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MILLIPLEX® Multiplex Panels for Research Applications in COVID-19 (SARS-CoV-2)

Cytokine Storm Biomarker Quantitation

What is a "cytokine storm"?

When the immune system overreacts to a pathogen or other immunogenic substance such as a drug, a hyperinflammatory response may trigger excess production of signaling molecules from immune cells. This is referred to as cytokine storm syndrome (CSS) or cytokine release syndrome (CRS). Acute or systemic inflammation results in fluid buildup in the lungs, respiratory distress, multiple organ failure, and can be fatal.

How does CSS relate to COVID-19 (SARS-CoV-2)?

In response to SARS-CoV-2 viral infection of the lungs, a cytokine storm can result. Over-produced immune cells and their signaling molecules cause a local inflammatory response in the lungs leading to respiratory distress and reduced blood oxygen levels. A cytokine storm can contribute to severe clinical symptoms and poor patient outcomes.

Some early publications on the cytokine profile for COVID-19 have found increased levels of IL-2, IL-7, G-CSF, IP-10, MCP-1, MIP-1α, TNFα, and Ferritin.[1] In a separate study, IL-6 was also found to increase with SARS-CoV-2 infection.[2] Tocilizumab, an immunosuppressive monoclonal antibody therapy that targets the IL-6 receptor (IL-6R) has been approved for Phase III clinical trials by the FDA for the treatment of COVID-19 pneumonia as of March 26, 2020. IL-1β, IL-1RA, IL-8, IL-9, IL-10, FGF-basic, GM-CSF, IFNγ, MIP-1β, PDGF, and VEGF have also been shown to be increased in COVID-19 patients compared to healthy subjects.[3]

CSS research with non-human primate models

Research on SARS-CoV-2 is also being conducted in animal models such as rhesus macaques, which will allow researchers to test possible vaccines and antiviral medications/treatments in an animal model. A preprint article used MILLIPLEX® non-human primate assays to analyze serum over multiple time points for changes in cytokine and chemokine levels, and showed increases in IL-1RA, IL-6, IL-10, IL-15, MCP-1, MIP-1β, along with a decrease in TGFα.[4]

How can MILLIPLEX® multiplex immunoassays help us understand the human immune response to SARS-CoV-2?

Our MILLIPLEX® multiplex immunoassays offer researchers the ability to simultaneously quantitate a large number of analytes critical to understanding the immune response in humans. Our 48-plex Human Cytokine/Chemokine/Growth Factor Panel A saves time and sample volume for a snapshot of analyte profiles during a cytokine storm, sepsis, or other disease states. We offer a wide array of MILLIPLEX® soluble protein panels and cell signaling kits to help elucidate the downstream signaling pathways when researching anti-viral immune response.

Our portfolio offers the widest range of analytes across the most species, including non-human primate panels for vaccine research.

References

1. Mehta, P., et al. 2020. COVID-19: consider cytokine storm syndromes and immunosuppression. Lancet Published Online March 12, 2020 https://doi.org/10.1016/S0140-6736(20)30630-9
2. Ruan, Q., et al. Clinical predictors of mortality due to COVID-19 based on an analysis of data of 150 patients from Wuhan, China. Intensive Care Med (2020). https://doi.org/10.1007/s00134-020-05991-x
3. Huang, C., et al. 2020. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Published Online January 24, 2020 https://doi.org/10.1016/S0140-6736(20)30183-5
4. Munster, V., et al. 2020. Respiratory disease and virus shedding in rhesus macaques inoculated with SARS-CoV-2. bioRxiv 2020.03.21.001628; doi: https://doi.org/10.1101/2020.03.21.001628. This article is a preprint and has not been certified by peer review

Comparison of Sepsis vs. Normal Serum/Plasma Samples Using MILLIPLEX® Human Cytokine Panel A

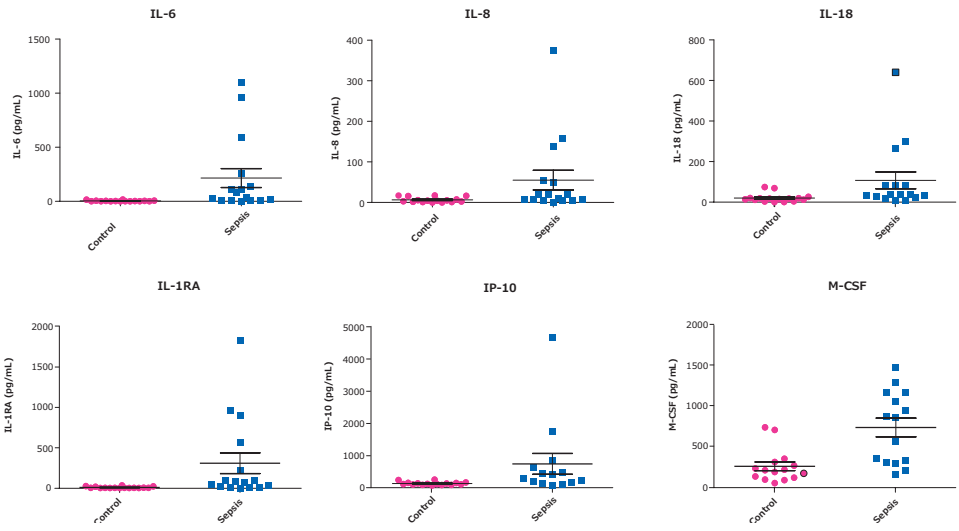

Figure 1. Healthy control (n=20) and sepsis patient (n=16) serum/plasma samples (obtained from BioIVT, Discovery, and BioChemed) were tested neat (25 µL/well) in the HCYTA-60K panel. Shown here are a subset of the analytes which have been mentioned in recent publications to be increased in SARS-CoV-2 cytokine release syndrome (CRS).

Product Information

MILLIPLEX® Kit	Cat. No.
Human Serum/Plasma and Cell/Tissue Culture Samples	
Cytokine/Chemokine/Growth Factor Panel A **NEW**	**HCYTA-60K**
Cytokine/Chemokine Panel I	**HCYTOMAG-60K**
Cytokine/Chemokine Panel II	**HCYP2MAG-62K**
Cytokine/Chemokine Panel III	**HCYP3MAG-63K**
Cytokine/Chemokine Panel IV	**HCYP4MAG-64K**
IL-18 Singleplex	**HIL18MAG-66K**
High Sensitivity T Cell, 96-well, 384-well	**HSTCMAG-28K, HSTC384-28K**
Th17	**HTH17MAG-14K**
CD8+ T Cell	**HCD8MAG-15K**
Soluble Cytokine Receptor	**HSCRMAG-32K**
Complement Panels 1, 2	**HCMP1MAG-19K, HCMP2MAG-19K**
TIMP Panels 1, 2	**HTMP1MAG-54K, HTMP2MAG-54K**
Multi-Species TGFβ Singleplex, 3-plex	**TGFBMAG-64K-01, TGFBMAG-64K-03**
Sepsis Panels 1, 2, 3	**HSP1MAG-63K, HSP2MAG-63K, HSP3MAG-63K**
Immunoglobulin Isotyping	**HGAMMAG-301K**
IgE Singleplex	**HGAMMAG-303E**

MILLIPLEX® Kit	Cat. No.
Non-Human Primate Serum/Plasma and Cell/Tissue Culture Samples	
Cytokine/Chemokine Panel I	**PRCYTOMAG-40K**
Cytokine/Chemokine Panel II	**PRCYT2MAG40K**
Cell Signaling Kits Cell/Tissue Lysate Samples	
Multi-Pathway 9 Plex	**48-680MAG (phospho-), 48-681MAG (total)**
NFκB 6 Plex	**48-630MAG**
STAT (Phospho) 5 Plex	**48-610MAG**

MILLIPLEX® kits are manufactured in facilities which are ISO 9001-2015 compliant and are for research use only (RUO), not for use in clinical or for medical diagnostic purposes.

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