**The Role of Extracorporeal Blood Purification Techniques in the Treatment of Septic Shock: a review based on the recent position paper by Bottari et al (1), with particular consideration of CytoSorb hemoadsorption therapy**

**Moving away from a "One Size Fits All" to a more individualized approach**

While hemoadsorption has demonstrated positive effects in septic shock, it is important to recognize that each patient is unique, and there is no universal solution to managing this complex condition. Therefore, hemoadsorption should be individualized, considering factors such as the patient phenotype, severity of the septic shock, type of the underlying infection, and also response to other treatments. A "one size fits all" approach is not appropriate for sepsis management, and personalized treatment strategies are crucial for optimizing outcomes. Decisions about when to initiate hemoadsorption, how long to continue the therapy, and at what dosing parameters should be based on clinical judgment, closely monitoring the patient's progress under established standard therapies, and adapting adjunctive treatments like CytoSorb to their evolving needs.

Clinical and preclinical studies have shown that early intervention with hemoadsorption within 24 hours of diagnosis can improve hemodynamics, organ perfusion, and capillary blood flow. Though further large-scale trials are needed, available studies indicate that hemoadsorption may lead to significant improvements in hemodynamic stability, lactate clearance and reduction of inflammatory markers. Furthermore, higher survival rates have been described in the literature with appropriate use of the therapy in adequately selected patients.

The optimal timing and dosing of hemoadsorption are critical to its effectiveness. Early intervention in the first 24 hours and an adequate blood flow rate and therapy duration are essential to achieve maximum benefits in cytokine removal and improvement in microcirculation and organ function. To ensure continued maximum efficacy, exchange intervals of 8 to max 12 hours on the first days of treatment are recommended.

**Perspectives beyond mortality as a primary endpoint in clinical studies**

Future clinical studies investigating hemoadsorption in septic shock should not focus solely on mortality as the primary endpoint. While survival remains an important outcome, it does not capture the full spectrum of patient recovery. Morbidity-related endpoints such as hemodynamic stability, duration of organ replacement therapy, and resolution of organ dysfunction should be prioritized. These endpoints provide a more comprehensive picture of patient recovery, as they reflect improvements in organ function and the ability to stabilize critical parameters, which are essential for long-term survival and quality of life. Focusing on functional recovery and time to recovery from organ failure may offer a better understanding of the true benefits of hemoadsorption in septic shock.

**Future developments**

To date, CytoSorb hemoadsorption has been used worldwide in more than 250,000 single treatments in a wide variety of indications including but not limited to septic shock, and has proven to generally be a safe and well tolerated extracorporeal blood purification treatment. Numerous preclinical and clinical datasets highlight the efficacy of the therapy for removal of excess inflammatory mediators and other harmful proteins, including endothelial damaging substances and PCT, as well as the resulting clinical benefits in regard to micro- and macrohemodynamics, fluid balance and organ function. Ongoing and future research is targeted at even better defining individualized patient selection and treatment modalities, to further improve and optimize extent and reproducibility of therapeutic response and patient outcomes.

**Conclusion**

Over the past years, hemoadsorption has been established as a beneficial adjunctive therapy for septic shock that targets the inflammatory cascade and improves microcirculatory function and endothelial integrity, when appropriately applied in terms of patient selection and treatment modalities. By removing inflammatory mediators and reducing endothelial damage, hemoadsorption helps restore vascular function and improve organ perfusion. Early application and individualized dosing are crucial for achieving the best outcomes. Rather than following a "one size fits all" approach, hemoadsorption should be tailored to the unique needs of each patient, based on patient phenotype, clinical context and the individual response to therapy. Future research should shift focus from solely mortality to morbidity-related outcomes, such as hemodynamic stability and duration of organ replacement therapy, to provide a more nuanced assessment of treatment effectiveness.

Reference:

1. **Use of extracorporeal blood purification therapies in sepsis: the current paradigm, available evidence, and future perspectives**

Bottari G, Ranieri VM, Ince C, Pesenti A, Aucella F, Scandroglio AM, Ronco C, Vincent JL.

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