OFFICE OF COMMERCIALISATION AND INNOVATION

MACQUARIE University

Quantitative tool to predict outcomes of cerebrovascular disease treatment

THE EXISTING PROBLEM

Cerebrovascular aneurysms are cerebral vascular disorders in which weakness of the wall of a cerebral blood vessel (eg. artery) causes a localised dilation or ballooning of a blood vessel. Cerebrovascular aneurysms have been estimated to affect around 5% of population, with cerebrovascular disease being the underlying cause of almost 7% of all deaths in Australia.

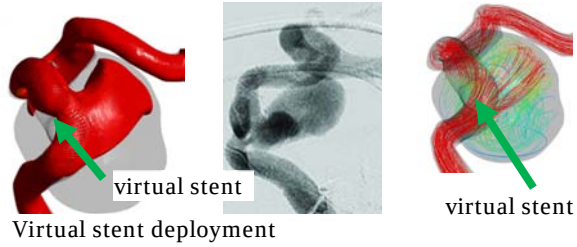
Quantitative assessment of the outcomes of endovascular treatment of aneurysms (eg. using stents or coiling) under different clinical conditions remains challenging, forcing doctors to rely heavily on experience to make decisions.

OUR SOLUTION

We have developed a quantitative modelling tool that:

- Performs **virtual implantation** (delivery and deployment) of stents of various designs and sizes into a modelled 3D artery based on patient-specific images;
- Enables **quantitative** estimate of stent treatment outcomes based on deployment algorithms and computational fluid dynamics technology;
- An objective and quantitatively based assessment of each potential stent procedure, enabling the **selection of the best stent** for each patient;
- Allows simulation of **potential compaction** during stent delivery;
- Estimates the time of **clot and thrombosis formation** after stent treatment to predict recovery process;

This information has the potential to improve the quality of treatment outcomes.



Virtual stent deployment
(Left: virtual, Right: clinical result)

CAPABILIITIES	BENEFITS
Virtual stent deployment & delivery	Evaluation of endovascular treatment options for the most optimal outcome
Patient specific flexibility of modelling pre-operation	Modelling based on patient data allows for the design of patient specific stent delivery procedures and optimal stent selection
Patient specific flexibility of modelling post-operation	Allows for the estimation of patient specific recovery times
Blood flow fibrin/thrombus simulation	Allows for an estimate of the potential speed of aneurysms occlusion after stent treatment

TECHNOLOGY APPLICATIONS

- ✓ Clinical diagnosis/optimal surgical decision
- ✓ Choice of treatment and device design
- ✓ Clinical training
- ✓ Surgical preparation, virtual surgery
- ✓ Personalised treatment
- ✓ Deep learning, and Artificial Intelligence(AI) in surgery planning

PARTNERING OPPORTUNITY

We are seeking an industry partner for further development and commercialisation of this technology through a research collaboration or technology licence.

INVENTORS

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WOULD YOU LIKE TO KNOW MORE?

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