Hemodialysis Flow Control Device

VTIP 19-068: “Flow Controller for Dialysis Applications”

THE CHALLENGE

Hemodialysis is a common treatment for individuals with chronic kidney failure. About 2 million people around the world and 468,000 people in the U.S. alone need hemodialysis treatments. Current procedures use large amounts of ultrapure water/dialysate, which is costly and unavailable in emergency situations or medically deprived areas. More efficient hemodialysis devices need to be developed in order to bring costs down and make life-saving treatments available to all of those in need.

OUR SOLUTION

The Flow Controller for Dialysis Applications device aims to conserve both costs and water by regulating the concentration and flow of dialysate (hemodialysis wastes). We have designed, fabricated, and tested a device that controls the flow for dialysate used in hemodialysis treatment. By controlling the flow rate of dialysate around the dialyzer, we are able to alter the saturation of waste dialysate with metabolic waste molecules (such as urea and creatinine). Modulation of saturation provides opportunities to reduce the amount of dialysate consumed during each treatment (typically 120-140 liters of ultrapurified dialysate) and control extraction of electrolytes and other molecules that affect patient response to therapy. A reduction in dialysate use translates into cost savings for treatment, decreased need for large amounts of ultrapurified water that may be in short supply in emergency situations (such as hurricanes or flooding), and individualization of treatment, based on patient needs.

CONTACT:
Grant Brewer
grantb76@vt.edu
540-231-6648