency of international concern (PHEIC). In March 2020, the WHO declared the COVID-19 outbreak a global pandemic[3]. Dr. Li Wenliang, who was punished for trying to warn of the coronavirus, died on February 7, 2020.

SARS-CoV-2 is classified within the genus Beta coronavirus (Subgenus Sarbecovirus) of the family Coronaviridae. It is an enveloped, positive sense, single-stranded ribonucleic acid (RNA) virus with a 30-kb genome. The genome encodes four structural proteins (Spike, envelope, membrane, nucleocapsid), several non-structural proteins (Some of these are essential in forming the replicase transcriptase complex), and or accessory proteins[2].

SARS-CoV-2 is the seventh coronavirus identified that is known to infect humans (HCoV). Four of these viruses, HCoV-229E, HCoV-NL63, HCoV-HKU1 and HCoV-OC43, are endemic, seasonal and tend to cause mild respiratory disease. The other two viruses are the more virulent zoonotic MERS-CoV and SARS-CoV-1[4].

The coronavirus disease 2019 (COVID-19) is the name of the illness caused by a novel coronavirus, SARS-CoV -2[5]. 'CO' stands for corona, "VI" for virus, and "D" for disease. The average incubation period for COVID-19 is around 5 to 6 days but can be up to 14 days[6]. Current data suggests that healthy adults remain infectious for up to 10 days after developing symptoms[7]. Children usually have milder symptoms, but there may be a link between COVID-19 and developing multisystem inflammatory syndrome[8]. Most people make a full recovery after COVID-19. However, a small percentage of people who are infected become so unwell that they die. The clinical presentation of SARS-CoV-2 infection can range from asymptomatic infection to severe disease[9].

Mortality rates differ per country[10]. Early laboratory diagnosis is crucial for the clinical management and outbreak control of a SARS-CoV-2 infection. Diagnostic testing can involve detecting the virus itself (Viral RNA or antigen) or detecting the human immune response to infection (Antibodies or other biomarkers). Standard confirmation of acute SARS-CoV-2 infections is based on the detection of unique viral sequences by nucleic acid amplification tests (NAATs), such as real-time reverse-transcription polymerase chain reaction (rRT-PCR). The assays' targets include regions on the E, RdRP, N, and S genes.

Since the original SARS-CoV-2 wild-type strain was detected in December 2019, several other variants of concern (VOCs) have emerged, which include the Alpha (B.1.1.7), Beta (B.1.351), Gamma (P.1), Delta (B.1.617.2), and Omicron (B.1.1.529) variants.

On November 26, 2021, WHO designated the B.1.1.529 lineage of the SARS-CoV-2 virus as VOC and assigned the name of Omicron to it, following the Greek alphabet. The decision was based on the large number of mutations identified throughout the genome and particularly in the spike (S) gene. Preliminary data based on genomic information indicates a potential risk of reinfection by this variant. Likewise, the substantial increase in the detection of suspected cases of B.1.1.529 (Based on the failure to detect the S gene in some RT-PCR protocols) in South Africa, the country that reported the first case of B.1.1.529 in a sample collected on November 9, 2021 and reported on November 24, 2021, led WHO to make the decision to designate B.1.1.529 as a VOC as a precautionary measure.

Presently, an Omicron subvariant known as BA.2, first identified in late 2021, has made headlines due to its rapid spread. While Omicron has approximately 60 mutations, it is thought that its sister lineage may have 85 mutations. This variant has also been termed the "stealth variant" due to a mutation that renders it "invisible" as Omicron to PCR testing. BA.2 has spread to over 40 countries, including the United States, the United Kingdom, India,

Australia, and Norway. In the latter, it currently accounts for half of Omicron cases. It is currently unknown why BA.2 has become so prevalent in Norway; however, enhanced immune escape or transmissibility has been proposed[11].

According to the findings from the current study, two doses of mRNA vaccines are not sufficient to confer immunity against the Omicron variant. Neutralizing antibody levels were estimated at 16 days after the third dose; therefore, further research is needed to determine whether these levels wane in the same manner that levels wane months after the second dose.

Vaccine-conferred immunity against COVID-19 wanes with increasing time after vaccination. To enhance this immunity, a third booster's dose of current COVID-19 vaccines has been recommended[12].

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