

# Scholarship recipient returns to Australia with world leading cerebrovascular skills

Neurosurgeon Dr Johnny Wong has spent the past three years working at two of the top neurosurgical units in North America expanding his skills in cerebrovascular and endovascular neurosurgery, with financial support provided by RACS through two separate Stuart Morson Scholarships.

Having returned to Australia in July this year, Dr Wong now has the skills to conduct the revolutionary procedure of mechanical thrombectomy along with aneurysm coiling and clipping, Arteriovenous Malformation (AVM) resection and embolization and carotid endarterectomy and stenting.

From 2014 to 2017, Dr Wong spent one year at the Toronto Western Hospital, University Health Network, Canada, and two years at the Stanford University Medical Centre in California.

In Canada, Dr Wong was a Clinical Fellow in Cerebrovascular Neurosurgery while at Stanford he held the positions of Clinical Instructor in Neurosurgery and Fellow in Interventional Neuroradiology.

During his Fellowships, Dr Wong conducted research into the surgical outcomes of microsurgical AVM resection, approaches to aneurysm clipping, and outcomes of mechanical thrombectomy. Specifically, he investigated the characteristics of blood clots to determine if pre-operative identification could alter retrieval techniques and thereby limit the brain damage caused by ischaemic stroke.

Now working as a Visiting Medical Officer at the Royal Prince Alfred Hospital in Sydney, Dr Wong said the support of the College had allowed him to return to Australia with world-leading cerebrovascular skills such as the mini-craniotomy techniques he learnt in Canada that could be used in aneurysm surgery.

Dr Wong said that in Canada he had seen and treated more arteriovenous malformations and dural arterio-venous fistulas in one year than he had ever witnessed as a neurosurgical registrar in Australia. He also participated in more than 20 extracranial-Intracranial bypass operations, including some with the use of the Excimer Laser-Assisted Non-occlusive Anastomosis (ELANA) (procedure - a technique that is not available in Australia).

At Stanford University Medical Centre, Dr Wong acquired skills in cerebral and spinal catheter angiography, complex endovascular interventions including the use of balloon

and stent-assisted aneurysm coiling, flow-diverting stent insertion and the revolutionary technique of mechanical thrombectomy.

Mechanical thrombectomy is an endovascular procedure in which a blood clot causing major strokes is removed with a stent retriever device that is introduced through a catheter, passed via an artery in the groin. Using guided imaging, the surgeon advances the catheter up to the clot interface and positions the stent past the clot, which then expands and traps the clot against the walls of the artery. The stent is then pulled backwards to remove the clot, which restores blood flow to the brain.



Dr Wong said that while mechanical thrombectomy was offered as an around-the-clock service in major medical centres across the US, it was not uniformly performed across Australia.

"This technique has revolutionised stroke treatment and represents a paradigm shift in the treatment of large vessel occlusion (LVO) strokes around the world," he said.

"There have not been any major advances in stroke care

since the introduction of intravenous thrombolysis about 20 years ago. So, this technique is revolutionising the field.

"The most recent randomised trials published in the *New England Journal of Medicine* (NEJM) showed significant improvement in outcomes for thrombectomy in LVO strokes, however, the techniques and outcomes are still variable which means there is a continued need for research to pursue better outcomes and standardisation of techniques.

"The focus of my research in the US centred on investigating whether identifying different clot characteristics and using different treatment techniques can improve outcomes.

"Mechanical thrombectomy has been proven to decrease mortality and morbidity in stroke patients, many of whom can now be treated with this minimally invasive procedure and then return to normal brain function.

"It represents an amazing surgical advance and while it is now available around the clock only in some parts of Australia, certain areas are without 24-7 coverage.

"Australia conducted one of the major trials published in the NEJM but the lack of funding and necessary auxiliary staff may prevent this from being a commonly accessible treatment option in some parts of Australia.

"Also strokes are time dependent and vast transfer distances from rural areas may limit our ability to successfully apply this technique to all patients."

This aspect of time-critical care was also the driver behind Dr Wong's research into clot characteristics.

He said the mantra in stroke treatment is "time is brain". Therefore, it is critically important to reperfuse the brain as quickly as possible, and that every five minutes lost equates to a one per cent reduction in the likelihood of a return to independent function for the patient.

"One of the frustrations during clot retrieval stroke treatment relates to the number of attempts necessary to reopen a vessel, which may be related to underlying clot characteristics," Dr Wong said.

"We know that red clots from atrial fibrillation and atrial thrombus versus white clots such as those caused by an atherosclerotic plaque rupture in carotid stenosis have anecdotally had different reperfusion rates and the consequent number of attempts required to achieve reperfusion.

"While more work is needed in this area, the hypothesis of this research is that, if a difficult clot can be identified pre-operatively, we may be able to select the best procedure needed to achieve rapid reperfusion."

Dr Wong was also actively involved in a world-leading NIH-funded stroke trial (DEFUSE 3), conducted at Stanford. This trial investigated stroke outcomes in patients having mechanical thrombectomy beyond six hours after onset of stroke. In many of these cases, he was working as the main proceduralist. The results of this trial will be available within the next 12 months.

In Canada, he collaborated on more than 250 operative cases working under the supervision of Professor Michael Tymianski and Dr Ivan Radovanovic while in California he worked under the supervision of Professor Michael Marks,

Professor Huy Do, Dr Robert Dodd and Dr Jeremy Heit.

Dr Wong said the highlights of his time abroad outside his hospital duties included welcoming into the world his first child, a daughter born in Toronto, and hiking across the Grand Canyon with Professor Tymianski.

During his time overseas, Dr Wong also wrote a number of research papers which have been published in the *Journal of NeuroInterventional Surgery*, the *Journal of Neurosurgery* and *Stroke*.

He thanked RACS for its generous support provided to take up the Fellowships.

"The skills I have acquired, particularly in the field of stroke invention procedures, will benefit the community. There is a high prevalence and morbidity rate associated with stroke in Australia and the limited number of physicians with skills necessary to perform stroke thrombectomy procedures is low."

The Stuart Morson Scholarship in Neurosurgery was established following a generous donation by the late Mrs Elisabeth Morson in memory of her late husband, Stuart Morson, a Sydney-based Neurosurgeon and is aimed at assisting young neurosurgeons to meet the costs of undertaking further training and/or research work in neurosurgery overseas.

— With Karen Murphy

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## Professional Highlights

- 2012 Peter Leech Memorial Prize for the best research presentation by a neurosurgical trainee at Neurosurgical Society of Australasia Annual Scientific Meeting 2012, Gold Coast
- 2013 Macquarie University Research Excellence Award in Human Sciences
- 2015 Royal Australasian College of Surgeons Stuart Morson Travel Scholarship in Neurosurgery for further training and research overseas (Awarded for open cerebrovascular Fellowship at University of Toronto 2014 – 2015)
- 2016 Royal Australasian College of Surgeons Stuart Morson Travel Scholarship in Neurosurgery for further training and research overseas (Awarded for interventional Neuroradiology Fellowship at Stanford University 2015 – 2017)