Aimed at improving the lifestyle of patients suffering from renal failure, a prototype wearable dialysis device may prove to be the latest innovation to offer patients greater freedom from dialysis regimentations and from being tied to a geographical locality. Neo Kok Beng, president/CEO of AWAK Technologies, updates *Healthy Times* on this latest development.

Personal-based DIALYSIS

Chronic kidney disease is the progressive loss of the function of the kidneys, which act as a filter to remove toxins and impurities from the blood. Major causes of chronic kidney disease include hypertension (high blood pressure) and diabetes, which can lead to irreversible damage of the blood vessels within the kidney that act as filtration units.

Some patients are able to live normally with chronic kidney disease but others will eventually progress to end-stage renal disease (ESRD), which requires life-sustaining treatment with dialysis or a kidney transplant. Like other developed countries, Singapore has seen an increase in ESRD patients in the past decade, and the shortage of donor kidneys does mean that most patients are treated indefinitely with dialysis, either by peritoneal dialysis or hemodialysis.

In hemodialysis, which is currently the more common treatment method, a special type of access, called an arteriovenous (AV) fistula, is placed surgically, and usually, in the patient's arm. After access is established, patient will be connected to a hemodialysis machine which drains the blood of wastes and excess water. Hemodialysis is usually performed several times a week, and each session can last for up to four to five hours.

Peritoneal dialysis, on the other hand, is performed by surgically placing a soft, hollow tube into the lower abdomen. After the tube is placed, a special fluid solution called dialysate is instilled into the peritoneal cavity, which is the space in the abdomen that houses the organs and is lined by two special membrane layers called the peritoneum. The dialysate fluid absorbs the waste products and toxins through the peritoneum. The fluid is then drained from the abdomen, measured, and discarded.

Natural-like functioning

AWAK Technologies is currently developing a peritoneal dialysis-based wearable artificial kidney that is envisioned to weigh just 2.2 pounds (1 kilogram). The Automated Wearable Artificial Kidney (AWAK) is a wearable dialysis device that is "bloodless", as it uses the patient's own peritoneal membrane as a filter. And because the spent dialysate is continuously regenerated from the device and reused in perpetuity, it is considered "waterless" and does not require large quantities of dialysate to be stored.

Functioning like natural kidneys, AWAK maintains steady-state metabolic and fluid regulation and is in contrast to the current dialytic practice which provides intermittent rather than continuous function with a consequent "see-saw" pattern regulation. The device is in the process of procuring for the FDA as well as the CE certification, so as to establish foundation for market entry into both the USA and the Europe market. It is also set for clinical trials in the US and Singapore in 2010.

Based on a recent completed study on eight patients using tidal peritoneal dialysis (reserve volume 500 ml, tidal volume 250 ml), this flow rate will translate into a weekly Kt/V of 4, a 100 percent increase over that used in current practice. AWAK will also incorporate a number of components focused on reducing infectious complications.

The technological breakthrough is based on a joint research with the University of California, Los Angeles (UCLA) and the Department of Veterans Affairs, US. The current AWAK device is currently a 6.6-pound (3 kilograms) battery-operated prototype designed to provide continuous, round-the-clock dialysis. Round-the-clock cycling of dialysate through the peritoneal cavity and the use of sterile connection are expected to reduce the incidence of infections.

Neo Kok Beng, president/CEO of AWAK Technologies is optimistic that this innovation will change the landscape of the dialysis industry and bring about a paradigm shift from 'facilities-based dialysis' to 'personal-based dialysis'.

"This is vital in lowering the cost of the national healthcare system," Mr Neo sums up. "More importantly, it contributes to the economy by allowing patients to be economically productive."

About AWAK Technologies

AWAK Technologies was incorporated in 2007 with the mission of saving, sustaining and enhancing lives of end-stage renal disease (ESRD) patients. Dedicated to the development of wearable artificial kidneys, AWAK was founded by Dr Gordon Ku (also the chairman of the Kidney Dialysis Foundation), Dr David BN Lee and Dr Martin Roberts (both of the United States department of Veterans Affairs Healthcare System and David Geffen School of Medicine at UCLA), and Mr Neo Kok Beng. Dr Lee and Dr Roberts are inventors of the licensed technologies and serve as chief scientists in the company.

For more information, please visit www.awak.com