



TheAlfred



Neurosurgery

Head: Professor Jeffrey Rosenfeld MBBS, MD, MS, FRACS, FRCS(Edin), FACS, FRCS(Glasg)Hon, FCNST(Hon), FACTM, MRACMA, RAAMC

In 2010, the Department of Neurosurgery entered an exciting new phase in its research program, with the commencement of the Monash Vision Direct to Brain Bionic Eye project. Professor Rosenfeld is a principal investigator with a team of experts in engineering physiology, ophthalmology and medical imaging, who, in partnership with industry, aim to restore some useful vision to selected blind individuals. The project is developing a cortical implant, in contrast to a retinal implant.

The Monash Vision Direct to Brain Bionic Eye system combines digital and biomedical technology with consumer-friendly glasses. A digital camera embedded in the glasses will capture images. As the head turns, the glasses turn as well. An eye movement sensor inside the glasses will detect more subtle changes in where the user looks. The digital processor will modify the images captured by the camera to present the image that is being looking at to the brain. Cutting edge digital processors will be embedded in the glasses along with a wireless transmitter. The transmitter will send signals to a chip inserted on the brain at the back of the head under the skull. The chip will then directly stimulate the visual cortex of the brain with electrical signals, which the brain will learn to interpret as sight.

The Neurosurgery Unit continued its participation in multidisciplinary and pure neurosurgical research in the last year. The study of blunt cervical and vertebral artery injury was published. This study has assisted neurosurgery, neurology and emergency physicians to more adequately screen trauma patients for these potentially devastating injuries. The POLAR study of hypothermia for severe traumatic brain injury is under way and we continue to work closely with the intensive care unit on this important project. The trial of decompressive craniectomy for diffuse traumatic brain injury has drawn to a close after seven years. The results were published in the *New England Journal of Medicine* in April 2011.

Phil Lewis continues his research on transcranial doppler and cerebral autoregulation. Dr Tony Goldschlager completed his PhD and published a number of papers in high ranking journals as a result of his research on mesenchymal stem cell applications in the spine.

Awards, Prizes and Major Grants

- The Monash Bionic Eye Project commenced in 2010. There are 30 researchers involved in this four-year project funded by an \$8 million grant from the Australian Research Council
- Professor Rosenfeld was appointed to the Neurotrauma Committee of the World Federation of Neurosurgical Societies
- Professor Rosenfeld was the recipient of the John Thomson Medal and Oration, Royal Australian Army Medical Corps and Queensland Medical School, Herston, Brisbane

Current Projects

- ARC Research in Bionic Vision Science and Technology Initiative: 'Direct stimulation of the visual cortex: a flexible strategy for restoring high-acuity pattern vision' (Rosenfeld JV, *et al.*)
- DECRA: a multicentre randomised trial of early decompressive craniectomy in patients with severe traumatic brain injury (Cooper DJ, Rosenfeld JV, *et al.*)

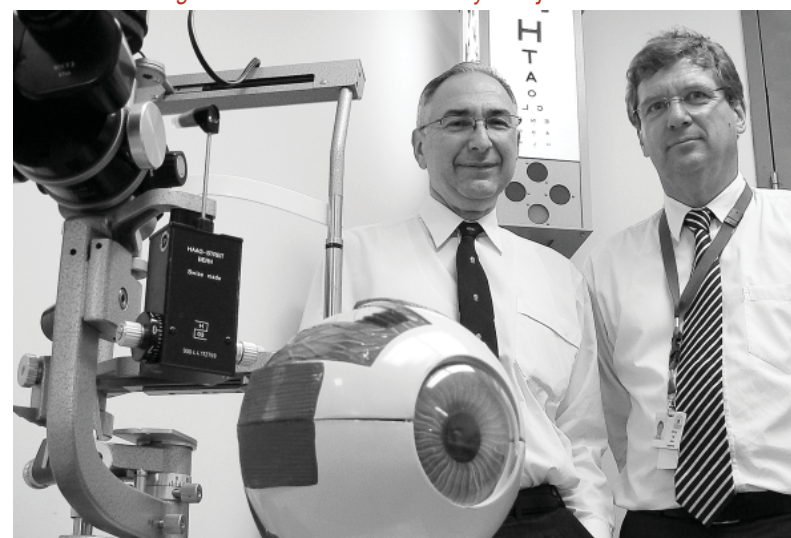
MONASH VISION

Direct to brain bionic eye



- POLAR: Prophylactic hypothermia trial to Lessen traumatic Brain injury randomised controlled trial (Cooper DJ, Rosenfeld JV)
- The correlation of clinical and radiographic findings with long-term outcomes in road trauma patients with acute cervical discoligamentous injury (Ackland H, Rosenfeld JV and Malham G)
- Establishment of a neurotrauma tissue/fluid bank within the National Neural Tissue Resource Centre (McLean C, Rosenfeld JV)
- Identification of risk factors for the development of postoperative bleeding after cranial neurosurgery (Hwang P)
- Intentional forgetting in frontal lobe tumour patients (Anderson J, Rosenfeld JV)
- The determination of the expression of calcitonin receptor (CTR) and the characterisation of CTR-positive cell types in human brain tumours. (Wookey P, Hwang P and Rosenfeld JV)
- Cerebral autoregulation monitoring in paediatric traumatic brain injury (Lewis P, Butt W, Rosenfeld JV)
- The development of a neurosurgical audit system (Lewis P)
- Melatonin in critical ill patients: a study to examine the levels of melatonin in severe head injuries (Morganti-Kossmann C, Rosenfeld JV, Seifman M)
- Establishment of a spinal injuries registry (Tee JW, Chan P, Rosenfeld JV, Liew S, Gruen R)

Director of Neurosurgery, Professor Jeffrey Rosenfeld (left), and Head of Ophthalmology, Associate Professor Anthony Hall, are Alfred investigators on the Monash Bionic Eye Project.



Postgraduate Students

2 PhD Students

Publications

15 Journal Articles
4 Book Chapters