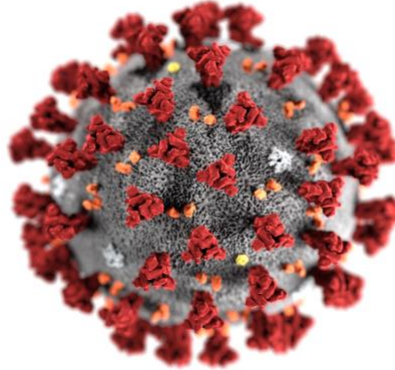


Could Stem Cells treat COVID-19?

By Tyrel Long



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Social distancing, school closures, cancellations of large public gatherings, and national lockdowns are just a few precautionary measures being enacted to fight a pandemic known as COVID-19 (Coronavirus Infectious Disease 2019). COVID-19 is the disease caused by SARS-CoV2 (Severe Acute Respiratory Syndrome – Coronavirus 2), a respiratory virus that is currently taking the world by storm. As of May 2020, COVID-19 has infected almost 4.7 million people and killed over 300,000 worldwide, with over 80,000 deaths occurring in the United States. As the infection rate and death rate are still on the rise, COVID-19 is a world-wide concern.

The symptoms of COVID-19 include fever, cough, and shortness of breath. SARS-CoV2 can spread person to person via droplets from coughs and sneezes and has an incubation period of 5-14 days. SARS-CoV2 attacks both the upper respiratory tract (the trachea) and lower respiratory tract (the lungs). Thus far, mortality rates appear to be much higher for elderly, individuals with other underlying health conditions, and those who are immunocompromised.

Once SARS-CoV2 reaches the interior of a human, it latches itself to the surfaces of respiratory cells and injects its genetic material (RNA). As it works its way down the respiratory tract, the virus eventually makes its way to the lungs where it does the most damage. The RNA from the virus forces the lung cells to create more and more of the virus. Lung cells fill with virus particles until it bursts open, releasing more SARS-CoV2 to infect the surrounding cells. In addition, the virus has the capability to send signals using cytokines (signaling proteins) to make the immune system go haywire. If a person has a healthy immune system, the body has a better chance of mounting an effective response to rid the body of infected cells. Those who are immunocompromised are not able to combat the virus and suffer severe loss of lung tissue,

inflamed lungs, and pneumonia. Many leaders around the world are asking, what can be done? Currently, there is no cure for COVID-19. While many scientists are spending countless hours to find a cure, other scientists are looking for ways to alleviate the symptoms of COVID-19. One avenue for possible relief comes in the form of mesenchymal stem cells (MSCs).

Now you might be asking what are MSCs, and how would they be able to help? MSCs are stem cells that originate in the mesenchyme layer during development. The mesenchyme originates from the mesoderm, one of the three initial layers formed when the early embryo first implants into the uterus (7-10 days following fertilization). The mesoderm gives rise to bones, muscles, the heart and circulatory system, and internal sex organs. Most importantly, adult MSCs have immunomodulatory properties—meaning they can secrete molecules to improve immune function.

Considering the current pandemic, scientists are scrambling to find a solution. Recently, a team of researchers from Zhejiang, China may have found a solution using MSCs. Researchers removed MSCs from the bone marrow of non-infected patients—a common practice for many other diseases. The stem cells were expanded in a lab (meaning, they let the cells divide a number of times in order to have more cells for the treatment), and several days later they injected the healthy MSCs into the lungs of COVID-19 patients. When the MSCs were injected into the lungs of an infected patient, researchers saw a significant decrease in inflammation of the lungs. Based on the well established ability of MSCs to send anti-inflammatory signals, it is theorized that the cells helped modulate the immune response of the COVID-19 patient. Another important feature of MSCs is that while they have the ability to differentiate into different connective cell types, when injected into patients they do not set up residence or differentiate into these cell types—they simply modulate the immune system and then are cleared from the body. Thus, MSCs give the immune system some guidance on recovery likely without having long-term deleterious impacts.

So why isn't every patient with COVID-19 being injected with MSCs? Although this research may seem like the solution, there is not enough research on the long-term effects of the MSCs. Research is underway and once the effects of MSCs are understood they may very well become a powerful tool for combating many types of diseases including COVID-19.

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