

Researchers spearhead groundbreaking research into treatment of brain swelling

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Researchers at Trinity College Dublin have reported the results of groundbreaking research into the prevention of cerebral oedema or swelling of the brain, a major cause of death in people who have sustained a traumatic injury to the brain, out of hospital cardiac arrest or stroke. The research, which is published this week in the international journal, *Nature Communications*, uses a radically new patented technology, developed in Ireland and termed, 'Neuronal Barrier Modulation' which has been shown in an animal model simulating human brain swelling, to be highly effective in reducing the dangerous effects of this condition, while improving cognitive outcome. The research was sponsored by the US Department of Defense and Enterprise Ireland.

The researchers have devised a method of safely manipulating the blood vessels in the brain to allow for periodic opening of tight junction channels between cells lining the vessels. A simple medication can be injected into a peripheral vein, rendering the blood vessels in the brain marginally and reversibly permeable to [tiny molecules](#) and this procedure allows the fluid in the brain, largely comprising water, to efficiently drain back into the blood.

"Unfortunately, there has been little change in treatment of acute [brain swelling](#) over the past 80 years and this is a major cause of mortality in traumatic brain injury (TBI), stroke and out-of-hospital cardiac arrest," says Senior Author of the Nature Communications paper, Dr. Matthew Campbell, of the Ocular Genetics Unit at Trinity College Dublin. "We

developed the technique initially for treatment of neuronal edema in cases where injury has occurred to the [visual cortex](#), the region of the brain involved in vision, in view of our Unit's profile in vision research, however, the same method can be used in alleviating edema in all [parts of the brain](#)," says Dr. Campbell.

In Europe alone, brain injuries cause over 66,000 deaths while almost 1.6 million people are admitted to hospital each year. Similar numbers are affected by stroke and cardiac arrest. In fact, more people suffer a [traumatic brain injury](#) (TBI) each year than the numbers diagnosed with breast, lung, prostate, brain, and colon cancer combined.

"The medication is based on the use of RNA Interference, a demanding technology which has had a bumpy ride within the pharmaceuticals industry in recent years, and I am delighted that a highly effective and simply deployable therapeutic strategy has emerged based on this technology. There is now a clear path to clinical deployment," says Professor Pete Humphries, Director of the Ocular Genetics Unit at Trinity College Dublin, where the work was carried out.

"Malignant brain swelling as a consequence of [cardiac arrest](#), head injury, stroke, and brain tumours is the single most common factor leading to death in Western society and plays a major role in worsening the outcome of those who survive. Given how common these conditions are, anything that could significantly reduce the effect of [brain](#) swelling is likely to have a profound impact on morbidity and mortality and will have reverberations through the public health system," continued co-author, neurologist, Dr Colin Doherty, MD, St James's Hospital, Dublin.

The technology the researchers have reported is planned to enter Phase I clinical trials both here, with neurologist Dr Colin Doherty and in the US along with the team's collaborator, neurosurgeon Professor Gerald Grant, at Duke University and will be developed by the recently established

Irish Company, Avena Therapeutics Ltd. Veteran life-science investor and Executive Chairman of the Company, Jeremy L. Curnock Cook says: "This sort of thing doesn't happen too often and we have now been presented with a remarkable and exciting opportunity thanks to the Trinity researchers and their supporters both here and in the US".

More information: Full title of the paper "Targeted suppression of claudin-5 decreases cerebral oedema and improves cognitive outcome following traumatic brain injury"

Provided by Trinity College Dublin

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