

The main areas of research at the Centre for Clinical Neurosciences at St. Vincent's are epilepsy, multiple sclerosis, Parkinson's disease, spinal cord regeneration, peripheral nerve regeneration, neuromuscular disorders and mitochondrial disorders.

About us

The 'family tree' of Neurosciences at St. Vincent's dates back more than 70 years to Mr Frank Morgan, inaugural head of the Department of Neurosurgery in 1936. A Department of Neurology was established in 1950 under Prof John Billings and our vision of an integrated centre was given life in 2002 with the launch of the Centre at St. Vincent's.

Through country satellite neurology clinics, we provide a full range of services to regional Victoria and host sub-specialty clinics in muscle disease, epilepsy and movement disorders. We acknowledge the vision of Prof Ed Byrne for laying the foundations of this most important service to our community.

Epilepsy has become a major component of our clinical service. In 1994 we introduced epilepsy surgery and in 1998, launched the Victorian

Epilepsy Centre – in partnership with the Epilepsy Foundation and the Alfred Hospital. Today, St. Vincent's has the largest surgical program in Australia for epilepsy patients. Our work with patients and families is supported by a commitment to both clinical and basic scientific research in epilepsy.

The establishment of an imaging laboratory has opened new pathways for us. Using techniques such as co-registration, functional neurosurgery has become a major focus and developed through a close alliance with the neurosurgical department.

Our work within the centre embraces multiple sclerosis, motor neurone disease and movement disorders, and the department fosters close links and collaborations with leading research institutions across Australia and internationally.

Projects in progress or completed

The main activity of the department in 2008 has been around the DIIRD/ St Vincent's Institute grant, with the department very much involved in developing a neural graft for nerve injuries, as well as treatment for epilepsy, including direct brain stimulation and polymer-based drug therapies. A variety of clinical projects, looking at issues around driving treatment for Parkinson's disease and multiple sclerosis have been completed during the year.

Research applications in the clinical setting

Research to develop a therapeutic electrical treatment strategy for epilepsy has been taken to the clinical setting. This work is currently performed in the ward when patients have grid electrodes implanted to record brain electrical activity directly from the cortex.

Research outcomes in relation to patient care

Most of our research is in an early phase and the clinical outcomes are too early to assess. Work around driving issues through the results of studies of the clinical impact of video-EEG monitoring prior to driving and therapy for epilepsy and MS in particular though have been influenced by the results from drug trials.

The team

Prof Mark J Cook, Head of Department; Assoc Prof Robert Kapsa, Scientist; Assoc Prof Michael Murphy, Director; Rebecca Argent, Research Assistant (Bionic Ear Institute); Dr Fiona Bardenhagen; Alya Barutchu, Bionic Ear Institute; Rachel E Blake; Dr Stephen Bowden; Assoc Prof Ross Carne; Maria Chiotis; Kathryn Cimdins; Assoc Prof Steven J Collins, Allied Health Professional; Dr Nicholas H Crump, Medical Clinician; Assoc Prof John Drago; Dr Wendyl J D'Souza; Stewart Duncum, Nurse; Dean Freestone, Scientist (Bionic Ear Institute); Dr Karen Fuller, Allied Health Professional; Dr Graeme Gonzales; Amy Halliday, Research

Assistant (Bionic Ear Institute); Prof Malcolm Horne; Hamish Innes-Brown, Research Assistant (Bionic Ear Institute); Rachael A Jeffery, Scientist; Magdalena Kita, Research Assistant; Dr Bulluss KJ, Research Fellow; Dr Andrew Kornberg; Dr Katya E Kotschet; Alan Lai; Lucas Litewka, Scientist; Kylie Magee, Research Assistant (Bionic Ear Institute); Rosetta Marotta, Scientist; Stefan Mauger, Bionic Ear Institute; Dr David Moses; Dr David Nayagam, Scientist (Bionic Ear Institute); Tim Nelson, Bionic Ear Institute; Dr Mark Paine; Dr Richard Peppard; Dr Christopher Plummer; Dr David Prentice; Dr Anita F Quigley, Research Fellow; Louise Rath; Dr Katrina Reardon; Mohit Shivdasani, Student; Paul Smith; Courtney Suhr; Karen Sweerts, Research Assistant; Dr Valerie Tay; C Timms; Dr E Bruce Tomlinson; Dr Ian A Trounce, 50% Clinical Neurosciences (STV) and 50% Centre for Eye Research Australia (CERA); Simon Vogrin, Scientist; Dr Yi Yuen Wang

Highlights

Dean Freestone

- Intelligent systems and sensor networks and information processing (ISSNIP) postgraduate award, (2008), \$10,000

Dr David Nayagam

- Completion of Royal Australasian College of Surgeons (RACS) ASSET basic surgical training course (February-March 2008)

Mohit Shivdasani

- Conference on Medical Bionics 2008 Student Poster Prize

Higher degrees conferred in 2008

- Bulluss KJ, enrolled Doctor of Philosophy, Melbourne University and the Centre of Clinical Neurosciences and Neurological Research, St. Vincent's
- Wang YY, Currently enrolled in Doctorate of Medicine – submitted, Melbourne University and the Centre of Clinical Neurosciences and Neurological Research, St. Vincent's

Grants

Horne M, Kotschet KE

The clinical application of accelerometry in the assessment of bradykinesia and dyskinesia in patients with Parkinson's disease, (2008-2009), \$40,205

Kotschet KE, Horne M

Investigating novel objective measurements of cervical dystonia severity, (2008-2010), \$80,840

Murphy M

Medtronic Sofamor Danek – Neurosurgical Society of Australasia (NSA) Research Grant. Neurosurgical Society of Australasia, (2008) \$30,000

Trounce IA, Jenkins A, Januszewski A, Kelly D

Mitochondrial oxidative stress and diabetic complications, (2008-2009), USD\$101,666

Trounce IA, Vingrys B

Effect of aging and mitochondrial dysfunction on optic nerve response to intraocular pressure-induced oxidative stress. Commonwealth Government – NHMRC, (2008-2010), USD\$340,000

Select international presentations

Freestone D

- 'Cortical excitability from electrical stimulation', Society for Autonomous Neurodynamics Stimulation, Heemstede, The Netherlands, August 2008

Magee K

- 'Nanostructured electromaterials for bio-applications', Asia-Pacific Symposium on Nanobionics, Wollongong, Australia, 2008

Marotta R

- 'The detection of MELAS m.3243A>G: urine epithelial cells versus skeletal muscle, blood and hair follicles', 7th Australasian Workshop on Mutation Detection, Broome, Australia, July 2008

Mauger S

- 'Inferior colliculus responses to microstimulation using penetrating auditor brainstem implants', Cochlear Implant Conference, San Diego, USA, April 2008

Nayagam D

- 'Nanostructured electromaterials for bio-applications', Asia-Pacific Symposium on Nanobionics, Wollongong, Australia, 2008

Shivdasani M

- 'Dual site stimulation of the ventral cochlear nucleus: a new insight for penetrating auditory brainstem implants', Cochlear Implant Conference, San Diego, USA, April 2008

Trounce IA

- Invited speaker (Honorarium Provided), 'Mitochondrial DNA mismatch modelling of neurodegenerative disease', Alabama, USA, May 2008

Collaborations

International

- University of Texas
- Western General Hospital, Edinburgh

National

- Alfred Hospital
- Australian Nuclear Science and Technology Organisation
- Bionic Ear Institute
- CSIRO
- Florey Institute
- La Trobe University
- Royal Melbourne Hospital
- University of Tasmania
- University of Wollongong

Publications

Atkin JD, Farg MA, Walker AK, McLean C, Tomas D, Horne M 2008, 'Endoplasmic reticulum stress and induction of the unfolded protein response in human sporadic amyotrophic lateral sclerosis', *Neurobiology of Disease*, 30, 3, 400-7

Aumann TD, Gantois I, Egan K, Vais A, Tomas D, Drago J, Horne M 2008, 'SK channel function regulates the dopamine phenotype of neurons in the substantia nigra pars compacta', *Experimental Neurology*, 213, 2, 419-30

Bermingham N, Cowie TF, Paine M, Storey E, McLean C 2008, 'Frontotemporal dementia and Parkinsonism linked to chromosome 17 in a young Australian patient with the G389R Tau mutation', *Neuropathology & Applied Neurobiology*, 34, 3, 366-70

Bowden S, Weiss LG, Holdnack JA, Bardenhagen F, Cook MJ 2008, 'Equivalence of a measurement model of cognitive abilities in US standardisation and Australian neuroscience samples', *Assessment*, 15, 2, 132-44

Brazier MW, Doctrow SR, Masters CL, Collins SJ 2008, 'A manganese-superoxide dismutase/catalase mimetic extends survival in a mouse model of human prion disease', *Free Radical Biology & Medicine*, 45, 2, 184-92

Bulluss KJ, Trost N, Murphy M, Yuen A 2008, 'Spontaneous third ventriculostomy', *Journal of Clinical Neuroscience*, 15, 5, 587-90

Butzkueven H, Kolbe SC, Jolley DJ, Brown JY, Cook MJ, van der Mei IA, Groom PS, Carey J, Eckholdt J, Rubio JP, Taylor BV, Mitchell PJ, Egan GF, Kilpatrick TJ 2008, 'Validation of linear cerebral atrophy markers in multiple sclerosis', *Journal of Clinical Neuroscience*, 15, 2, 130-7

Cher L, Rosenthal MA, Drummond KJ, Dally M, Murphy M, Ashley D, Thursfield V, Giles GG, Cher L, Rosenthal MA, Drummond KJ, Dally M, Murphy M, Ashley D, Thursfield V, Giles GG 2008, 'The use of chemotherapy in patients with gliomas: patterns of care in Victoria from 1998-2000', *Journal of Clinical Neuroscience*, 15, 4, 398-401

Enticott JC, Vitkovic JJ, Reid B, O'Neill P, Paine M 2008, 'Vestibular rehabilitation in individuals with inner-ear dysfunction: a pilot study', *Audiology & Neuro-Otology*, 13, 1, 19-28

Hogan RE, Carne R, Kilpatrick CJ, Cook MJ, Patel A, King L, O'Brien TJ 2008, 'Hippocampal deformation mapping in MRI negative PET positive temporal lobe epilepsy', *Journal of Neurology, Neurosurgery & Psychiatry*, 79, 6, 636-40

Horne M, Lee J, Chen F, Lanning K, Tomas D, Lawrence AJ 2008, 'Long-term administration of cocaine or serotonin reuptake inhibitors results in anatomical and neurochemical changes in noradrenergic, dopaminergic and serotonin pathways', *Journal of Neurochemistry*, 106, 4, 1731-44

Kapsa R, Wong SH, Quigley AF 2008, 'Electroporation of corrective nucleic acids (CNA) in vivo to promote gene correction in dystrophic muscle', *Methods in Molecular Biology*, 423, 405-19

Klistorner A, Arvind H, Nguyen T, Garrick R, Paine M, Graham S, O'Day J, Grigg J, Billson F, Yiannikas C 2008, 'Axonal loss and myelin in early ON loss in postacute optic neuritis', *Annals of Neurology*, 64, 3, 325-31

Klug GM, Boyd A, Lewis V, McGlade AR, Roberts H, Douglass SL, Masters CL, Collins SJ 2008, 'Surveillance of Creutzfeldt-Jakob disease in Australia: 2008', *Communicable Diseases Intelligence*, 32, 2, 232-6

Kukat A, Kukat C, Brocher J, Schafer I, Krohne G, Trounce IA, Villani G, Seibel P 2008, 'Generation of rho0 cells utilising a mitochondrially targeted restriction endonuclease and comparative analyses', *Nucleic Acids Research*, 36, 7, e44

Lawson VA, Vella LJ, Stewart JD, Sharples RA, Klemm H, Machalek DM, Masters CL, Cappai R, Collins SJ, Hill AF 2008, 'Mouse-adapted sporadic human Creutzfeldt-Jakob disease prions propagate in cell culture', *International Journal of Biochemistry & Cell Biology*, 40, 12, 2793-801

Lee J, Zhu WM, Stanic D, Finkelstein DI, Horne MH, Henderson J, Lawrence AJ, O'Connor L, Tomas D, Drago J, Horne M 2008, 'Sprouting of dopamine terminals and altered dopamine release and uptake in Parkinsonian dyskinesia', *Brain*, 131, Pt 6, 1574-87

Lewis V, Collins SJ 2008, 'Analysis of endogenous PrPC processing in neuronal and non-neuronal cell lines', *Methods in Molecular Biology*, 459, 229-39

Lewis V, Klug GM, Hill AF, Collins SJ 2008, 'Molecular typing of PrPres in human sporadic CJD brain tissue', *Methods in Molecular Biology*, 459, 241-7

Lo HP, Cooper ST, Evesson FJ, Seto JT, Chiotis M, Tay V, Compton AG, Cairns AG, Corbett A, MacArthur DG, Yang N, Reardon K, North KN 2008, 'Limb-girdle muscular dystrophy: diagnostic evaluation, frequency and clues to pathogenesis', *Neuromuscular Disorders*, 18, 1, 34-44

- Loesch DZ, Cook MJ, Litewka L, Gould E, Churchyard A, Tassone F, Slater HR, Storey E 2008, 'A low symptomatic form of neurodegeneration in younger carriers of the FMR1 premutation, manifesting typical radiological changes', *Journal of Medical Genetics*, 45, 3, 179-81
- Loring DW, Strauss E, Hermann BP, Barr WB, Perrine K, Trenerry MR, Chelune G, Westerveld M, Lee GP, Meador KJ, Bowden S 2008, 'Differential neuropsychological test sensitivity to left temporal lobe epilepsy', *Journal of the International Neuropsychological Society*, 14, 3, 394-400
- Meade CE, Bowden S, Whelan G, Cook MJ 2008, 'Rhinal cortex asymmetries in patients with mesial temporal sclerosis', *Seizure*, 17, 3, 234-46
- Moosavi M, Maghsoudi N, Zahedi-Asl S, Naghdi N, Yousefpour M, Trounce IA 2008, 'The role of PI3/Akt pathway in the protective effect of insulin against corticosterone cell death induction in hippocampal cell culture', *Neuroendocrinology*, 88, 4, 293-8
- Moses D, Drago J, Teper Y, Gantois I, Finkelstein DI, Horne M 2008, 'Fetal striatum and ventral mesencephalon-derived expanded neurospheres rescue dopaminergic neurons in vitro and the nigro-striatal system in vivo', *Neuroscience*, 154, 2, 606-20
- Nisbet DR, Forsyth JS, Shen W, Finkelstein DI, Horne M 2008, 'A review of the cellular response on electrospun nanofibers for tissue engineering', *J Biomater Appl*
- Nisbet DR, Crompton KE, Horne M, Finkelstein DI, Forsythe JS 2008, 'Neural tissue engineering of the CNS using hydrogels', *Journal of Biomedical Materials Research Part B, Applied Biomaterials*, 87, 1, 251-63
- Nisbet DR, Moses D, Gengenbach TR, Forsyth JS, Finkelstein DI, Horne M 2008, 'Enhancing neurite outgrowth from primary neurons and neural stem cells using thermoresponsive hydrogel scaffolds for the repair of spinal cord injury', *J Biomed Mater Res A*.
- O'Brien TJ, Miles K, Ware R, Cook MJ, Binns DS, Hicks RJ 2008, 'The cost-effective use of 18F-FDG PET in the presurgical evaluation of medically refractory focal epilepsy', *Journal of Nuclear Medicine*, 49, 6, 931-7
- O'Sullivan GJ, Dunleavy M, Hakansson K, Clementi M, Kinsella A, Croke DT, Drago J, Fienberg AA, Greengard P, Sibley DR, Fisone G, Henshall DC, Waddington JL 2008, 'Dopamine D1 vs D5 receptor-dependent induction of seizures in relation to DARPP-32, ERK1/2 and GluR1-AMPA signalling', *Neuropharmacology*, 54, 7, 1051-61
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- Srinivasan J, Coleman L, Kornberg A 2008, 'Juvenile onset globoid cell leukodystrophy masquerading as XL-adrenoleukodystrophy', *Journal of Paediatrics & Child Health*, 44, 7-8, 459-61
- Srinivasan J, Leventer RJ, Kornberg A, Dahl HH, Ryan MM 2008, 'Central nervous system signs in X-linked Charcot-Marie-Tooth disease after hyperventilation', *Pediatric Neurology*, 38, 4, 293-5
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- Yiu EM, Ravat S, Ryan MM, Shield LK, Smith LJ, Kornberg A 2008, 'Adolescent spinal muscular atrophy with calf hypertrophy and a deletion in the SMN gene', *Muscle & Nerve*, 38, 1, 930-2
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