



# AWAK NEWSLETTER

Volume 1, Issue 4

October 2009

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**Current Status:**

- Preparation for ASN and Medica Exhibitions

**Inside this issue:**

Chariman's Message	1
Upcoming Events	1
Tidal Studies Results	2
Results from questionnaire of July Newsletter	2

## Chairman's Message



Chairman: Dr. Gordon Ku

AWAK Technologies – “*The Wearable Dialysis Company*” will be making our debut public appearance to the world by showcasing our wearable functional prototypes.

I am pleased to invite you to attend our booth at the American Society of Nephrology - 42<sup>nd</sup> Annual Meeting & Scientific Exposition held at San Diego Convention Center from 29-31<sup>st</sup> October. The ASN conference attracts nephrologists from all over the world, presenting and sharing on their latest research findings.

After 2 years of development, based on more than 20 years of research, we have developed a breakthrough technological product that will change the landscape of dialysis treatments. ESRD patients are able to have 24x7 hours dialysis through a wearable dialysis machine; in line with our mission of *Saving, Sustaining & Enhancing Lives*. Our current prototype weighs 3Kg (6.6 lbs) and we are working towards a 1 Kg (2.2 lbs) model.

In 2<sup>nd</sup> half of 2008, we conducted a clinical study into the design of our machine based on tidal PD. Dr Marjorie Foo, Senior Consultant of Renal Medicine at Singapore General Hospital, and the Co-Principal Investigator will be doing a poster presentation at the ASN conference. We are pleased that the clinical study shows that our design will be able to achieve much higher clearance than the current DOKI standard of 1.7.

In this issue, our Chief Scientist will be discussing the results obtained and the implications from the tidal study. I would like to take this opportunity to show my appreciations to the dedicated clinical team; and design team of clinicians, scientists, nurses and engineers.

## Upcoming Events

<p>42nd Annual Meeting Scientific Exposition The American Society of Nephrology (ASN) Renal Week San Diego, California (27 Oct—1 Nov 2009)</p> <p><b>AWAK Technologies</b> <b>Booth 318</b> <b>29-31 October 2009</b></p> <p><b>Poster Session</b> Dialysis— Peritoneal Dialysis— Methods, Access and Adequacy Saturday, 31 October 2009 Time: 10-12pm Poster Board (Program Number): SA— PO2627</p>	<p>MEDICA 2009 41st World Forum for Medicine International Trade Fair with Congress Düsseldorf Nov 18-21, 2009</p> <p><b>AWAK Technologies</b> <b>Hall 13</b> <b>Stand F41</b> <b>18-21 November 2009</b></p>
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## Tidal Study Results

Current practice of peritoneal dialysis (PD) calls for the intra-peritoneal infusion of 2 liters of fresh dialysate, followed by an equilibration period, and thereafter the 2 liters spent dialysate is drained and discarded. The cycle is then repeated. With our automated wearable artificial kidney (AWAK), the used dialysate is regenerated and stored for reinfusion during the next infusion phase. This will add 2 kg (4.4 pounds) to the weight of AWAK, a burdensome load to carry.

In our original concept for the AWAK we had planned to use continuous flow peritoneal dialysis (CFPD). In CFPD, dialysate continuously flows into and out of a patient's peritoneal cavity. Thus, the regenerated dialysate immediately flows back into the patient, thereby eliminating the need for storage. This mode of dialysate delivery will not only minimize the weight of AWAK, but is also anticipated to provide a higher clearance of uremic toxins. However, CFPD requires either two single-lumen catheters or a double lumen catheter; one conduit for inflow and the other for the outflow. Unfortunately, the insertion of two catheters is not an acceptable clinical practice, and an approved double lumen catheter for clinical application is not available.

Tidal PD provides another mode of dialysate delivery using only one single-lumen catheter. In this mode a given amount of dialysate is infused (for example 2,000 mL) and then part of that dialysate is drained (for example 750 mL) and discarded. This leaves 1,250 mL in the abdomen. Thereafter, 750 mL of fresh dialysate is infused and drained and discarded again. The process is repeated until the end of the dialysis session, at which time all of the dialysate is drained. The 750 mL is called the tidal volume and the 1250 ml is called the reserve volume.

In AWAK, tidal volume is the amount of dialysate that will require storage, thus, reduction of this volume will reduce the weight of the AWAK. Reduction in tidal volume, coupled with minimizing the reserve volume, will also result in a lower total dialysate volume in the peritoneal cavity, allowing ultrafiltrate (fluid removed from the patient) storage in the peritoneal cavity. A search of the literature on tidal PD found no studies on low reserve and tidal volumes that will provide problem-free inflow and outflow of dialysate at high-flow rates and maintain optimal

solute clearance and ultra-filtration.

To this end a tidal PD study was designed, approved by the institutional review board (IRB), and completed at the Singapore General Hospital, Department of Renal Medicine. Five-hour tidal PD was conducted at a dialysate flow rate of 4L/hour. In all patients eight combinations of tidal volume and reserve volume, each from 250 mL to 1,000 mL, were studied. All tidal volume and reserve volume combinations gave a urea removal efficiency of about twice the usual amount obtained by traditional PD. There was no "down time" relating to dialysate filling or drainage and no adverse effect or patient complaint in all studies.

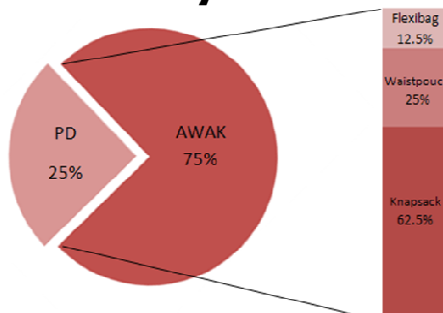
A tidal volume of 250 mL and reserve volume of 500 mL (maximum intra-peritoneal dialysate volume of 750 mL) combination was chosen for our first AWAK prototype. With this combination, the added weight to AWAK will be limited to 250 grams (0.5 pounds). Also, with the maximum intra-peritoneal dialysate volume of 750 mL, a 1,250 mL of ultrafiltrate can be accommodated before reaching 2,000 mL - the intra-peritoneal dialysate volume in current PD practice. In AWAK, the total intra-peritoneal volume will be drained periodically, and then 750 mL will be re-infused for continuing tidal PD while the rest (ultrafiltrate) discarded. Our findings are also applicable to nightly PD using a mobile portable dialysate delivery system. In which at the end of a dialysis treatment, 750 mL of dialysate is stored in the peritoneal cavity for initiating treatment the following night, thus eliminating the need for additional fresh dialysate.

**- Dr Martin Roberts  
Chief Scientist**



*Our clinical team: Research nurse Ms Siti Noor Huda (right), Clinical Manager Ms Jasmin Wong (left), A/Prof. Wong Kok Seng (absent), Dr. Marjorie Foo W. Y. (absent) & Dr. Roger Tan Choon Hian (absent)*

## Thank you!



AWAK Technologies sincerely appreciates the feedback from the questionnaire in our July issue. We are glad to know that there is much anticipation and high receptiveness towards AWAK. We assure that all concerns over issues raised with regards to the system, design, cost as well as continuous wearability have been taken into serious consideration and suggestions offered will be taken into account to improve our product.

**We welcome more feedback  
at [info@awak.com](mailto:info@awak.com)**