

Hemoadsorption (CytoSorb®) in management of Cytokine Storm - Implication in COVID-19 pandemic.

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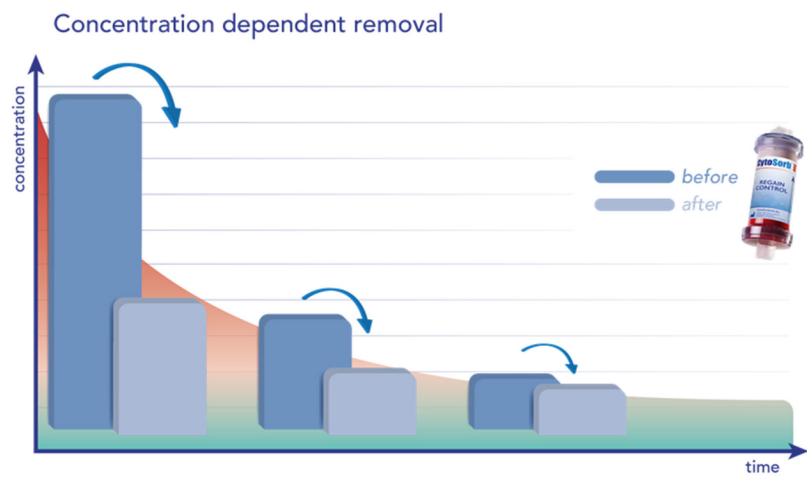
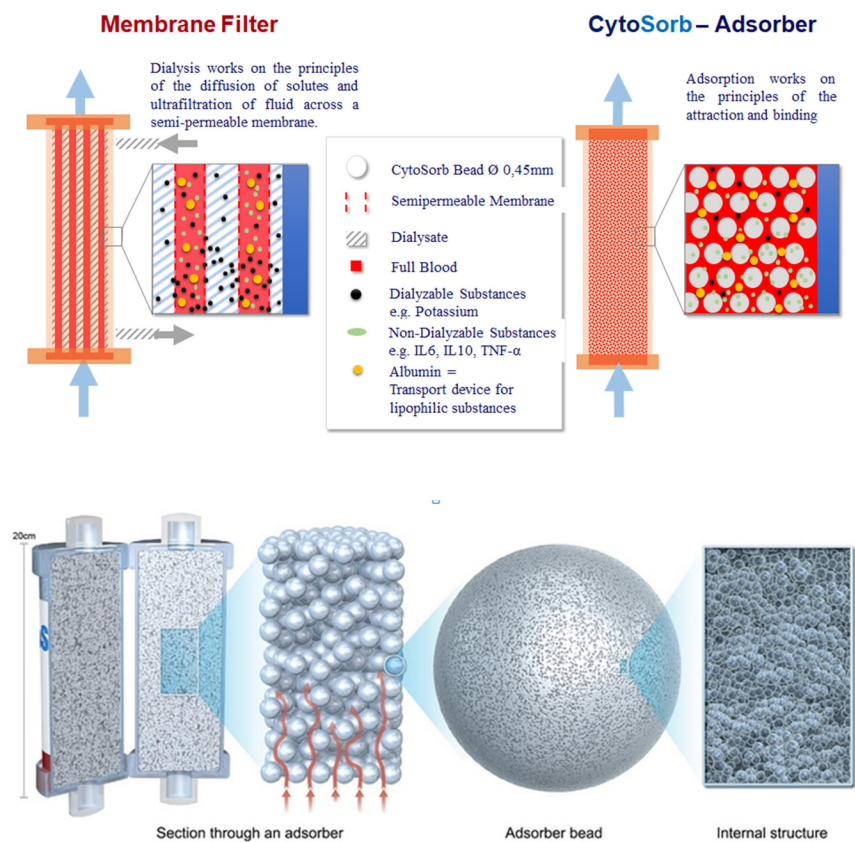
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Abstract

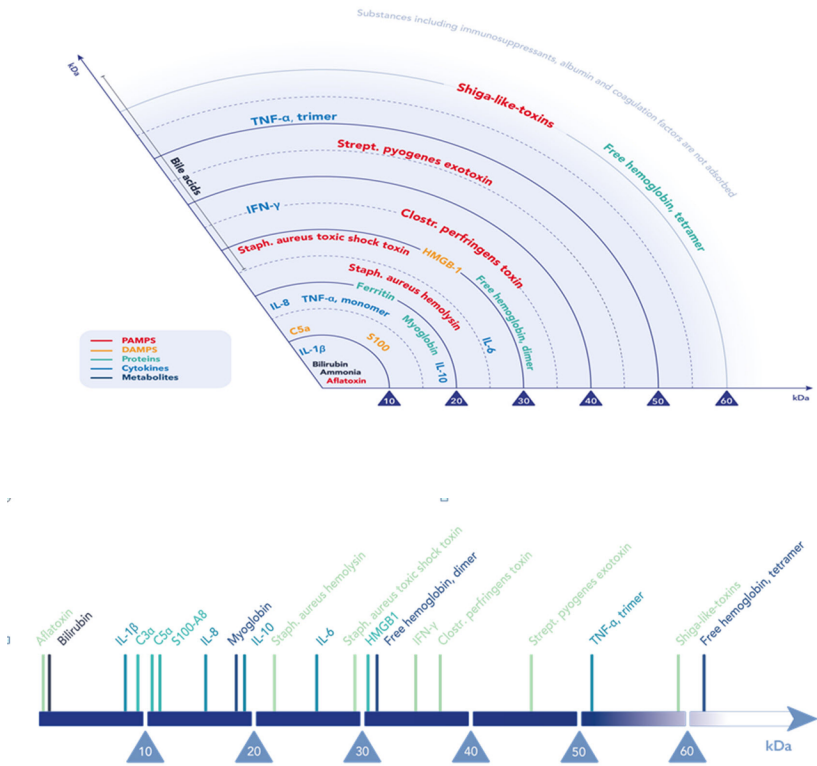
Background: Sepsis-related deaths contribute up to 20% of all global deaths, with the highest-burden from sub-Saharan Africa and Southeast Asia. Cytokines are the mediators of organ dysfunction in systemic inflammatory response syndrome (SIRS) across varied aetiologies, including sepsis. The imbalance of pro and anti-inflammatory cytokines continues to be the crux of the pathophysiology of organ dysfunction in septic shock. Therapies to treat cytokines either by antagonizing them or filtering them out of the body are evolving. Hemoadsorption is a process of filtering out cytokines and other metabolites involved in SIRS by surface adsorption. Methods: We searched for terms – Hemoadsorption; CytoSorb; in PubMed. We enrolled manuscripts with patients at Indian Centres for review. We extend our review of cytokine storm in COVID-19 and the utility of CytoSorb as an adjuvant in the management of septic shock in COVID-19. Results: Severe acute respiratory syndrome coronavirus -2 (SARS-CoV-2) infection causing COVID-19 (Corona Virus disease - 2019) pandemic has affirmed cytokine storm as the principle pathology causing morbidity and mortality. Management strategies are mostly supportive since specific anti-viral therapy is still in the incipient stage. Cytokine adsorption is being used across most western countries in COVID-19 septic shock. Conclusion: COVID-19 with cytokine storm as its main pathology is a suitable substrate for the use of CytoSorb. COVID-19 patients with elevated cytokine levels can be offered CytoSorb® hemoadsorption along with other supportive therapies.

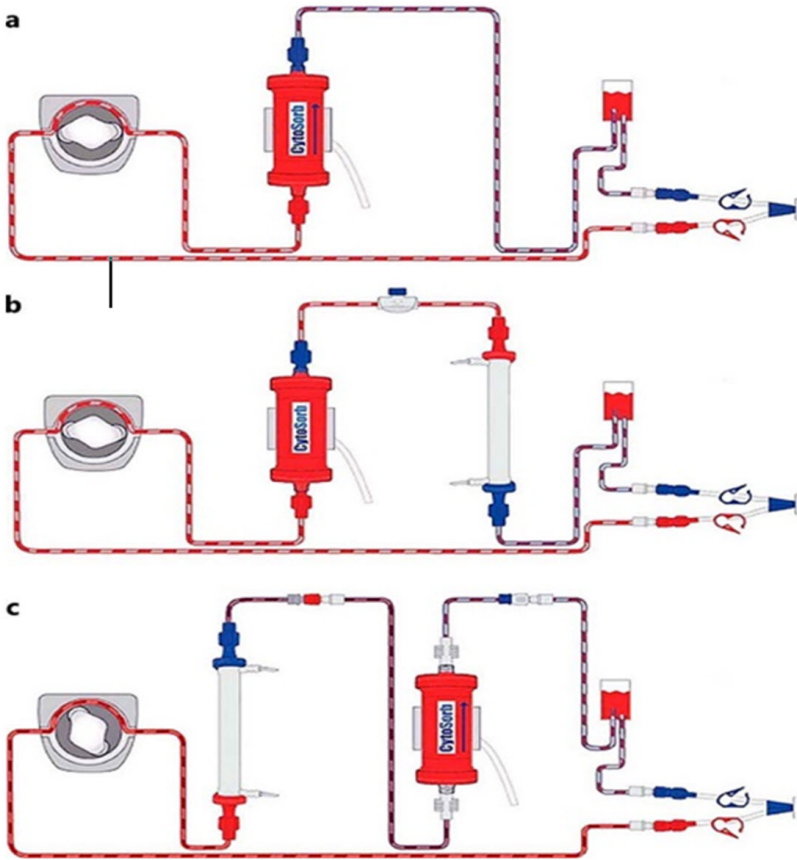
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CytoSorb adsorption spectrum





Clinical Variables	Severity Score			Patient Score (Take highest score of any variable in each segment)
	1	2	3	
Hemodynamic Parameter				
MAP	>70 mmHg With or without vasopressor support	> 65 mmHg High dose single Vasopressors (0.3mcg/ml)	> 65 mmHg High dose of multiple Vasopressors	
Septic Shock	< 24hrs	24 – 48hrs	> 48hrs	
Renal Parameter				
Acute oliguria	< 0.5 mL/kg/h for 6 hours	< 0.5 mL/kg/h for 12 hours or longer	< 0.3 mL/kg/h for 24 hours or anuria for 12 hrs	
S. Creatinine	Increase to > 1.5 fold	Increase to > 2 fold	> 4 mg/dL or greater	
RRT	Not on RRT	On RRT < 24 hrs	On RRT > 24 hrs	
Respiratory Parameter				
Arterial hypoxemia	PaO ₂ /FIO ₂ < 300	PaO ₂ /FIO ₂ < 200	PaO ₂ /FIO ₂ < 100	
Mechanical Ventilation	Not Required	May require	High PEEP	
Lab Parameters				
S. Lactate	< 2 mmol	2- 3.9 mmol	> 4 mmol	
PCT	< 1ng/ml	1-3 ng/ml	> 3 ng/ml	
CRP	<100 mg/ dL	100 – 200 mg/ dL	> 200 mg/ dL	
Sepsis Scores				
SOFA Score OR qSOFA	< 8 < 1	8 – 12 1-2	>12 > 2	
APACHE 2	< 20	20 – 25	> 25	
Total Score				

Please note Patient may have one or multiple clinical variable in each segment. The highest variable should be considered for Patient Score

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