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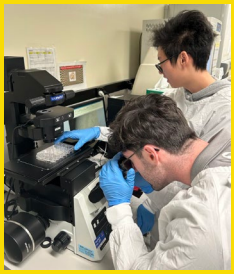

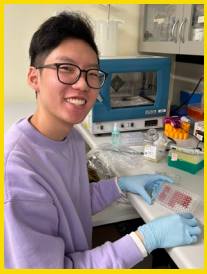

Vision Science Honours VISN4016

Information Booklet 2027

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- Education

Why do Vision Science Honours?

Vision Science Honours involves a full-time research project (with supervision) in the School of Optometry & Vision Science. This runs over 3 terms (with no coursework) and involves developing a research question, performing research tasks and assessing and interpreting results, with supervision.

Vision Science Honours provides a practical, real-world learning experience in a research environment. Students join a SOVS research group and are guided through a project by experienced SOVS academics.

Honours is an opportunity to gain advanced training and knowledge in a specific area of vision science (for example laboratory-based, bioinformatics, sensory systems/virtual reality, clinical or public health techniques and applications) and build further skills and confidence that can significantly enhance learning and improve employability including:

- Critical thinking
- Time management
- Oral and written communication
- Data analytics and statistics
- Collaboration and networking

Honours also provides an opportunity for further post-graduate study.

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Vision Science Honours Course schedule

In Vision Science Honours, you are expected to commit approximately 28 hours a week across 3 terms to your research project. You are also expected to attend monthly workshops and will have optional opportunities to attend extra-curricular activities.

Below is the typical course schedule and commitments for Vision Science Honours

Feb
- Vision Science Honours commences

Mar
- Monthly Workshop (Literature Reviews)

Apr
- Literature Review Due
- Monthly Workshop (Research Presentation Skills)

May
- Proposal presentation
- Monthly Workshop (Research Ethics)
- Optional activity: Shadowing in the SOVS Optometry Clinic

Jun
- Monthly Workshop (Research tools)
- Optional activity: Working with low vision specialists

Jul
- Monthly Workshop (Publishing)
- Optional activity: Visiting Sydney Eye Bank

Aug
- Monthly Workshop (Guest Speaker)
- Optional activity: Visit the Health Translation Hub

Sep
- Monthly Workshop (Thesis preparation)

Oct
- Monthly Workshop (Research as a career)

Nov
- Thesis and Final Presentation Due

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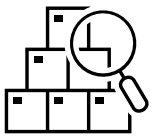
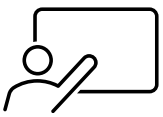
Assessments in Vision Science Honours



1. Literature review

15%

In the first term, you write a literature review on your research topic. This helps you learn more about the research field, identify research questions and hypotheses, and develop skills to critically assess the literature.



2. Proposal Presentation

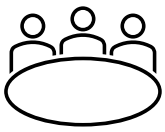
15%

After your literature review, you present your proposed research plan to your fellow honours students and SOVS academics. Feedback from the presentation can be used to refine your research plan.

3. Thesis

50%

In your final term, you submit a thesis detailing the results of your research. The thesis will include Introduction, Methods, Results, Discussion, References and tables and figures.



4. Final Research Presentation

20%

After thesis submission, you present a summary of your research to SOVS academics and students.

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Unique offerings in Vision Science Honours

- **Monthly Check-in Workshops**

  These sessions are held in the 1st week of every month and include a tutorial on an essential research topic or skill. The sessions are also a chance for students to meet with the course convenor and their peers for feedback and support.

- **Shadowing in the SOVS Optometry Clinic**

  In these optional sessions, students will shadow an optometrist in the SOVS Optometry Clinic while they see patients. Students can take this opportunity to observe clinical workflow and ask questions about working in clinical practice.

- **PhD Buddy Program**

  In this optional program, students are paired with a PhD mentor from SOVS who can share advice and experiences about life as a research student. Meetings are organized by the Honours student and can be casual coffee chats, emails, or Teams calls.

- **Extra-curricular activities**

  Optional activities will be offered throughout the year to allow you to engage in areas of vision science outside your project. Activities include visiting the Sydney Eye Bank to see how donated eyes are used for research and visiting the Health Translation Hub to use the slit lamp simulator.

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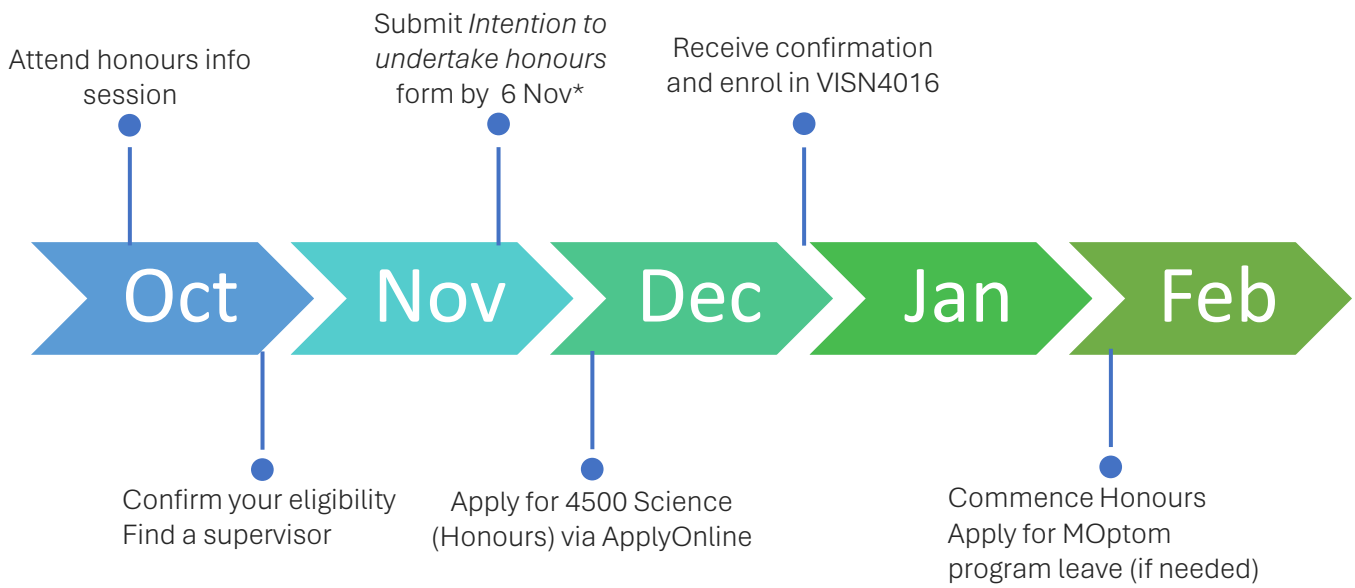
Applying for Vision Science Honours

Honours Application Timeline



Expressions of interest for Honours closes 6 November 2026*.

To apply, students need to submit intention forms through the Faculty of Science and the Applyonline portals (see page 8 for details). ***Note, students who submit intention forms are not committed to enrol in Honours and may change their mind.***

Students will be notified by UNSW if they can enrol in the Honours program by December. Students need to enrol by late January to commence Honours in February.

If a student is enrolled in MOptom, they can apply for program leave to enroll in Honours and return to the MOptom program in the following year.

*Late applications will be considered
Please contact Convener Dr Daisy Shu for assistance

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Applying for Vision Science Honours

- **Confirm your eligibility**

  To apply for Vision Science Honours you need:

  - To have completed 3-year, full-time BVisSci or BSc (VisSci) (144UOC) or BAdvSci (VisSci, Internal Honours)
  - A WAM of 65 (credit) or more (if <65 WAM please contact convener about special entry)

- **Find a supervisor**

  Before applying for Honours, you need a supervisor. This can be organised by:

  - Reviewing projects in this booklet and contacting supervisors directly
  - Checking the SOVS website to identify research groups you may be interested in and contacting them to see if they have an honours projects
  - Contacting the Honours Convenor Dr. Daisy Shu (daisy.shu@unsw.edu.au) to discuss your interests and to help you find a supervisor

- **Submit an Intention**

  You must complete the following once you find a supervisor:

  - Submit an "Intention to Undertake Honours" form at www.unsw.edu.au/science/student-life-resources/honours-how-apply by 6 Nov 2026
  - Apply for the Honours Program (VISNBH4500) via https://applyonline.unsw.edu.au . International students need to apply by 24 Sep 2026; domestic students by 26 Jan 2027

- **Enrol in Vision Science Honours**

  Once your intention has been accepted, you can enroll in Vision Science Honours

  - If you are in the MOptom program, you can contact the teaching admin coordinator Michelle Wanandy to organize program leave.

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2027 Honours Projects*

**new projects can also be negotiated individually with supervisors*

Research Area: Anterior Eye

Dr. Suki Jaiswal

- Through the Smoke: Understanding How Bushfires Affect Our Eyes
- Development and Psychometric Validation of the Firefighter Eye Symptoms Questionnaire

Dr. Jerome Ozkan

- Investigating environmental factors associated with ocular surface disease

Scientia Prof Fiona Stapleton

- Why does space travel cause dry eye?

A. Prof Nicole Carnt

- Geospatial modelling of severe eye infection “hot spots”
- PREDATOR - PREdiabetes and Diabetes Assessment Through Optos Retinal photograph
- Are contact lens contaminants the culprits in orthokeratology microbial keratitis?
- Which repurposed angiotensin receptor II blocker works best for reducing corneal scars?

Dr. Ushasree Pattamatta

- Confirming AT1R-Mediated Neuroprotection by Irbesartan

A. Prof Pauline Kang

- Green Recommendations to Encourage outdoor Exposure & combat Nearsightedness (GREEN) study
- Controlling myopia with spectacle lenses

A. Prof Maria Markoulli

- Do ocular lubricants improve dry eye symptoms and passenger experience on long-haul flights?

A. Prof Jacqueline Tan-Showyin

- The effect of the eyelids on ocular comfort

Research Area: Posterior Eye

Dr Lisa Nivison-Smith

- Validation of a Novel Imaging Method to Measure Retinal Neurovascular Coupling
- Can a novel high-density analysis detect inner retinal changes in macular degeneration?

Dr Angelica Ly

- From Imaging to Insight: Visualising Geographic Atrophy with Hyperspectral Technology

Dr Matt Trinh

- Mapping the Healthy Retina: Topographic Analysis of Hyperspectral Retinal Imaging

Dr Daisy Shu

- Mapping the Role of Immune Cells in Age-Related Macular Degeneration

2027 Honours Projects*

**new projects can also be negotiated individually with supervisors*

Research Area: Vision Science

A.Prof Juno Kim

- Using virtual reality to understand multisensory integration

Dr Revathy Mani

- Comparison of Objective and Subjective Vergence Responses in Smartphone Users at Different Viewing Distances

Research Area: Public Health and Healthcare Delivery

Dr Sheela Kumaran

- AEye Navigator: Evaluation of an AI-enabled clinical decision support tool for mental health
- Artificial Intelligence Use Among People with Visual Impairment and Blindness

Dr Lisa Nivison-Smith

- Can Automated Clinical Decision Support Systems be Implemented Responsibly in Eye Care?
- Gridlocked: Breaking Barriers to Amsler Grid Use

Research Area: Education

Dr Vinod Maseedupally

- Effectiveness of Vision Science Work Integrated learning program

Dr Ereeny Mikhail

- An Investigation of Sustainability across Vision Science and Optometry Education and Practice

Anterior Eye Projects

Through the Smoke: Understanding How Bushfires Affect Our Eyes

Supervisors: Dr Suki Jaiswal
Prof Isabelle Jalbert
Prof Fiona Stapleton

Project type: Clinical Intervention

Project description

Eye irritation is one of the most reported symptoms from air pollution from bushfire smoke. However, the underlying effects of bushfire smoke on the eye are not fully understood. This project aims to better understand how smoke exposure affects the surface of the eye to address this major environmental and public health issue.

In this project you will

- use a specialised system developed by our research team to measure changes in corneal sensitivity following controlled air pollution exposure
- analyse high resolution in vivo corneal microscope images to determine changes in corneal nerve and immune cell morphology.
- develop skills in research methods, advanced imaging and statistical analysis

Skills developed in the project

- Human participant engagement and recruitment
- Clinical ocular assessment
- Image analysis with specialised software (NeuronJ)
- Interpretation of ocular surface and neuro-immunological changes
- Biomedical statistics

Contact
Dr Suki Jaiswal
suki.jaiswal@unsw.edu.au

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Development and Psychometric Validation of the Firefighter Eye Symptoms Questionnaire

Supervisors: Dr Suki Jaiswal

Project type: Survey-based, Mixed-methods

Project description

Firefighters are routinely exposed to smoke, heat, and airborne particles that can affect their eye health. Yet there is currently no accepted questionnaire to measure these symptoms. This project will contribute to the development of a tool to support firefighter health research around the world.

In this project you will

- evaluate and validate the draft questionnaire and ensure it reliably measures eye symptoms across firefighter populations.
- collaborate directly with Australian and Canadian firefighters
- have flexible working arrangements depending on the task and your schedule.

Skills developed in the project

- Survey-item development
- Human participant engagement and recruitment
- Statistical analysis (including psychometric analyses)
- Translating real-world problems into research studies
- Working within an international multidisciplinary research team

Contact
Dr Suki Jaiswal
suki.jaiswal@unsw.edu.au

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Investigating environmental factors associated with ocular surface disease

Supervisors: Dr Jerome Ozkan
Prof Minas Coroneo

Project type: Wet-lab experimental

Project description

Meibomian gland dysfunction (MGD) is the leading cause of evaporative dry eye disease, yet the underlying mechanisms of the disease remain unclear. Emerging evidence suggests that environmental exposures may play an important role in ocular surface health, highlighting the need to better understand their potential contribution to MGD.

In this project you will

- use lab-based analytical techniques and clinical samples to explore if a novel environmental factor is associated with MGD and examine its potential relevance to disease processes.
- gain experience in clinical research, laboratory methods and data analysis

Skills developed in the project

- Preparing and submitting ethics applications
- Clinical biospecimen collection and handling
- Wet lab experimental techniques
- Analytical lab methods
- Statistical analysis (SPSS, Prism, R, etc.) and interpretation

Contact
Dr Jerome Ozkan
j.ozkan@unsw.edu.au

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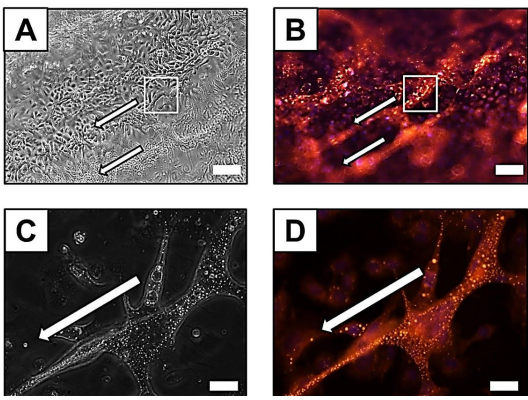
Why does space travel cause dry eye disease?

Supervisors: Scientia Prof Fiona Stapleton
Prof Kate Poole
A/Prof JingJing You

Project type: Wet-lab experimental



Project description

Astronauts return from space travel with dry eye thought to be due to increased tear evaporation and changes to meibomian lipid metabolism, although this is not confirmed. This project will explore the effects of microgravity on meibomian gland epithelial cells grown in tissue culture to understand how zero gravity affects lipid production by those glands.

In this project you will

- Be trained to grow and differentiate immortalised and primary meibomian gland epithelial cells and stimulate lipid production in a holocrine system.
- Use staining and microscopy to visualise and quantify lipid production under conditions of microgravity
- Manage and report data and prepare draft manuscript

Skills developed in the project

- Wet-lab techniques such cell culture
- Immunostaining, microscopy and image analysis
- Statistical analysis (SPSS, Prism)
- Critical thinking, problem-solving

Contact
Scientia Prof Fiona Stapleton
f.stapleton@unsw.edu.au

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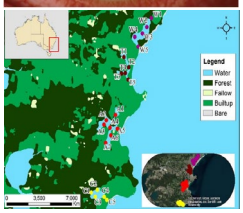
Geospatial modelling of severe eye infection “hot spots”



Supervisors: A/Prof Nicole Carnt
A/Prof Samsung Lim
A/Prof David Muscatello

Project type: Computational modeling, epidemiology

Project description

Acanthamoeba keratitis is responsible for only 5% of contact lens related eye infections, but results in 50% of the vision loss. More than 50% of the population attributable risk of infection is due to patients swimming and showering in contact lenses and we have found Acanthamoeba in up to 38% samples from northern NSW lakes, Sydney bathroom sinks and Warragamba Dam. This project will use geospatial models to identify links between these environmental and population risks to inform earlier detection and targeted prevention.

In this project you will

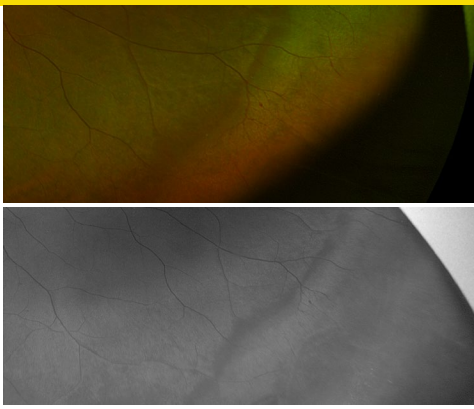
- use spatial analyses to link infection locations with environmental conditions and demographic factors to identify areas of increased risk.
- Work with a muti-disciplinary team from optometry, engineering and population health

Skills developed in the project

- Epidemiology
- Statistical analysis

Contact
A/Prof Nicole Carnt
n.carnt@unsw.edu.au

PREDATOR
PREdiabetes and Diabetes Assessment Through Optos Retinal photograph



Supervisors: A/Prof Nicole Carnt
Prof Andrew White
Dr Stephanie Hyams

Project type: Clinical Assessment

Project description

Optometrists see millions of Australians every year making them ideally placed to screen for major diseases such as diabetes. Wide-field retinal photography could be used to identify individuals at risk of diabetes by capturing peripheral microaneurysms, an early visible manifestation of microvascular injury in the prediabetic state before symptoms develop. No published studies however have used wide-field photography to characterise peripheral microaneurysm prevalence in prediabetes or insulin resistance.

In this project you will

- Assist in recruiting participants and conducting screening visits including performing Optos ultra-wide-field retinal photography
- Perform image pre-processing and data analysis
- Work with a multi-disciplinary team

Skills developed in the project

- Human participant engagement and recruitment
- Clinical assessment and imaging
- Statistical analysis

Contact
A/Prof Nicole Carnt
n.carnt@unsw.edu.au

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Are contact lens contaminants the culprits in orthokeratology microbial keratitis?

Supervisors: A/Prof Nicole Carnt
Dr Kathleen Watt
Dr Brett Drury
Dr Con Petsoglou

Project type: Wet-lab experimental

Project description

A popular contact lens modality for slowing myopia is orthokeratology, where large reverse curve rigid contact lenses are worn overnight to reshape the corneal epithelium. However, there have been cases of a rare but severe form of corneal infection (microbial keratitis) in children wearing orthokeratology lenses, with 50% of cases resulting in vision loss. We hypothesise that this is due to microbial biofilms and communities in orthokeratology contact lens cases.

In this project you will

- collect and analyse storage cases of orthokeratology and other contact lens wearers with microbial keratitis and asymptomatic contact lens wearers to determine if storage case microbial communities are involved.
- work with diverse team including ophthalmologists, a microbial keratitis epidemiologist, and an orthokeratology and myopia expert.

Skills developed in the project

- Biospecimen collection and handing
- Wet-lab experimental techniques
- Statistical analysis

Contact
A/Prof Nicole Carnt
n.carnt@unsw.edu.au

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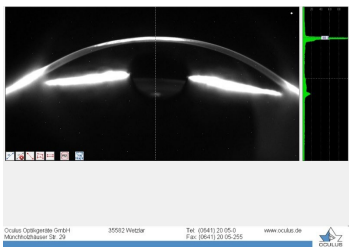
Which repurposed angiotensin receptor II blocker works best for reducing corneal scars?



Supervisors: A/Prof Nicole Carnt
Dr Ushasree Pattamatta,
A/Prof Andrew White

Project type: Wet-lab experimental

Project description

Angiotensin receptor II blockers (ARBs) are widely used as oral drugs to treat hypertension. In the cornea, the ARB Losartan has also been used off label as a compounded eye drop to reduce corneal scarring. Irbesartan is the most effective ARB for lowering blood pressure and has more bioavailability, metabolic, anti-inflammatory and antioxidative pathways than Losartan. Thus, this project will investigate the potential of this repurposing Irbesartan across a range of eye diseases, including glaucoma.

In this project you will

- Be trained in cell culture techniques and use a cell based model to compare Irbesartan with Losartan
- Perform confocal microscopy and undertake image analysis

Skills developed in the project

- Wet-lab techniques
- Microscopy
- Image analysis

Contact
A/Prof Nicole Carnt
n.carnt@unsw.edu.au

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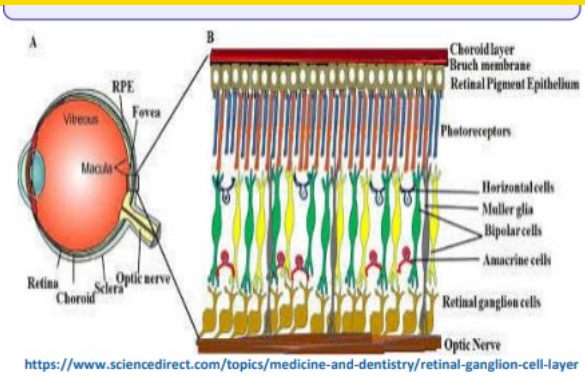
Confirming AT1R-Mediated Neuroprotection by Irbesartan

Supervisors: Dr Ushasree Pattamatta,
A/Prof Andrew White
A/Prof Nicole Carnt

Project type: Wet-lab experimental



https://www.sciencedirect.com/topics/medicine-and-dentistry/retinal-ganglion-cell-layer

Project description

Glaucoma causes blindness through progressive loss of retinal ganglion cells (RGCs). Current treatments only lower intraocular pressure and do not directly protect RGCs, highlighting a need for neuroprotective therapies. Irbesartan, a widely used blood pressure drug, is a promising neuroprotective strategy potentially through blockage of AT1R. This project investigates if irbesartan protects RGCs specifically through AT1R blockade, and which cell types mediate the ROS response.

In this project you will

- Be trained and perform a range of wet-lab experimental techniques including retinal explant culture, ELISA, immunostaining and microscopy
- Perform data, image and statistical analysis
- Work at the Centre for Vision Research at Westmead Institute of Medical Research

Skills developed in the project

- Wet-lab techniques such as ELISA
- Retinal explant culture
- Immunostaining, microscopy and image and colocalisation analysis
- Statistical analysis

Contact
Dr Ushasree Pattamatta
ushasree.pattamatta@sydney.edu.au

UNSW SYDNEY

Controlling myopia with spectacle lenses

Supervisors: A/Prof Pauline Kang
Prof Padmaja Sankaridurg
Prof Lisa Keay

Project type: Clinical Research,
Retrospective study

Project description

Real-world clinical data provide unique insights into treatment effects beyond those captured in strictly controlled clinical trials. This study aims to evaluate the efficacy of two lens designs in slowing myopia (short-sightedness) progression using data from community optometry clinical practices.

In this project you will

- Review clinical records
- Data handling, collation, management and analysis
- Statistical analysis

Skills developed in the project

- Clinical record keeping
- Statistical analysis (SPSS, Prism etc)
- Scientific writing
- Critical Thinking and problem-solving

A $5000 honours scholarship is available for this project. Please contact A/Prof Kang to determine your eligibility

Contact
A/Prof Pauline Kang
p.kang@unsw.edu.au

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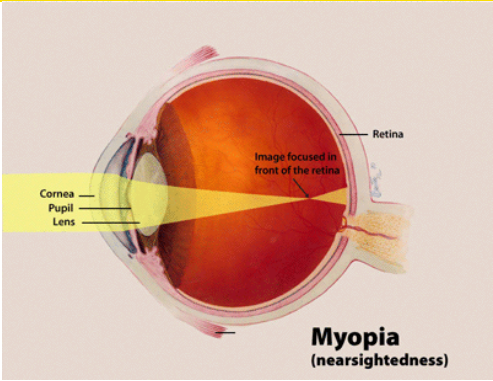
Green Recommendations to Encourage outdoor Exposure and combat Nearsightedness (GREEN) study

Supervisors: A/Prof Pauline Kang
Prof Eva Kimonis

Project type: Clinical Intervention



Project description

Myopia is becoming one of the most significant causes of blindness worldwide. Time spent outdoors has been shown to protect against myopia in children, while also delivering other physical and mental health benefits and improving academic and learning outcomes. This project will investigate if a behavioural intervention incorporating nature prescribing can increase outdoor time in children.

In this project you will

- Recruit participants and and manage scheduling and retention
- Take clinical ocular measurements and administer questionnaires
- Measure effectiveness of intervention using a wearable light sensor
- Collaborate with a research group from the School of Psychology

Skills developed in the project

- Human participant recruitment and engagement
- Hands-on experience conducting clinical ocular measurements and administering structured questionnaires
- Scientific writing and statistical analyses
- Interdisciplinary collaboration

Contact
A/Prof Pauline Kang
p.kang@unsw.edu.au

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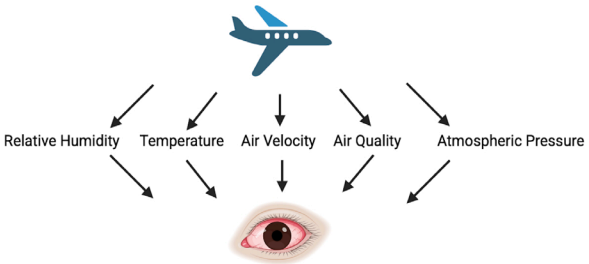
Do ocular lubricants improve dry eye symptoms and passenger experience on long-haul flights?

Supervisors: A/Prof Maria Markoulli
Dr Ereeny Mikhail

Project type: Survey based, clinical research



Project description

The environment of aircraft cabins can result in symptoms of ocular irritation and ultimately dry eye disease (DED). This has been found in several studies with reporting of subjective symptoms of DED and objective signs. With the nativity of direct, ultra long-haul flights by Qantas known as Project Sunrise, which commenced in 2026 from Sydney to London and Sydney to New York, there needs to be a further understanding of the impact of the factors that can mitigate these in-flight DED symptoms, and thereby, improve passenger experience.

In this project you will

- Examine the effect of the aircraft environment on ocular symptoms and passenger satisfaction
- Examine if ocular lubrication mitigates symptoms in long-haul flights
- Perform a cross-sectional study on human participants, statistical analysis and scientific writing

Skills developed in the project

- Human participant interaction and recruitment
- Clinical research methods
- Statistical analysis (SPSS, Prism etc)
- Scientific writing and critical thinking

Contact
A/Prof Maria Markoulli
m.markoulli@unsw.edu.au

UNSW SYDNEY

The effect of the eyelids on ocular comfort

Supervisors: A/Prof Jacqueline Tan-Showyin
Scientia Prof Fiona Stapleton

Project type: Clinical research

Project description

Dry eye disease (DED) affects hundreds of millions of people around the world, and has detrimental effects on quality of life. DED is recognized as a multifactorial disorder, but despite the eyelids travelling 300 m per day during blinking, limited research has focused on the contribution of the eyelids to ocular discomfort. This project will contribute to understanding eyelid characteristics and their potential role in influencing ocular comfort.

In this project you will:

- assist in developing new techniques to assess eyelid features and dynamics
- measure eyelid and eyelash characteristics across different populations
- investigate associations between eyelid features and ocular comfort

Skills developed in the project

- Clinical research methods
- Good Clinical Practice
- Statistical analysis and scientific writing
- Work within a team recognized globally as leaders in clinical trial research

Contact
A/Prof Jacqueline Tan-Showyin
Jacqueline.tan@unsw.edu.au

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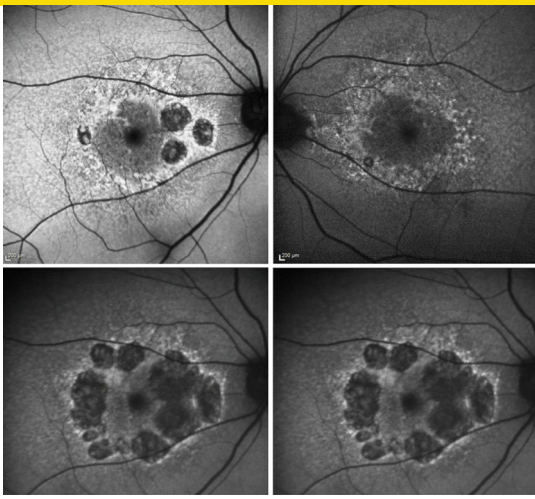
Posterior Eye Projects

Can a novel high-density analysis detect inner retinal changes in macular degeneration?



Supervisors: Dr Lisa Nivison-Smith
Dr Matt Trinh

Project type: Clinical research

Project description

Geographic atrophy is a major reason for vision loss in age-related macular degeneration (AMD). While several studies have characterized outer retinal changes in geographic atrophy, the health of the inner retina remains unclear. This is problematic as interventions such as bionic eye implants restore vision by assuming the inner retina is still healthy in AMD.

In this project you will

- Interpret and process OCT scans from a large dataset of healthy eyes and those with intermediate AMD and geographic atrophy
- Assist in applying our novel, high-density OCT image analysis pipeline to these OCT images to determine if inner retinal health is compromised

Skills developed in the project

- Clinical image analysis and interpretation
- Big data handling and processing
- Statistical analysis

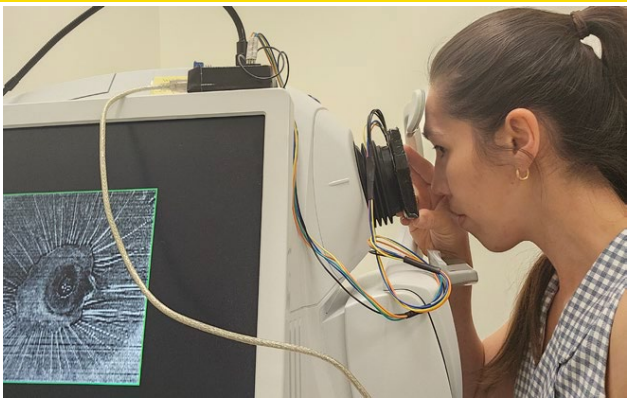
Contact
Dr Lisa Nivison-Smith
l.Nivison-smith@unsw.edu.au

UNSW SYDNEY

Validation of a Novel Imaging Method to Measure Retinal Neurovascular Coupling

Supervisors: Dr Lisa Nivison-Smith
Dr Matt Trinh

Project type: Clinical research



Project description

Breakdown of neurovascular coupling is thought to occur in major retinal diseases such as macular degeneration and diabetic retinopathy however further exploration of this hypothesis is limited due to few methods that can measure neurovascular coupling. We recently developed a custom lens attachment that delivers flickering light stimulus and can measure neurovascular coupling. This project will validate this novel technique so it can be used to assess those with retinal degeneration.

In this project you will

- Be training in clinical techniques such as OCT and OCTA imaging.
- Recruit participants and perform clinical testing using the novel flicker stimulus
- Assist in applying our novel, high-density image analysis pipeline to determine if the novel method can detect neurovascular coupling

Skills developed in the project

- Participant recruitment and clinical testing
- Clinical image analysis and interpretation
- Statistical analysis

Contact
Dr Lisa Nivison-Smith
l.Nivison-smith@unsw.edu.au

UNSW SYDNEY

From Imaging to Insight: Visualising Geographic Atrophy with Hyperspectral Technology

Supervisors: Dr Angelica Ly
Dr Lisa Nivison-Smith
Dr Matt Trinh
Ms Judith Massmann

Project type: Clinical Research

Project description

Geographic atrophy, an advanced form of age-related macular degeneration (AMD), causes irreversible vision loss in millions of people worldwide. New treatment options implore us to better identify and understand geographic atrophy. Hyperspectral retinal imaging (HSI) is a state-of-the-art, non-invasive technology that uses sequential monochromatic illumination to acquire detailed high-resolution spectral data across 91 wavelengths and may detect geographic atrophy more accurately and earlier than other routine imaging modalities, such as OCT. This project will evaluate the clinical utility of HSI in advanced AMD (geographic atrophy).

In this project you will

- Recruit and comprehensively assess participants with advanced AMD
- Be trained in advanced image analysis and apply this to benchmark HSI against clinical imaging modalities, including OCT and colour fundus photography
- Engage in a multi-disciplinary collaboration involving retinal biology, computer science and optometry

Skills developed in the project

- Participant recruitment and stakeholder engagement
- Clinical imaging
- Image analysis, machine learning/AI

Contact
Dr. Angelica Ly
a.ly@unsw.edu.au

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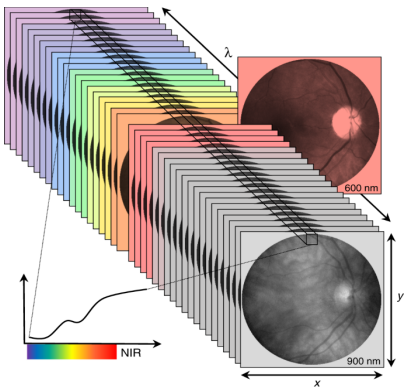
Mapping the Healthy Retina: Topographic Analysis of Hyperspectral Retinal Imaging

Supervisors: Dr Matt Trinh
Ms Judith Massmann
Dr Lisa Nivison-Smith
Dr Angelica Ly

Project type: Clinical Research



Project description

Hyperspectral retinal imaging captures detailed information across multiple wavelengths, but we do not yet understand how these measurements vary in the healthy retina or how repeatable they are. The project will adapt existing image-analysis approaches developed by our research team to map spatial variation in hyperspectral measurements and provide normative data for future studies of ageing and retinal disease.

In this project you will

- Recruit and image healthy participants using hyperspectral imaging and other clinical imaging modalities.
- Apply topographic image analysis to map hyperspectral measurements across the retina.
- Assess test-retest repeatability and examine how hyperspectral outcomes vary between retinal regions and participants.

Skills developed in the project

- Clinical imaging and research methods
- Image analysis
- Statistics (e.g., SPSS, Prism)
- Scientific writing

Contact
Dr. Matt Trinh
m.trinh@unsw.edu.au

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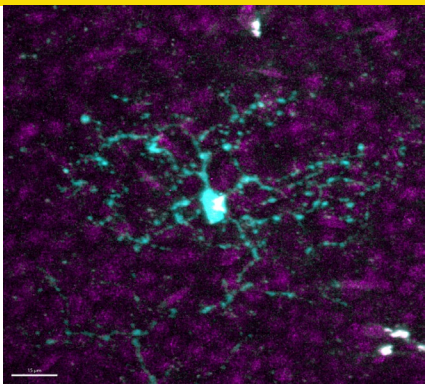
Seeing Immune Cells in Colour: Mapping Their Role in Age-Related Macular Degeneration



Supervisors: Dr Daisy Shu
A/Prof Tatyana Chtanova
Dr Andrew Yam

Project type: Wet-lab experimental
Secondary analysis of existing data

Project description

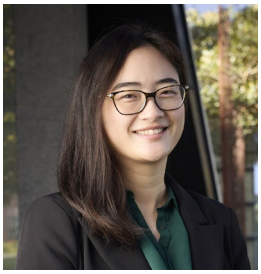
Immune cells may protect the retina or contribute to vision loss in age-related macular degeneration (AMD). Using SMARTIE mice, which show different immune cells in different colours, we will map how these cells behave in models of dry and wet AMD. Flow cytometry and multiphoton microscopy will help us identify immune cells that could be targeted to protect vision.

In this project you will

- Use SMARTIE mice in models of dry and wet age-related macular degeneration to study immune cells during disease.
- Prepare eye tissue and perform flow cytometry to identify and count different immune cell populations.
- Use multiphoton microscopy to image where immune cells are located and how they interact with damaged tissue, then compare the findings with retinal damage and abnormal blood vessel growth.

Skills developed in the project

- Wet lab techniques (flow cytometry, microscopy)
- Animal handing
- Microscopy
- Biospecimen collection



Contact
Dr. Daisy Shu
daisy.shu@unsw.edu.au

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Vision Science Projects

Using virtual reality to understand multisensory integration

Supervisors: Prof Juno Kim

Project type: Experimental, observation

Project description

The development of immersive technologies relies on better understanding of how we perceive real-world and virtual environments. However, it is still not clear what specific patterns in sensory information explain optimal perception and action in real-world scenarios. In this project, understanding the physiological constraints in normal humans when engaging in physical activities like walking will be investigated with broad applications in the development of future head-mounted display virtual reality for interactive entertainment and gamification in health.

In this project you will

- use motion capture innovations and head/eye tracking to determine how visual motion influences our perception and navigation through real and virtual reality (VR) environments presented in Head Mounted Displays (HMDs).
- work with a diverse Sydney-based supervisory team

Skills developed in the project

- Basic coding with HTML and JavaScript
- Use of motion capture and HMD-based VR technologies
- Human participant recruitment and engagement
- Statistical analysis (e.g., ANOVA, correlation, Linear Mixed Effects Regression)

Contact
Prof Juno Kim
juno.kim@unsw.edu.au

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Comparison of Objective and Subjective Vergence Responses in Smartphone Users at Different Viewing Distances

Supervisors: Dr Revathy Mani
A/Prof Sieu Khuu

Project type: Secondary analysis of existing data

Project description

This project aims to compare subjective clinical measures of vergence with objective eye-tracking data previously collected from smartphone users while reading at three viewing distances under two different viewing conditions - natural viewing and continuous viewing. The analysis will provide a deeper understanding of vergence eye movements by assessing changes in vergence responses across viewing distances and examine the relationship between objective and subjective responses.

In this project you will

- extracting vergence eye-movement traces recorded from the existing eye tracker data using an automated algorithm
- gain hands-on experience in eye-tracking data extraction, statistical analysis, and interpretation of results and scientific writing.

Skills developed in the project

- Big data handling
- Statistical analysis (e.g., using SPSS, Graphpad Prism)
- Systematic review of the literature and critical thinking
- Scientific writing

Contact
Dr Revathy Mani
revathi.mani@unsw.edu.au

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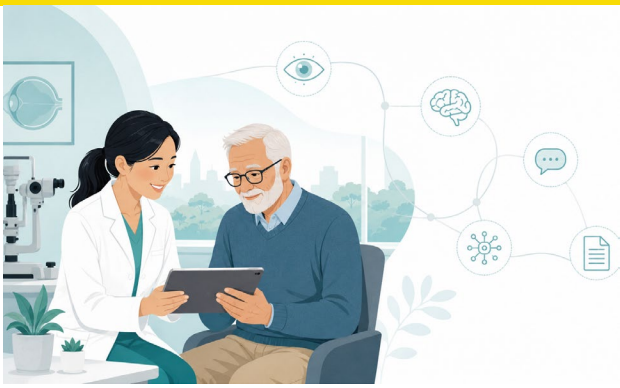
Public Health Projects

AEye Navigator: Evaluation of an AI-enabled clinical decision support tool for mental health

Supervisors: Dr Sheela Kumaran
Dr Jessie Huang-Lung
Prof Lisa Keay

Project type: Public health, intervention



Project description

The Mental Wellbeing Resources published by Vision 2020 Australia compiles over 50 mental heath services and supports on available to people with vision loss. While comprehensive, the large number of services make it challenging for practitioners to identify the most appropriate support during routine clinical care. This project will implement and evaluate AEye Navigator, an AI-enabled clinical decision support tool that assists eyecare professionals in identifying who may benefit from mental health support, provide information on available resources, and connect those at risk with appropriate support services.

In this project you will

- Refine clinical workflows that allow implementation of AEye Navigator.
- Test AEye Navigator in simulated and real-world clinical scenarios
- Evaluate the usability, acceptability, and feasibility of AEye Navigator among eye care practitioners.

Skills developed in the project

- Stakeholder engagement / Participant recruitment
- Survey design
- Conducting interview/focus groups
- Mixed - methods analysis

Contact
Dr. Sheela Kumaran
Sheela.kumaran@unsw.edu.au

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Artificial Intelligence Use Among People with Visual Impairment and Blindness

Supervisors: Dr Sheela Kumaran
Dr Sharon Oberstein
Prof Lisa Keay

Project type: Public health, mixed-methods

Project description

A number of AI-powered applications are being developed to support people with visual impairment and blindness (VI&B). These include conversational AI platforms (e.g. ChatGPT), AI-enhanced magnification tools (e.g. Magnifying Glass + AI), identification apps (e.g. Google Lens), navigation aids (e.g. BlindSquare), and real-time assistance tools (e.g. Seeing AI). Whie these technologies could enhance social inclusion, access to education and employment, autonomy and independence for people with VI&B, evaluation of AI use among people with VI&B is yet to be explored.

In this project you will

- Use mixed-methods research design combining surveys with qualitative methods to explore awareness, patterns of use, perceived benefits and barriers and ethicality of AI technologies for people with VI&B
- Identify potential supports needed to bridge the emerging 'AI gap'

Skills developed in the project

- Stakeholder engagement / Participant recruitment
- Survey design
- Conducting interview/focus groups
- Mixed - methods analysis

Contact
Dr. Sheela Kumaran
Sheela.kumaran@unsw.edu.au

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Can Automated Clinical Decision Support Systems be Implemented Responsibly in Eye Care?

Supervisors: Dr Lisa Nivison-Smith
Dr Angelica Ly

Project type: Survey-based

Project description

Automated tools are increasingly being used in clinical practice to support decision making and improve efficiency. However, concerns remain around safety, transparency, bias, accountability and patient trust. To know which of these concerns to address and how urgently, it is essential to understand what clinicians and patients consider most important for responsible implementation of AI in eye care.

In this project you will

- Develop and validate surveys for clinicians and patients demonstrating real-world examples of automated tools that they can evaluate for priorities such as safety, bias and accountability.
- Distribute, collect and analyse the finalized survey
- Use findings to form recommendations on best-practice for implementing new automated tools in eyecare

Skills developed in the project

- Survey design and validation
- Stakeholder engagement / Participant recruitment
- Quantitative data analysis

Contact
Dr. Lisa Nivison-Smith
l.nivison-smith@unsw.edu.au

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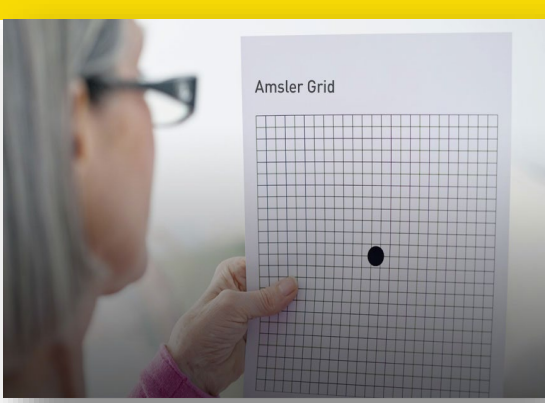
Gridlocked:
Breaking Barriers to Amsler Grid Use

Supervisors: Dr Lisa Nivison-Smith

Project type: Mixed-methods, co-design



Project description

The Amsler grid is a widely used tool for patients with retinal disease to monitor their vision at home. Early detection of vision changes with Amsler grid is critical to ensuring treatment is delivered early when it is most successful however only 8% of patients use their Amsler grid regularly. Efforts to improve adherence such as education and reminders have had limited success.

In this project you will

- Conduct workshops with individuals who use the Amsler grid to understand what interventions could improve Amsler Grid use
- Co-design an intervention/s to improve use and gather feedback in subsequent workshops to improve and finalise design
- Use findings to form recommendations on Amsler grid adherence strategies

Skills developed in the project

- Stakeholder engagement / Participant recruitment
- Conducting co-design workshops and focus groups
- Mixed - methods analysis

Contact
Dr. Lisa Nivison-Smith
l.nivison-smith@unsw.edu.au

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Education Projects

Effectiveness of Vision Science Work Integrated learning program

Supervisors: Dr. Vinod Maseedupally
A/Prof. Sieu Khuu
Prof. Isabelle Jalbert

Project type: Educational, Mixed-methods

Project description

The Work Integrated Learning (WIL) program supports Vision Science and Optometry students to develop skills and prepare for their careers. Evaluation of student experiences and outcomes from this program however has yet to be performed. This project will analyse the WIL program to determine its effectiveness as well as areas for improvement.

In this project you will

- Develop and administer surveys or interviews to participants to WIL program on placement alignment, skills development and impact on career aspirations.
- Analyse data to identify key trends and generate program recommendations.
- Contribute to improvement of a major academic program at SOVS

Skills developed in the project

- Applying and obtaining human research ethics approval
- Participant recruitment and stakeholder engagement
- Designing and conducting surveys and focus groups
- Data collection, management and organisation
- Statistical analysis of quantitative and qualitative data

Contact
Dr. Vinod Maseedupally
v.maseedupally@unsw.edu.au

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An Investigation of Sustainability across Vision Science and Optometry Education and Practice

Supervisors: Dr Ereeny Mikhail
Dr Revathy Mani

Project type: Educational, Mixed-methods

Project description

Sustainability has become an increasingly important priority in healthcare due to the sector's impact on greenhouse gas emissions, resource consumption and waste generation. Within optometry, sustainability considerations include manufacturing and disposal of spectacle and contact lenses, eye drops and other ophthalmic products; and the environmental impact of eyecare delivery and referral pathways. Recent studies identify a need to incorporate sustainability into optometry education but there is limited literature on sustainability-related knowledge across the Vision Science and Optometry field, particularly in Australia.

In this project you will

- Develop and implement surveys and/or interviews to evaluate knowledge, practices, attitudes and experiences of sustainability in the Optometry field
- Perform appropriate data analysis within and across groups
- Use findings to make suggested improvements to the knowledge and practices of sustainability in the Optometry profession

Skills developed in the project

- Designing and conducting surveys and/or interviews/focus groups
- Participant recruitment and stakeholder engagement
- Statistical analysis of quantitative and/or qualitative data

Contact
Dr. Ereeny Mikhail
e.mikhail@unsw.edu.au

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Thank you for your interest in our Vision Science Honours Program. More Honours Projects can be negotiated with supervisors so please get in touch to discuss project ideas.

If you have any questions, please do not hesitate to reach out to the VISN4016 Course Convenor, Dr. Daisy Shu at daisy.shu@unsw.edu.au

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