

The New Zealand National Eye Centre

Annual Report 2013

Director:

Professor Charles McGhee
Department of Ophthalmology

Deputy Director:

Professor Paul Donaldson
Department of Optometry and Vision Science

Advisory Board Members:

Professor Charles McGhee – Chair
Professor Paul Donaldson
Professor Colin Green
Mr Gordon Sanderson – External member (University of Otago)
Hon Associate Professor O Bruce Hadden – Former President Royal Australia and New Zealand College of Ophthalmologists
Geoff Sargent - President New Zealand Association of Optometrists
Associate Professor Sherwin
Professor John Fraser (or nominee)

Management Committee:

Professor Charles McGhee
Professor Paul Donaldson
Sue Raynel – Manager NZ-NEC
Hutokshi Chinoy – Administrative Manager

Dates of meetings of the board and management committee that have taken place during the year:

Advisory Board: did not meet.

Management Committee: 3 times throughout the course of 2013.

Names and Departments of Participating members: *Refer appendix 1*

Introduction

The New Zealand National Eye Centre (NZ-NEC) was formally established in July 2008. The primary foci of NZ-NEC are to consolidate working relationships between University departments involved in Ophthalmology, Optometry, and Vision Sciences, to provide educational, clinical and research expertise and facilities of the highest level in a University of Auckland based centre for the benefit of New Zealand. The establishment of the NZ-NEC is unprecedented anywhere in Australasia, in bringing together the expertise of three major research groups, including ophthalmology and optometry, focussed on increasing the profile of translational vision sciences. By combining the resources of all the research programmes in the area, we have increased capability to answer questions of importance to the eye health of New Zealanders and worldwide. It is anticipated that the NZ-NEC will quickly be recognised as a premier eye research facility in Australasia with such extraordinarily diverse clinical, scientific, teaching and research expertise.

Briefly outline plans and objectives of Centre

Vision: to eliminate preventable blindness and reduce visual impairment

Mission: to become a foremost international vision research, clinical and teaching centre through excellence, innovation and collaboration

Goals: To develop and increase the profile of eye health, vision research and education – in New Zealand/Aotearoa and internationally by:

Laboratory research
Clinical research and Clinical Services
Application of research into practice
Innovation
Collaboration
Teaching and Learning
Community Outreach
Public Health Policy

Staff, post-graduate students involved in the Centre

Refer appendix 1

Summary major developments and plans

1. Research funding

In 2013 members of the NZ-NEC received in excess of \$9 million in competitive research grants and philanthropic awards.

In 2013 members of NZ-NEC received more than \$5.2 million in collaborative grants. Members were successful in getting competitive grants from a wide variety of sources including: Health Research Council almost \$2,700,000 (this includes three \$500,000 grants for emerging researchers), Marsden Fund \$826,087, Faculty Research Development Fund \$138,969, the Save Sight Society \$75,000, NIH \$65,926.

The department of Ophthalmology also received \$2,400,000 from the Buchanan Trust one of the largest individual donations received by the School of Medicine.

2. Bi-monthly NZ-NEC seminar series.

We continue to hold bi-monthly seminars as they have proved invaluable in not only disseminating current research findings and issues but also have been an avenue for generating collaboration amongst researchers who otherwise would not have had contact, due to disparate working locations/situations. The seminars have been invaluable for members of NZ-NEC and affiliates in increasing collaborative research within the UoA.

The seminars provide an opportunity, predominantly for young researchers, to present their current work, discuss potential future research and receive feedback from established vision researchers. The sessions are well attended by researchers, technical and clinical staff.

Several high profile international guest lecturers have presented at NZ-NEC seminars in 2013:

1. Dr Stuart Cook – Consultant Ophthalmologist, Bristol Eye Hospital
2. Dr Patricia McGettrick – Consultant Ophthalmologist in charge of simulator training Irish College of Ophthalmologists
3. Professor Gordon Dutton – Emeritus Professor of Vision Science, Glasgow Caledonian University

These seminars have been well attended by a wide range of medical and allied health personell and has not only enabled dissemination of international vision research but also raised the profile of NZ-NEC internationally.

3. Collaborative Research

NZ-NEC members currently undertake collaborative research with more than 10 National and 35 International Research Centres and continue to develop further collaborations, some of the new collaborations established in 2012 are:

1. The Stem Cell group in the Department of Ophthalmology which has expanded its area of interest beyond adult stem cells and are now eyeing up 'induced pluripotent stem cells' or iPS cells as novel treatments. This iPS cell technology is being developed in collaboration with a research group from the Department of Molecular Medicine who have established the technology in Auckland since returning from Harvard. Initially this stem cell collaboration will target corneal dystrophies but will be easily translatable into therapies for other eye disorders should the initial attempts prove successful. A Marsden application to further this research was unsuccessful but Associate Professor Trevor Sherwin has been awarded a \$28,000 research grant to explore further 'A new vision for the future: pluripotent stem cell therapy for corneal disease' with a view to re-submitting for Marsden funding in 2014.
2. Following successful research outcomes in 2012 The Ocular Surface Laboratory has obtained additional funding to continue their, project in collaboration with industry, to develop a topical Manuka honey-based preparation for the management of eyelid disease. A multidisciplinary approach to this project has been adopted, with input from the disciplines of ophthalmology, optometry, pharmacy and microbiology. Industry has provided additional funding of \$27,154.
3. Visual Neuroscience Laboratory, Department of Optometry and Vision Science, have established "A randomized clinical trial of a new binocular treatment for amblyopia" with a paediatric ophthalmology service at Green Lane Clinical Centre, Auckland District Health Board.
4. Dr Acosta from the Cell and Molecular Biology of the Retina Laboratory, Department of Optometry and Vision Science, continues investigating the biochemical and molecular aspects of the pathology of macular degeneration and other retina pathologies. Following from the successful collaboration established with the Interdisciplinary Centre of Neurosciences at the University of Valparaiso, Chile the investigations have expanded to include research into transgene and sporadic animal models of Alzheimer's disease (AD) for the presence of biomarkers of the pathology in the eye. The study is currently exploring de Octodon degus and transgenic models in collaboration with researchers at the University of Otago and members of the CMBR at the University of Auckland. Funds are currently sought to further research into the neurodegenerative process that occurs in the eye in brain pathological conditions.
5. The Connexin Biology group have established new international collaborations with the University of Valparaiso Chile, Shanghai Jiao Tong University China, Harvard Medical School, University of Medicine and Dentistry New Jersey and the University of Bonn Germany. This in addition to existing international links in China, Australia, Wales, Belgium, Canada, USA and France.

4. Philanthropic donation update:

1. The Department of Ophthalmology and the Fred Hollows Foundation NZ have embarked on a programme of research and teaching in the Pacific. The Fred Hollows Foundation NZ have funded a project for three years with a contribution of \$50,000 pa towards the salary for a research fellow and up to \$25,000 p.a for other expenses related to the project.
2. The Buchanan Charitable Trust has pledged \$2,400,000 to establish an Ocular Therapeutics Unit in the Department of Ophthalmology – this is one of the largest single, individual donations that the School of Medicine has received. The initial donation for \$1,200,000 was received in 2013. The remaining \$1,200,000 will be provided in 2016. This donation was celebrated at a function attended by the donors (Drs Caroline and Trevor Gray and members of the trust); Stuart McCutcheon, VC of UoA; John Fraser Dean of the School of Medicine and staff from the Department of Ophthalmology.
3. The Tom Cat Trust donated \$500,000 to the Department of Ophthalmology, via the School of Medicine Foundation to support the appointment of post-Doctoral fellows over the next three years. Two doctoral fellows have been employed to date on this grant.

5. Achieving self sustainability

This continues to be a major goal for NZ-NEC over the next 3-5 years and two major areas that we will target are philanthropy and accessing some overhead components from external grants.

6. Application of Research into Clinical Practice

There were no instances where laboratory research has been translated into clinical practice

7. Summer Students

The NZ-NEC summer student symposium has been incorporated into "Excellence in Ophthalmology and Vision Research Prize Evening". Students were given guidelines for their 10 minute presentations and these were judged on meeting set criteria by academics external to NZ-NEC – Professor Mark Barrow and Professor Louise Nicolson.

The Department of Ophthalmology had three externally funded summer studentships in 2013

8. Public Health Policy

Several members continue to be involved in the Ministry of Health Workforce Planning Group (HWFPG) for the delivery of eye services in 2020. The HWFPG is still investigating running a pilot project in collaboration with ADHB and the UoA Departments of Ophthalmology and Optometry and Vision Science (NZ-NEC) to shift selected eye services into the community – this is on-going.

9. Awards

- Professor Charles McGhee was awarded The Guy H Chan Medal Lecture, International Symposium of Ophthalmology, Asia Pacific Academy of Ophthalmology, Guangzhou, China
- Carol Greene (PhD student) and her supervisors Professor Colin Green and A/P Trevor Sherwin were awarded the Chiasma prize.
- Salim Ismail, Jane McGhee and A/P Trevor Sherwin were awarded the Light Microscopy award in the BIRU imaging competition
- Dr Shuan Dai, consultant ophthalmologist and honorary senior lecturer, was presented with a community award by the New Zealand Health Foundation for Asian and Ethnic Communities
- Lily Chang (supervisor Monica Acosta) won the UoA wide Three Minute Thesis competition and will compete in the Trans Tasman finals hosted by the University of Western Sydney, and have the chance to compete by video in the inaugural 3MT competition in October
- Professor Paul Donaldson was honoured by the National Foundation of Eye Research who awarded him their Cataract Research Award.
- PhD student Ankita Umapathy was awarded first place in the Fisher & Paykel Healthcare Oral Competition for her presentation: "Characterising glutathione efflux pathways in the rat lens" at the UoA Exposure competition.

10. Highlights

- Launch of the Buchanan Ocular Therapeutics Unit in November 2013 and the appointment of Dr Ilva Rupenthal as the Director of the Unit.
- Ten PhD's or MD's graduated or were completed and one Doctor of Science (by Thesis) was submitted in 2013.
- The CatWalk Spinal Research Facility within the Centre for Brain Research has a further \$300,000 of new funding pending, with a focus on taking connexin peptides towards clinical application.
- Cancer therapy patents formed the basis for a business school commercialisation project and the group is now working with Auckland UniServices Ltd to also move this towards clinical application.
- Professor Charles McGhee was the Keynote/Invited speaker at the Oman Ophthalmology Society Meeting, Oman; Invited Lecture at the State Key Laboratory of Ophthalmology (SKLO), Asia Pacific Academy of Ophthalmology, Guangzhou, China; British Society of Refractive Surgeons meeting, Belfast, Ireland; Royal Australian College of Surgeons, Auckland, New Zealand; European Society of Ophthalmology (SOE), Copenhagen, Denmark. He also gave another 22 presentations at national and international conferences during 2013

- Professor Green gave 12 Research Seminars with four being Keynote Lectures. Also 9 were at international venues (Australia, France, Chile, USA and China) and all were invited presentations.
- Visit to the Department from the Maurice and Phyllis Paykel Trust board
- Visit to the Department from the family of Sir Lindo Ferguson – a major contributor of instrumentation to the ophthalmology museum in the Department
- Professor Danesh-Meyer was invited to speak at Harvard University
- Sachini Jayaratne (Masters Student supervisor Julie Lim) came second in the UoA wide Three Minute Thesis competition
- Ankita Umapathy was also selected by the Royal Society of New Zealand to be part of a delegation to attend the 6th HOPE meeting with Nobel Laureates in Japan in March 2014.
- Professor Charles McGhee was appointed as Member of the International Advisory Board for C-MER (Shenzhen) Dennis Lam Eye Hospital in Shenzhen, China.
- Professor Charles McGhee is a visiting Professor of Ophthalmology (2013-2015) at the Sun Yat-Sen University, China
- Professor Charles McGhee was elected Vice President of Academy of Asia Pacific Professors of Ophthalmology (AAPPO)
- Professor Charles McGhee was appointed Advisor on the Health and Disability expert advisory panel (for cornea and anterior segment)

Co-operative commercial activities, research with other University or Government laboratory research groups

Patents

Methods for the treatment of cancer. New Zealand Provisional Patent Application Number 509696

Methods for the treatment of cancer. Supplementary Patent. New Zealand Provisional Application Number 510268.

Turuwhenua, J.T.W & Thompson, B. (2013). Eye tracking. Filing date 10th April 2013. Application number 609259.

Educational Activities

Members of NZ-NEC participate in the MBChB, optometry undergraduate and the optometry ocular therapeutics programmes as well as vocational training for the Royal Australian and New Zealand College of Ophthalmology vocational scheme. They also provide education to ophthalmic nurses, health facilities and community organisations.

Post-graduate courses specific to vision science have been developed and approved and are now in the Master of Health Science, Master of Medicine and Master of Nursing programmes within the UoA. Insufficient enrolments meant that no courses were run in 2013.

Financial Report

NZ-NEC does not have its own cost centre. It was established in 2008 and currently our income would not sustain a 'stand alone' cost centre. However, we continue to seek a portion of external research grant overheads and explore philanthropic avenues for future sustainability.

Publications

Book Chapters:

1. O'Carroll, S. J., Becker, D. L., Davidson, J., Gunn, A. J., Nicholson, L. F., & Green, C. R. (2013). The use of Connexin-Based Therapeutic Approaches To Target Inflammatory Diseases. R. G. Gourdie, & T. A. Myers (Eds.), *Wound Regeneration and Repair: Methods and Protocols*. New York. Humana Press
2. Becker, D. L., Cook, J. E., Cormie, P., Green, C. R., Mendoza-Naranjo, A., Phillips, A. R. J., Thrasivoulou, C. (2013). Enhancing epithelial tissue repair and reducing inflammation by targeting connexins. E. Oviedo-Orta, W. H. Evans, & B. Kwak (Eds.). *Connexin Cell Communication Channels: Roles on the immune system and Pathology*. Taylor and Francis Group.
3. Zhang, J., O'Carroll, S. J., Danesh-Meyer, H. V., Van der Heyde, H. C., Becker, D. L., Nicholson, L. F. B., & Green, C. R. (2013). Connexin-based therapeutic approaches to inflammation in the central nervous system. E. Oviedo-Orta, W. H. Evans, & B. Kwak (Eds.). *Connexin Cell Communication Channels: Roles on the immune system and Pathology*. Taylor and Francis Group.

Peer reviewed Publications:

1. Lockington D, Wang EF, Patel DV, Moore SP, McGhee CN. Effectiveness of cataract phacoemulsification with toric intraocular lenses in addressing post-keratoplasty astigmatism. *Journal of Cataract and Refractive Surgery* 2014 (In press)
2. McGhee CN. Keratoconus: the arc of past, present and future. *Clin Exp Optom*. 2013; 96(2):137-9.
3. Bhikoo R, Niederer RL, Hart R, Sherwin T, McGhee CN. In vivo confocal microscopy of climatic droplet keratopathy. *Clin Exp Optom*. 2013 Jul;96(4):430-2.
4. Mackey DA, Crowston JG, McGhee CN, McCluskey P. Publication output of senior academic ophthalmologists in Australia and New Zealand. *Clin Experiment Ophthalmol*. 2013 Jun 18. [Epub ahead of print]
5. Grzybowski A, McGhee CN. The early history of keratoconus prior to Nottingham's landmark 1854 treatise on conical cornea: a review. *Clin Exp Optom*. 2013; 96(2):140-5.
6. Cheung IM, McGhee CN, Sherwin T. A new perspective on the pathobiology of keratoconus: interplay of stromal wound healing and reactive species-associated processes. *Clin Exp Optom*. 2013; 96(2):188-96
7. Fan Gaskin JC, Chou CY, McGhee CN. Pentacam keratometric values unreliable for IOL power calculation after refractive surgery. *J Refract Surg*. 2013; 29(1):10.
8. de Souza CF, Acosta ML, Polkinghorne PJ, McGhee CN, Kalloniatis M. Amino acid immunoreactivity in normal human retina and after brachytherapy. *Clin Exp Optom*. 2013; 96(5):504-7
9. Harkin DG, Apel AJ, Di Girolamo N, Watson S, Brown K, Daniell M, McGhee J, McGhee CN. Current status and future prospects for cultured limbal tissue transplants in Australia and New Zealand. *Clin Experiment Ophthalmol*. 2013; 41(3):272-81.
10. Lockington D, Fang Gaskin JC, McGhee CN, Patel DV. A prospective study of acute corneal hydrops by in vivo confocal microscopy in a New Zealand population with keratoconus. *British Journal of Ophthalmology* 2014 (In press)
11. Fan Gaskin JC, Patel DV, McGhee CN. Acute corneal hydrops in keratoconus – new perspectives. *American Journal of Ophthalmology* 2014 (In press)

12. McDonald EM, Patel DV. Cranial nerve palsies as a complication of herpes zoster ophthalmicus. *Journal of Neurosciences in Rural Practice* 2014 (In press)
13. Crawford AZ, Patel DV, McGhee CN. A brief history of corneal transplantation. *Oman Journal of Ophthalmology* 2013;6(Suppl 1):S12-S17
14. Patel DV, McGhee CN. Presumed late recurrence of *Acanthamoeba* keratitis exacerbated by exposure to topical corticosteroids. *Oman Journal of Ophthalmology* 2013;6(Suppl 1):S40-2
15. Lockington D, Ali NQ, Al-Taie R, Patel DV, McGhee CN. Outcomes of scleral sutured conventional and aniridia intraocular lenses performed in a university hospital setting. *Journal of Cataract and Refractive Surgery* 2013 (In press)
16. Lockington D, Johnson R, Patel DV, McGhee CNJ. Healthcare and a holiday: the risks of LASIK tourism. *Clinical and Experimental Optometry* 2013 (Epub ahead of print)
17. Jordan C, Patel DV, Abeysekera N, McGhee CN. In vivo confocal microscopy analyses of corneal microstructural changes in a prospective study of collagen cross-linking in keratoconus. *Ophthalmology* (Epub ahead of print)
18. Patel DV, McGhee CN. Hanging by threads: ectopia lentis. *Lancet* (In press)
19. Misra S, Craig JP, McGhee CN, Patel DV. A prospective study of pterygium excision & conjunctival autograft with human fibrin tissue adhesive: effects on vision, refraction & corneal topography. *Asia Pacific Journal of Ophthalmology* (Epub ahead of print)
20. Goh YW, McGhee CN, Patel DV, Barnes R, Misra S. Treatment of Herpes zoster related corneal neovascularisation and lipid keratopathy by photodynamic therapy. *Clinical and Experimental Optometry* 2013 (Epub ahead of print)
21. Chong C, Patel DV, Hadden P, McGhee CN. Conservative biopsy excision and management of a large iris melanoma. *Clinical and Experimental Optometry* 2013 (Epub ahead of print)
22. McDonald EM, Ram FSF, Patel DV, McGhee CN. Effectiveness of topical antifungal drugs in the management of fungal keratitis: a systematic review and meta-analysis of randomised controlled trials. *Asia Pacific Journal of Ophthalmology* (Epub ahead of print)
23. Ali NQ, Patel DV, Lockington D, McGhee CN. Citation analysis of keratoconus 1900-2013: the most influential publications, authors, institutions and journals. *Asia Pacific Journal of Ophthalmology* (Epub ahead of print)
24. Misra S, Ahn HN, Craig JP, Pradhan M, Patel DV, McGhee CN. Effect of Pan-Retinal Photocoagulation on Corneal Sensation and the Corneal Sub-Basal Nerve Plexus in Diabetes Mellitus. *Investigative Ophthalmology and Visual Science* 2013;54(7):4485-90
25. Vincent AL, Jordan C, Sheck L, Niederer R, Patel DV, McGhee CN. Screening the visual system homeobox 1 gene in keratoconus and posterior polymorphous dystrophy cohorts identifies a novel variant. *Molecular Vision* 2013;19:852-60.
26. Patel DV, McGhee CN. Techniques for Wide-Field Assessment of the Human Corneal Subbasal Nerve Plexus. *Cornea* 2013;32(6):e140-1
27. Goh YW, Misra S, Patel DV, McGhee CN. Combining primary and piggyback intraocular lenses to treat extreme myopic astigmatism in stable keratoconus following cataract surgery. *Clinical and Experimental Optometry* 2013;96(2):242-4
28. Fan Gaskin JC, Good WR, Jordan CA, Patel DV, McGhee CN. The Auckland Keratoconus study: identifying predictors of acute corneal hydrops in keratoconus. *Clinical and Experimental Optometry* 2013;96(2):208-13

29. Patel DV, McGhee CN. Quantitative analysis of in vivo confocal microscopy images: a review. *Survey of Ophthalmology* 2013;58(5):466-75
30. Crawford AZ, Patel DV, McGhee CN. Comparison and repeatability of keratometric and corneal power measurements obtained by Orbscan II, Pentacam and Galilei corneal tomography systems. *American Journal of Ophthalmology* 2013;156(1):53-60
31. Patel DV, McKelvie J, Sherwin T, McGhee CN. Keratocyte progenitor cell transplantation: a novel therapeutic strategy for corneal disease. *Medical Hypotheses* 2013;80(2):122-4
32. Patel DV, Horne A, House M, Reid IR, McGhee CN. The incidence of acute anterior uveitis following intravenous zoledronate. *Ophthalmology* 2013;120(4):773-6
33. Patel DV, McGhee CN. Understanding keratoconus: what have we learned from the New Zealand perspective? *Clinical and Experimental Optometry* 2013;96(2):183-7
34. Thompson, A.M., Chee, K-S. N., Loh, I-P., Sherwin, T., Green, C.R. & Polkinghorne, P.J. Vitreous contamination by lens protein in patients with chronic cystoid macular edema following uncomplicated cataract surgery: A possible contributor to chronic cystoid oedema. *Asia-Pacific Journal of Ophthalmology*, In press.
35. Greene, C.A., Chang, C-Y., Fraser, C.J., Nelidova, D.E., Chen, J.A., Lim, A., Brebner, A., McGhee, J., Sherwin, T & Green, C.R. Exogenous growth factors induce reprogramming of adult corneal stromal cells to a neuronal phenotype. *Experimental Cell Research*, In press.
36. Mallard, C., Davidson, J.O., Tan, S., Green, C.R., Bennet, L., Robertson, N.J. & Gunn, A.J. Astrocytes and microglia in acute cerebral injury underlying cerebral palsy associated with preterm birth. *Pediatric Research*, In press
37. Zhang, J., O'Carroll, S.J., Henare, K., Ching, L-M., Ormonde, S., Nicholson, L.F.B., Danesh-Meyer, H.V. & Green, C.R. Connexin hemichannel induced vascular leak signals a new paradigm for cancer therapy. *FEBS Letters*, In press.
38. Davidson, J. O., Green, C. R., Nicholson, L. F., Bennet, L., & Gunn, A. J. (2013). Connexin hemichannel blockade is neuroprotective after, but not during, global cerebral ischemia in near-term fetal sheep. *Exp Neurol*. doi:10.1016/j.expneurol.2013.06.026
39. Chen, Y. S., Toth, I., Danesh-Meyer, H. V., Green, C. R., & Rupenthal, I. D. (2013). Cytotoxicity and vitreous stability of chemically modified connexin43 mimetic peptides for the treatment of optic neuropathy. *J Pharm Sci*, 102 (7), 2322-2331. doi:10.1002/jps.23617
40. O'Carroll, S. J., Velamoor, S., Nicholson, L. F. B., Green, C. R., & Gorrie, C. A. (2013). Connexin43 mimetic peptide is neuroprotective and improves function following spinal cord injury. *Neuroscience Research*, 75 (3), 256-267. doi:10.1016/j.neures.2013.01.004
41. Guan, J., Pavlovic, D., Dalkie, N., Waldvogel, H. J., O'Carroll, S. J., Nicholson, L. F. B., & Green, C. R. (2013). Vascular degeneration in parkinsons disease. *Brain Pathology*, 23 (2), 154-164. doi:10.1111/j.1750-3639.2012.00628.x
42. Liu, K. -C., Alany, R. G., Green, C. R., & Rupenthal, I. D. (2013). Synergistic effect of chemical penetration enhancer and iontophoresis on transappendageal transport of oligodeoxynucleotides. *International Journal of Pharmaceutics*, 441 (1-2), 687-692. doi:10.1016/j.ijpharm.2012.10.027
43. Davidson, J. O., Green, C. R., Bennet, L., Nicholson, L. F., Danesh-Meyer, H., O'Carroll, S. J., & Gunn, A. J. (2013). A key role for connexin hemichannels in spreading ischemic brain injury. *Curr Drug Targets*, 14 (1), 36-46.

44. Yu, S., Jacobs, R.J., Anstice, N.S., Paudel, N., Harding J.E., Thompson, B. (2013). Global motion perception in 2-year-old children: a method for psychophysical assessment and relationships with monocular and binocular visual function. *Investigative Ophthalmology and Visual Science*, In Press.
45. Zhou, J., Thompson, B. & Hess, R.F. (2013). A new form of rapid binocular plasticity in adults with amblyopia. *Scientific Reports*, 3, 2638.
46. Spiegel, D.P., Li, J. Hess, R.F., Byblow, W.D., Deng, D., Yu, M. & Thompson, B. (2013). Transcranial direct current stimulation enhances recovery of stereopsis in adults with amblyopia. *Neurotherapeutics*, 10(4):831-839.
47. Black, J.M, Jacobs, R.J., Philips, G., Chen, L, Tan, E., Tran, A. & Thompson, B. (2013). An assessment of the iPad as a testing platform for distance visual acuity in adults. *BMJ Open*, E00230.
48. Anstice, N.A. & Thompson, B. (2013). The measurement of visual acuity in children: an evidence based update. *Clinical and Experimental Optometry*. In Press.
49. Clavagnier, S., Thompson, B. & Hess, R.F. (2013). Long lasting effects of daily theta burst rTMS sessions in the human amblyopic cortex. *Brain Stimulation*. Epub ahead of print.
50. Peters, M.A.K, Thompson, B. Merabet, L.B., Wu, A.D. & Shams, L, (2013). Anodal tDCS to V1 blocks visual perceptual learning consolidation. *Neuropsychologia*, 51(7):1234-9.
51. Spiegel, D.P., Hess, R.F., Byblow, W.D. & Thompson, B. (2013). Anodal transcranial direct current stimulation transiently improves contrast sensitivity and normalises visual cortex activation in individuals with amblyopia. *Neurorehabilitation and Neural Repair*, 27(8), 760-769.
52. Li, J., Thompson, B., Deng, D., Chan, L.Y.L., Yu, M. & Hess, R.F. (2013). Dichoptic training enables the amblyopic brain to learn. *Current Biology*, 23(8), R308-9.
53. Li, J., Hess, R.F, Chan, L.Y.L., Deng, D., Yang, X., Chen, X., Yu, M. & Thompson, B. (2013). Quantitative measurement of interocular suppression in anisometropic amblyopia: A case-control study. *Ophthalmology*, 120(8),1672-1680.
54. Babu, R., Clavagnier, S., Bobier, W., Thompson, B. & Hess, R.F. (2013). The regional extent of suppression: strabismic vs non-strabismic. *Investigative Ophthalmology and Visual Science*, 54(10):6585-6593.
55. Thompson, B., Tjan, B.S., Liu, Z. (2013). Perceptual learning of motion direction discrimination with suppressed and unsuppressed MT in humans: an fMRI study. *PLOS One*, 8(1), e53458.
56. Li, J., Hess, R.F., Chan, L.Y.L, Deng, D., Chen, X., Yu, M., Thompson, B. (2013). How best to assess suppression in patients with high anisometropia. *Optometry and Vision Science*, 90(2), 47-52.
57. Hess R.F. and Thompson, B. (2013). New insights into amblyopia: Binocular therapy and non-invasive brain stimulation. *JAAPOS*, 17(1), 89-93.
58. Agarwal, P., & Rupenthal, I. D. (2013). Injectable implants for the sustained release of protein and peptide drugs. *Drug Discovery Today*, 18 (7-8), 337-349.
doi:10.1016/j.drudis.2013.01.013 (IF 6.551)
59. Liu, K. C., Green, C. R., Alany, R. G., & Rupenthal, I. D. (2013). Synergistic effect of chemical penetration enhancer and iontophoresis on transappendageal transport of oligodeoxynucleotides. *International Journal of Pharmaceutics*, 441 (1-2), 687-692.
doi:10.1016/j.ijpharm.2012.10.027 (IF 3.458)

60. Chen, Y. S., Toth, I., Danesh-Meyer, H. V., Green, C. R., & Rupenthal, I. D. (2013). Cytotoxicity and vitreous stability of chemically modified connexin43 mimetic peptides for the treatment of optic neuropathy. *Journal of Pharmaceutical Sciences*, 102 (7), 2322-2331. doi:10.1002/jps.23617 (IF 3.130)
61. Chaplot, S. P., & Rupenthal, I. D. (2013). Dendrimers for gene delivery - a potential approach for ocular therapy? *Journal of Pharmacy and Pharmacology*. doi:10.1111/jphp.12104 (IF 2.033)
62. Shapey J. Sabin HI. Danesh-Meyer HV. Kaye AH. (2013). Diagnosis and management of optic nerve sheath meningiomas. *Journal of Clinical Neuroscience*. 20(8):1045-56.
63. Chen YS. Toth I. Danesh-Meyer HV. Green CR. Rupenthal ID. Cytotoxicity and vitreous stability of chemically modified connexin43 mimetic peptides for the treatment of optic neuropathy. *Journal of Pharmaceutical Sciences*. 102(7):2322-31, 2013 Jul.
64. Kerr NM. Patel HY. Chew SS. Ali NQ. Eady EK. Danesh-Meyer HV. (2013) Patient satisfaction with topical ocular hypotensives. *Clinical & Experimental Ophthalmology*. 41(1):27-35.
65. I Patel HY. Danesh-Meyer HV. (2013). Incidence and management of cataract after glaucoma surgery. [Review] *Current Opinion in Ophthalmology*. 24(1):15-20.
66. Sheck LH. Ng YS. Watson M. Vincent AL. (2013). Clinical findings and molecular diagnosis of retinoblastoma in older children. *Ophthalmic Genetics*. 34(4):238-42.
67. Liskova P. Palos M. Hardcastle AJ. Vincent AL. (2013) Further genetic and clinical insights of posterior polymorphous corneal dystrophy 3. *JAMA Ophthalmology*. 131(10):1296-303.
68. Burdon KP. Vincent AL. (2013). Insights into keratoconus from a genetic perspective. *Clinical & Experimental Optometry*. 96(2):146-54.
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Appendix 1

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<p>Clinical Research Fellows Dr Kathleeya Stang-Veldhouse (Oculoplastics) Dr Jay Meyer (Cornea) Dr Ramasamy Balasubramanian (Surgical Retina) Dr Brenda Breidenstein (Paediatrics) Dr Scott McClintic (Medical Retina) Dr Son Ho (Oculoplastics)</p>	<p>Professional Teaching Fellows Wanda lam Bhavini Solanki Jorge Perez-Velasco Thomas Cossick Kate Vanweerd Richard Johnson Melinda Calderwood Ken Robertson Jonathan Payne Lisa Silva Kathryn Sands Kerry Atkinson Melinda Calderwood</p>
<p>Research Fellows Dr Kaliopy Matheos (Optic Nerve) Dr Thiaga Krishnan (Maurice & Phyllis Paykel) Dr Riyaz Bhikoo (Fred Hollows)</p>	<p>Senior Research Fellow Dr Julie Lim (Molecular Vision Laboratory)</p>
<p>Post Doctoral Research Fellows Dr Jie Zhang Dr Stuti Misra</p>	<p>Research Fellows and Postdoctoral Fellows Dr Gus Grey (Molecular Vision Laboratory) Dr Simon Backhouse (Myopia Laboratory) Dr Keith Pine Dr Irene Vorontsova</p>
<p>PhD Candidates Professor Helen Danesh-Meyer Stuti Misra Carol Green Hannah Kirsten Elissa McDonald Yeri Kim Akilesh Gokul Naveed Yasim Isabella Cheung Erika Chen Prachi Dimish Amelia van Slooten (Anatomy with Radiology)</p>	<p>PhD Candidates – STILL CHECKING THE DETAIL Phil Turnbull Cindy Guo Alice Lagas Martin Loertscher Sandy Yu Victor Borges Ankita Umapathy Daniel Baker Richard Wilde Arjit Chakraboka Nabin Paudel Myra Leung Lisa Hamm Rosica Petrova Tanya Poppe Mitchell Nye-Wood</p>
<p>MD Candidates Dr Catherine Wheeldon Dr Jennifer Fan Dr Bruce Hadden Dr Alexandra Crawford Dr Andrea Vincent Dr Leo Sheck</p>	<p>MSc Candidates Sechi Jayaratne</p>
<p>Research and Technical Staff Jane McGhee – senior research technician Judy Loh – Research technician Salim Ismail – research technician Katherine van Bysterveldt – research technician</p>	

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Professor Paul McMenamin (Monash University,
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Dr Pendergrast, David
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