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Editorial

Mesenchymal Stem Cell Transplantation for COVID-19

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Editorial

In-vitro, Mesenchymal Stem Cell (MSC) populations with potentials of similar multi-lineage differentiation have been obtained from several Bone Marrow (BM) and non-bone marrow tissues, including umbilical cord, placenta, amniotic fluid, adipose tissue, and peripheral blood [1-10]. The clonogenic BM-human MSCs fraction ranges from 10 to 100 Colony-Forming Unit-Fibroblast (CFU-F) per 106 Marrow Mononuclear Cells (MNCs) [11]. BM-human MCSs are characterized by lacking CD11b, CD14, CD19, D34, CD45, CD79α, and Human Leukocyte Antigen (HLA)-DR expression; positive expression of surface antigens CD73, CD90, and CD105; multipotency (i.e., chondrogenic, osteogenic, and adipogenic); and their adherence to plastic [11]. By the year 2000, clinicians increasingly had become interested in intravenously applied MSC therapy [12]. A previous study demonstrated that both human and murine MCSs can induce immune suppression by attracting and killing auto reactive T cells via FasL, therefore stimulating Transforming Growth Factor-beta (TGF-β) production by macrophages and generation of regulatory T cells [13]. The dying T cells that is caused by the interaction involving the MSC-induced Monocyte Chemoattractant Protein-1 (MCP-1) secretion in turn activate macrophages to produce TGF-β, then stimulating regulatory T cells and promoting immune tolerance [14]. The capacity of MSCs for *in-vivo* differentiation and engraftment and by their efficacy in promoting wound healing highlighted its clinical relevance [15-21].

In 2006, the International Society for Cellular Therapy came up with the guidelines for MSC characterization for standardization the MSC biology, definition, isolation, and characterization criteria, *in-vivo* relevance, and ethical and institutional regulations for its

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clinical use [11]. Since the COVID-19 pandemic, there are several ongoing trials that have been studied in China, such as the ClinicalYtrials.gov identifiers: NCT04252118, NCT04273646, NCT04276987, NCT04293692, NCT04302519, NCT04288102, etc. for fighting against severe COVID-19 or COVID-19 pneumonia [22-27]. MSCs can decrease the overproduction of immune cells caused by a reaction to the COVID-19 and decrease excessive levels of inflammatory substances, contributing to regulating the immune system and recovering to the normal status, particularly of the elderly patients [28].

In conclusion, human MSCs are currently being evaluated as a stem cell treatment for a number of diseases, particularly severe COVID-19 and have been demonstrated to be safe in clinical trials. Nevertheless, further studies are urgently needed to investigate and optimize a number of variables in the human MSC culture environment by developing a bioprocess that can be operated in accordance with the Good Manufacturing Product (GMP).

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