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# Convalescent plasma in Covid-19: Possible mechanisms of action

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ABSTRACT

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is responsible of the coronavirus disease 2019 (COVID-19) pandemic. Therapeutic options including antimalarials, antivirals, and vaccines are under study. Meanwhile the current pandemic has called attention over old therapeutic tools to treat infectious diseases. Convalescent plasma (CP) constitutes the first option in the current situation, since it has been successfully used in other coronaviruses outbreaks. Herein, we discuss the possible mechanisms of action of CP and their repercussion in COVID-19 pathogenesis, including direct neutralization of the virus, control of an overactive immune system (*i.e.*, cytokine storm, Th1/Th17 ratio, complement activation) and immunomodulation of a hypercoagulable state. All these benefits of CP are expected to be better achieved if used in non-critically hospitalized patients, in the hope of reducing morbidity and mortality.

## 1. Introduction

Viruses of the *Coronaviridae* family have a positive-sense, single strand, RNA structure with 26 to 32 kilobases length [1]. Coronaviruses have been recognized in numerous avian hosts and in several mammals, such bats, camels, mice, cats, dogs and more recently in scaly anteaters [2–4]. Most of Coronaviruses are pathogenic to humans but they produce mild symptoms or asymptomatic infections. However, in the last two decades two lethal viruses have emerged within this family: the severe acute respiratory syndrome (SARS) coronavirus (SARS-CoV) [5], and the Middle East respiratory syndrome (MERS) coronavirus (MERS-CoV) [6]. These are characterized by severe fever (85%), non-productive cough (69%), myalgia (49%) and dyspnea (42%), with a high frequency of admission to intensive care unit (ICU) [5,7].

In December 2019, a new member of the *Coronaviridae* family associated with severe pneumonia was detected in Wuhan, China [8]. Patients showed similar clinical findings to SARS-CoV and MERS-CoV given by high fever, dyspnea, and chest radiographs revealing invasive multilobed lesions [9,10]. The virus was initially termed as 2019 novel coronavirus (2019-nCoV) [8], and it is currently known as SARS-CoV-2 producing the coronavirus disease 2019 (COVID-19). The origin of the virus is unknown, however, a recent study showed that the virus shares

*Abbreviations:* 2019-nCoV, 2019 novel coronavirus; ACE-2, Angiotensin converting enzyme-2; ADE, Antibody-dependent enhancement; BAFF, B cell–activating factor; BCR, B-cell receptor; COVID-19, Coronavirus disease 2019; CP, Convalescent plasma; DCs, Dendritic cells; E, Envelope; HIV, Human immunodeficiency virus; ICU, Intensive care unit; IgG, Immunoglobulin G; IgM, Immunoglobulin M; IVIg, Intravenous immunoglobulin; M, Membrane; MERS, Middle East respiratory syndrome; MERS-CoV, MERS coronavirus; N, Nucleoprotein; NAbs, Neutralizing antibodies; NAT, Nucleic acid test; S1-RBD, Spike1-receptor binding protein; SARS, Severe acute respiratory syndrome coronavirus; SARS-CoV, SARS coronavirus.

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