Unlocking mysteries of brain cancer, stroke

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New studies at the University of Adelaide, Australia, will delve into some of the crucial issues surrounding death by brain tumours and stroke.

The research, to be conducted in the joint University of Adelaide/IMVS Centre for Neurological Diseases, will aim to find links between chemical signals in the brain and the reasons why brain tumours or strokes become fatal.

“There are still many mysteries around how the brain works, and this new research will help to unlock key elements we believe are involved in two separate but equally debilitating conditions,” says Professor Robert Vink, Head of the University's School of Medical Sciences and NRF Chair of Neurosurgical Research.

Brain tumours account for approximately 2% of all cancer deaths. However, a much greater problem is the spread of cancer, with secondary tumours developing within the central nervous system. This accounts for almost 10 times as many deaths as primary brain tumours.

For the first time, the Centre for Neurological Diseases will begin studies of brain tumours focusing on two specific research questions. The first is concerned with the oedema (swelling) caused in neural tissue by tumours, which plays a major role in patient mortality.

“We know that the cerebral blood vessels in the vicinity of the tumour become ‘leaky’, and this is what underlies the development of the

swelling. However, the mechanism that causes this change in vascular permeability is unknown," Professor Vink says.

"From our research into traumatic brain injury and stroke, we believe that neuropeptides (chains of amino acids in the neural tissue) may play a key role in changing the permeability of the blood-brain barrier. This could also offer a novel therapeutic approach to managing the oedema caused by tumours, and therefore play an important part in helping to save patients' lives," he says.

The second research question focuses on how cancerous cells enter the central nervous system, because the blood-brain barrier should normally prevent any cells – including cancer cells – from infiltrating the brain.

"We will examine whether neuropeptides play any role in enabling these cancerous cells to cross the blood-brain barrier and facilitate secondary tumour development," Professor Vink says.

This year, the Centre for Neurological Diseases has also begun two new research projects investigating the role that a specific neuropeptide – known as substance P – can play in helping to prevent injury and death in victims of stroke. Substance P is a neurotransmitter and modulator that appears to be connected with brain haemorrhage.

"These haemorrhages exacerbate the injury caused by stroke or brain trauma and are known to significantly increase mortality and worsen outcome in survivors. However, the mechanisms associated with how this exacerbation occurs are still unknown," Professor Vink says.

"Our lab has evidence to suggest that substance P may play a major role in the injury process, and the use of antagonists which act to block substance P may therefore be highly beneficial in improving a patient's outcome."

Source: University of Adelaide