

Project Title: ONAMI Microchannel Hemodialyzer

Project Funding: Grant from Home Dialysis Plus and Erkkila Foundation

Project Description: Program Description: ONAMI at OSU is developing a microtechnology-based kidney dialysis dialyzer that will be part of a portable dialysis system that will allow patients to conduct dialysis therapy in the comfort of their home. Rather than having kidney dialysis therapy at a central location three to four times per week, patients can have a more comfortable therapy as they sleep each night in the comfort of their home.

The dialyzer in a kidney dialysis machine is the critical filter component responsible for clearing the blood of toxins. The unique microchannel design developed at ONAMI at OSU in partnership with Home Dialysis Plus (a Portland Oregon based biomedical firm) is ten times smaller than existing dialyzers. The unique microchannel design takes advantage of mass transfer principles for fluid flow to improve the clearance process. Early laboratory experiments show that it is 3 to 4 times more efficient in clearing the blood of toxins over conventional dialyzers. This effect together with the longer time available for dialysis to be done overnight, allows the patient to feel better and enjoy a better quality of life.

Currently, over 1.4 million Americans are in dialysis therapy daily. In 10 years, it is estimated that over 12 million people will need the treatment. To meet this demand, home dialysis must become a reality as the medical profession will not be able to afford therapy in the way it is done today, namely in centralized facilities.

The ultimate intention of the project is for someday patients to have a wearable dialysis unit that will enable them to have continuous slow dialysis similar to the functioning of a real kidney.

Student Involvement: Three graduate students are involved in this research project.

Natural Resource Utilization: Research is underway to develop the membrane filter for the dialyzer from cellulose fibers. This process is being developed in collaboration with the OSU College of Forestry.

Innovations, new companies and jobs: Portable dialysis units have both commercial and military application. As described above, the devices can be used for home dialysis. In a combat theatre, the units can be setup for usage in ambulances and mobile field hospitals. It is estimated that over 200 million dialyzer filter units per year can be sold at a cost of \$15 per unit. Home Dialysis Plus plans to manufacture and market the devices and portable machines in Portland Oregon. This technology is within two years of commercialization.

Graphic: Photograph of microchannel dialyzer.

