Hemofiltration device, system and method for a high blood flow extracorporeal circuit

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Field
Hemofiltration
Dialysis
Intensive care
Renal Replacement

Technology
Hemofiltration
High Blood Flow
Extracorporeal Circuit
Renal Replacement Therapy

Advantages
Advantages here

Status
Available for licensing

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External Reference
Continuous Renal Replacement Therapy

Summary
The disclosed invention describes a hemofiltration device, system, and method designed for high blood flow extracorporeal circuits. This technology overcomes the limitations of conventional renal replacement therapy (RRT) modalities, enabling rapid solute removal from a patient's blood. It promises high-efficiency, high-flux convective solute clearance, and potentially diffusive solute clearance, offering a promising solution for rapid toxin clearance.

Market
The market for renal replacement therapies is vast and growing, driven by the increasing prevalence of acute kidney injury and chronic kidney diseases. According to the National Kidney Foundation, an estimated 37 million people in the United States have chronic kidney disease, and millions of others are at increased risk. Acute kidney injury, a common complication in critically ill patients, affects approximately 5% to 10% of patients in intensive care units, necessitating renal replacement therapy.

The hemofiltration device, system and method for a high blood flow extracorporeal circuit could revolutionize the field of renal replacement therapy. Its high blood flow rate and efficient solute removal could improve patient outcomes, reduce the duration of hospital stays, and potentially decrease healthcare costs. The technology could be particularly beneficial in intensive care settings, where patients often require rapid and efficient renal support.

The technology's potential extends beyond the treatment of kidney disorders. Its ability to rapidly clear toxins from the blood could make it a valuable tool in a variety of medical scenarios, including the treatment of sepsis and other conditions characterized by high toxin levels in the blood.

Technology
The disclosed technology revolves around a hemofiltration device, system, and method that can accommodate higher blood flows and use membranes capable of handling higher blood volumes while maintaining hemodynamic stability. The efficiency of convective solute removal is dependent upon both the hemofilter surface area and the rate of hemofiltration. Therefore, the technology aims to proportionally increase these two factors to achieve high-efficiency, high-flux convective solute clearance, and optionally diffusive solute clearance.

The hemofiltration assembly is designed for a high blood flow extracorporeal circuit, such as an ECMO circuit. It includes one or more hemofilters with a greater filter medium surface area in a circuit with higher flow rates than previously implemented RRT modalities. This design allows for rapid clearance of toxins, including those not currently dialyzable (e.g., those with high volumes of distribution).

The technology utilizes a dual-lumen catheter, which allows for simultaneous blood inflow and outflow. The blood is circulated through an extracorporeal circuit, where it is filtered to remove waste products. The filtered blood is then returned to the patient. The device also includes a blood pump, which maintains a high blood flow rate through the circuit, and a controller, which monitors and adjusts the operation of the system.

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