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Commentary

Can Stem Cells Beat COVID-19?

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INTRODUCTION

The COVID-19 patients were first detected in China, in December 2019, and then the novel virus with associated pneumonia and other diseases spread quickly to worldwide becoming a serious public health intimidation. Despite all the efforts, the pharmacological agents used for controlling or treating the disease, especially respiratory problems, have not been accomplished so far. Among various treatment options, mesenchymal stem cell-based cellular therapies are being investigated, because of their regeneration ability and multipotency along with other features like immunomodulation, antifibrosis and anti-inflammatory effects.

During your transplant your immune system is replaced, so if you received a COVID-19 vaccine before your transplant it is recommended you are vaccinated again after your transplant. Your transplant team will help you to arrange this. This official recommendation is in the Public Health England guidance for healthcare professionals known as the Green Book. The reference to revaccination after transplant is in Chapter 14 on page 20 here - you may find this link useful when discussing this with your transplant team.

This paper intends to analyze the current clinical trials on stem cell treatment of novel virus, searching and reviewing the available information and the International Clinical Trials Registry Platform (ICTRP) of World Health Organization (WHO). We concluded that the stem cell treatment of COVID-19 is found promising with pilot studies' results, but still in the early development phase. There is an urgent need for large-scale investigations to confirm and validate the safety and efficacy profile of these therapies with reliable scientific evidence.

Since its eruption in China, novel coronavirus disease (COVID-19) has been reported in most of the countries and territories (>200) of the world with 18 million confirmed cases (as of August 3, 2020). In most of the countries, COVID-19 upsurge is uncontrolled with a significant mortality rate. Currently, no treatment effective for COVID-19 is available in the form of vaccines or antiviral drugs and patients are currently treated symptomatically. Although the majority of the patients develop mild symptoms and recover without mechanical ventilation for respiratory management, severe respiratory illness develops in a significant portion of affected patients and may result in death. The COVID-19 vaccines could cause side effects in a few people with allergies to the components of the vaccine. If you have concerns that your own allergies may affect your reaction to the vaccine you should talk to the medical team about it beforehand. Providing a list of the medications you are currently taking would also be helpful.

The COVID-19 vaccines approved for use in the UK have been tested on healthy volunteers of various ages. They were not initially tested in patients with compromised immune systems, such as stem cell transplant recipients. This means we do not yet know for certain how effective they will be. One of the well-known facts about SARS-CoV infection is that it leads the Acute Respiratory Distress Syndrome (ARDS) in severe cases. In some patients, ARDS induces severe pneumonia, and in more severe cases the Multi Organ Dysfunction (MOD) which is currently causing panic all over the world. Despite all the efforts, the pharmacological agents used for controlling or treating the disease, especially curing the respiratory problems, have not been fully successful so far. Among various treatment options, mesenchymal stem cell (MSC)-based cellular therapies are being investigated, because of MSC's regeneration ability though limitless self-renewal and multipotency along with other features like immunomodulation, antifibrosis and anti-inflammatory effects. Notwithstanding, there has not been a certain consensus on MSC therapy reliability in treating the SARS-CoV-2 induced ARDS or pneumonia in the scientific community.

Coronavirus, named after the spike-like glycoproteins (S proteins) surrounding the viral envelope like a crown. These S proteins binds the virus to its cellular receptors, angiotensin-converting enzyme 2 (ACE2) in SARS-CoV and dipeptidyl peptidase 4 (DPP4) in MERS-CoV, with subsequent membrane fusion. Cell cytoplasm meets the viral RNA genome, then the viral genome is replicated. The virion-containing vesicles consists of genomic RNA, envelope glycoproteins and nucleocapsid proteins develops, then fuses with the plasma membrane, resulting in the release of the viruses. SARS-CoV-2, was found to

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be a new type of beta-CoV with more than 99.98% genetic identity similarity to SARS-like coronaviruses and was reported as genetically more identical to SARS-CoV than to MERS-CoV.

While the scientific community is working to develop vaccines and drugs against the COVID-19 pandemic, novel alternative therapies may reduce the mortality rate. Recent use of stem cells for critically ill COVID-19 patients in a small group of patients in China and subsequent Emergency Use Authorization of stem cells by Food and Drug Administration to Global Institute of Stem Cell Therapy and Research and Athersys has created excitement among the medical community. As a result, several clinical trials have been registered using stem cells for COVID-19 treatment that aim to use different cell sources, dosage, and importantly diverse targeted patient groups. In this brief review, the possibilities of stem cell use in COVID-19 patients and relevant challenges in their use have been discussed.