

# The influence of SARS-COV-2 infection on the production of cytokines by peripheral blood mononuclear cells and neutrophils in COVID-19 ICU patients.

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## Abstract

The COVID-19 pandemic is spreading globally with a worrying mortality rate. There is a crucial necessity for effective therapeutic approaches to fight potentially deadly complications. Unique medical features of severe COVID-19 include neutrophilia, and cytokine storm, besides acute respiratory distress syndrome and severe inflammatory syndrome. Here, we propose investigating the influence of SARS-CoV-2 infection on the cytokines profile of peripheral blood mononuclear cells (PBMC) and neutrophils in COVID-19 patients. This study examines PBMC and neutrophils as a potential target for the immunopathologic complications of severely ill COVID-19 patients. Neutrophils and PBMC were separated by density gradient sedimentation and stimulated with a mitogen. Culture supernatants from 100 COVID-19 patients and 100 sex and age- matched healthy control (HC) were evaluated for levels of GM-CSF, interferon (IFN)- $\alpha$ , IFN- $\gamma$ , Interleukin (IL)-2, -4, -5, -6, -9, -10, -12, -17A, and tumor necrosis factor (TNF)- $\alpha$  by using the MACSplex cytokine kit. The PBMC cytokine profiles showed significantly lower mean values for IL-6 and IL-10 ( $p < 0.0001$ ) of COVID-19 patients compared to HC. In contrast, COVID-19 patients showed higher mean levels of PBMC cytokine values for IL-5 ( $p < 0.05$ ), and IL-17A ( $p < 0.0001$ ). As for neutrophils, COVID-19 patients showed significantly lower mean values in the levels of GM-CSF, IFN- $\gamma$ , IL-4, IL-6, IL-9, IL-10, IL-12, IL-17A, and TNF- $\alpha$  ( $p < 0.0001$ ). Our results suggest that SARS-CoV-2 infection brings about an immunomodulatory effect not only PBMC but also to a greater extent on neutrophils. Such studies may aid in finding novel targets for therapeutic interventions.

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## Biography

Sahar Sultan Essa is an Assistant Professor in the Department of Microbiology, Faculty of Medicine, Kuwait University, Kuwait. She holds a Ph.D. in Virology from Warwick University, U.K. She has her experience and passion in improving her knowledge about respiratory viruses and viral immunopathology. Her

published work reflects years of practice, experience, and dedication to research. Her research shed light on the impact of the circulating respiratory viruses and the cellular immune responses to Cytomegalovirus and Hepatitis C virus.