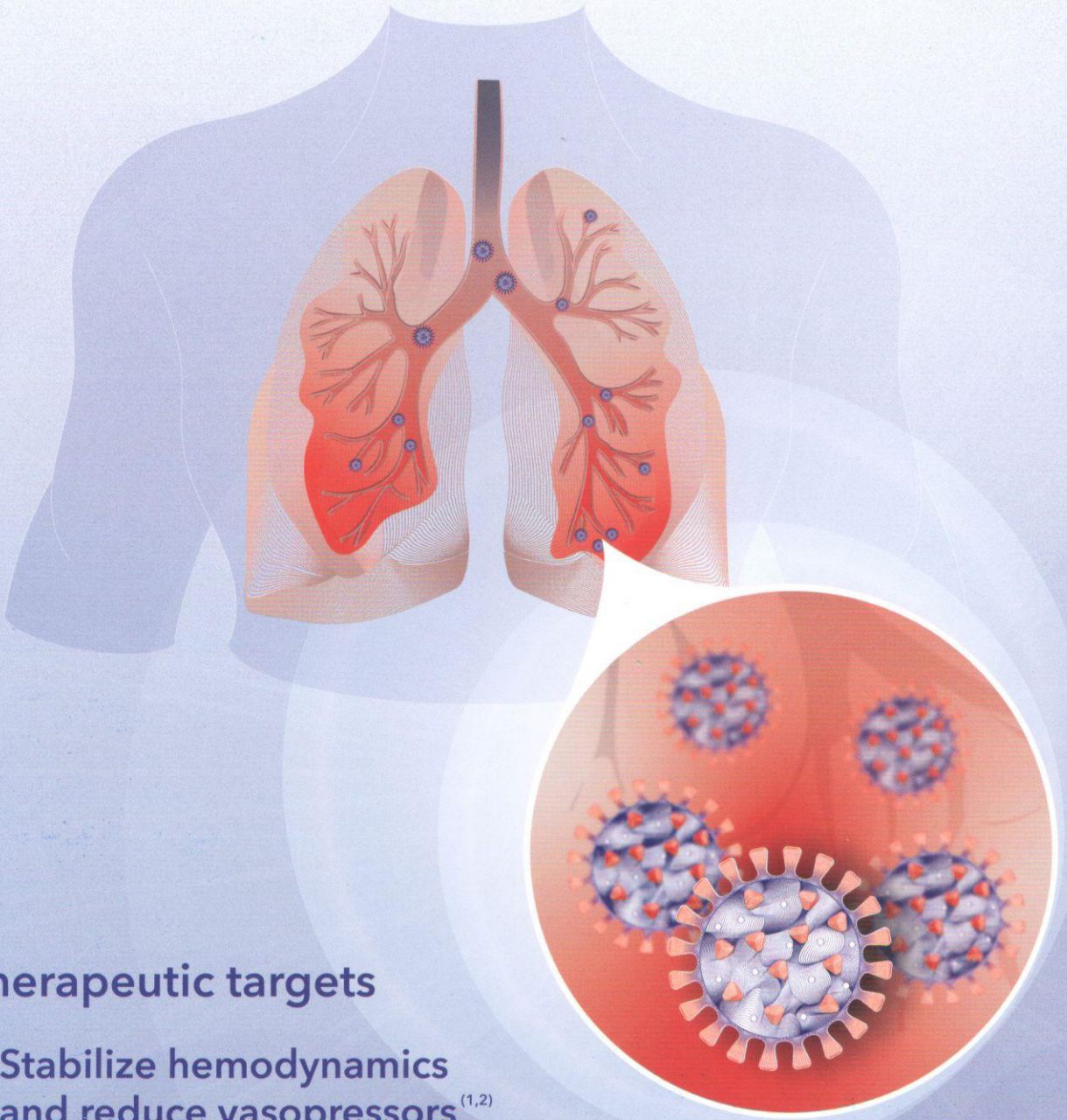
CytoSorbents™

# CytoSorb Therapy

## Manage cytokine storm in patients with COVID-19

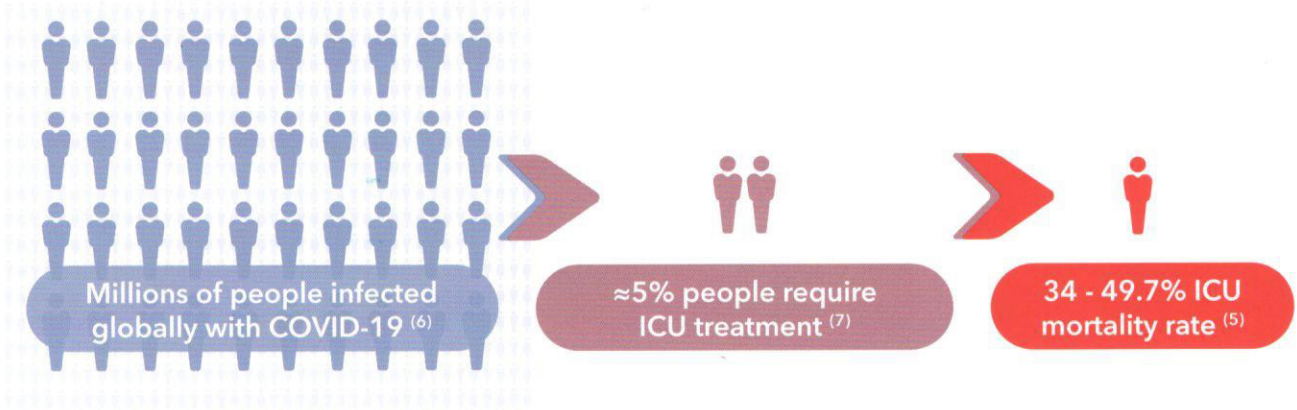


## Therapeutic targets

- Stabilize hemodynamics and reduce vasopressors [1,2]
- Reduce inflammatory mediators [2,3]
- Support lung function [1,4]

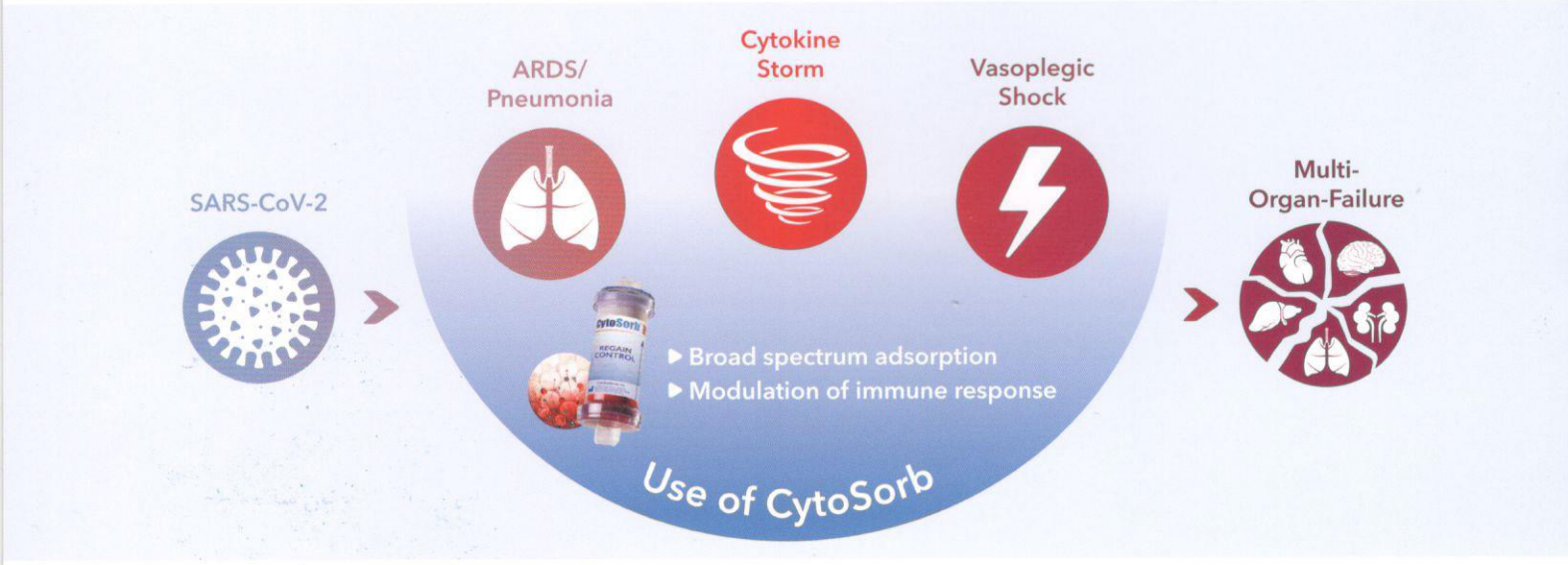
# Background

Limited treatment options are currently available for critically-ill COVID-19 ICU patients who may experience mortality rates up to 50%. [5]




## Action of CytoSorb Therapy

CytoSorb Therapy reduces cytokines and targets the underlying pathophysiology in critically-ill COVID-19 patients. Cytokine storm may be a key component in many critically-ill COVID-19 patients and controlling the inflammatory response may be as important as targeting the virus. [8]




## Use of CytoSorb Therapy

Formal and expert recommendations for CytoSorb Therapy are now in place in many countries. The FDA in USA granted CytoSorb Therapy Emergency Use Authorization for use in critically-ill COVID-19 patients with imminent or confirmed respiratory failure.


100,000+ CytoSorb treatments

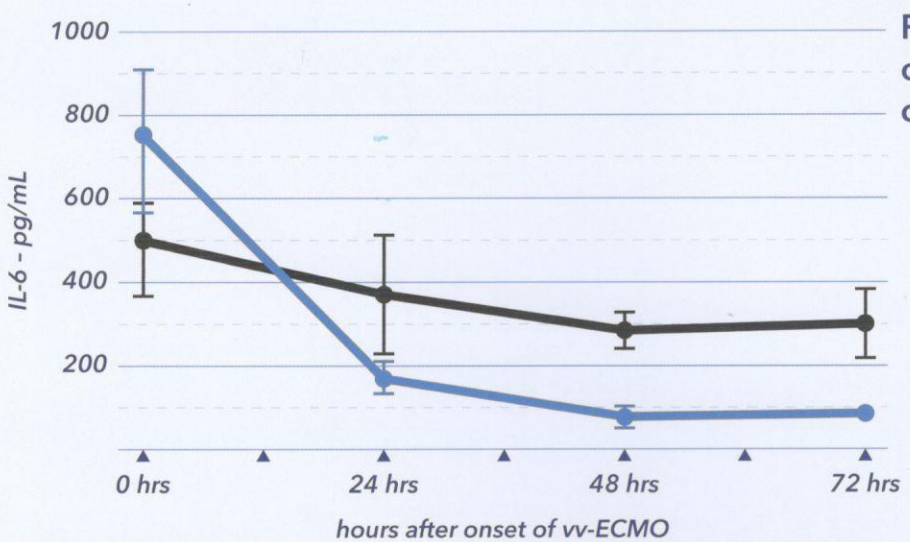
Thousands of COVID-19 treatments

Recommended & used globally


R&D Blueprint Non-drug Life Support [9]

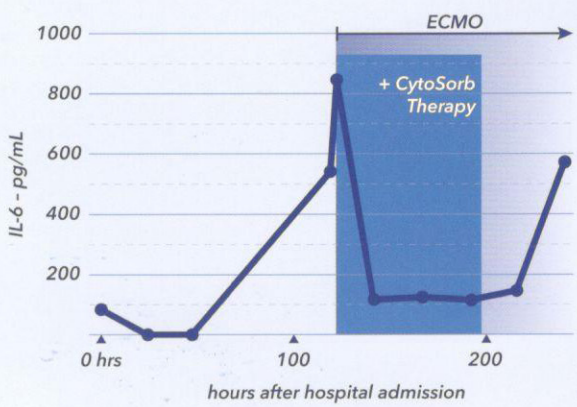
## Current status

### Preliminary data in COVID-19 patients have shown reductions in IL-6, enhancements in oxygenation and hemodynamics [1,2,3,4]

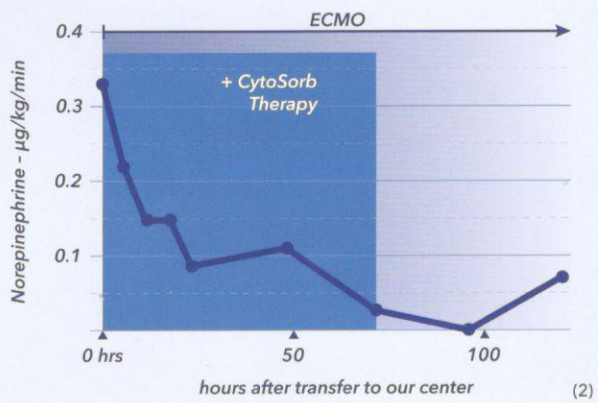



**Preliminary data from an ongoing randomized controlled trial** [3]

- *vv-ECMO without CytoSorb Therapy (n=4)*
- *vv-ECMO with CytoSorb Therapy (n=4)*




(2)




(2)

### CytoSorb Therapy has demonstrated:

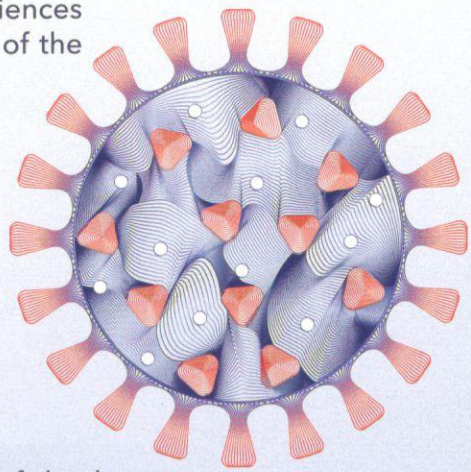
- To be a crucial adjunctive therapy in treating critically-ill COVID-19 patients. [4,10,11]
- Rapid hemodynamic stabilization in patients with refractory septic shock and cytokine storm. [12,13,14]
- The potential to improve lung function in sepsis-associated ARDS patients. [12,13]
- The potential to support the liver dysfunction frequently seen in severe COVID-19 cases. [15,16]
- Promising results in haemophagocytic lymphohistiocytosis (HLH), which can resemble severe cases of COVID-19. [17,18]
- An excellent safety profile In other situations with a dysregulated immune response. [19,20]

**CytoSorb Therapy may be a promising and important therapeutic option to help manage the serious complications caused by cytokine storm and hyperinflammation in critically-ill COVID-19 patients.** [4,10,11,21]

# CytoSorbents™

## Criteria for considering CytoSorb in COVID-19 patients

Based on international guideline recommendations, as well as experiences in the field, CytoSorb Therapy should be considered, if one or more of the following criteria is met without response to standard therapy:



- Refractory vasoplegic shock (NE > 0.3 µg/kg/min, lactate↑) [22,*]
- Moderate ARDS [22]
- ECMO / ECLS [22]
- AKI stage III with start CRRT [23]
- H-Score suggesting sHLH [17,18]

* Start CytoSorb Therapy early, preferably within 6 hours of the onset of shock.

***"In order to improve the chances of patients with severe COVID-19 associated ARDS with a correspondingly high mortality, as a standard approach, CytoSorb should be integrated into the ECMO system directly from the start of ECMO therapy in every COVID-19 patient"***

Buchwald D et al., CytoSorb Case of the Week 38 / 2020 [24]

EXPLORE **Clinical decision support** *cyto.news/clinical-decision-support*

EXPLORE **COVID-19 website** *cyto.news/covid-19*


References:

1. Maritati F et al., Transpl Infect Dis 2020; e13377
2. Rieder M et al., Artif Org 2020; epub.
3. Rieder M et al., Critical Care 2020; 24:435
4. Berlot G et al., Nephron 2020; 114 (9): 459 - 62
5. Armstrong RA et al., Anaesthesia 2020; 75: 1340 - 9
6. John Hopkins University & Medicine. "CORONAVIRUS RESOURCE CENTER.", *coronavirus.jhu.edu/*. Domain record activated: 19-Mar-1987
7. Santhosh S.B. et al., J Drug Target 2020; 28(7-9):755 - 9
8. Tay MZ et al., Nat Rev Immunol 2020; 6:363 - 74
9. WHO R&D Blueprint - COVID 19 - Experimental Treatments. 28 April 2020
10. Napp LC & Bauersach J., Shock 2020; 54 (5): 700 - 1
11. Gao Y-M et al., J Intern Med 2020; epub
12. Kogelmann K et al., J Intensive Care Soc 2020; 21(2): 183 - 90
13. Akil et al., Thorac Cardiovasc Surg 2020; epub
14. Friesecke S et al., J Artif Organs 2017; 20(3): 252 - 259
15. Zhang C et al., Lancet Gastroenterol Hepatol 2020; 5(5): 428 - 30
16. Calabro MG et al., Artif Organs 2019; 43:189-194
17. La Rosee P et al., Blood 2019; 133(23): 2465-2477
18. Mehta P et al., Lancet Rheumatol 2020; 2(6): e358 - 67
19. Schaedler D et al., PLoS One 2017;12(10):e0187015
20. Friesecke S et al., Med Klin Intensivmed Notfmed 2019;114(8):699-707
21. Ronco C et al., Blood Purif 2020; epub
22. Asociación Panameñade Medicina Criticay TerapiaIntensiva, Guías Nacionales de atención de pacientes adultos COVID-19 Version 2.0
23. Brescia Renal Covid Task Force: Alberici Fetal., Gestionedel paziente in dialisie con trapianto di rene in corso di infezione da coronavirus COVID-19
24. Buchwald D et al., Case of the Week 38 / 2020 published on: *literature.cytosorb-therapy.com*


Visit **https://literature.cytosorb.com** for an overview of all references


**CytoSorbents Europe GmbH**

Müggelseedamm 131
12587 Berlin | Germany

T +49 30 65 49 91 45
F +49 30 65 49 91 46
support@cytosorbents.com


follow us on | www.cytosorb.com