

SynPhNe: Offering home-based hope for 'plateaued' stroke patients

Stroke victim Mr Ang Kok Tong had resigned himself to living his life predominantly in a wheelchair. Yet thanks to a revolutionary new stroke therapy system, he's back on his feet and living an independent life.



Patient profile

Mr Ang Kok Tong, 69, never expected to have a stroke. A retired English teacher, he made sure to keep in top shape by teaching exercise classes several times a week. "I also walked on the treadmill every morning for an hour. I had a healthy diet and didn't smoke or drink. I was a very independent 69 year old," says Mr Ang.

But in May 2011, as he was driving to a birthday party, he felt his right foot fall asleep. Then he stumbled getting out of the car. And when he tried speaking, his words didn't come out right. A blockage had occurred in the tiny blood vessels deep within the left side of Mr Ang's brain; he'd suffered a lacunar stroke, which often leads to disability. At the hospital and suffering paralysis to half of his body, his prognosis seemed grim. A doctor told Mr Ang, "You've reached a plateau, and there's nothing else we can do."

Challenge

After his stroke, Mr Ang's life changed dramatically. He went from being very energetic and fit, to half-paralysed. The damage to the left side of his brain meant he struggled to control the right side of his body, including his right arm and leg.

He could not extend his fingers and simple tasks, such as picking up a bottle or using a pen, became excruciatingly tiresome, if not impossible. And because Mr Ang lived alone, he usually spent his days in a wheelchair, exhausted from having to work so hard to do everything – from moving his nearly immobilised right arm and attempting to walk on stiff legs that barely supported him, to struggling to simply stay awake and alert.

"I lived alone so there was no one I could call out to for help," he says. His only connection to the outside world was through the television and his therapist, who visited once a day.

However, a turning point came in Mr Ang's recovery journey when, 21 months later, he was asked to be part of a trial for a new stroke therapy system at Tan Tock Seng Hospital in Singapore's Novena district.

Solution

Led by Dr John Heng and Dr Subhasis Banerji, a team of scientists from Singapore's Nanyang Technological University (NTU) have spent the last seven years developing a home-based stroke therapy system that is both risk-free and affordable.

SynPhNe – short for Synergistic Physio-Neuro Platform – specifically addresses the problem of disability and dependence in 'plateaued' patients with brain impairment.

Available as a portable training kit for home use, SynPhNe consists of patented computer software connected to a specially designed headset, with neural sensors and a sensor arm glove. The device is designed to be worn easily by patients who have control of only one arm.

The software contains instructional videos for limb movements, which the patient can mimic to improve their performance of set tasks. As they perform the exercises, sensor information is displayed in real time on the computer screen so the patient can understand what's happening – mentally as well as physically.

The therapeutic approach is based on dynamic relaxation. For instance, by using SynPhNe, Mr Ang was able to see that although his mind was sending out signals that his muscles were receiving, he would need to take corrective action before he could get his fingers to move. In other words, the device made it clear to him which muscle needed to be relaxed to allow the opposing muscle to do its job.

Simply put, SynPhNe's biofeedback concept is like looking in the mirror to watch yourself move your arm or leg. It works as a visual reinforcement that can help you move your limbs in a certain way, with little or no assistance required from a therapist.

With SynPhNe, patients do not need to travel to specialised centres for rehabilitation, which can significantly lower healthcare costs and free up hospital capacity. Patients can communicate with their therapists from home using the device's WiFi capability, making SynPhNe truly accessible. At the same time, it offers patients a risk-free, accelerated recovery, which can radically improve clinical outcomes.

Results

Putting his trust in the SynPhNe system, Mr Ang worked hard to regain control of the right side of his body. Four weeks and 12 sessions later, he could hold a bottle steady and feed himself sandwiches and biscuits with his right hand.

"Previously, my fingers would always be curled up or arched, but now I'm able to move and extend them. I can do things like turn the pages of a book," he says. "As the SynPhNe system provides visual feedback, I could see how my muscles were behaving. I learnt to relax and 'activate' the right muscles to move my right arm and fingers – without the help of a therapist."

Today, Mr Ang's quality of life has been transformed. He has regained 70 per cent of his right arm and leg movement, and can now walk, take a shower and comb his hair by himself. He even travels by train to run errands in the city – something he was not able to do before SynPhNe.

As he puts it, "The SynPhNe system has got me to a place where I can be independent again."