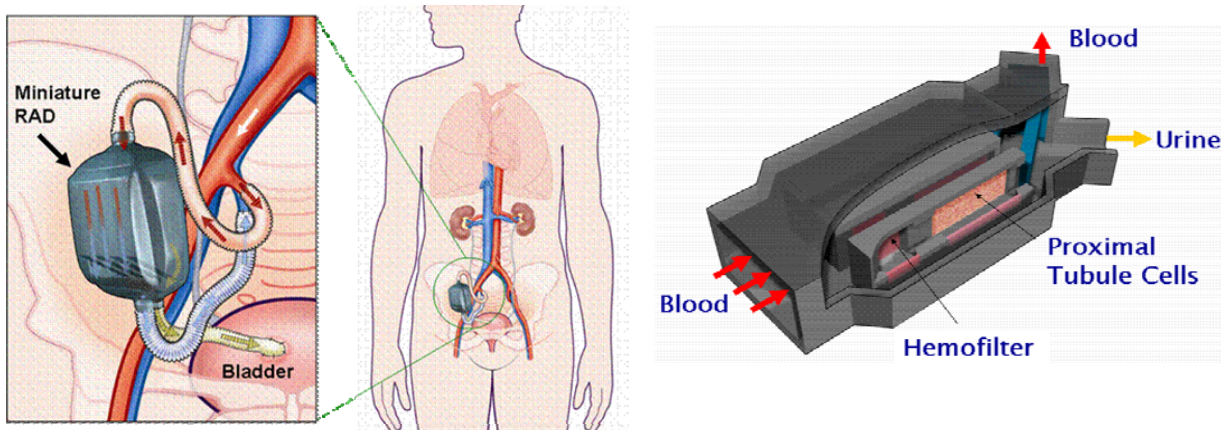
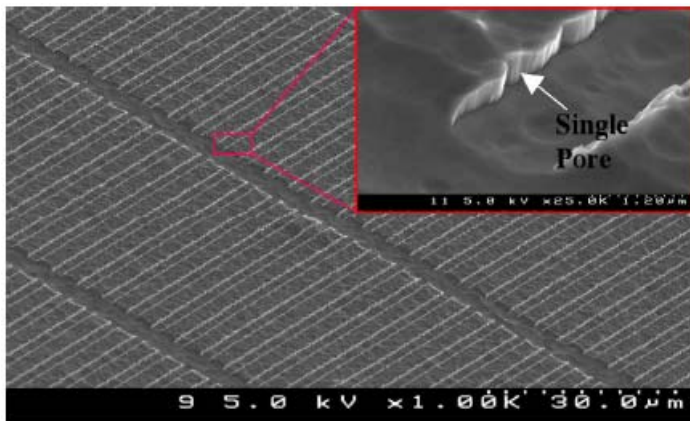


Implantable Renal Assist Device

End stage renal disease affects over 425,000 Americans with more than 300,000 patients requiring dialysis at least three times a week. In addition to the toll on quality of life, the financial cost of dialysis is immense and donor organs are far too scarce to meet this need. The long term goal of this project by Dr. Shuvo Roy from the Cleveland Clinic Foundation is to develop a miniature, implantable bioartificial kidney to potentially eliminate the majority of 50 million dialysis procedures performed annually in the US. Toward this end, a multidisciplinary team of investigators will fabricate and test an implantable, miniature, renal assist device (mini-RAD) that eliminates disposables and dialysate by coupling a biocompatible, long-life hemofilter with a bioreactor of renal tubule cells. With the integration of a sensor and actuators, the device will regulate the extracellular fluid volume and clearance of toxins. The final device will be a compact biocompatible cartridge handling afferent and efferent streams of blood and an exit stream that drains into the bladder.



Schematics of renal assist device.



Scanning electron micrograph of a silicon nanoporous membrane used for the hemofilter. Each pore is 8nm in critical dimension to allow for ultrafiltration of selected solutes.

Fissell WH, H.D. Humes, A.J. Fleischman, S. Roy. Dialysis and nanotechnology: now, 10 years, or never? *Blood Purif* 2007;25:12-7.