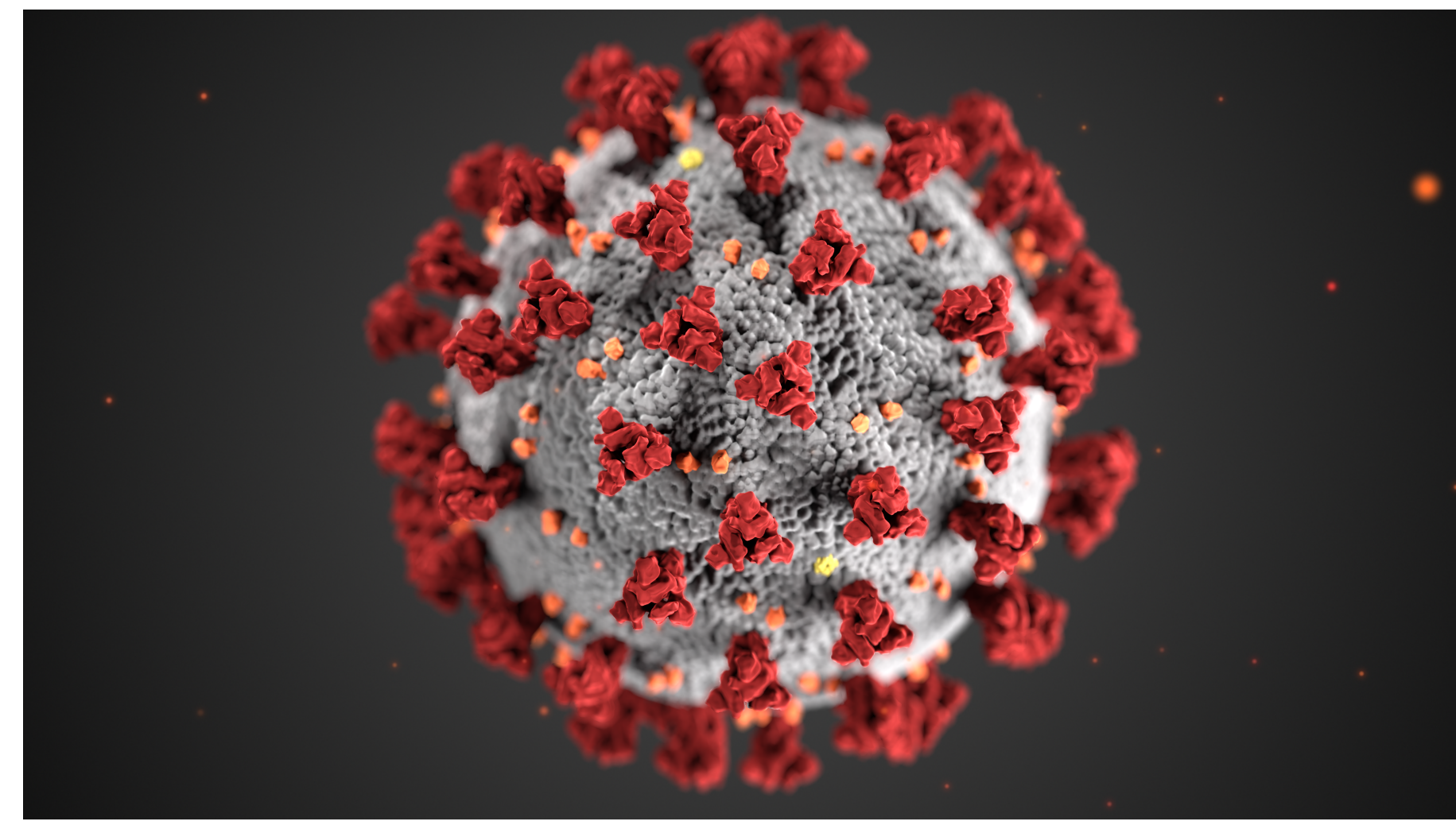
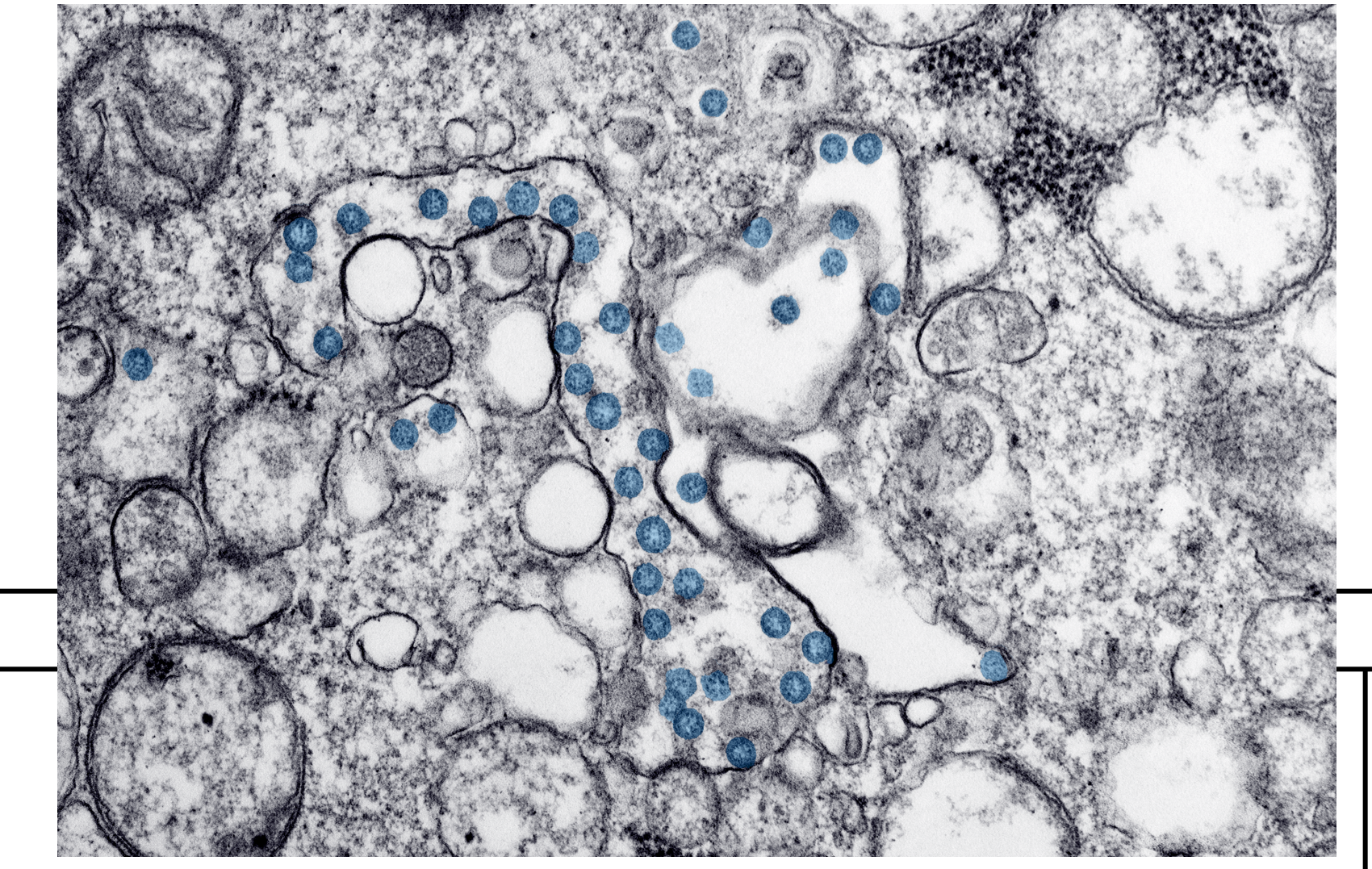


[SARS-CoV-2: Affecting the Immune System and How COVID-19 Symptoms Relate]

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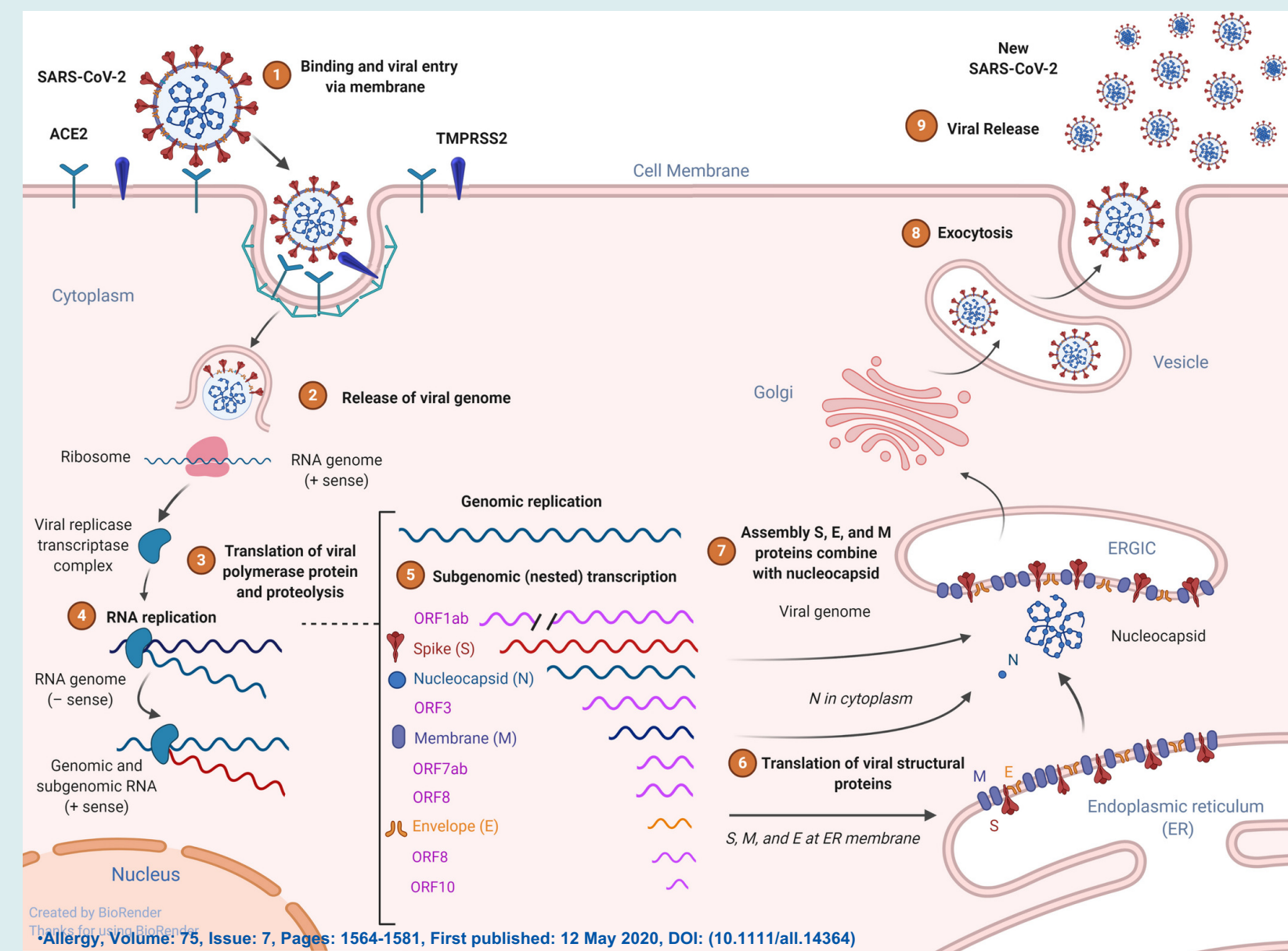
ABSTRACT

SARS-CoV-2 is a novel zoonotic, single stranded RNA coronavirus that was first discovered in Wuhan, China. After its discovery in 2019, several outbreaks have occurred across the world, becoming a global pandemic. The virus that causes COVID-19 can have an adverse effect on the immune system causing an attack on the respiratory system, leading to organ failure and death.

BACKGROUND

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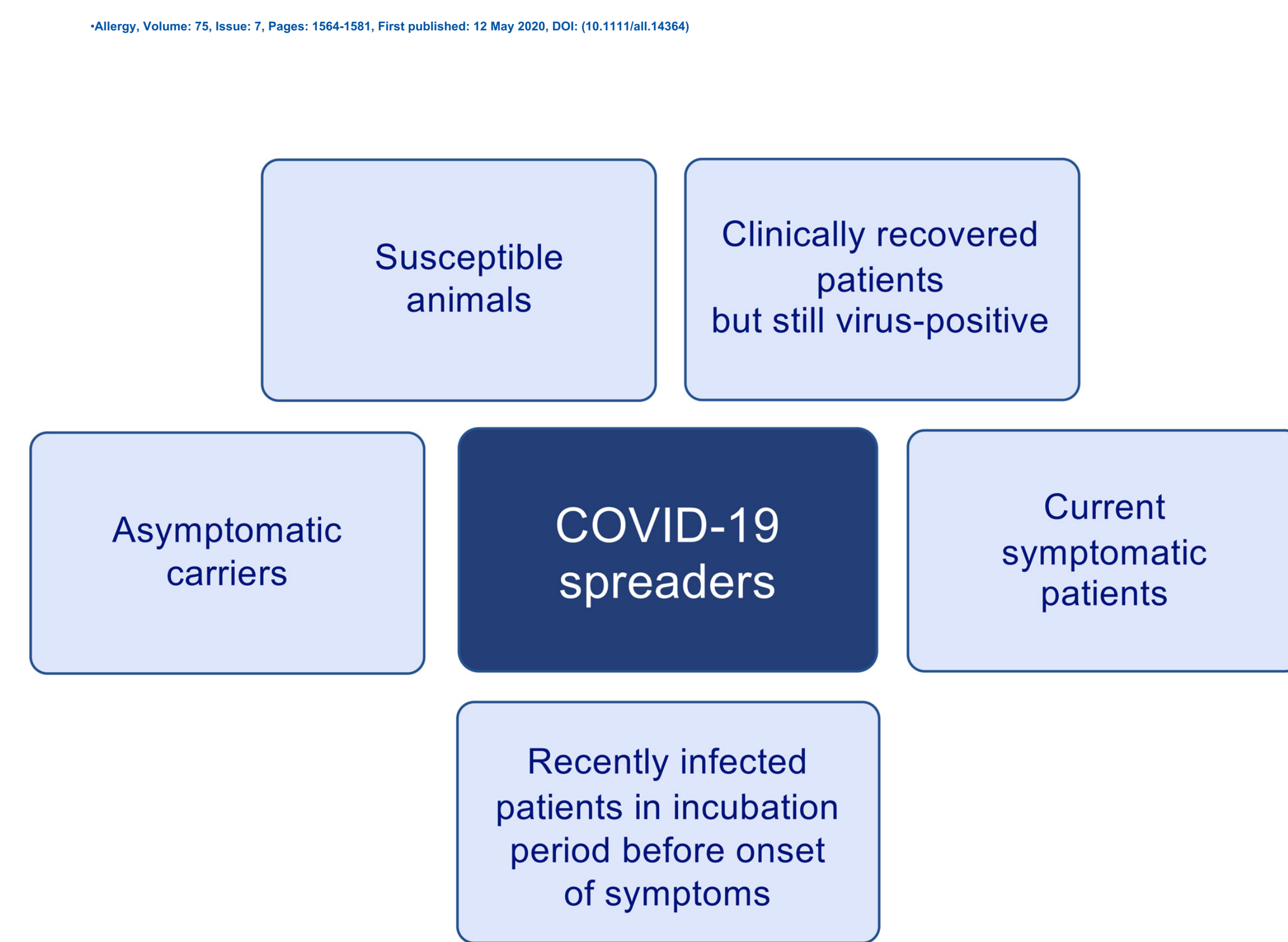
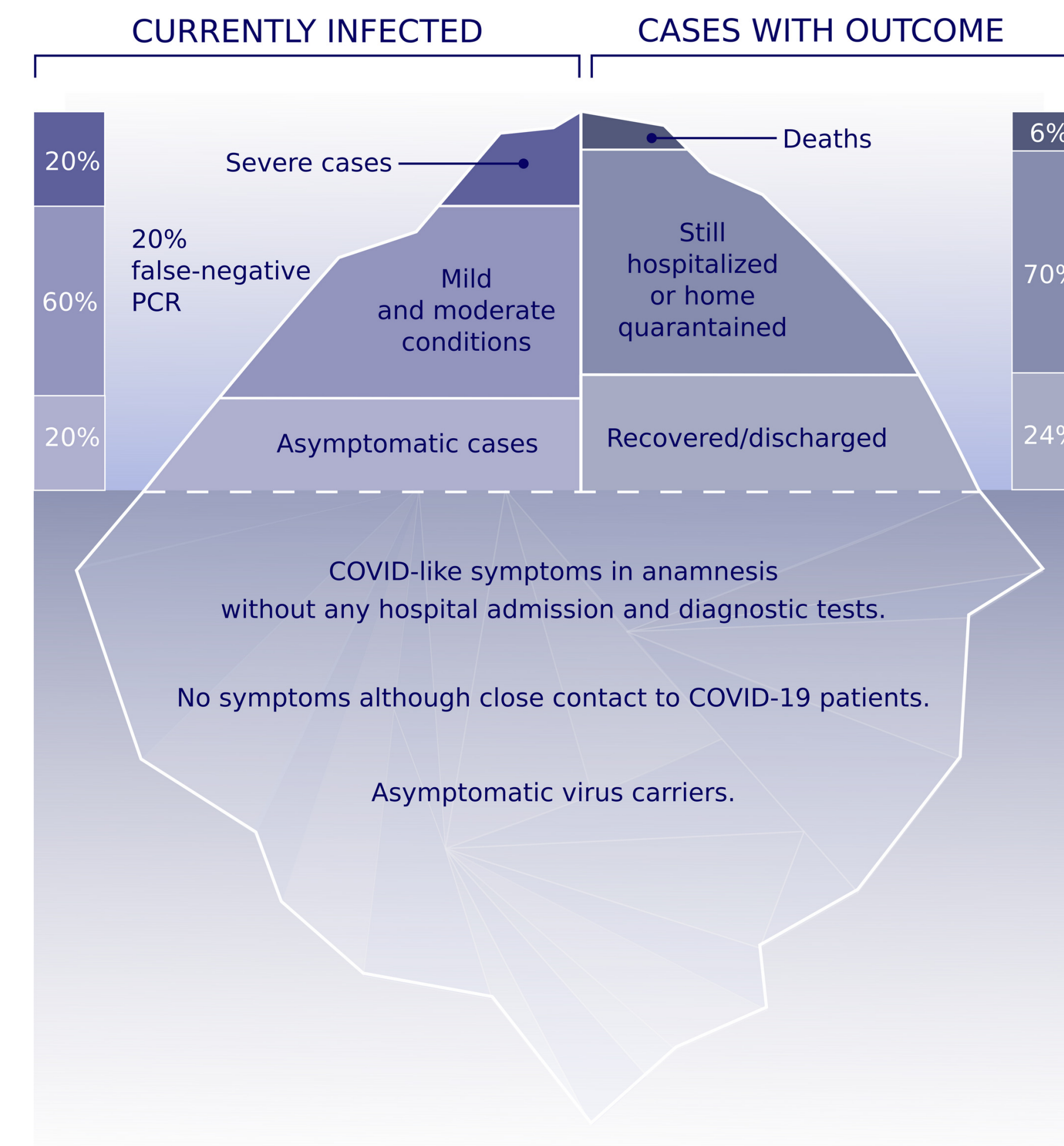
In December 2019, a novel coronavirus strain was discovered in the province of Wuhan, China, where patients displayed pneumonia-like symptoms. Coronaviruses are single-stranded RNA viruses that originate from animals and are passed down to people; for this reason, they are known as zoonotic viruses. Bats, pigs, birds and other animals are often traced back as the original source for several coronavirus outbreaks in recent years. This was the case for Severe Acute Respiratory Syndrome (SARS-CoV) and Middle Eastern Respiratory Syndrome (MERS-CoV) outbreaks which were traced back to animals. The novel coronavirus outbreak differs from different outbreaks due to their genetic and protein structure. Scientists and health officials are still researching the uniqueness of the SARS-CoV-2 virus.



SARS-CoV-2 is a newly discovered type of coronavirus that is highly contagious and enters primarily through the eyes, nose and mouth. The virus binds by means of its "spike" protein structure to the ACE-2 (angiotensin-converting enzyme 2) receptor, which serves as an entry point as the cell will engulf the receptor-virus complex (Azkur et al, 2020). After the virus enters the cell's cytoplasm, the virus RNA's genes are then translated into a viral polymerase protein. Next, the virus' RNA strand serves as a template for replication. Then, all the parts of the virus, including the spikes, membrane, and envelopes go through transcription. The virus' structural proteins are translated and are manufactured in the endoplasmic reticulum and Golgi apparatus. New SARS-CoV-2 viruses exit the cell membrane from the cytoplasm's vesicle (Azkur et al 2020).

OBJECTIVE

In this poster, I will discuss the relationship between the effects of the SAR-CoV-2 virus on the immune system and symptoms of COVID-19. Scientists and doctors must understand the different ways the virus is spread and carried. There are people who spread the virus by being asymptomatic, those who had the virus and recovered but still test positive, susceptible animals, current people who are infected and show symptoms and even those who were recently infected and are going through the inoculation period of virus development (Azkur et al, 2020). Experts realize and admit that due to worldwide spread, fully eradicating the novel coronavirus is close to impossible (Azkur et al, 2020). Recognizing this fact will help us understand how the immune system can help us in containing the pandemic and developing effective vaccines and medicines to help with prevention and treatment (Azkur et al, 2020).



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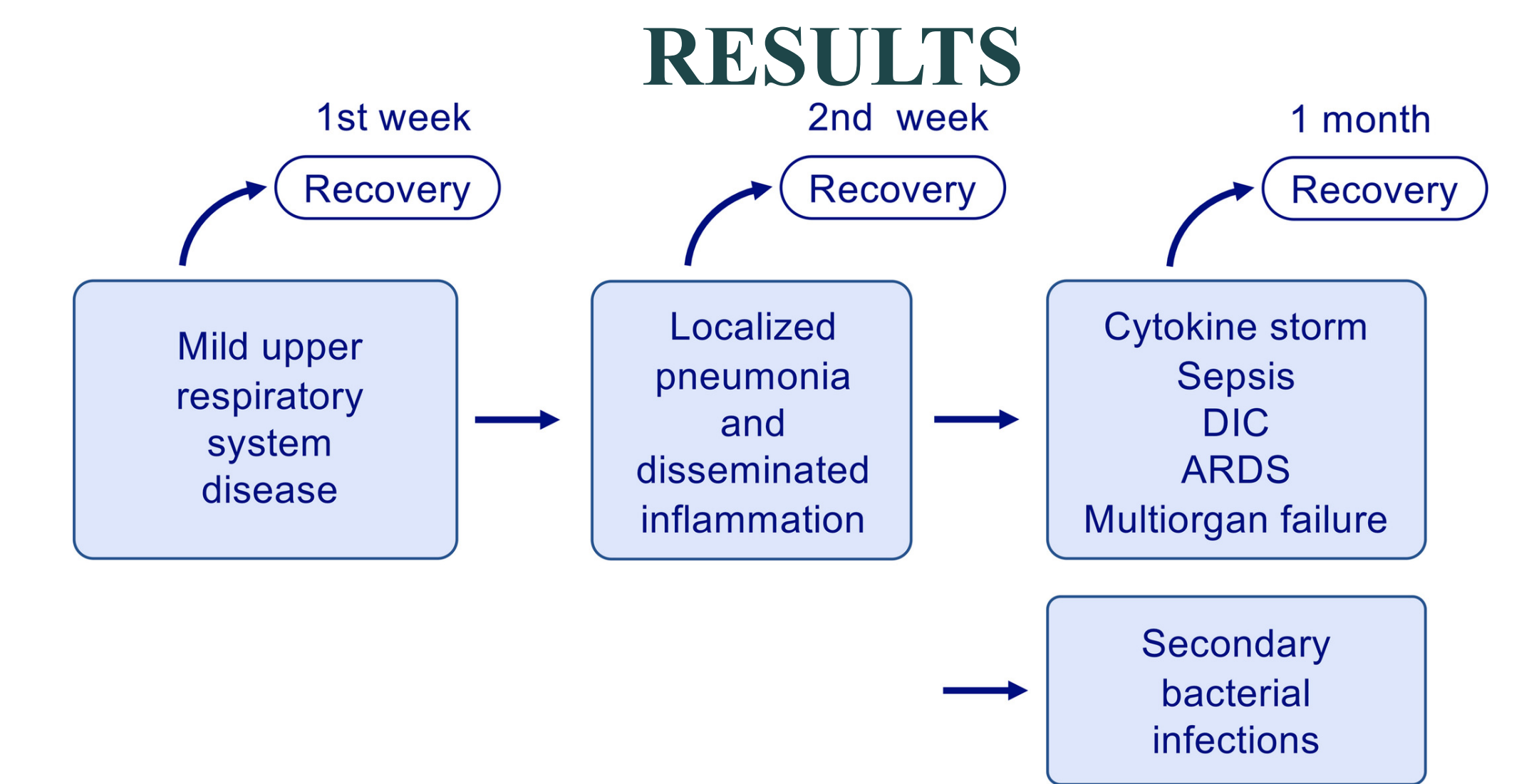
[Methods

- [Azkur, A. K., Akdis, M., Azkur, D., Sokolowska, M., Veen, W., Brügggen, M. -. C., O'Mahony, L., Gao, Y., Nadeau, K., & Akdis, C. A. (2020). *Allergy*, 75(7), 1564-1581. <https://doi.org/10.1111/all.14364>
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RESULTS

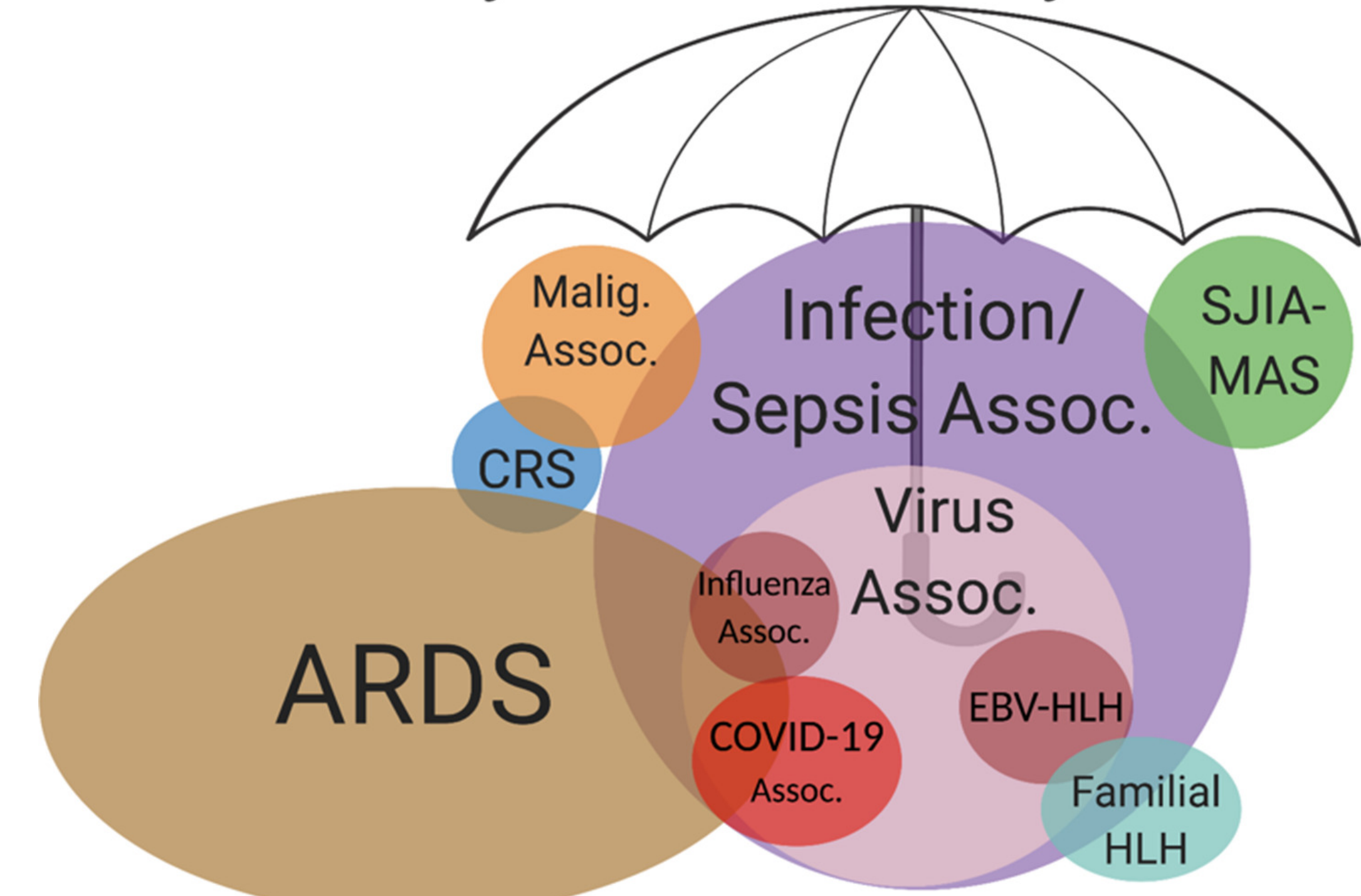
- Asymptomatic infections usually present little to no symptoms. Patients that present mild to moderate symptoms, feeling sore in their muscles, having low grade fever, or cough
- Some of the mild cases suddenly turned critical in a matter of weeks, experiencing Acute Respiratory Distress Syndrome (ARDS) and multi-organ failure.
- Cytokine storm is defined as a series of complex molecular events such as inflammation, multi-organ failure, and overproduction of iron in the blood cells. Cytokine storm occurs when excessive white blood cells such as B cells, T cells, NK cells (Natural Killer) and other immune response cells inflame an organ such as the lungs and essentially attack the organ (Azkur et al, 2020).
- Cytokine storm is dangerous in a patient because it could lead to ARDS and multi-organ failure, which then can lead to death.



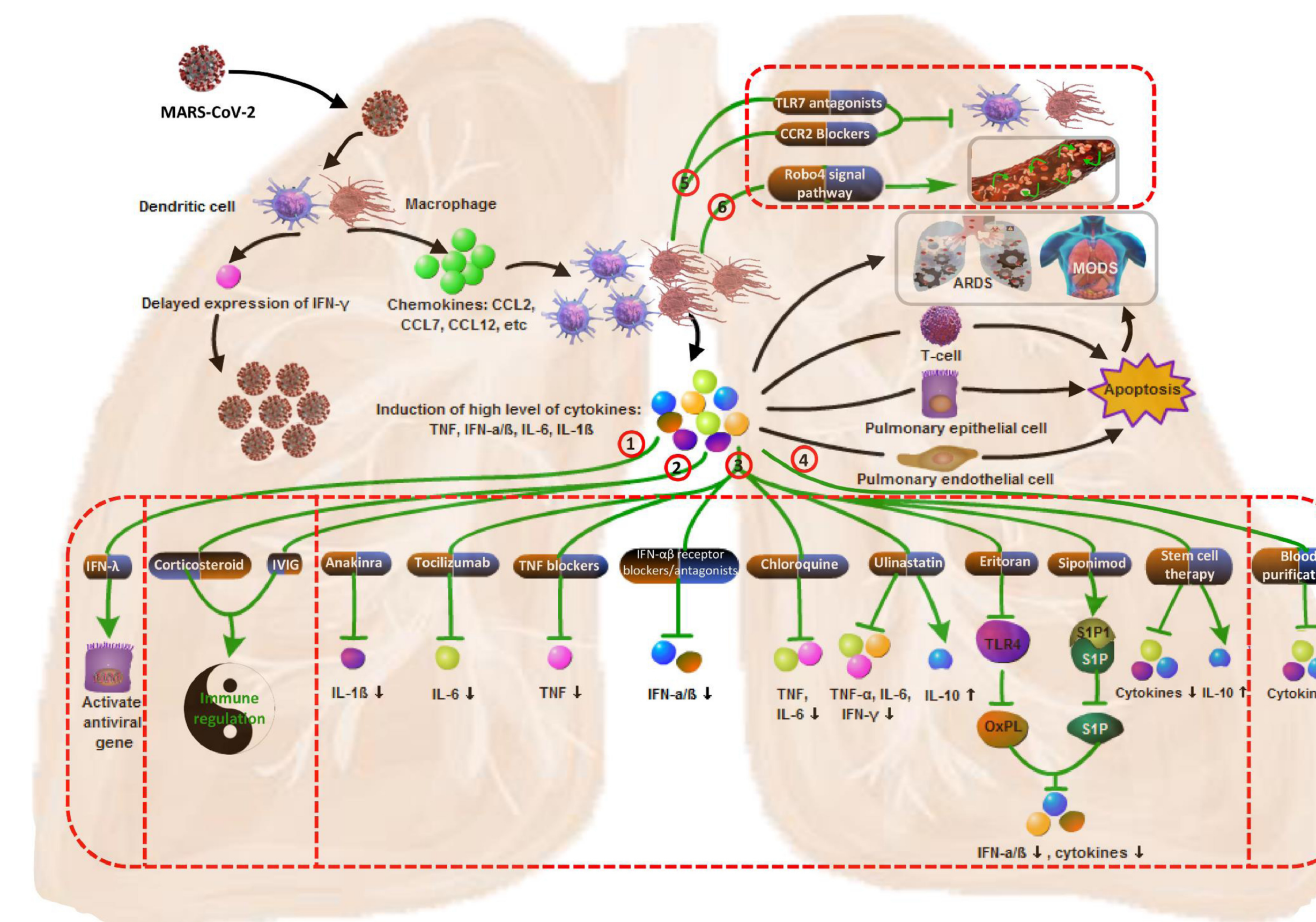
Allergy, Volume 75, Issue 7, Pages 1564-1581, First published: 12 May 2020, DOI: 10.1111/all.14364

What scientists have discovered about the cytokine storm is that it is a common feature in patients with severe cases of COVID-19. When patients experience ARDS and multi-organ system failure, their mortality rates increase. (Azkur et al, 2020). However, the symptoms still vary among people, from asymptomatic spread to severe respiratory failure. According to a study from Italy, 50 to 75 percent of the population were asymptomatic, while 10 percent of the population developed severe symptoms such as pneumonia, ARDS and multi-organ failure (Pascarella et al, 2020). The 10 percent of symptomatic patients were found to have underlying illness, or comorbidities such as high blood pressure, diabetes, and heart disease (Pascarella et al, 2020). Scientists are still trying to figure out many unknowns because the immune responses for each case are complex and different (Azkur et al, 2020).

Cytokine Storm Syndromes



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Ye, Q., Wang, B., & Mao, J. (2020). The pathogenesis and treatment of the 'Cytokine Storm' in COVID-19. *Journal of Infection*, 80(6), 607-613. <https://doi.org/10.1016/j.jinf.2020.03.037>

CONCLUSIONS

In conclusion, much is still unknown when it comes to understanding the characteristics of the SARS-CoV-2 virus. According to the Center for Disease Control, asymptomatic spread seems to be one of the primary causes for spread. The coronavirus affects people who have underlying illnesses, and those who are asymptomatic who do not practice health care measures such as wearing a mask could contribute to someone contracting COVID-19. Scientists understand that although there are a low percentage of people who develop severe cases, those who are asymptomatic must practice safety measures and self-isolate to curb the spread of the virus. Although the virus has spread worldwide and nearly impossible to eradicate, doctors and scientists are instructing civilians to keep practicing health safety measures to stop the spread. That way, when vaccines and treatments are developed and administered, the virus will be at bay. Personally, this has changed the way I view my life and health. It is important for people to take care of themselves, otherwise, people who are most vulnerable can get severely ill from this deadly virus. My father learned this the hard way, where he did not wear his mask and lowered his guard by not taking the health precautions seriously, and presumably contracted the virus. However, although he was in the high-risk category since he has diabetes, he was able to self-isolate and recover at home without hospitalization. To summarize, although the pandemic is not over yet, learning how to take measures to live with the novel coronavirus and study the relationship between immune response and symptoms will help with the solution to ending the global pandemic.