Hemoadsorption with CytoSorb in critically-ill pediatric patients: potential clinical applications and practical use

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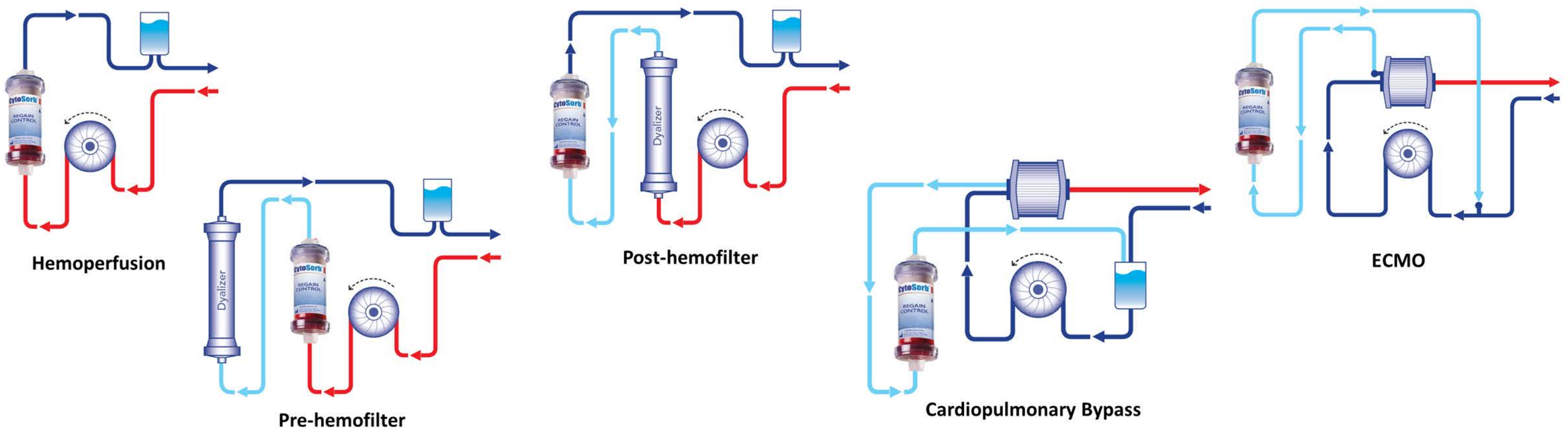
Background

In recent years, several extracorporeal techniques for the treatment of critically-ill patients have been introduced in the clinical practice. Blood purification via adsorption seems to be a promising adjuvant therapy in critical patients characterized by overwhelming inflammation and elevated levels of toxic molecules in the bloodstream. Hemoperfusion with CytoSorb is a safe and well-tolerated therapy in critically-ill patients, including children, and seems to play a fundamental role in the modulation of peak concentration with consequent hemodynamic and metabolic stabilization. The large adsorbent surface area allows an efficient modulation of the target molecules, also in relation to the amount of blood purified and especially in children, characterized by a lower blood volume.

Materials and Methods

Latest clinical evidences suggest a potential application of blood purification techniques in different clinical contexts, such as sepsis and septic shock, liver failure, rhabdomyolysis, critically-ill conditions requiring ECMO support, cardiogenic shock, ARDS, HLH syndrome, Severe Multisystem Inflammatory Syndrome (MIS-C), Cytokine Release Syndrome, drug removal. The versatility of CytoSorb allows its use in several configurations: hemoperfusion, together with CKRT, during CPB and ECMO support. According to the IFU, the adsorbent cartridge can be inserted in the CKRT circuit in series with the hemofilter, in a pre- or post-filter position, depending on the type of machine, and in the CPB/ECMO circuit in parallel position. Regardless of the chosen configuration, CytoSorb is flushed by gravity with saline solutions and, if necessary, primed with 120 ml of albumin or blood at discretion of the attending physicians, in order to reduce the possible hemodilution. It is normally suggested to change the absorber every 24 hours or, according to the latest FDA indications, every 12 hours in the first day and every 24 hours for two more days, followed by a clinical assessment after 72 hours to evaluate the clinical benefit for continuation of therapy.



Conclusions

Blood purification with CytoSorb is a useful adjuvant therapy in severe critically-ill patients. Potential efficacy has been shown in different promising clinical pictures characterized by overwhelming inflammation and elevated levels of toxic molecules (septic shock, CRS after CAR-T cells, MIS-C, HLH...). Its early use – within 24h from shock onset – is suggested and supported by literature evidences. The amount of blood purified – exacerbated in pediatric patients – seems to be directly linked to the efficacy and clinical benefits. Preliminary results on drug monitoring seem to be promising, but need to be more investigated in order to achieve quality standard protocols. International Multicentric Investigations, such as registries and study protocols of precision and individualized medicine, are required to collect more clinical evidences.

References

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