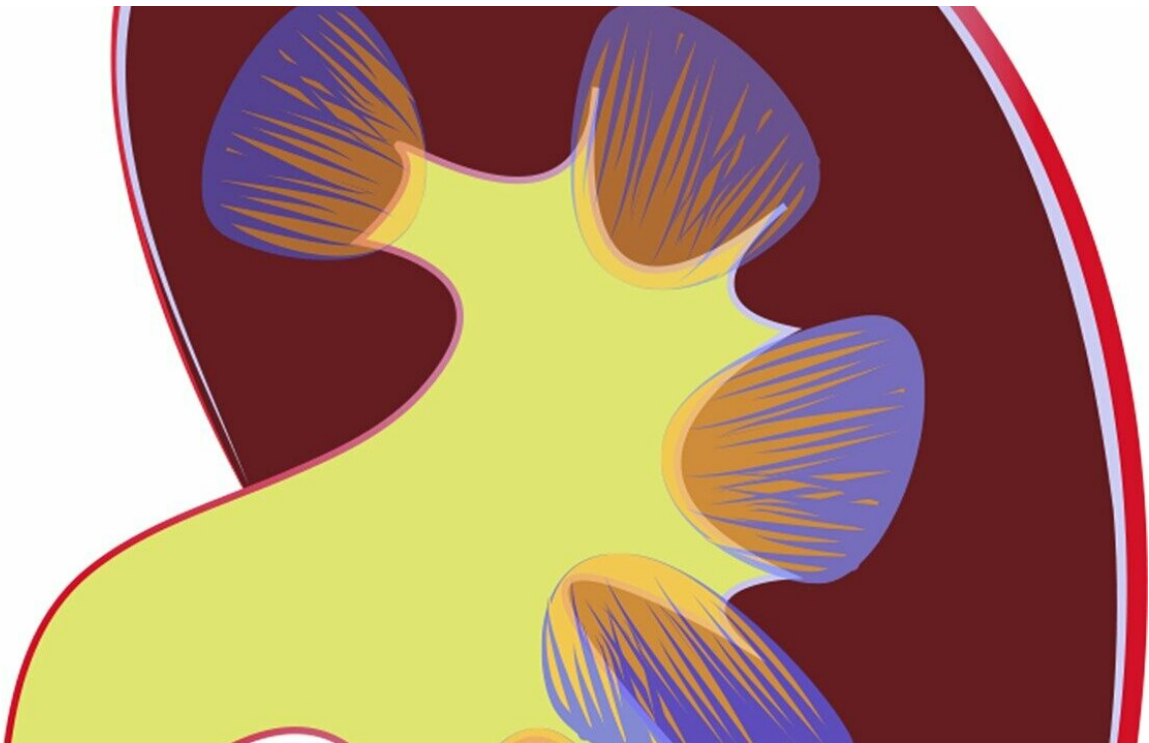


Wearable and implantable devices may transform care for patients with kidney failure

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A feature article appearing in an upcoming issue of *CJASN* highlights the potential of wearable and implantable devices for treating kidney failure.

In their feature article, Shuvo Roy, Ph.D. (University of California, San Francisco) and his colleagues note that traditional hemodialysis performed in clinics has a number of shortcomings, with patients reporting burdens related to fatigue, poor sleep, inability to travel, and long treatment times. Home hemodialysis enables patients to undergo dialysis in the comfort of their homes, but not all patients are capable of performing home hemodialysis. Recent interest in wearable and implantable—or ambulatory—hemodialysis devices has largely been motivated by the desire to implement the benefits of home hemodialysis in a more patient-friendly manner. Moreover, the recent Executive Order from President Trump should pave the way for new technologies to treat end stage kidney disease. The Executive Order seeks to prevent [kidney failure](#) through better diagnosis, treatment, and preventative care; increase affordable alternative treatment options, educate patients on treatment alternatives, and encourage the development of artificial kidneys; and increase access to kidney transplants by modernizing the transplant system and updating counterproductive regulations.

"The suffering and death experienced by patients who are treated with conventional in-center hemodialysis are partly due to the on-again/off-again—or intermittent—nature of the treatment," said Dr. Roy.

"Prolonged and frequent dialysis helps reduce the stress on the heart and the dietary restrictions of dialysis, but patients cannot spend their whole lives tied to a large heavy machine and hundreds of pounds of water for dialysis. With ambulatory devices, it will be possible for kidney failure patients to lead more normal and healthier lives."

Dr. Roy noted that it is important to determine the necessary features of key technologies that will be the basis for new ambulatory devices. Just as automatic implantable cardioverter-defibrillator and left ventricular assist devices have saved the lives of cardiac patients, wearable and implantable devices can be engineered to allow intensive self-care treatment by patients with [kidney](#) failure. "Results from the clinical

evaluation of a wearable unit suggest the need for additional advances in hemofiltration membranes, dialysate regeneration, vascular access, and patient monitoring systems. Moreover, preclinical testing of an implantable dialyzer demonstrated the feasibility of eliminating repeated vascular access and blood pumps," he said. "Much of the future work will not necessarily need new scientific discoveries. Instead, a concerted focus on engineering tasks can lead to the technology improvements to facilitate ambulatory implementation and clinical evaluation of wearable and [implantable devices](#)."

More information: Nina Hojs et al, Ambulatory Hemodialysis-Technology Landscape and Potential for Patient-Centered Treatment, *Clinical Journal of the American Society of Nephrology* (2019). [DOI: 10.2215/CJN.01970219](#)

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