Curriculum Vitae

Date Prepared: October 30th, 2018

Name: Daniel Sun

Education

1996-1999	Bachelor	Optometry	University of Melbourne
2000-2002	Masters	Optometry (Michael Kalloniatis, Ph.D.)	University of Melbourne
2004-2007	Ph.D.	Optometry (Michael Kalloniatis, Ph.D.)	University of Auckland

Postdoctoral Training

09/07-06/09	Research Fellow	Cell Biology/Glaucoma (Richard Masland, Ph.D.)	Massachusetts General Hospital
06/09-03/13	Senior Research Fellow	Cell Biology/Glaucoma (Richard Masland, Ph.D.)	Massachusetts Eye and Ear Infirmary

Faculty Academic Appointments

04/13-present	Instructor in Ophthalmology	Astrocyte cell biology	Massachusetts Eye and Ear Infirmary

Appointments at Hospitals/Affiliated Institutions

04/13-present	Investigator	Astrocyte cell biology	Massachusetts Eye and Ear Infirmary

Professional Societies

1999-2005	Victorian College of Optometry, Melbourne, Australia	Member
1999-2005	Optometric Association of Australia	Member
1999-2006	Australian Neuroscience Society	Member
2004-2007	Auckland Neuroscience Network	Member
2004-2007	New Zealand Association of Optometrists	Member

2002-present	Association for Research in Vision and Ophthalmology (ARVO)	Member
2010-present	Society for Neuroscience (SfN)	Member

Editorial Activities

Neuroscience, Ad-hoc Reviewer
Molecular Vision, Ad-hoc Reviewer
Clinical Ophthalmology, Ad-hoc Reviewer
Journal of Comparative Neurology, Ad-hoc Reviewer
Experimental Eye Research, Ad-hoc Reviewer
PLoS One, Ad-hoc Reviewer
Scientific Reports, Ad-hoc Reviewer

Honors and Prizes

2000	Alcon Scholarship	Alcon	Scholastic
2004	Top Achiever Doctoral Scholarship	New Zealand Ministry of Science and Technology	Scholastic
2006	Doctoral Scholarship	University of Auckland	Scholastic
2008	Imaging Structure & Function in the Nervous System	Cold Spring Harbor Imaging Workshop	Selected
2014	NIH Early Career Reviewer	NIH	Selected
2015	Harvard Catalyst Leadership Course for Scientists and Doctors	Harvard Medical School	Selected

Report of Local Teaching and Training

Formal Teaching of Residents, Clinical Fellows and Research Fellows (post-docs)

10/09	Reactive astrocytes of the mouse optic nerve For departmental Research Fellows	Massachusetts General Hospital Department of Neurosurgery One hour presentation
02/11	Structural remodeling of fibrous astrocytes after axonal injury For Harvard Glaucoma group	Schepens Eye Research Institute One hour presentation
04/11	Structural remodeling of fibrous astrocytes after axonal injury For departmental Research Fellows	Harvard Medical School Department of Neurobiology One hour presentation
05/12	Reversible reactivity by optic nerve astrocytes For institutional Research Fellows	Schepens Eye Research Institute One hour presentation
11/13	Reversible reactivity by optic nerve astrocytes For departmental faculty	Mass. Eye & Ear Infirmary One hour presentation
03/15	Do we need optic nerve head astrocytes to become reactive in glaucoma? For institutional faculty	Schepens Eye Research Institute One hour presentation

09/16-11/16 The molecular pathology and current therapies for retinal diseases.

Neurobiology 309qc
Harvard Medical School students and fellows

04/10/18 – 04/17/18 Experimental Design and Analysis of Eye and Vision Studies
Harvard Medical School students and fellows

Laboratory and Other Research Supervisory and Training Responsibilities

2011-present	Training of lab techniques and protocols to medical students, graduate students and technicians	Daily mentorship
2014-2015	Training of an intern working directly with me for 1 year	Daily mentorship

Report of Regional, National and International Invited Teaching and Presentations

International Invited Presentations and Courses

Those presentations below sponsored by outside entities are so noted and the sponsors are identified.

2000-2002 **655-111 Vision: How the eye sees the world**
This subject provides a primary overview of basic visual functions, visual perceptions and anatomy for first year students
1st year Optometry students, University of Melbourne

2000-2002 **655-221 Human Visual Functions**
Theories of visual function. Workshop classes cover measuring visual function and using classical visual psychophysical methodology.
2nd year Optometry students, University of Melbourne

2000-2002 **655-222 Visual Processing and Control**
Physiological processes underlying vision and the control of eye movements. Visual processing – phototransduction, the organisation and function of the retina, the LGN, and the visual cortex. Eye movements – muscular mechanisms, neural control, and binocular movements.
2nd year Optometry students, University of Melbourne

2000-2002 **655-201 Ocular Anatomy and Histology**
This subject covers the detailed anatomy and histology of the eye, orbit and neuroanatomy of the visual pathways with associated practical classes.
2nd year Optometry students, University of Melbourne

2003-2004 **Optom 170 Visual Science I**
This laboratory class encompasses aspects of light and vision, form vision, motion perception, colour vision, visual psychophysical measurements, eye movements and binocular vision.
1st year Optometry students, University of Auckland

2003-2004 **Optom 251 Ocular Pathology**
Pathophysiology of the eye. Histopathology of eye disease. Pathology of orbit, lacrimal system, conjunctiva, cornea, uvea, lens and retina. Developmental anomalies of the eye.
2nd year Optometry students, University of Auckland

2004 Selective vulnerability of retinal neurons to ischaemia.

(Auckland Neuroscience Network Workshop, New Zealand)

2006-2007 Continuing Education Workshop on Advances in Basic Vision Research
(New Zealand Association of Optometrists)

2005-2007 Instructor in Continuing Education Workshops on Identification of Retinal Diseases in the Clinical Setting
(New Zealand Association of Optometrists)

2005-2007 Instructor in Continuing Education Workshops on Clinical Techniques
(New Zealand Association of Optometrists)

Regional/National Invited Presentations and Courses

2015 The functional role of reactive astrocytes
(Rhode Island College)

Report of Clinical Activities and Innovations

Practice Activities

I have no current clinical activities, but practiced and taught as an Optometrist in Australia and New Zealand.

2000-2007	Optometrist in private practice	Various private practices throughout Melbourne	One to two full-day sessions per week
2000-2002	Clinical Instructor for General Optometry	Victorian College of Optometry, University of Melbourne, Australia	Two to three half-day sessions per week
2004-2007	Clinical Instructor for General Optometry	Department of Optometry and Vision Science, University of Auckland, New Zealand	Two to three half-day sessions per week

Report of Education of Patients and Service to the Community

Activities

Those activities below sponsored by outside entities are so noted and the sponsors are identified.

2002 Externship in clinical optometry to rural Australia
(Victorian College of Optometry, University of Melbourne)

2006 Voluntary eyecare trip to rural community in Fiji
(Lion's Club New Zealand)

Report of Scholarship

Peer reviewed publications in print

Research Investigations

1. **Sun D**, Rait JL, Kalloniatis M. 2003. Inner retinal neurons display differential responses to N-methyl-D-aspartate receptor activation. *J Comp Neurol.* 465:38-56.

2. **Sun D**, Kalloniatis M. 2004. Quantification of amino acid neurochemistry secondary to NMDA or betaxolol application. *Clin Exp Ophthal.* 32:505-517.

3. Kalloniatis M, **Sun D**, Foster L, Haverkamp S, Wässle H. 2004. Localization of NMDA receptor subunits and mapping NMDA drive within the mammalian retina. *Vis Neurosci.* 21:587-597.

4. **Sun D**, Kalloniatis M. 2006. Mapping glutamate responses in immunocytochemically identified neurons of the mouse retina. *J Comp Neurol.* 494:686-703.

5. Kalloniatis M, **Sun D**. 2006. Functional activation of neurochemically identified amacrine and bipolar cells. *Clin Exp Optom.* 89:112.

6. **Sun D**, Bui BV, Vingrys AJ, Kalloniatis M. 2007. Alterations in photoreceptor-bipolar cell signaling following ischaemia/reperfusion in the rat retina. *J Comp Neurol* 505:131-146.

7. **Sun D**, Vingrys AJ, Kalloniatis M. 2007a. Metabolic and functional profiling of the normal rat retina. *J Comp Neurol* 505:92-113.

8. **Sun D**, Vingrys AJ, Kalloniatis M. 2007b. Metabolic and functional profiling of the ischaemic/reperfused rat retina. *J Comp Neurol* 505:114-130.

9. **Sun D**, Lye-Barthel M, Masland R, Jakobs T. 2009. The morphology and spatial arrangement of astrocytes in the optic nerve head of the mouse. *J Comp Neurol* 516:1-19. PMCID: PMC2900161.

10. **Sun D**, Lye-Barthel M, Masland R, Jakobs T. 2010. Structural remodeling of fibrous astrocytes after axonal injury. *J Neurosci* 30:14008-14019. PMCID: PMC3124820.

11. **Sun D**, Jakobs T. 2012. Structural remodeling of astrocytes in the injured CNS. *Neuroscientist.* 18:567-588. (INVITED REVIEW).

12. Lye-Barthel M, **Sun D**, Jakobs T. 2013. Morphology of astrocytes in a glaucomatous optic nerve. *Invest Ophthalmol Vis Sci* 54:909-917.

13. Nivison-Smith L, **Sun D**, Fletcher EL, Marc RE, Kalloniatis M. 2013. Mapping kainate activation of inner neurons in the rat retina. *J Comp Neurol* 521:2416-2438.

14. Kalloniatis M, Loh CS, Acosta ML, Tomisich G, Zhu Y, Nivison-Smith L, Fletcher EL, Chua J, **Sun D**, Arunthavasothy N. 2013. Retinal amino acid neurochemistry in health and disease. *Clin Exp Optom* 96:310-332.

15. **Sun D**, Qu J, Jakobs TC. 2013. Reversible reactivity by optic nerve astrocytes. *Glia* 61:1218-1235.

16. Choi HJ, **Sun D**, Jakobs TC. 2015. Isolation of intact astrocytes from the optic nerve head of adult mice. *Exp Eye Res* 137:103-110.

17. Choi HJ, **Sun D**, Jakobs TC. 2015. Astrocytes in the optic nerve head express putative mechanosensitive channels. *Mol Vis* 21:749-766.

18. **Sun D**, Moore S, Jakobs TC. 2017. Optic nerve astrocyte reactivity protects function in experimental glaucoma and other nerve injuries. *J Exp Med* 214:1411-1430.

19. **Sun D**. 2018. Visualizing astrocytes of the optic nerve. *Methods in Mol Biol 1695:269-286.*

20. Zhu Y, Pappas AC, Wang R, Seifert P, **Sun D**, Jakobs TC. 2018. Ultrastructural morphology of the optic nerve head in aged and glaucomatous mice. *Invest Ophthalmol Vis Sci* 59:3984-3996.

Thesis

Neurochemical and functional characterization of the ischaemic rat retina (doctoral thesis).

Abstracts, Poster Presentations and Exhibits Presented at Professional Meetings

All abstracts published and exhibits presented at meetings during the last 3 years have been published as full-length manuscripts.

Narrative Report

My primary interest lies in understanding the role a type of supporting cell (called astrocytes) play in glaucomatous nerve degeneration, especially, whether they are in general beneficial or deleterious to the nerves they intimately ensheath within the optic nerve head. Although I have a background in clinical optometry, I currently focus 90% of my efforts on investigative laboratory research and 10% on teaching/administration. The major achievements within my area of excellence include a body of work that has (1) characterized in detail what individual astrocytes within the normal optic nerve look like and how they are structurally organized, (2) how they morphologically react following injury/disease, (3) the importance of the STAT3 signaling pathway in regulating astrocyte 'reactive' changes, and (4) demonstrated that astrocyte reactivity is not necessarily detrimental for glaucomatous axon degeneration. These works have been published in seven major journals (see peer reviewed publications 9-12, 15, 18, 20), including one invited review paper.

Previous work in many laboratories has identified the optic nerve head as an important location for where glaucomatous nerve degeneration begins. Prior to my research, there had been no detailed description of how astrocytes in this region responded to nerve injury. Using a mouse strain in which these astrocytes are labeled green, I have been able to study in great detail their normal structure and response to glaucoma and a nerve crush injury. One exciting finding has been the fact that once injured, astrocytes assume a reactive phenotype without necessarily damaging the nerves they ensheath. They then have the potential to return to their original state, suggesting that they may play a beneficial role in injury. Although I have focused on the optic nerve, this work has gained interest within the general neurobiology community as it relates to the topic of the diversity in the types of astrocytes in the CNS. Astrocytes in white matter (e.g., optic nerve) had not been studied as comprehensively as astrocytes in the grey matter of the brain. In the beginning of my post-doctoral training I was selected via a competitive entry process to attend a Cold Spring Harbor Workshop on Imaging that helped immensely with these projects.

In my current role as an Instructor within the lab I have been teaching undergraduate medical students, graduate students and supervising the activity of research technicians. Although I am currently not

involved in clinical practice, I was very active in teaching and contributing to the broader optometric community: teaching clinical optometry in the university clinic, providing continuing education workshops to clinicians in private practice, lecturing on basic science subjects to undergraduate students and volunteering on overseas eyecare missions. Additionally, I have in the past worked as an optometrist in both private practice and public clinics.

Going forward, I plan to continue to work on understanding whether astrocytes are supportive or detrimental in eye diseases. In the recent year I have started to approach this question using molecular techniques and expanded collaborations. For example, two of my recent publications focus on the molecular gene phenotyping of isolated populations of optic nerve astrocytes. Most significantly, I have recently received my own NIH R01 grant. From a teaching perspective, I would like to continue to mentor students and technicians within the laboratory. I have also begun to teach to the wider Harvard community (Neurobiology 309qc, see above).