# Smart Hemodialysis Device

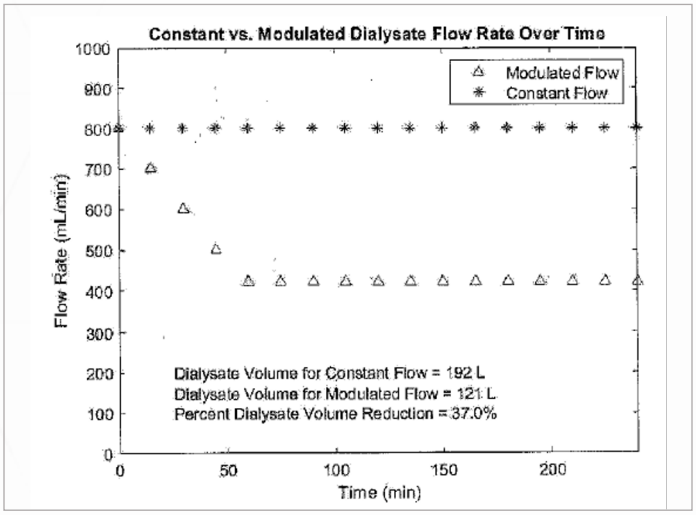
## VTIP 19-067: "Sensing Device for Sampling Composition of Aqueous Fluids Using Spectroscopic Methods and Computation"

## THE CHALLENGE

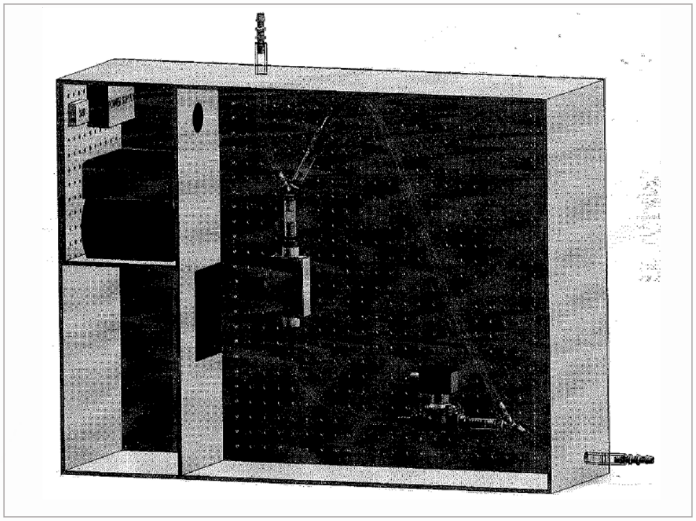
Hemodialysis is the most prevalent treatment for patients with chronic or severe kidney disease. Current treatment devices gather very little real-time information from patients to monitor how they are responding to the treatment. Clearance goals are based on monthly samples for blood concentration of metabolic waste molecules like urea and creatine. Improved devices that can use results from real time blood concentration measurements to modulate dialysate flow could lead to more personalized, cost efficient, and rapid hemodialysis treatment.

## OUR SOLUTION

The device developed by Virginia Tech's John Robertson and his team will revolutionize hemodialysis treatment by measuring the molecular composition of aqueous fluids that are intermittently sampled in real time (during treatment). The current embodiment uses Raman spectroscopic measurement and complex computational algorithms to determine the types and amounts of molecules in the fluid sample. The device is designed to measure the molecular composition of waste dialysate during hemodialysis treatment of patients with kidney failure. Using this invention should permit caregivers to determine the progress and adequacy of hemodialysis therapy and measurements could be used to modify and individualize treatment. When integrated with a flow controller, the system can conserve the amount of dialysate consumed during every treatment, reducing cost and treatment time. In other planned embodiments, this device could be used to assess the molecular composition of drinking and waste water or aqueous biological materials.




Plot showing the reduction of dialysate flow achieved with smart hemodialysis.



Picture of CAD model for the smart hemodialysis device.

CONTACT:

**Grant Brewer**
grantb76@vt.edu
540-231-6648