



RESEARCH PROJECTS

Anatomy and Human Biology, Physiology, Neuroscience, Sport Science, Exercise and Health

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Tips for choosing a project

Supervisor and Topic

Supervision

The role of the supervisor is to advise, guide, and provide constructive feedback to the student through the processes of choosing a realistic topic, designing a project, doing the research, interpreting the findings, and writing the dissertation.

Things to do before you decide on a supervisor:

Talk with a few prospective supervisors about their research interests and prospective topics, as well as their styles of supervision and what they expect of their students; and

Talk with current and former Honours and postgraduate students, your prospective supervisors of their experiences.

Things to discuss and negotiate with your supervisor very early in the program;

The regularity, timing, and format of your meetings.

The type and level of assistance that you would like, and your supervisor is prepared to give, with respect to choosing a topic and setting goals; finding appropriate literature; collecting the data and information; analysing and interpreting your findings; planning the dissertation; and writing and reviewing the dissertation.

Choosing a topic

Before you decide on a topic, it is usually a good idea to first identify one or more prospective supervisors according to the criteria above. Then, in consultation with your prospective supervisor/s, identify some possible topics and projects according to the following criteria:

Choose an area that is sufficiently interesting to you to maintain your enthusiasm for a year-long project.

Choose a topic in which you can identify questions to be answered or gaps to be filled in the current knowledge; and

Find a project that is realistic for you to complete within the time allocated for your research and dissertation.

Information for applicants

In an Honours year, the learning emphasis is on completion of an original research project. Projects are guided by academic staff who are internationally recognised in their specific fields of research. Students acquire the specialized skills that are required to complete their particular research project and also develop generic research skills such as analytical and problem-solving abilities, and a variety of communication skills. These are not only vital for future success in research but stand graduates in good stead whatever career they may subsequently pursue. Throughout the year, students also work in close collaboration with a like-minded peer group and professional university staff.

Honours are available in the following disciplines:

Anatomy and Human Biology

Physiology

Neuroscience

Human Biology and Data Analytics

Sport Science, Exercise and Health

Essential qualifications

For Honours: An appropriate undergraduate degree with a minimum weighted average of 65% in the level 3 subjects that comprise the relevant major, from an approved institution. Applicants will be assessed on a case-by-case basis.

For Master or PhD: An appropriate Honours degree or equivalent research experience from an approved institution. Applicants will be assessed on a case-by-case basis.

Enrolment must be full time.

Honours Scholarships available

DR MARGARET LOMAN-HALL HONOURS SCHOLARSHIP (APHB)

Scholarships are funded by a bequest from Dr Margaret Loman-Hall for the purpose of encouraging eligible students to undertake a Bachelor of Science (Honours) or Bachelor of Philosophy (Honours) in the Department of Anatomy, Physiology & Human Biology, School of Human Sciences, UWA.

Each Scholarship is valued at \$7,500 and comprises:

\$6,000 during the honours enrolment as a stipend

\$1,500 during the honours enrolment as research costs allowance payable to the student's supervisor.

<https://www.uwa.edu.au/study/scholarship-listing/dr-margaret-loman-hall-scholarship-f512651>

THE FRANK PYKE MEMORIAL SCHOLARSHIP (SSEH)

A stipend of \$5,000 is available to assist an Honours student, (who has demonstrated academic excellence and other outstanding achievements, abilities, leadership or community involvement in sport or exercise related activities) to undertake a Bachelor of Science (Honours) in the Department of Sport Science, Exercise and Health, School of Human Sciences, UWA.

<https://researchdegrees.uwa.edu.au/scholarships/1vwvx1/frank-pyke-memorial-hdr-scholarship-in-sport-science>

THE HIGH-PERFORMANCE SPORT RESEARCH CENTRE (HPSRC) AD-HOC HONOURS SCHOLARSHIP (SSEH)

These scholarships will provide selected UWA honours students with research project funds and a small personal stipend (\$3,000) in order to conduct an honours-level research project that aligns with the research focus areas of the HPSRC. In a collaborative effort between service providers from the Western Australian Institute of Sport (WAIS) and academic staff from the University of Western Australia (UWA), the honours research project should have a focus on the daily training environment and/or the performance outcomes of WAIS athletes and sport programs.

THE "KIDDO" HONOURS SCHOLARSHIP (SSEH)

The Kiddo \$5,000 Honours Scholarship is open for students eligible to undertake a BSc (Honours) course in 2027. The aim of this scholarship is to encourage and assist a meritorious student to undertake an honours course with a thesis related to the Kiddo program, www.kiddo.edu.au within the School of Human Sciences in 2027. The stipend of \$5,000 is expected to contribute to the student's living expenses. Successful applicant/s will be selected based on their academic performance. Prior experience in the Kiddo program will be considered favourably.

Email amanda.derbyshire@uwa.edu.au to register your interest.

Overview of SHS Honours units

Bachelor of Science (Honours) BH004

Bachelor of Sport Science Exercise and Health (Honours) BH032

Bachelor of Human Science (Honours) BH034

Note: Students who have completed the Bachelor of Human Science will need to enrol in the Bachelor of Human Sciences (Honours) BH034

2027 HON-ANHBY (ANATOMY & HUMAN BIOLOGY) BH004

2027 HON-HSAMP (ANATOMY & PHYSIOLOGY) BH034

Semester 1

Unit (6pts)	Unit name	Tasks	Weighting	Unit result
HMSC4001	Scientific Communication Part 1	Project Plan, Research Proposal, Proposal Seminar	12.5%	AC
HMSC5004	Research Methods in Human Sciences	Conceptual Examination of the Research Process	12.5%	Grade
HMSC5005	Data Analysis in Human Sciences	Statistics and Data Analysis Modules	12.5%	Grade
APHB5514	Honours Dissertation Part 1	Dissertation	AC	AC

Semester 2

Unit (6pts)	Unit name	Tasks	Weighting	Unit result
HMSC4008	Scientific Communication Part 2	Final Seminar, Student Viva	12.5%	Grade
APHB5515	Honours Dissertation Part 2	Dissertation	AC	AC
APHB5516	Honours Dissertation Part 3	Dissertation	AC	AC
APHB5517	Honours Dissertation Part 4	Dissertation	50%	Grade

2027 HON-PHYGY (PHYSIOLOGY) BH004

2027 HON-HSAMP (ANATOMY & PHYSIOLOGY) BH034

Semester 1

Unit (6pts)	Unit name	Tasks	Weighting	Unit result
HMSC4001	HMSC4001	Project Plan, Research Proposal, Proposal Seminar	12.5%	AC
HMSC5004	Research Methods in Human Sciences	Conceptual Examination of the Research Process	12.5%	Grade
HMSC5005	Data Analysis in Human Sciences	Statistics and Data Analysis Modules	12.5%	Grade
APHB5514	Honours Dissertation Part 1	Dissertation	AC	AC

Semester 2

Unit (6pts)	Unit name	Tasks	Weighting	Unit result
HMSC4008	Scientific Communication Part 2	Final Seminar, Student Viva	12.5%	Grade
APHB5515	Honours Dissertation Part 2	Dissertation	AC	AC
APHB5516	Honours Dissertation Part 3	Dissertation	AC	AC
APHB5517	Honours Dissertation Part 4	Dissertation	50%	Grade

2027 HON-NEURS (NEUROSCIENCE) BH004**2027 HON-HSNEM (HUMAN SCIENCE & NEUROSCIENCE) BH034****Semester 1**

Unit (6pts)	Unit name	Tasks	Weighting	Unit result
HMSC4001	Scientific Communication Part 1	Project Plan, Research Proposal, Proposal Seminar	12.5%	AC
HMSC5004	Research Methods in Human Sciences	Conceptual Examination of the Research Process	12.5%	Grade
HMSC5005	Data Analysis in Human Sciences	Statistics and Data Analysis Modules	12.5%	Grade
NEUR5514	Honours Dissertation Part 1	Dissertation	AC	AC

Semester 2

Unit (6pts)	Unit name	Tasks	Weighting	Unit results
HMSC4008	Scientific Communication Part 2	Final Seminar, Student Viva	12.5%	Grade
NEUR5515	Honours Dissertation Part 2	Dissertation	AC	AC
NEUR5516	Honours Dissertation Part 3	Dissertation	AC	AC
NEUR5517	Honours Dissertation Part 4	Dissertation	50%	Grade

2027 HON-HSDEM (HUMAN BIOLOGY & DATA ANALYTICS) BH034**Semester 1**

Unit (6pts)	Unit name	Tasks	Weighting	Unit result
HMSC4001	Scientific Communication Part 1	Project Plan, Research Proposal, Proposal Seminar	12.5%	AC
HMSC5004	Research Methods in Human Sciences	Conceptual Examination of the Research Process	12.5%	Grade
HMSC5005	Data Analysis in Human Sciences	Statistics and Data Analysis Modules	12.5%	Grade
HMSC5514	Honours Dissertation Part 1	Dissertation	AC	AC

Semester 2

Unit (6pts)	Unit name	Tasks	Weighting	Unit results
HMSC4008	Scientific Communication Part 2	Final Seminar, Student Viva	12.5%	Grade
HMSC5515	Honours Dissertation Part 2	Dissertation	AC	AC
HMSC5516	Honours Dissertation Part 3	Dissertation	AC	AC
HMSC5517	Honours Dissertation Part 4	Dissertation	50%	Grade

2027 HON-SSCEH (SPORT SCIENCE, EXERCISE AND HEALTH) BH032**Semester 1**

Unit (6pts)	Unit name	Tasks	Weighting	Unit result
HMSC4001	Scientific Communication Part 1	Project Plan, Research Proposal, Proposal Seminar	12.5%	AC
HMSC5004	Research Methods in Human Sciences	Conceptual Examination of the Research Process	12.5%	Grade
HMSC5005	Data Analysis in Human Sciences	Statistics and Data Analysis Modules	12.5%	Grade
SSEH5011	Honours Dissertation Part 1	Dissertation	AC	AC

Semester 2

Unit (6pts)	Unit name	Tasks	Weighting	Unit result
HMSC4008	Scientific Communication Part 2	Final Seminar, Student Viva	12.5%	Grade
SSEH5012	Honours Dissertation Part 2	Dissertation	AC	AC
SSEH5013	Honours Dissertation Part 3	Dissertation	AC	AC
SSEH5014	Honours Dissertation Part 4	Dissertation	50%	Grade

Student Research Projects

Honours in the Department of Health, Western Australia



Government of Western Australia
Department of Health

For further information please contact:

E: Prof Shane Maloney (shane.maloney@uwa.edu.au)

In 2027 there is an opportunity for a student to conduct their Honours project within the Government of Western Australia, Department of Health (Health Networks division). This initiative is suitable for students who are interested in research but see themselves pursuing employment outside of academia.

Support is provided by a supervisor from the Department of Health and an internal supervisor within the School of Human Sciences.

Project 1: Quantifying Carbon Savings from WA Health's Sustainability Initiatives

Climate change already affects the health and wellbeing of Western Australians and places increasing pressure on healthcare services. WA Health has introduced a range of sustainability measures across facilities, operations, and service delivery to reduce Greenhouse Gas emissions, but its current trajectory remains short of the goal to reach net zero by 2040.

This project will collate and analyse data on carbon savings from existing initiatives, calculate emissions reductions and develop a monitoring tool or dashboard to track progress. Findings will demonstrate the impact of current efforts, identify the gap between achieved and required reductions, and support future investment in high-impact strategies to reduce the health sector's carbon footprint and improve community resilience.

Student Role

The student will play a hands-on role in:

- Conducting emissions calculations to quantify reductions and assess progress, including sourcing emissions factors.
- Developing a monitoring tool/dashboard for tracking carbon savings.
- Develop an understanding of healthcare delivery and gain exposure to work undertaken across WA Health, including Health Service Providers and the Department of Health.
- Complex emissions reduction modelling on how to achieve NetZero can be explored.

Project 2: Water Security, Climate Stress and Community Wellbeing

Focus: Climate change, mental wellbeing, public health, and resilience

Background: Water availability is fundamental to health, wellbeing, and community resilience. Climate change is expected to increase pressure on water resources through changing rainfall patterns, prolonged drought and increasing demand on critical infrastructure. While considerable attention has been given to heat-related health impacts, less is known about how water stress affects wellbeing, perceptions of future security and resilience in regional communities.

Aim: To explore the relationship between water-related climate stress, wellbeing, and resilience in regional communities.

Potential research questions:

- Is concern about water availability associated with wellbeing, resilience, or psychological distress?
- How do perceptions of water security influence health and community resilience?
- What factors support adaptation and wellbeing in communities experiencing water-related climate stress?
- What role do health and community services play in supporting resilience to water-related climate risks?

Benefits: The findings could inform climate adaptation planning, community wellbeing initiatives, and resilience-building programs in regional communities.

Project 2: Climate Adaptation and Community Resilience: The Role of Regional Health Services

Focus: Community resilience, climate adaptation, and health systems

Background: Climate change is increasing the frequency and severity of challenges facing regional communities, including extreme heat, water insecurity, natural hazards, environmental degradation and disruptions to essential services. These stressors can have significant impacts on physical health, mental wellbeing, and community resilience. While much research has focused on how climate change affects healthcare systems, less attention has been given to how health services can support communities to adapt, remain healthy, and recover from climate-related challenges. As trusted institutions operating across regional and remote areas, health services may play an important role in strengthening resilience through health promotion, preparedness, community partnerships, and support for vulnerable populations.

Aim: To explore the role of regional health services in supporting community climate adaptation, resilience, and health outcomes in the face of environmental change.

Potential research questions:

- What role do regional health services currently play in supporting community resilience to climate-related challenges?
- How do staff and community stakeholders perceive the contribution of health services to climate adaptation and preparedness?
- What health impacts associated with climate change are of greatest concern to regional communities?
- What strengths and gaps exist in current approaches to supporting community resilience?
- How can health services strengthen their contribution to climate adaptation, health promotion, and community wellbeing?

Benefits: The project could identify opportunities for health services to play a greater role in supporting climate adaptation and resilience in regional communities. Findings may inform future approaches to community wellbeing, preparedness, health promotion, adaptation planning, and support for vulnerable populations experiencing the impacts of environmental change.

Project 3: Plastics in Healthcare: Understanding Exposure Pathways and Potential Health Implications

Focus: Sustainable healthcare, environmental health, and emerging risks. A co-host team is still being confirmed for this project.

Background: Healthcare services rely heavily on single-use plastics to support infection prevention, sterility, and patient safety. However, growing evidence suggests that plastics and plastic-associated chemicals may contribute to environmental contamination and human exposure through pathways including food packaging, medical products and microplastic ingestion. While healthcare organisations are increasingly seeking to reduce plastic waste, there is limited understanding of potential exposure pathways within healthcare settings and the implications for patients, staff, and sustainable healthcare practices.

Aim: To explore perceptions, use patterns and potential exposure pathways associated with plastics in healthcare settings, and identify opportunities to support both patient safety and environmental sustainability.

Potential research questions:

- What are the major sources of plastic use within healthcare settings?
- What is known about potential human exposure pathways associated with plastics used in healthcare?
- How do healthcare staff perceive potential health and environmental risks associated with plastics?
- What barriers and opportunities exist for reducing plastic dependence in healthcare practice?
- How can healthcare organisations balance patient safety, infection prevention, and sustainable healthcare objectives?

Benefits: The findings could inform sustainable healthcare initiatives, waste reduction programs, procurement decisions, and future research into the health implications of plastics in healthcare environments.

The Auditory Laboratory



Dr Kristin Barry

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Hearing loss and other hearing disorders, such as tinnitus, are among the most common forms of sensory impairment and can have profound consequences for the individual and society. Hearing loss can significantly affect quality of life, including mental health and cognition. In our laboratory, we work with animal models to investigate neural mechanisms of tinnitus, effects of hearing loss on cognition and the effects of fibrosis on the effectiveness of cochlear implants. We also develop innovative approaches to neuroscience education, including the use of MRI-derived 3D-printed brain models to support the teaching and learning of neuroanatomy.

Project 1: Mapping the neural circuitry underlying sensory gating

Tinnitus, the perception of sound without an external source, has been proposed to be associated with dysfunction in sensory gating neural circuitry. Sensory gating, the brain's ability to filter out irrelevant stimuli, may break down in tinnitus, contributing to persistent auditory perceptions. However, the specific neural pathways involved in sensory gating within the auditory system remain underexplored. This project will use neuronal tracing, immunofluorescence and light-sheet imaging to map the neural pathways involved in auditory sensory gating and better understand how non-auditory brain regions interact with the auditory system to shape sensory information.

Project is suitable for: Honours, Masters, PhD

Project 2: Investigating sensory gating dysfunction in tinnitus

Human studies, together with research from our laboratory, suggest that stimulation of the prefrontal cortex may reduce tinnitus in some individuals, potentially through its influence on sensory gating circuitry. Our previous research has shown that hearing loss alters the activity of this circuitry; however, whether these changes are associated with the subsequent development of tinnitus remains unknown. This project will use an animal model of hearing loss to investigate how sensory gating circuitry changes following hearing loss and whether these changes distinguish individuals that develop tinnitus from those that do not.

Project is suitable for: Honours, Masters, PhD

Project 3: Developing longitudinal EEG telemetry to investigate brain activity following hearing loss

Hearing loss causes changes in brain activity that develop over time and may contribute to conditions such as tinnitus. However, most experimental studies examine brain activity at only a single time point, limiting our understanding of how these changes develop following hearing loss. This project will develop and optimise wireless EEG telemetry in guinea pigs to enable repeated recordings from the same animal before and after hearing loss. The project will use resting and sound-evoked EEG measures to investigate how brain activity changes over time following hearing loss and establish a new longitudinal approach for studying the neural consequences of hearing loss.

Project is suitable for: Honours, Masters, PhD

Project 3: Development of 3D-Printed brain models for neuroscience education

This project will develop accurate, low-cost 3D-printed models of the human brain for use in neuroscience education and training. Using MRI-derived anatomical data, students will use image-processing software such as 3D Slicer to identify and segment brain regions of interest before refining these models for 3D printing. The project will explore different approaches to designing anatomically accurate, practical teaching models, which may include modular brains, individual brain structures, or anatomical sections. The resulting models will be evaluated and refined with the aim of producing accessible teaching resources that can support the learning of complex three-dimensional neuroanatomy.

Project is suitable for: Honours, Masters, PhD

Cancer and Cancer Targeted Therapies



Associate Professor Pilar Blancafort

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Each project will take place in the Cancer Epigenetics Laboratory at the Harry Perkins Institute of Medical Research.

Project 1. Engineering the cancer epigenome and targeting metastatic behaviour using epigenetic editing tools.

Cancer is one of the major causes of death in Australia. For decades, the origin of cancer was attributed to genetic mutations, deletions and copy number amplifications. Recent advances have illuminated the aberrant epigenetic landscape which not only contributes but, in some cases, drives cancer development and progression. Epigenetic marks are heritable covalent modifications in the DNA or associated proteins. Epigenetic modifications provide the mechanisms by which a cell “knows” and “remembers” which genetic information to read and which to ignore. Epigenetic modifications include DNA methylation and modifications in the proteins that the DNA is wrapped around. Unlike genetic mutations, epigenetic modifications are reversible, and this can be used to restore the normal state of gene expression in the cancer. Our laboratory develops novel epigenome-targeted therapies to reverse the abnormal epigenetic modifications frequently observed in cancer. In this proposal, we aim to reverse the epigenetic modifications of key cancer drivers using the CRISPR/dCas9 system. We propose the development of novel and more selective technologies able to stably suppress the genes that cause cancer spread.

Supervisors: A/Prof Pilar Blancafort, Dr. Charlene Waryah

Project is suitable for: Honours, Masters, PhD

Essential qualifications:

For Honours: An appropriate undergraduate degree with a biological science, cell biology and basic molecular biology emphasis, and a minimum weighted average of 65% in the level 3 subjects that comprise the relevant major from an approved institution. Applicants will be assessed on a case-by-case basis.

For Masters or PhD: An appropriate Honours degree with a biological, cellular and basic molecular biology science emphasis or equivalent research experience from an approved institution. Applicants will be assessed on a case-by-case basis.

Desirable Skills/Experience

Knowledge of statistics, cell biology, basic biochemistry and cell biology

Project 2. Development of a novel strategy using engineered peptides to selectively sensitise metastatic breast cancers to chemotherapy agents.

The goal of this study is to develop innovative targeted treatments for triple negative breast cancers (TNBCs). TNBCs are responsible for the majority of breast cancer deaths in Australia and throughout the world. These cancers do not express oestrogen receptor alpha, progesterone receptor and epidermal growth factor receptor 2, which are common targets exploited in the clinic.

They belong to the basal-like subtype breast cancer, which accounts for 15% of all breast cancers. In the metastatic setting, they are highly resistant to chemotherapy. DNA-damaging agents used in chemotherapy that lack target specificity, cause wide range adverse effects. Thus, there is an urgent need to develop novel, more specific and targeted molecular approaches to treating this lethal disease.

As a cutting-edge therapy for TNBCs, we propose the generation of interference peptides (iPeps), which are synthetic peptides engineered from oncogenic transcription factors overexpressed in these breast cancers. The iPeps carry cell penetration and nuclear localization sequences that allow the peptide to be rapidly internalized across the cell and nuclear membranes. In addition, the iPeps are designed with residues essential for protein-protein interactions and DNA-binding derived from the endogenous oncogenic transcription factor. The iPeps then compete with the endogenous transcription factor by sequestering the binding partners necessary for transcriptional and DNA-binding activities.

Furthermore, we will use this highly innovative approach to physically link the iPep with small molecules like Doxorubicin and pro-drugs like platinum IV, to localize them specifically in the nucleus of the cancer cells. We hypothesize that the iPeps will serve as "guides" for the chemotherapeutic drugs, directing them precisely into the nucleus to induce DNA damage. These iPeps will increase the selectivity and the kinetics of the small molecule's uptake, as well as decrease the dose of the small molecule required for anti-cancer efficacy, thus lowering chemotherapy toxicity. This strategy will be employed in both TNBC cell lines and several aggressive breast cancer animal models, and eventually be adapted to patients to help eliminate the mortality associated with metastatic breast cancer, particularly for these triple negative breast cancers.

Supervisors: A/Prof Pilar Blancafort, Dr. Edina Wang

Essential qualifications

For Masters or PhD: An appropriate Honours degree with a biological, cellular and basic molecular biology science emphasis or equivalent research experience from an approved institution. Applicants will be assessed on a case-by-case basis.

Desirable Skills/Experience

Knowledge of statistics, cell biology, basic biochemistry and cell biology.

Gene Regulation and RNA Therapeutics



Professor Archa Fox

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The Fox laboratory focuses on understanding the role of RNA within cell physiology, and how to apply this knowledge for the development of RNA therapeutics for various types of cancer. A major focus of the lab has been the study of paraspeckles, nuclear bodies built on a long noncoding RNA. Another key focus is the infant cancer neuroblastoma, a heterogeneous cancer that is amenable to RNA/epigenetic manipulation.

The School of Human Sciences also hosts the [Australian Centre for RNA therapeutics in Cancer](#) (ACRTC). In this Centre we extend our basic understanding of cancer pathways and targets to make and test the efficacy of different mRNA treatments. Interested students should contact Archa to learn more about research opportunities with the centre.

Project 1: Development of RNA therapeutics for the infant cancer, neuroblastoma. (ACRTC project)

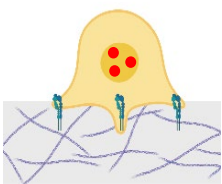
Neuroblastoma is a paediatric cancer that makes up 8-10% of all childhood cancer diagnoses and is the most common extracranial tumour in children. To combat the high recurrence rate and late-complications of current neuroblastoma treatments often associated with chemotherapy, alternative therapies are currently of high interest. Our previous work focused on manipulation of paraspeckles, and their component proteins and RNAs in neuroblastoma, to alter cell state.

In this project you will extend these findings to explore combinatorial RNA treatments of neuroblastoma. You will increase understanding of these pathways in neuroblastoma by measuring the responses to different treatments using a variety of sequencing and microscopy methods.

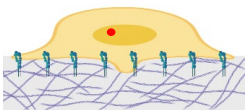
This project would suit someone with an interest in cell biology, genetics and cellular models of disease.

Project 2: Investigating how the cell nucleus responds to mechanical insults.

Cells need to navigate and adapt to different environments within the body. There is growing appreciation that the rigid cell nucleus has to respond to the external environment that a cell experiences. The nucleus can respond to environmental cues by altering gene expression in the cell.



In this project you will investigate nuclear organisation, primarily focusing on paraspeckle nuclear bodies, within a variety of cells that experience different external environments. You will culture cells in different conditions and monitor how the nuclear responds. You will also assess the impact of increasing paraspeckles on cell responses to different environments. This work is critical for understanding and eventually targeting diseases such as cancer, where metastasis involves cells experiencing, and surviving, under extreme confinement.



This project would suit someone with an interest in cell biology, mechanobiology, and cellular models of disease.

References:

- McCluggage and Fox. Paraspeckle nuclear condensates: Global sensors of cell stress? *Bioessays*. 2021
- Zhang S, et al., ..Fox AH. NONO enhances mRNA processing of super-enhancer-associated GATA2 and HAND2 genes in neuroblastoma. *EMBO reports*, 24 (2), e54977 2023
- Naveed A, et al., ..Fox AH. NEAT1 polyA-modulating antisense oligonucleotides reveal opposing functions for both long non-coding RNA isoforms in neuroblastoma. *Cell Mol Life Sci*, 2020
- Todorovski V, McCluggage F, Li Y, et al., Fox AH, Choi YS. Confined environments induce polarized paraspeckle condensates. *Communications Biology* 6(1), 145, 2023

RNA Multi-Omics and Design



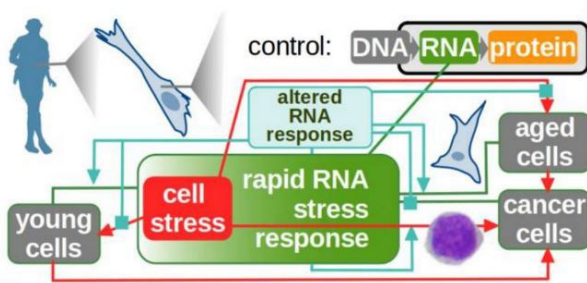
Dr Nikolay Shirokikh

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<https://research-repository.uwa.edu.au/en/persons/nikolay-shirokikh>

Unlocking the RNA Code for Next-Generation Cancer Therapies

The RNA Multi-Omics and Design Laboratory (RMODEL) is at the forefront of RNA biology and biotechnology, decoding how cells read, regulate, and respond to information inputs. We combine cutting-edge molecular RNA biology with artificial intelligence to understand and engineer RNA molecules that control life's fundamental processes. Our research spans from basic mechanisms of protein biosynthesis to developing revolutionary RNA therapeutics for cancer treatment.



Working in our dynamic team, you'll explore how RNA molecules orchestrate cellular responses to stress, aging, and disease. We invent and use state-of-the-art techniques including nanopore sequencing, high-throughput RNA profiling, ribosome footprinting, and machine learning to reveal RNA's hidden regulatory codes. Our ultimate goal is to translate these discoveries into life-saving therapies that can precisely target cancer at its molecular roots.

World-Class Facilities

RMODEL works together with Western Australia's two world-class RNA research facilities that provide unique opportunities for student training.

ACRTC - A dedicated RNA innovation node developing next-generation cancer treatments. The centre brings together RNA innovators, oncologists, and patient advocates to uncover new insights and develop RNA-based therapies.

Learn more: <https://www.uwa.edu.au/australian-centre-for-rna-therapeutics-in-cancer>

RNA Innovation Foundry (RIF) - A state-of-the-art mRNA production facility offering end-to-end services for RNA therapeutic development. As the Western Australian node in a national network supported by Therapeutics Innovation Australia, RIF provides cutting-edge capabilities in RNA design, synthesis, and formulation.

Learn more: <https://www.uwa.edu.au/rna-innovation-foundry>

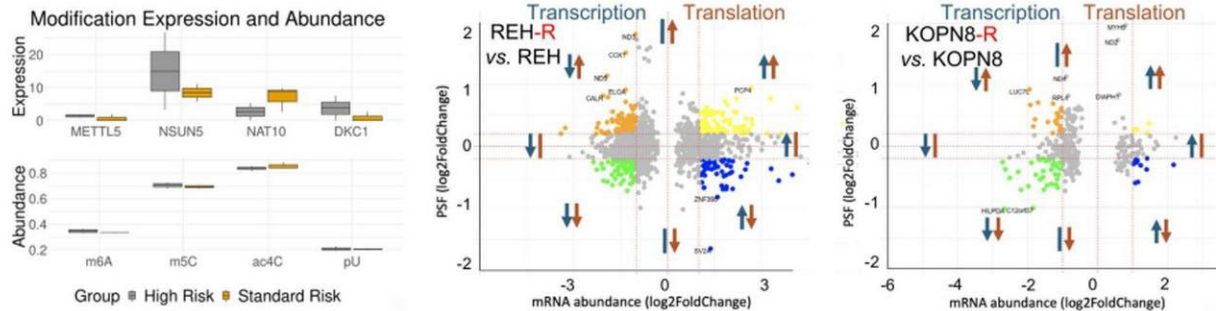
Why RNA Research Matters

RNA therapeutics represent a paradigm shift in medicine. Unlike traditional drugs that target proteins, RNA medicines can directly control genetic information, offering unprecedented precision in treating disease. The COVID-19 mRNA vaccines demonstrated RNA's potential, but this was just the beginning. Cancer cells often hijack RNA regulatory mechanisms to survive and spread. By understanding these processes, we can design RNA-based interventions that outsmart cancer's defenses, restore normal cellular function, and activate the body's natural tumor-fighting capabilities.

Project 1: RNA Diagnostics and Therapeutics in Cancer.

Decoding cancer's RNA fingerprint to develop precision therapies

Cancer cells produce unique RNA signatures that reveal their vulnerabilities. This project will use direct RNA nanopore sequencing to comprehensively profile RNA modifications, isoforms, and stability in cancer cells. You'll work with cutting-edge Oxford Nanopore technology to measure poly(A) tail lengths, map RNA modifications including m6A and pseudouridine, and identify RNA-binding protein interactions that drive cancer progression.



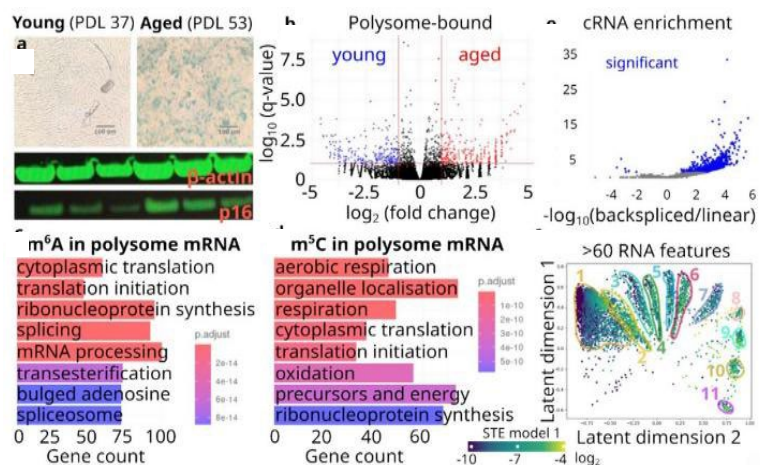
You'll learn to integrate multi-omic data using AI/ML approaches to identify therapeutic targets and biomarkers. This project combines wet-lab techniques with computational analysis, providing excellent training in both experimental design and bioinformatics.

Project 2: Cytosolic Cell Stress Response and RNA Control of Ageing and Longevity.

Understanding how RNA regulation determines cellular resilience and lifespan

Cellular stress responses are orchestrated by complex RNA regulatory networks that determine whether cells survive, adapt, or die. This project investigates how cytosolic free RNA, RNA stress granules and processing bodies control mRNA fate during oxidative stress, nutrient deprivation, and DNA damage - conditions that accelerate aging and promote cancer.

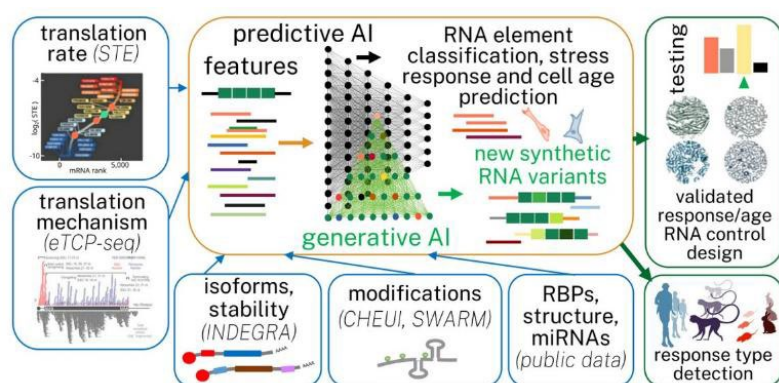
Using our advanced ribosome profiling and polysome fractionation techniques, you'll map translation dynamics in real-time during stress responses. Direct RNA sequencing will reveal how RNA modifications and poly(A) tail dynamics regulate stress-responsive genes. You'll explore how these mechanisms break down during aging and how they can be therapeutically targeted to enhance cellular resilience.



Project 3: Design of New RNA Therapeutics.

Engineering next-generation RNA medicines using AI and synthetic biology

The future of medicine lies in programmable RNA therapeutics that can be designed to target any disease-causing gene. This project focuses on developing technologies that invest into RNA therapeutic modalities, including cell-specific and condition-specific response elements.



You'll use our RNA modeling pipeline and test RNA sequences for stability, specificity, and therapeutic efficacy. Direct RNA sequencing will be used to validate RNA structure, modifications, and interactions with cellular machinery. You also will have an opportunity to develop and invent new technologies in this area.

This project offers unique access to industrial-scale RNA production capabilities and the opportunity to see your designs progress

from computer to clinic. Our collaboration with the RNA Innovation Foundry provides hands-on experience with GMP-like RNA manufacturing processes.

Multi-Omic Technologies

All projects leverage our comprehensive RNA multi-omic toolkit:

- **Direct RNA Nanopore Sequencing:** Real-time, single-molecule analysis of native RNA
- **RNA Modifications:** Map m6A, pseudouridine, and other epitranscriptomic marks
- **Isoform Analysis:** Discover novel splice variants and their functional consequences
- **Poly(A) Tail Profiling:** Measure tail lengths that control RNA stability
- **RNA-Protein Interactions:** Identify regulatory complexes using CLIP-seq and proximity labeling
- **Translation Dynamics:** Ribosome profiling to measure protein synthesis rates
- **Machine Learning Integration:** AI-powered analysis to extract biological insights

Select references

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Revolutionary method for RNA integrity assessment - critical for all RNA-seq experiments

2. **Santos-Rodriguez G, Srivastava A, Ravindran A, Oyelami F, Ip KH, Gupta P, Villanueva J, King HE, Grootveld A, Blackburn J, Gupta I, Vieira HGS, Shirokikh NE, Eyraas E, Weatheritt RJ (2024).** The conserved landscape of RNA modifications and transcript diversity across mammalian evolution (EpiEvo). *bioRxiv*. doi: 10.1101/2024.11.24.624934

Comprehensive m6A modification atlas across mammalian tissues - directly relevant to Projects 1 & 3

3. **Horvath A, Janapala Y, Woodward K, Mahmud S, Cleynen A, Gardiner EE, Hannan RD, Eyraas E, Preiss T, Shirokikh NE (2024).** Comprehensive translational profiling and STE AI uncover rapid control of protein biosynthesis during cell stress. *Nucleic Acids Research*, 52(13):7925-7946.

AI-powered translation control analysis - perfect for Project 2

4. **Mateos PA, Sethi AJ, Ravindran A, et al., Shirokikh NE, Eyraş E** (2024). *Nature Communications*, 15:3899.
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Join Our Mission

We're seeking highly motivated Honours/Master students passionate about RNA biology, biotechnology, and computational biology. You'll join a collaborative team working at the intersection of fundamental science and therapeutic innovation. Our graduates have gone on to prestigious PhD programs, industry positions, and clinical research roles.

Requirements: Strong academic record in and passion for RNA, computational and molecular biology, biochemistry, or related fields. Computational skills are highly advantageous but not exclusively essential - we provide comprehensive training.

Contact Dr. Nikolay Shirokikh to discuss these exciting opportunities and begin your journey in RNA and RNA design research.

Transform your passion for science into life-saving discoveries at RMODEL

Cardiovascular Electrophysiology - Ion Channels in Heart Muscle



Prof Livia Hool

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Currently, cardiovascular disease accounts for 32 % of all deaths in Australia. This is a staggering proportion and continues to exceed death from all cancers combined (30%) and from road deaths (4%). A number of the deaths in the cardiovascular group are due to arrhythmia or disturbances in the electrical activity in the heart.

The normal electrical activity in the heart is controlled by the movement of ions through specialised channels in the membranes of cardiac cells. The autonomic nervous system plays an essential role in regulating cardiac function and many of its effects are mediated via sympathetic neurotransmitters that regulate the activity of these ion channels.

Certain pathophysiological conditions contribute to arrhythmias such as hypoxia and oxidative stress. Under these conditions there is a reduction in blood flow to the muscle in the heart resulting in a reduction in available oxygen and reactive oxygen species production. This is then followed by an increase in generation of reactive oxygen species. There is increased sympathetic drive and the heart has a greater vulnerability to sudden cardiac death. Understanding how cardiac ion channels are regulated under these conditions is crucial to understanding the ionic mechanisms involved in the triggering of ischemic arrhythmias. In addition an increase in reactive oxygen species can contribute to the development of cardiac hypertrophy (enlarged heart) and cardiac failure. We have good evidence that an early mechanism involves increased calcium influx through the L-type calcium channel.

The laboratory uses molecular biology techniques for expression and purification of ion channel protein and biochemical techniques for assay of generation of reactive oxygen species and cell viability. The method that will be used to study membrane currents is the patch-clamp technique. This technique is an extremely powerful method for studying the electrophysiological properties of biological membranes and its contribution to the advancement of research was justly recognised with the awarding of the Nobel Prize in Physiology or Medicine in 1991 to its developers Erwin Neher and Bert Sakmann. The technique can be used to study ion channels either at a whole-cell level or at the level of a single channel. In addition, since the intracellular composition of the cell can be controlled, this can be exploited to determine any second messengers involved. Patch-clamp technique is also used in the laboratory in conjunction with fluorescent dyes to record changes in intracellular calcium, reactive oxygen species generation and mitochondrial function.

Project 1. How does the L-type calcium channel regulate mitochondrial function in pathology where actin filaments are disrupted?

(Collaboration with Prof Christine Seidman, Harvard University and Prof Chris Semsarian, Sydney University)

Mitochondrial respiration is abnormal in hearts where actin or cytoskeletal proteins are disrupted and it is not understood why. This project follows from data generated by previous students in the lab. We have evidence that the L-type calcium channel can regulate mitochondrial function via the actin cytoskeleton. The project involves the use of patch clamp technique to study L-type calcium channel currents in mouse myocytes isolated from hearts of mice with disease involving disruption in cytoskeletal proteins and fluorescent detection of changes in mitochondrial membrane potential, NADH and superoxide production after activation of the channel.

Alterations in expression of proteins in mdx mouse hearts that co-immunoprecipitate with the channel (assessed by Mass Spec) will be identified using immunoblot analysis.

Project 2. How does oxidative stress alter the sensitivity of the L-type calcium channel to isoproterenol? What effect does this have on the action potential?

(Collaboration with Professor Yoram Rudy, University of Washington, St Louis, Missouri, USA)

This question seeks to understand how arrhythmias occur during ischemia/reperfusion in the heart (after a heart attack). Isoproterenol is a beta- adrenergic agonist (and mimics the effects of catecholamines such as adrenaline in the heart). This project will use patch clamp technique to study the effect of oxidative stress and isoproterenol on L- type calcium channel currents in addition to K and Na channel currents and record changes in action potentials. Information gained from patch-clamp studies are incorporated into the Rudy-Luo model. Changes in action potential configuration are modelled and the relative risk of arrhythmia is determined.

Supervisor: Prof Livia Hool



Professor Silvana Gaudieri

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Project 1: High-resolution analysis of the human immune response to HIV: implications for cure research and vaccine design.

Summary: More than 35 million people worldwide are infected with HIV including >22,000 Australians. Anti-HIV therapy can reduce mortality associated with infection but treatment does not provide a cure, is life-long and remains a substantial financial burden in Australia and worldwide. The main impediment to cure is the enormous diversity of HIV. A significant proportion of this variation is due to mutations in the HIV genome that allow the virus to escape from our immune response (viral adaptation). In this study, we will utilize our unique ability to analyze the host's immune response at the single cell level to examine viral adaptation during the critical acute phase of infection. Understanding viral adaptation will aid in the rational design of vaccine candidates for either preventative or therapeutic strategies.

Scientific Background and Rationale: The prototypic anti-viral immune response requires the actions of an array of naïve CD4⁺ and CD8⁺ T cells which, upon antigen-stimulation, differentiate into a highly specific population of “best-fit” clonotypes with an optimal T cell receptor (TCR) repertoire for clearance of virally infected targets and anti-viral memory. In the case of highly mutable viruses such as HIV, this process is subverted prominently by an extreme capacity for viral escape from CD8⁺ T cells. The extent of CD8⁺ escape, or more broadly adaptation, to immune responses, in founder/transmitting viruses or vaccine immunogens influences the subsequent quality of immunological control (1).

However, this mechanism alone is not sufficient to explain immune failure in HIV infection. It has been established that effective CD4⁺ T cell responses are necessary for quality CD8⁺ T cell responses (2, 3). We have characterised mutations in HIV sequences, which suggest that HIV can actually adapt to CD4⁺ T cell responses. This is a novel form of adaptation, which may operate in early infection, and have critical long-lasting effects on subsequent antibody and CD8⁺ T cell responses. Furthermore, while functional studies have shown examples of viral mutations causing disruption of antigen presentation leading to loss of antigen recognition, these ‘classical’ mechanisms represent only one strategy of adaptation. We have previously shown that the adapted viral strain can still be recognised by the host's T cells in many instances (4, 5) and these T cells can exhibit greater functional avidity to the cognate peptide than T cells that target the non-adapted form (6).

We **hypothesise** that viral adaptation to T cell pressure, rather than leading to ‘classical’ escape, may result in the selection of a narrow, high avidity, TCR repertoire that ultimately is less effective at viral control, perhaps because of viral exhaustion. We can now address this issue using our established single cell analysis approach. Understanding how the TCR diversity of a maturing immune response can be altered or exploited by a pathogen is a fundamental question for many acute and chronic pathogens for which natural, vaccine or cell therapy-based immunity is not currently effective or available.

The link between TCR repertoire changes and effector functions at the single clonotype and global response levels is also a fundamental question for anti-viral immunity.

Significance: The mechanisms of viral adaptation to T cell responses **are fundamental concepts for host-pathogen interaction** and have important clinical implications. The cumulative burden of providing immediate and life-long anti-retroviral therapy (ART) to all individuals with HIV infection is significant, and the HIV incidence and prevalence continues to increase in Australia every year since 1999 despite good ART coverage (7).

Harnessing immunological clearance as an alternative to 'drugs for life' could reduce this health and economic burden, as well as advance the global research efforts for HIV eradication. Improved therapeutic vaccines could ideally be combined with anti-latency strategies as a potential synergy in Australian research, with resulting benefits for global health.

Current immunogen design approaches do not solve the problem of viral adaptation nor do they consider how to overcome viral adaptation to CD4⁺ T cell responses in ensuring sustained CD8⁺ and antibody responses for vaccine memory.

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Project 2: The role of NKT cells in the outcome of liver transplantation in a murine model.

Organ transplantation is the final treatment option for many patients with end-stage diseases. Despite improvements in short-term outcomes, long-term organ survival has remained poor for the past two decades. This is primarily due to chronic rejection, caused by a long-term, uncontrolled immune response against the transplanted organ. Understanding this damaging immune response is vital to improving outcomes for organ transplant patients.

We have an established liver transplantation model in mice which can be manipulated to tolerate or reject the transplanted liver depending on the genetic mismatch between the donor and recipient mice. Preliminary data in our model indicates that a specific type of immune cell, called a natural killer T (NKT) cell, could be vital in controlling the survival of the transplanted liver. NKT cells are multi-functional immune cells that recognise and react to a broad range of activating signals in different ways.

There is evidence that immune cells that are contained within the transplanted liver are necessary for it to be tolerated by the recipient. By transplanting livers which have or which lack NKT cells we can assess their importance for successful transplantation. By transplanting normal livers into recipients which have or which lack NKT cells, we can assess if transplant success is dependent on recipient NKT cells.

The health of the transplants will be assessed by measuring levels of liver tissue damage and cytokines in the blood, and by characterisation of the immune response in the graft and peripheral lymphoid organs using flow cytometry. Ultimately, we aim to use this model to discover potential new targets to enable tolerance to transplanted solid organs and consequently reducing the need for life-long immunosuppression and the associated adverse side effects.

Supervisors: Prof Silvana Gaudieri, Prof Michaela Lucas and Dr Amy Prosser (Perkins)

Desirable Skills/Experience: Background in immunology would be preferred.

Project 3: The effect of plastic-chemical exposure on cellular signalling in fat cells.

Though traditionally thought to be a passive energy storage depot, we now understand that fat cells (adipocytes) are a critical source for signalling molecules such as Adiponectin and Leptin which regulate the adipose tissue microenvironment to control inflammation and promote metabolic balance. Plastic associated chemicals (PACs) such as Bisphenols and Phthalates that leach from plastic goods and personal care products have the capacity to interrupt the core functional pathways that allow adipocytes to carry out their role, potentially implicating them in the growing prevalence of obesity and its comorbidities. While a growing volume of evidence suggests that PACs can affect adipocyte metabolism, their effect on intercellular signalling is unclear. This project aims to use a variety of molecular biology techniques, including cell culture, fluorescent microscopy, ELISA and flow cytometry to investigate if/how 3T3-L1 adipocytes that have been exposed to PACs communicate with naïve cells in a way that affects their function.

Supervisors: Prof Silvana Gaudieri, Jacob Warger (Perkins) work to be completed at Harry Perkins Institute

Cell Mechanobiology



Associate Professor Yu Suk Choi

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W: <https://yusukchoi.weebly.com/>

<https://sites.google.com/view/yusukchoi-uwa/cell-mechanobiology-lab>

Cells can feel. We want to understand how.

We often think of cells responding to chemical signals such as growth factors and hormones. But cells also **sense the physical world around them**.

Is their environment soft or stiff?

Are they tightly attached to their surroundings or free to move?

Are they surrounded by other cells, or squeezed into a confined space?

Cells can detect these physical cues and convert them into biochemical signals that change how they behave — a phenomenon called **mechanosensation** via a process called **mechanotransduction**.

Our cell mechanobiology lab uses **biomaterials, cell biology and tissue engineering** to recreate these physical environments in the laboratory and discover how cells respond.

The exciting part is that **you can help us build these environments and see what happens to the cells**.

Our Honours projects sit at the intersection of **cell biology, skin, cancer, stem cells, biomaterials and tissue engineering**.

Project 1. Stem cell: the cellular triathlete

With Drs. Andrew Holle and Jennifer Young (National University of Singapore / Mechanobiology Institute) and Prof. Archa Fox (UWA)

How does a stem cell survive and migrate when its environment keeps changing?

Cells can migrate in very different ways. They can strongly attach to a surface and crawl, move together as a group, squeeze through confined spaces, or even become completely detached and travel through fluids.

We think long-distance cell migration is more like a triathlon than a marathon — cells need to switch between different migration modes to survive the journey.

For this project, you could investigate how changing the physical environment affects stem cell migration and fate.

In this project, we will **aim** to

- develop adult stem cells with transient adherent-to-suspension transition using **RNA** technology
- fabricate 3D migration **platform** with varying mechanical challenges
- screen the effect of AST and mechanomemory on **stem cell fate**

Project 2. Stopping Cancer Cells from Spreading

With Prof. Henry Park (Yonsei University) and Prof. Archa Fox (UWA)

Cancer is most dangerous when it spreads — but we still don't fully understand how cancer cells survive the journey through the body.

When cancer cells leave a tumour and enter the blood or lymphatic system, they suddenly experience a completely different physical environment. Instead of being attached to a stiff tissue, they become surrounded by fluid and exposed to mechanical forces.

Our research has identified a potential molecular switch that may control whether cancer cells can survive this transition.

In this Honours project, you could help us recreate aspects of the tumour and blood/lymphatic environments using 3D biomaterials and investigate how cancer cells respond.

In this project, we will **aim** to

- develop cancer cells with transient adherent-to-suspension transition using **RNA** technology
- fabricate 3D migration **platform** with varying mechanical challenges
- screen the effect of AST and mechanomemory on **cancer cell fate**

Project 3. Building Better Human Skin in the Lab

With Prof. Fiona Wood and Prof. Brendan Kennedy (UWA)

What happens when skin becomes too stiff?

In fibrosis, fibroblasts produce excessive amounts of collagen. This makes the tissue stiffer — and that increased stiffness can then stimulate fibroblasts to produce even more collagen.

It creates a vicious cycle.

But skin isn't just one layer. It contains multiple interacting cell populations across the epidermis, dermis and hypodermis.

We are developing full-thickness human skin models in which we can precisely control the physical properties of the tissue.

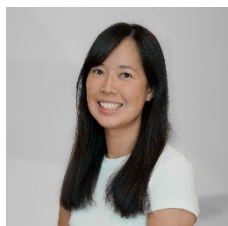
As an Honours student, you could help us understand how mechanical signals move through different layers of skin and change the behaviour of different cell types.

In this project, we will **aim** to

- fabricate 3D hydrogel **platform** with tunable stiffness mimicking each skin layer
- engineer **full thickness skin tissue** using hydrogel and human-derived cells
- screen the effect of stiffness and mechanomemory on **skin cell fate**

Supervisor: A/Prof Yu Suk Choi

The Tonsil Immunology Laboratory



Dr Jua Iwasaki

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Why individuals respond differently to germs is a central question in infectious diseases research. Some people experience mild or non-existent symptoms, while others suffer severe and long-lasting effects. One example is Strep A, the cause of the common childhood disease Strep throat, that can also cause severe diseases in some people, including invasive diseases (e.g. "flesh eating disease") and autoimmune diseases of the heart (Rheumatic Heart Disease). Most germs cause disease by avoiding the immune system, but Strep A target the tonsil immune system during infection. In our laboratory, we investigate why individuals respond differently to Strep A and develop experimental systems to replicate the essential features of the human tonsil epithelium and immune systems.

Project 1: Characterisation of human tonsil epithelial organoids as an experimental model for Strep A tonsil infections

The palatine tonsils act as a site where viral and bacterial pathogens can persist, while also playing a major role in the immune system's first line of defence. Histologically, they consist of an epithelial lining overlying lymphoid tissue composed of B and T lymphocytes. The aim of this study is to generate and characterise epithelial cell-derived organoids from tonsils obtained from children undergoing tonsillectomies and examine their feasibility as an ex vivo model for Strep A infections. This project will involve tissue culture, histology and immunohistochemistry.

Project is suitable for: Honours, Masters

Supervisors: Dr Jua Iwasaki, A/Prof Yu Suk Choi, A/Prof Timothy Barnett (The Kids Research Institute)

Project 2: Tonsil immune organoids as a translational platform for Strep A vaccine development

There is currently no licensed vaccine against Strep A and vaccines in development are injectable vaccines aimed to produce a systemic response. Our goal is to develop a needle-free vaccine to block Strep A infection where it first occurs, in the tonsils. The aim of this project is to test lead Strep A vaccine candidates, as well as a new candidate that we have discovered, to determine whether they produce protective immune responses in the tonsils. Using our tonsil immune organoid system, we will investigate the immune responses to Strep A vaccines and how these vary on an individual basis. This project will involve tissue culture, immunoassays and flow cytometry.

Project is suitable for: Honours, Masters, PhD.

Supervisors: Dr Jua Iwasaki, Dr Christian Tjiam (The Kids Research Institute), A/Prof Timothy Barnett (The Kids Research Institute)

Neuroscience



Associate Professor Stuart Hodgetts

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Emeritus Professor Alan Harvey

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Project: Cell and tissue transplantation, pharmacotherapy, gene therapy and the repair of central nervous tissue damaged after injury.

The research by the neuroscience groups in Anatomy, Physiology and Human Biology has a particular emphasis on cell and tissue transplantation, gene therapy, bioengineering, in vivo reprogramming, pharmacotherapy, photobiomodulation, and the repair of central nervous tissue damaged after injury. Ways are being tested for preventing nerve cells from dying after injury and promoting plasticity and the regenerative growth of damaged axons. The potential for replacing compromised cells with new healthy cells, including stem cells, is also under investigation. Studies are mostly carried out in the spinal cord.

Supervisors: A/Prof Stuart Hodgetts and Emeritus Prof Alan Harvey

Desirable skills/experience:

Neuroscience emphasis. Cellular and molecular biology knowledge would be helpful.

Non-invasive brain stimulation and brain plasticity



Dr Jamie Beros

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Project 1: Investigating the effect of repetitive transcranial magnetic stimulation on neuroplasticity in a mouse model of depression

Repetitive transcranial magnetic stimulation (rTMS) is a form of non-invasive brain stimulation that has been clinically used for almost 20 years as an intervention for treatment resistant depression. Historically, rTMS is delivered once daily for a period of 4-6 weeks, however, there is increased interest in delivering multiple stimulation sessions per day in a shorter period of time (e.g. 3 sessions a day for 2 weeks). There is promising evidence that these 'accelerated' rTMS protocols may be just as effective as standard once daily protocols, however the mechanisms of how this treatment induces changes in the brain and how they compare to once-daily protocols remain to be elucidated. In this project we will use a mouse model of depression to investigate the mechanisms of accelerated rTMS relating to different forms of neuroplasticity such as synaptic plasticity and glial plasticity and how these correlate with behavioural outcomes.

Project 2: Assessing the effects of rTMS in an adolescent mouse model of depression

Depression is one of the most prevalent mental health conditions experienced by young people and is a significant global concern. Unfortunately, first line pharmacological and psychological antidepressant treatment are not always effective in young people and in some cases are associated with increased risk of significant side effects. rTMS is routinely used as an intervention for treatment resistant depression in adults and may be a suitable alternative treatment for young people, however the evidence-base for this treatment in this aged cohort is limited. In this study we will use a mouse model of adolescent depression to investigate the mechanisms of how rTMS may affect the developing brain both in the short and long-term.

Neuroendocrinology



Dr Jeremy Smith

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Project 1: The role of kisspeptin in energy expenditure in the mouse.

Recent data from our laboratory demonstrate no effect of central kisspeptin treatment on accumulative food intake. Despite this, neuroanatomical links have been established between kisspeptin cells and appetite regulating neurons expressing neuropeptide Y (NPY) and Pro-opiomelanocortin (POMC). Moreover, kisspeptin results in the activation of NPY cells in the hypothalamus. Electrophysiological data also suggests kisspeptin regulates the activity of NPY, and also POMC neurons. Taken together, these data strongly suggest kisspeptin has effects on energy expenditure.

Experiments will be conducted to measure the effect of kisspeptin and the absence of kisspeptin signalling in mice on energy Expenditure. GPR54 (Kiss1r) knock-out mice or their wild-type littermates will be challenged with a high fat diet for 12 weeks. Mice will then be tested on indices of energy balance including:

- Measurement of whole body energy metabolism (using metabolic cages for indirect calorimetry)
- Assessment of whole body glucose metabolism (using intraperitoneal glucose and insulin tolerance tests)
- Assessment of body composition (Using dual energy X-ray absorptiometry DEXA)
- Assessment of neuropeptide systems involved in energy metabolism (using in situ hybridisation).
- Results from these experiments will shed light on the known link between the reproductive system and metabolism and will, potentially, offer novel therapeutic alternatives for the treatment of obesity and related metabolic disorders.

Project 2: The role of kisspeptin in implantation and placentation.

Kisspeptin, the neuropeptide product of the Kiss1 gene, is synthesized by neurons within the hypothalamus and is critical for the release of gonadotrophin-releasing hormone (GnRH) and fertility. In humans, kisspeptin secretion into the peripheral circulation increases dramatically (approximately ten-thousand-fold) during pregnancy and declines precipitously at term, indicating a placental origin. The placenta is known to express KISS1 and kisspeptin receptor (KISS1R) mRNA and it appears to be localized to the trophoblast compartment. We aim to determine the expression of Kiss1 mRNA in the mouse placenta and examine the effect of reduced kisspeptin signalling (using a kisspeptin receptor knock-out mouse) on fetoplacental growth.

Experiments will be conducted to measure fetoplacental growth in an Kiss1r KO model. Kiss1rKO mice or their wild-type littermates will be examined at day 14 and 18 of pregnancy. We will examine:

- Fetal weight
- Placental weight and morphology
- Assessment of key placental genes (using RT-PCR)
- The effect of kisspeptin and the absence of kisspeptin signalling in mice on placental histology

Results from these experiments will shed light on the function of kisspeptin in the placenta and will, potentially, offer novel therapeutic alternatives for the treatment of placental insufficiency and/or pre-eclampsia.

Supervisors Dr Jeremy Smith and Prof Caitlin Wyrwoll

Reproductive Biology



Dr Kathy Sanders

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My research focuses on human reproduction with a particular emphasis on lifestyle and psychosocial factors influencing male and female fecundity (the ability to conceive) and fertility.

Student projects can be developed in the following areas:

- Lifestyle and psychosocial factors influencing human fecundity and fertility (database and survey studies). For example, student projects in this area have looked at climate change concern and reproductive intentions; and Fly-in-fly out work and risks for sperm health.
- Issues surrounding the use of donated gametes and embryos in assisted reproductive technology (survey based and qualitative projects). Student projects in this area have examined factors influencing the public's willingness to consider gamete donation.
- Reproductive health literacy and the healthcare system environment (survey based and qualitative projects). Projects have examined the sources of information people use when making decisions about fertility treatment and evaluated the accessibility and inclusivity of public facing fertility information.
- Optimising processes and clinical outcomes in assisted reproductive technology (database and laboratory-based projects). Recent student projects have focussed on optimising sperm selection protocols, evaluated the costs and benefits of different methods of assessing sperm DNA health, and examined the effect of ejaculatory abstinence period on sperm cryosurvival. Projects are in collaboration with various fertility clinics in Perth and availability varies year-to-year.

Students are encouraged to contact **Kathy Sanders** to discuss other topics on human reproduction they may wish to pursue.

Reproductive and Developmental Biology



Dr Peter Mark

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The major interests of our group centre on the importance of circadian biology in relation to placental function, maternal adaptation to pregnancy, and developmental programming. Current studies are focussed on the impact of maternal obesity, omega-3 fatty acids and glucocorticoid excess on pregnancy outcome (from the perspective of both the mother and the developing fetus).

Projects are suitable for Honours, Master by Research, PhD

Project 1: Developmental origins of health and disease (DOHAD).

Studies in relation to DOHAD focus on the effects of fetal glucocorticoid excess on the adult phenotype, particularly in relation to programming of adult-onset diseases such as hypertension, diabetes and obesity. The capacity of postnatal diets to either exacerbate (e.g. by a high fat diet) or rescue (e.g. dietary fish oil) adverse outcomes is an important focus of this work.

Tissue banks have been collected from a large scale glucocorticoid programming study and these are available for analysis. Tissues including heart, kidney and adrenal gland have been collected at 6 months of age from control and programmed offspring raised on standard, high fat or high fat/high omega-3 diets. They have been collected at four time points across a 24 hour period, enabling circadian profiling of gene expression and tissue function to be layered into the analysis.

Supervisors: Dr Peter Mark (Chief), with Em Prof Brendan Waddell

Project 2: Circadian rhythms in the spiny mouse placenta.

Circadian biology underpins all major metabolic processes to appropriately align physiology of the organism with behaviour. Altricial (immature at birth) organisms, such as the rat and mouse, have minimal circadian variation in placental function, possibly to supply the fetus with constant nutrition during the relatively brief period of fetal growth. Precocial (relatively mature at birth) organisms are often born with metabolic rhythmicity (e.g. in liver function) which may be driven by exposure to peaks and troughs in substrate supply from the placenta.

This project aims to determine whether placentas from the precocial spiny mouse exhibit distinct circadian rhythmicity in their function in association with fetal liver rhythmicity. Samples have been collected from pregnant spiny mice in collaboration with Dr Hayley Dickinson, The Ritchie Centre at The Hudson Institute, Victoria. Placental expression of clock genes and nutrient transporters will be determined at various stages throughout gestation to determine the timing of onset for placental rhythmicity.

Supervisors: Dr Peter Mark (Chief), with Em Prof Brendan Waddell and Dr Hayley Dickinson (Monash University)

Project 3: Maternal circadian adaptation to pregnancy.

Pregnancy is one of the greatest physiological and metabolic challenges the body is confronted with. Maternal metabolism exhibits a predominantly anabolic phase during the first half of gestation, to lay down sufficient nutrients in maternal metabolic tissues (e.g., liver and adipose tissue) to meet the high energetic demands of the developing fetus later in gestation, via catabolism of the stored nutrients.

In addition, many metabolic pathways exhibit circadian rhythmicity in their activity, so they can optimise their performance to appropriate times of day e.g. food consumption during the day and fasting overnight.

Tissues have been collected at 4 hourly timepoints across 24 hours from non-pregnant mice and during mouse pregnancy (days 6, 10, 14 and 18 of pregnancy; term = 19 days). Metabolic pathways and their circadian rhythmicity in these tissues will be interrogated through quantitative PCR and Western blot analysis to identify how liver and adipose tissue change during this metabolic adaptation to pregnancy.

Supervisors: Dr Peter Mark (Chief), with Em Prof Brendan Waddell

Project 4: Maternal obesity disrupts circadian adaptation to pregnancy and fetal and placental development.

Obesity during pregnancy is associated with numerous adverse outcomes including preeclampsia, gestational diabetes, fetal overgrowth and somewhat counter-intuitively, some mothers exhibit fetal growth restriction. In obese pregnancies complicated by fetal growth restriction, placental dysfunction is considered a likely cause of the reduced fetal growth. This placental dysfunction may eventuate, in part, through maladaptation of maternal circadian rhythmicity in metabolic processes.

Female rats were fed cafeteria items (e.g., meat pies, biscuits, chocolate cake) for eight weeks prior to mating, and through pregnancy. By the time of mating, the CAF-fed rats were ~25% heavier than control rats, fed only normal chow. Maternal metabolic tissues (liver and adipose tissue), placental tissue and fetal liver were collected at 4 hourly intervals across days 15-16 and 21-22 of gestation (term = 23 days). These tissues show marked changes in circadian expression of clock genes following consumption of the CAF diet, with the amplitude of the rhythm frequently reduced. Further investigation in alterations in metabolic pathways will identify other genes that are dysregulated in maternal obesity.

Supervisors: Dr Peter Mark (Chief), with Em Prof Brendan Waddell

Project 5: Pathways to infertility: mechanisms of action of phyto-oestrogens.

Background: *Trifolium subterraneum* clover has historically been used as a pasture throughout Western Australian sheep farms, due to its palatability to livestock and low maintenance requirements. However, in the 1930s and 40s, reproductive anomalies in flocks grazing *Trifolium subterraneum* clover were linked to the presence of phytoestrogens. Phytoestrogens are non-steroidal, naturally occurring phytochemicals produced in plants, partly in response to stress. Phytoestrogens are functionally and structurally similar to oestrogens, particularly 17 β -oestradiol, found in mammals including sheep. Phytoestrogens act as a mixed agonist/antagonist of oestrogen action, suppressing the hypogonadal-pituitary axis and competing for oestrogen receptors, ER α and ER β .

In sheep ingesting oestrogenic clover, the cervix loses the ability to respond to oestrogen, thus failing to produce the viscoelastic mucous necessary for fertilisation. However, some sheep are not affected by the ingestion of oestrogenic clover.

The molecular basis of the resistance to phyto-oestrogen exposure is not understood. This project aims to compare the expression of oestrogen receptors ER α and ER β and related intracellular mechanisms in ewes exposed to phyto-oestrogens, that were either successful or unsuccessful in the production of a lamb.

Supervisors: Dr Peter Mark, Dr Dominique Blache [SaGE], A/Prof Caitlin Wyrwoll

Reproductive Physiology



Professor Caitlin Wyrwoll

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Effects of environmental exposures on pregnancy and subsequent development

Early life environment is a powerful determinant of adult health outcomes. Each year, the [Pregnancy Exposures Group \(PrEG\)](#) offer a range of research projects that address this topic. Broadly, these environmental stressors encompass issues such as extreme heat exposure, drinking water quality, and medication use in pregnancy. Projects can range from working with animal models, to computer modelling, to cell based projects, to analysis of human health datasets. PrEG is co-led by Prof Caitlin Wyrwoll (reproductive physiologist, School of Human Sciences) and Dr Erin Kelty (epidemiologist, School of Population & Global Health). The group currently consists of three postdoctoral researchers, one project manager, and three PhD students. **We have opportunities available for projects involving discovery science, population health analyses, and policy reviews.**

Please contact Caitlin (caitlin.wyrwoll@uwa.edu.au) directly for more information.

Project is suitable for Honours, Masters, PhD

Supervisors: Prof Caitlin Wyrwoll and/or Dr Erin Kelty plus another PrEG researcher.

Some specific projects we have available for 2027 are:

Impact of Late-Gestation Heat Exposure on Fetal Heart Growth and Development

Climate change is increasingly harming human health worldwide, with extreme heat events becoming more intense and occurring more rapidly than previously predicted. While there is a growing body of evidence demonstrating that heat exposure during pregnancy increases the risk of adverse birth outcomes, less focus has been placed on the potential long-term impacts for the offspring.

Cardiometabolic diseases are the largest contributors to global morbidity and mortality. *In utero* perturbations have been associated with future cardiometabolic disease, however how heat stress specifically affects fetal cardiac development has not been well characterised. Any change in heart development *in utero* can have lasting consequences on future offspring health.

This Honours project will investigate how exposure to heatwave-like conditions during late gestation affects fetal heart morphology and the expression of genes and proteins that regulate heart growth and development. Using samples collected from a sheep model which simulates real-world heatwave exposures during late pregnancy, this study will characterise:

- Fetal heart morphology, through histological analysis to evaluate metabolic storage, fibrotic remodelling and cellular proliferation.
- Fetal heart gene and protein expression, to identify any potential changes in key cardiac markers of hypertrophy and proliferation.

The project will involve laboratory-based molecular techniques, histological staining and imaging, and data analysis to compare heat-exposed and control groups. In the context of a warming world, findings will contribute to a deeper understanding of how maternal heat stress may compromise heart development.

Supervisory team: Dayna Zimmerman, Caitlin Wyrwoll

Intergenerational Health



Associate Professor David Coall

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Using a predominately biological anthropology perspective, we apply evolutionary theory to understanding intergenerational influences on health and behaviour within families. However, this research is also applicable to the fields of evolutionary medicine, medical anthropology, evolutionary behavioural sciences, maternal and child health, paediatrics, cognitive science, and mental health. I have two strong research themes, one investigating the impact that pregnancy and childhood environments have on an individual's subsequent growth, development, reproduction and health. The second examines the roles grandparents play in families and society and its subsequent health consequences. I am now bringing these two fields together to highlight grandparents as a valuable and available public health resource that can buffer families and particularly grandchildren against early life adversity.

Project 1: An evolutionary analysis of grandparents raising grandchildren.

Grandparents are well known to support their families and communities. However, research examining what grandparents actually do that makes a difference is only just beginning. Biological anthropology provides a broad, interdisciplinary perspective to explore the roles grandparents play. In this project, data from a state-wide study of families where grandparents are raising their own grandchildren (Grandcarers) can be explored. A total of 530 Grandcarers in Western Australia, including 25% from the Indigenous community, completed the Grandcarer Survey (online or paper). The domains included in the Survey include family structure, culture, food security, service barriers, family relationships, and grandparenting issues. This research will be positioned to inform government policy wherever possible. Aboriginal and Torres Strait Islander people are welcome.

Project is suitable for: Honours, Masters, PhD

Supervisor: A/Prof David Coall

Project 2: How is grandparenting for you?

It has been suggested that grandparenting research is biased because everyone is working with happy, helpful grandparents. However, we know some grandparents and families are not happy for a wide range of reasons. This project would involve recruiting grandparents who want more grandparenting or less grandparenting, or who are happy with their grandparenting role. The aim is to gain an understanding of the contributing factors to more or less grandparenting with potentially some information on how families can work better on sharing caring. Aboriginal and Torres Strait Islander people are welcome.

Project is suitable for: Honours, Masters, PhD

Supervisors: A/Prof David Coall

Project 3: What do grandparents do when their first grandchild is about to arrive?

Grandparents are important to us; however, they may be pivotal to our development even before we are born. Grandparents have always been central to maternal and child wellbeing. How those roles translate into a modern Australian context is unknown. This project will recruit grandparents who are about to have their first grandchild to see exactly what it is that grandparents do (or don't do) around pregnancy and its impact on their family's wellbeing. It is critical to grasp this opportunity to understand grandparental support during pregnancy as family structures rapidly diversify. This will illuminate family processes around pregnancy and potential interventions supporting our best start to life. Aboriginal and Torres Strait Islander people are welcome.

Project is suitable for: Honours, Masters, PhD

Supervisor: A/Prof David Coall

Corneal Ophthalmology



Associate Professor Holly Chinnery

Lions Eye Institute, Perkins and UWA Optometry

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Project: Linking cell shape and phenotype to inform cell identities in the cornea

Using a newly developed method called intravital microscopy, it is now possible to observe immune cells moving through the human cornea. We know from ex vivo analysis of human tissue that the normal cornea contains T cells and myeloid cells, but whether other immune cell types exist is unclear. To predict the cell types present in the cornea, we aim to create an atlas of mouse corneal immune cell morphologies to help predict the identity of immune cells in human corneas.

This project will involve inducing local inflammation to the mouse cornea to induce inflammatory cell subsets. Ex vivo immunostaining of immune cells will be conducted, and cell shapes analysed using morphometry and cluster analysis. Techniques will include animal handling, induction of corneal inflammation using topical application of bacterial products (i.e. heat-killed *Pseudomonas aeruginosa* and *Staph aureus*), immunohistochemistry and confocal microscopy and image analysis.

References:

- Downie LE, Zhang X, Wu M, Karunaratne S, Loi JK, Senthil K, Arshad S, Bertram K, Cunningham AL, Carnt N, Mueller SN, **Chinnery HR**. Redefining the human corneal immune compartment using dynamic intravital imaging. *Proc Natl Acad Sci U S A*. 2023 Aug;120(31):e2217795120
- Wu M, Fletcher EL, Chinnery HR, Downie LE, Mueller SN. Redefining our vision: an updated guide to the ocular immune system. *Nat Rev Immunol*. 2024 Dec;24(12):896-911.

Supervisors: A/Prof Holly Chinnery, Dr Danial Roshande [Lions Eye Institute, Perkins]

Project Location: Lions Eye Institute at Perkins Institute

Comparative Physiology of Adaptation



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Dr Dominique Blache

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Our group is interested in the physiological mechanisms whereby animals (including humans) adapt to environmental stressors. We focus mainly on thermal and osmotic stress, but exercise, inanition (starvation), and infection are also studied, and recently the operation of circadian clocks and their role in physiological function (with Dr Peter Mark and Jane Pillow). Most experimental work is at systems level, but organ and molecular levels are also studied. Our long-term aim is to identify specific adaptations, or biomarkers of those adaptations, that allow animals to survive and reproduce in challenging environments, and to identify how "homeostasis" handles the trade-offs when simultaneous challenges are presented to an organism. Prospective Honours students with a background in General Systems Physiology, Exercise Physiology, Applied Animal Physiology, or Comparative Physiology are encouraged to apply. Depending on the project chosen, a background in Cell Physiology could be an advantage.

Students will be exposed to a range of approaches and techniques including (in non-human animals) recovery anaesthesia and surgery, implantation of physiological recording equipment, blood sampling for hormone measurement, and husbandry techniques for various species. In human research we use state of the art equipment to record physiological parameters in ambulatory subjects, including core and skin temperature transmitters, ambulatory blood pressure recording equipment, laser Doppler skin blood flow techniques, and infra-red thermography for surface temperature measurement.

Project 1: Models of human heat balance – how important is the effect of wind speed that is usually ignored?

Following a well-cited study in 2010, it has become common place to project the impact of climate change on human thermoregulation and work capacity using the wet-bulb temperature as an index of human heat stress. There are several issues with such an approach that limit its utility and accuracy; one is that way that the wet-bulb temperature is derived from meteorological data, which inevitably means that the index ignores the effect of wind (convection) on heat exchange, as discussed in a recent article.

<https://onlinelibrary.wiley.com/doi/10.1111/apha.14196>

The difference between the natural-wet-bulb temperature and the ventilated-wet-bulb temperature is well grounded in theory, but has been measured only once formally; at 25°C. Other than those few measures at 25°C, there are no empirical data on the wet-bulb temperature that is registered at different wind speed for combinations of dry-bulb temperature and humidity.

The project will involve the measurement of the wet-bulb temperature while the dry-bulb temperature, the humidity, and the wind speed are systematically varied. The outcome will be an empirical formula to calculate the natural-wet-bulb temperature. Good mathematical knowledge will be an advantage.

Supervisors: Prof Shane Maloney, Prof Duncan Mitchell (WITS, South Africa), Prof Mike Kearney [U Melb]

Project 2: Nerve conduction velocity, ion pump activity, and the cardiac pacemaker during cooling in the cane toad (*Rhinella marina*).

In Australia, cane toads (*Rhinella marina*) are classified as pests. Since their introduction into Queensland in 1930, their numbers have reached around 200 million. To try to limit the population, many thousands of toads are killed annually using a variety of methods. Toads are also killed for university teaching and research. Gradual cooling then freezing has been a common method for humane killing, but is now deemed unacceptable by some authorities. The aim of the project is to measure the activity of various components of the nociceptive pathway at different temperatures. You will make measures using a PowerLab, similar to the practicals you did in PHYL2002, to elucidate the Q_{10} for nervous activity in toads. Your results will help to determine whether cane toads have the necessary physiology to detect pain when they are frozen.

Supervisors: Prof Shane Maloney, Dr Dominique Blache [SAgE]

Project 3: Can IRS be used to assess animal welfare?

The increasing public interest in the quality of life of animals used by humans (research or production animals) has led to calls for objective means to assess how an animal experiences events in its life. Vibrational spectroscopy techniques, such as infrared spectroscopy (IRS), have been proposed to assess the welfare of different domestic animals (Manteuffel et al., 2023). These techniques are used in the field of animal nutrition and physiology. Our team has published the results of a preliminary experiment showing that the profile of IRS of brain tissue is associated with short- and long-term events that compromise animal welfare. However, there is a need to develop methodologies to use infrared spectroscopy (IRS) techniques to analyse biological samples such as blood or saliva, which would be more practical to collect. With this project, you will test different methods of collection and preservation of blood, plasma, saliva, and brain samples to optimise the use of a handheld infrared spectroscopy machine.

Supervisors: Dr Dominique Blache [SAgE], Dr Luoyang Ding [SAgE], Prof Shane Maloney [SHS]

Project 4: Fibre, rumen function, circadian rhythms, and sleep in ruminant animals. Is rumination a form of sleep?

Ruminant animals can consume and process foods that monogastric animals (like us humans) cannot metabolise. That occurs because the rumen is densely populated by microorganisms that make enzymes that can break $\alpha_{1,6}$ bonds between monosaccharides that form the long chain polysaccharide molecules of cellulose. The digestion of those molecules begins with mechanical processing, the act of chewing. Particles larger than about 1.2 mm cannot move from the rumen further along the digestive tract, and rumination exposes ruminal contents to another round of mechanical digestion. Diets that are low in fibre require no rumination to process, and so a normal behaviour is not expressed in animals on high quality (low fibre) diets. There is some evidence that rumination is a form of sleep; it occurs only when animals are undisturbed and calm. We would like to know what brain activity looks like in a ruminating animal, and whether rumination is a form of sleep. If it is, there are important implications for animal welfare. This project aims to feed sheep diets that are high or low in fibre, and see if the time spent ruminating is impacted, and whether total sleep time changes when rumination time changes.

Supervisors: Prof Shane Maloney [SHS], Dr Joh Milton [SAgE], Dr Dominique Blache [SAgE], Prof John Lesku [LaTrobe].

Project 5: Exploring the role of gut microbiome on dietary preference in *Drosophila* exposed to heat stress.

Heat exposure is a significant environmental challenge to the health of humans and other animals. Rising global temperatures force species to endure temperatures outside of their thermal neutral zone, leading to many physiological dysfunctions. However, while it is possible to mitigate the negative effects of heat stress, the nature and mechanism of action of some of the successful mitigating interventions are not fully understood. In *Drosophila melanogaster*, our model, exposure to high temperatures induces excessive production of reactive oxygen species (ROS) leading to oxidative stress. Vitamin E, a lipid soluble antioxidant, can reduce the negative effect of the overproduction of ROS and improve the health and performance of the flies. In our laboratory, we have shown that under heat stress conditions, *Drosophila* exhibit a preference for vitamin E-rich foods within six days of being offered food with Vit-E. The trigger of the cognitive process that leads to that preference in response to exposure to heat stress is not understood. It has been proposed, in other species, that the gut-brain axis could be involved in cognitive function.

For example, the kynurenine pathway, amongst the different pathways linking the gut microbiome to the brain, is promising because at the brain level, in other species, the kynurenine pathway is involved, for example, in neuroplasticity and oxidative stress. This project will use probiotics, brain mapping, gene expression, immunohistochemistry, genetic modification, and microbiome sequencing to explore the importance of the gut-brain axis in the establishment and maintenance of the preference of *Drosophila* for vitamin E rich food during exposure to heat stress.

Supervisors: Dr Dominique Blache [SAG], Prof Shane Maloney [SHS], Dr Jaime Beros and Prof Jennifer Rodger [SBS]

Project 6: Making sense of 25 years of data about sheep personality: A desktop project.

Our laboratory pioneered the study of personality (also referred to as temperament) in sheep since 1993. We maintain a unique resource to study the impact of personality on most biological functions, primarily the stress axis, reproduction, and metabolism of sheep: this resource comprises two divergent lines of sheep that have been selected for their personality phenotype: one line was labelled calm, and one line was labelled nervous. In each generation, the phenotype was measured using two behavioural tests and the males with the most extreme phenotype (either calm or nervous) were used to produce the next generation by mating them to females of the same genotype. The selective breeding was maintained from 1992 to 2017. The database accumulated over these 25 years needs to be explored using state-of-the-art statistical analyses. The database contains around 9,000 personality phenotypes of individual sheep to understand the nature of the variability in the phenotype, the evolution of that variability, and the stability of the trait over time.

The student leading this project will have to test the analytical tools selected from the large array of methods that can be used to analyse a clinical database. In addition to the large database available at UWA, we also have access to a smaller database from overseas collaborators using different breeds of sheep that could be used to extrapolate the model, or integrate other breeds into the model.

Supervisors: Dr Dominique Blache [SAG], Dr Luoyang Ding [SAG], Prof Shane Maloney [SHS]

Project 7: Heat stress, nutrition, and feedlot cattle in the tropics.

We conducted a study in Kununurra that investigated the potential benefits of supplementing steers with whole cottonseed as an alternative method for feeding growing steers that are not yet ready for sale to a feedlot or other market. All of the steers were fed hay made from local forages (primarily rhodesgrass); the hay was chopped and mixed with a molasses-based vitamin and mineral supplement to ensure that they received the appropriate number of vitamins and minerals. Control (CON) steers received only the hay/molasses/mineral mix, while treatment steers (TRT) also received whole cottonseed. All of the cattle were equipped with an intraruminal logger that measured body temperature every 5-minutes, a 3D accelerometer that measured activity, and a subcutaneous impact that measured skin temperature and heart rate. The behaviour of the cattle was recorded using CCTV. Your role will be to analyse the physiological and behavioural data in relation to the growth performance of the cattle and the environmental conditions. This project is a computer-based project but there will opportunities to assist with fieldwork on ongoing cattle projects during the year.

Supervisors: Dr Dominique Blache [SAG], Prof Shane Maloney [SHS], Dr Luoyang Ding [SAG]

Project 8: Vibration enhanced cooling of hyperthermic subjects

This project concerns the physiology of heat transfer. Exercise and heat exposure can lead to heat storage in the body and the state of hyperthermia. That state is associated with decrements in physical and mental performance, and can precipitate heat stroke, a medical emergency that can result in death. Strategies to cool hyperthermic people involve methods to enhance heat transfer from the body to the environment, but can be hindered by the body's physiological responses to cold stimuli. For example, placing the body, or parts of it, into cold water causes a reduction in blood flow in the skin of the cooled area, while blood flow is critical to transfer heat from the body's core to the skin where it is lost to the environment. We recently showed that vibration at low frequency causes a vasodilation in the hands despite exposure to ice-water. The result was enhanced heat transfer and a faster decrease in core temperature. We would like now to test whether the response is specific to the hands, or whether whole body vibration can enhance skin blood flow in hyperthermic subjects exposed to cold air.

Supervisors: Prof Shane Maloney [SHS]

Project 9: Erythrocyte shape and human heat stroke

The symptoms of heat stroke in humans include dizziness and incoordination, suggesting that perfusion of the brain with oxygenated blood is affected. But recent research that compared the blood pressure of people exercising in the heat found no difference in blood pressure between people who developed symptoms of dizziness and those who did not develop symptoms of dizziness. Some work from last century suggests that erythrocytes might lose their concavity when they are heated, either directly or because of an effect of oxidative stress on the erythrocyte that develops with temperature. The loss of concavity would increase the resistance of the blood to flow in the vascular system. It is likely that there is phenotypic variation in the likelihood of spherical erythrocytes between individuals in the heat. You will look at the shape, and probability of lysing, in erythrocytes at normal body temperature, at elevated temperature, and with or without antioxidant or prooxidant treatment.

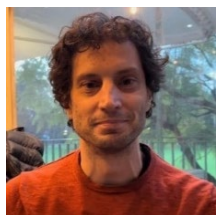
Supervisors: Prof Shane Maloney [SHS]

All projects are suitable for: Honours, Masters, PhD

Essential qualifications: *For Honours:* An appropriate undergraduate degree with a minimum weighted average of 65% in the level 3 subjects that comprise the relevant major, from an approved institution. Applicants will be assessed on a case-by-case basis.

For Masters or PhD: An appropriate Honours degree or equivalent research experience from an approved institution. Applicants will be assessed on a case-by-case basis.

Airway Physiological Research Laboratory



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Prof Alan James



Mr John Elliott



Dr Michael Hackmann

The Airway Physiological Research Laboratory in the School of Human Sciences, in collaboration with clinicians and scientists at Sir Charles Gairdner Hospital, has a long-standing interest in the control and function of conducting bronchi. The trachea, bronchi and other airways conduct air into and out of the lung. During an asthma attack, contraction of airway smooth muscle narrows the conducting bronchi and obstructs airflow. Airway obstruction also occurs in several other respiratory diseases including chronic obstructive pulmonary disease (COPD), chronic bronchitis and emphysema. We perform *in vivo* and *in vitro* experiments on human and animal models with a broad focus of understanding the detailed mechanisms involved in the control of airway diameter and airway obstruction.

Project 1: Pharmacological ablation of the airway smooth muscle layer as a new treatment for asthma.

One of the primary pathologies of asthma is increased airway smooth muscle thickness which contributes in no small part to disease severity; yet this structural abnormality has never seriously been used as a specific drug target. It has been well established that the airway smooth muscle layer is in a state of ongoing proliferation and apoptosis. Shifting the balance in favour of apoptosis (inhibiting proliferation or upregulating apoptosis) is a logical intervention to reduce airway smooth muscle thickness. Under biomechanically relevant cell culture conditions, this study will trial 'hypotrophic/anti-proliferative agents' and attempt to pharmacologically degrade the airway smooth muscle layer, forming a basis for a new therapy in the treatment of asthma.

Supervisors: Prof Peter Noble, A/Prof Yu Suk Choi

Project 2: Developing a new class of therapeutics to heal airway damage in asthma.

Asthma is the most common chronic respiratory disorder in children and remains one of the main causes of their hospitalisation. Thus, there is a pressing need for identification of novel therapeutic strategies that target the principal cause of asthma in early life and not just its clinical sequelae. Work by our team and others has established that the airway epithelium of children with asthma has intrinsic abnormalities relating to dysregulated responses to injury, infection and inflammation. Our team is developing novel therapeutics that target the airway epithelial repair with the goal to improve health outcomes for children with asthma.

There is now an opportunity for a motivated student/multiple students to contribute towards the assessment of new therapeutics for asthma that enhance airway repair. The project(s) aims to determine the preclinical efficacy of repurposed and novel therapeutics to enhance airway epithelial repair using cell-based and *in vivo* models.

Supervisors: Prof Peter Noble, Dr Thomas Iosifidis, A/Prof Alexander Larcombe, Dr Katherine Landwehr

Project 3: Quantification of airway-associated adipose tissue by polarisation-sensitive optical coherence tomography.

We have recently used ex vivo human tissue to demonstrate airway-associated adipose tissue as a contributing factor in co-morbid asthma and obesity. For a respiratory physician, fat infiltration of the airway wall was not previously a consideration and certainly not one to guide treatment. What we are in fact seeing is a fatty invasion of the airway wall and therefore an immediate shift in the constituent properties, analogous to airway remodelling (structural modification) that is believed to play a fundamental role in the manifestation of breathing difficulties in asthma. How do we diagnostically assess airway-associated adipose tissue in patients? We are developing polarisation-sensitive optical coherence tomography (PS-OCT) as a non-invasive diagnostic tool for the assessment of airway-associated adipose tissue in patients. The present study will validate measurements of airway-associated adipose tissue using PS-OCT in pig bronchial segments by comparing them with histological measurements.

Supervisors: Prof Peter Noble, Dr Alvenia Cairncross, Dr Michael Hackmann

Project 4: Electrical impedance tomography for the assessment of lung disease.

Electrical impedance tomography (EIT) is a safe, non-invasive, cheap and portable technology that constructs maps of lung ventilation from surface electrodes positioned around the chest. The underlying principle of EIT is that electrical impedance increases in proportion to lung inflation such that the degree of lung aeration during breathing can be tracked from changes in impedance. EIT has the potential to characterise ventilation heterogeneity which is typically increased in respiratory disease. The present project will determine whether EIT is a useful diagnostic approach in patients with asthma, chronic obstructive pulmonary disease, interstitial lung disease, cystic fibrosis and non-cystic fibrosis bronchiectasis.

Supervisors: Prof Peter Noble, A/Prof John Blakey, Dr Alvenia Cairncross

Project 5: Switching to renewable fuels to combat occupational diesel exhaust health effects may backfire.

Over a quarter of Australians between the ages of 14 and 18 have tried electronic cigarettes (vaping), with 1 in 10 being a "current" vaper. Even more alarmingly, 1 in 8 asthmatic Australians vape daily. Our unique preliminary data suggest vaping may impair the effectiveness of bronchodilator drugs, which are used in quick relief inhalers to treat asthma exacerbations. When we assessed vape-induced health effects in adolescent mice, we found airflow obstruction, likely due to vape aerosol congesting/lining the airways and alveoli. This could prevent the drugs from reaching where they are most needed. Vape aerosol also alters the expression of many cytochrome P450 and sulfotransferase genes in the airway. These gene families are responsible for the metabolism of most bronchodilator drugs, which could impact drug efficacy and reduce relief provided to asthmatics during an exacerbation.

The aim of this project is to determine if vape aerosol impacts bronchodilator drug efficacy in a mouse model of vaping. Mice will be exposed to vape aerosol 5 days a week for 8 weeks using standardised exposure guidelines. The trachea will be excised and organ bath experiments performed to assess smooth muscle contraction and relaxation in response to bronchodilator drug exposure. This will inform whether exposure to vape aerosol change the response to bronchodilator drugs.

Supervisors: Prof Peter Noble, A/Prof Alexander Larcombe, Dr Katherine Landwehr

Project 6: Characterising structural properties of kangaroo airways.

Comparative physiological studies using animal models provide an opportunity to better understand the relationship between airway structure and function. The present study will focus on the kangaroo airway. In preliminary findings, we have identified a thickened basement membrane, at the level and beyond that which is observed in patients with asthma. We also observed infiltration of eosinophils, which led us to conclude that kangaroos are an innate model of allergic airway disease. The present study will further characterise basement membrane thickness in relation to inflammation with the hope of revealing phenomena relevant to human asthma.

Supervisors: Prof Peter Noble, Dr Kimberley Wang, Mr John Elliott

Project 7: Application of the Airway Disease Biobank to advance our understanding of respiratory disease.

The Airway Disease Biobank is a Western Australian resource comprising airway samples from > 350 subjects with and without respiratory disease. Using histological and stereological techniques to examine human tissue, the Biobank has advanced our understanding of asthma and chronic obstructive disease. In particular, the fundamental role of airway smooth muscle remodelling in determining disease severity has been revealed through decades of publications utilising Biobank tissue. Yearly projects are run for students who enjoy histology and are keen to generate clinically relevant data. Projects are custom-designed to student interest. An emerging question is whether sarcoidosis is also a disease where airway disorder is produced by thickening of the airway smooth muscle layer.

Supervisors: Prof Peter Noble, Mr John Elliott

In Vitro Musculoskeletal Research



Dr John Gostage

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Receptor activator of nuclear factor kappa B (RANK), RANK ligand (RANKL), and osteoprotegerin (OPG) comprise the RANK-RANKL-OPG axis, a complex, and multifaceted signalling system. The axis has a pivotal role in regulating bone mass and calcium homeostasis by controlling osteoclasts and bone remodelling. Growing evidence suggests the RANK-RANKL-OPG axis may play a regulatory role in extra-osseous tissues, especially in skeletal muscle. Targeting RANKL may be a novel therapy in ameliorating loss of muscle mass and function. More research is warranted to determine the causality of the RANK-RANKL-OPG axis in extra-osseous tissues, especially those affected by aging and disease.

Research pursuits include: **(1)** understanding how bone health is affected in different types of muscular dystrophy, particularly dysferlinopathy (a heavily understudied condition), **(2)** exploring the interplay between bone and muscle in muscular dystrophy i.e., determining whether targeting bone/bone-related signalling proteins may have therapeutic potential in certain muscular dystrophies, and **(3)** deciphering whether co-targeting both bone and muscle represents a viable therapeutic strategy in preserving musculoskeletal health in muscular dystrophy.

- Dr Erin Lloyd and I have the potential for various *in vitro* research projects, please get in touch if you would like to discuss further. See below for an example project we are currently offering:

Determining the myogenic potential of OPG in dysferlinopathic muscle *in vitro*

This project will begin to explore the interplay between bone and muscle in muscular dystrophy. Focus will be on firstly optimising an *in vitro* myogenesis model utilising specialised human myoblasts harvested from patients with dysferlinopathy and secondly beginning preliminary investigations into the effect of OPG on myogenic potential *in vitro*. This honours project is wet lab based and involves cell culture, immunohistochemistry, bench top assays and statistical analysis.

- Dr Robyn Choi and I are also exploring the potential of targeting bone remodelling/RANKL signalling as a therapeutic strategy in middle ear infections (otitis media). In Australia otitis media is one of the leading causes of disease among Aboriginal and Torres Strait Islander children. We are currently developing projects in this space as we believe more research is required in this space - please get in touch if you would like to discuss further.

Skeletal Muscle Physiology



Dr Erin Lloyd

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This research examines how skeletal muscle functions and adapts across the lifespan in health and disease. It also considers how muscle interacts with other biological systems.

Projects draw on experimental physiology, molecular techniques, advanced imaging, and computational approaches to study muscle contractile function, mechanics, and signalling.

Potential topics include neuromuscular disorders such as dysferlinopathy; the effects of ageing, development, or therapeutic interventions on muscles; muscle-derived signals such as myokines; and relationships between tissue structure, mechanics, and function. By connecting mechanisms across scales, from cells and tissues to wider physiological function, the aim is to identify strategies that preserve muscle and neuromusculoskeletal health.

Please get in touch to discuss potential projects, which can be tailored to your goals, background, and interests.

Sleep Science – Sleep and its Disorders



Dr Jennifer Walsh

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Dr Kathleen Maddison

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Sleep disorders and poor sleep are common, affecting more than 40% of the Australian population.

Sleep researchers at the School of Human Science's Centre for Sleep Science (CSS) (UWA) and the West Australian Sleep Disorders Research Institute (Sir Charles Gairdner Hospital) have an active interest in understanding factors that predispose individuals to various sleep disorders and how they can be treated. They have a particular interest in cannabinoids as a therapy for sleep disorders.

They are also interested in gathering evidence to (potentially) debunk common sleep myths such as drinking a 'sleepy girl mocktail' and using 'mouth tape' to improve sleep.

Projects are suitable for: Honours, Masters, PhD

Supervisors: Dr Jennifer Walsh and Dr Kathleen Maddison

Exercise Physiology and Biochemistry



Professor Olivier Girard

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<https://www.oliviergirard.com/training-under-environmental-stress>

If you have a passion for exploring the limits of human performance and implementing innovative interventions, come and have a chat!

My research identifies, quantifies and explains mechanisms responsible for fatigue during high-intensity intermittent exercises performed by team- or racket-sport athletes under challenging environmental conditions (i.e. heat stress or hypoxia).

Several projects also shed light on the neuro-mechanical determinants of team-sport performance, with a special focus on (repeated) sprinting mechanics and underpinning neuromuscular factors.

Current research is focussed on therapeutic use of hypoxia to improve cardio-metabolic health of 'at risk' patients and improve exercise tolerance in load-compromised individuals (injured athletes).

Four main research areas:

1. Training under environmental stress (altitude, heat)
2. Exercising in hypoxic and/or hot conditions
3. Neuro-mechanical adjustments to exhaustive running
4. Racket sports

Key words: Neuromuscular fatigue, repeated-sprint ability, hypoxia, altitude training, heat stress, sprinting mechanics, cardio-metabolic health, team and racket sports.

Project: Effect of intermittent hypoxia on the immune system

This project investigates how controlled exposure to intermittent hypoxia (IH) - repeated cycles of low oxygen followed by normal oxygen - can be optimised to reduce inflammation and enhance immune resilience in humans. While severe or chronic hypoxia impairs health, brief, well-dosed hypoxic conditioning shows promise for improving immune homeostasis by modulating pro- and anti-inflammatory cytokines (IL-6 and IL-10) and suppressing latent viral reactivation (e.g. Epstein-Barr Virus). This study aimed to define the optimal "hypoxic dose" by systematically varying the number of cycles, hypoxic duration, and total exposure time. Additionally, this project will explore whether hypoxic preconditioning can mitigate the immunosuppressive effects of high-intensity exercise, such as sprint-interval training.

Students will gain hands-on experience with advanced physiological testing (hypoxic exposure protocols, cardiopulmonary assessment), molecular immunology techniques (ELISA, qPCR), and rigorous statistical analysis. This work has direct applications for athletes, clinical populations (e.g. chronic disease rehabilitation), and anyone exposed to environmental or physiological stressors, offering a novel, non-pharmacological approach to optimise health and performance.

Supervisors: PhD student Thibaut Legoy, Prof Silvana Gaudieri and Prof Olivier Girard

Several other applied projects (working directly with athletes) are proposed and include:

- Energy requirements and physical demands (lower limb activity) in racket sports (tennis and new formats such as padel etc)
- Training load monitoring, fatigue and recovery practices in team and racket sports
- Repeated sprint training in hypoxia and altitude training
- Heat acclimation (high performance sport) and heat tolerance (occupational settings such as mining industry)
- Exercise with blood flow restriction

This list is certainly not exhaustive and if you have some burning real world (practical) questions that need to be answered working with your athletes or patients, please reach out!

Masters Project

Accuracy of markerless motion analysis for tennis serve biomechanics – How much has it improved?

Video-based markerless motion capture technology offers huge benefits to capturing motion data of world class athletes in competition – a scenario long eluded to traditional marker-based motion capture. However, the accuracy of the former is still debatable for use in biomechanics. Nonetheless, human pose estimation models, used by markerless motion systems to determine joint positions and kinematics, are rapidly improving in their accuracy. Play a part in this fast-developing field by helping to create a dataset used to train and test the latest pose estimation model.

Through this project, you will get the opportunity to analyse three-dimensional player (and skeletal) tracking data from the world of professional tennis to generate insight to improve coaching and player performance.

You will be required to perform the following:

1. Process marker-based motion capture trials of five international tennis players performing 20 serves each.
2. Compare the marker-based data with concurrently captured markerless data to establish the accuracy and reliability of the markerless system.
3. Compare the results from this study to the findings from the original model evaluation to assess improvements to accuracy and reliability.

Preferred proficiencies in:

1. Vicon Nexus (Marker-based motion capture system)
2. Coding (Python)
3. Statistical analyses



Associate Professor Karen Wallman

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We have a proposed honours project working with the WA police in order to determine physical attributes required by police who work with the canine squad.

Officers who work in the canine squad need to be able to lift their dog over fences, carry their dog if need be, and have good physical fitness to keep up with their dog.

Canine handlers' perspectives on the cognitive and psychological demands of their role

- Qualitative study looking at what the WAPOL canine handlers think about what it 'takes', mentally, to do the job.

How cognitive performance changes after critical canine handler tasks

- Understanding whether attention, reaction time, and decision-making are affected by completing canine handler tasks.

These projects will be about determining the physical attributes that officers in each squad need to be able to successfully perform their duties.

You would be working with myself, Dr Grant Landers and Prof Tim Ackland.



Email Karen if interested:
karen.wallman@uwa.edu.au



Professor Paul Fournier

E: paul.fournier@uwa.edu.au

Sport performance research

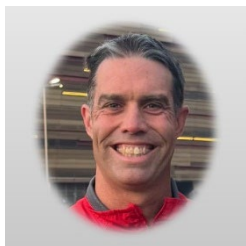
- Effect of bicarbonate loading on opposing the appetite suppression and nausea following sprinting
- The effect of antiemetic drugs on countering appetite suppression and nausea following sprinting
- The effect of pre-cooling on countering appetite suppression and nausea following sprinting.

Exercise and type 1 diabetes

- Effect of under-water cycling in cold water on blood glucose in people with type 1 diabetes.
Co-supervisor: *Prof Shane Maloney*
- Effect of high temperature and body hydration level on blood glucose response to exercise in people with type 1 diabetes.
Co-supervisor: *Prof Shane Maloney*

Nutrition Science

- Effect of ingesting protein to oppose the oxidative stress associated with breakfast skipping.
Co-supervisor: *Prof Peter Arthur*



Senior Lecturer Grant Landers

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Research projects focus on understanding and improving human performance, health and participation in sport and physical activity. Opportunities are available across sport, exercise and occupational settings, with projects conducted in collaboration with athletes, sporting organisations, community groups and industry partners using lab and field-based approaches.

Open water swimming & Applied Endurance Performance

Research exploring performance, safety and participation in endurance sports, with a particular focus on open water swimming, triathlon and ultra-endurance events.

- Open water navigation, race tactics and pacing
- Feeding and hydration strategies during endurance and ultra-endurance events
- Physiological responses to prolonged swimming and endurance exercise
- Determinants of endurance performance in swimmers, triathletes and ultra-endurance athletes
- Factors influencing performance in events such as the Rottneest Channel Swim and Backyard Ultra competitions

Environmental Physiology & Human Performance

Research examining how heat, humidity and environmental stress influence exercise and occupational performance.

- The impact of hot and humid environments on endurance performance
- Heat stress during sport and occupational activity
- Sex differences in adaptation to environmental stress
- Practical strategies to improve heat tolerance and recovery

Occupational Performance & WA Police

In collaboration with the Western Australia Police Force, students can investigate the physical demands of specialist operational roles.

- Physical demands of police canine handlers
- Development of occupation-specific fitness standards
- Load carriage and occupational performance
- Fatigue and readiness monitoring in specialist personnel

Athlete Monitoring & Body Composition Assessment

Projects exploring performance monitoring and physiological adaptation to training and competition.

- Athlete monitoring and training distress
- Relationships between workload, recovery and performance
- Match and training demands in team sports
- Changes in body composition during training programs, competitive seasons or endurance events



Cardiovascular Research Group



Prof Danny Green
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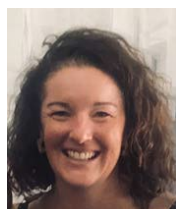
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Jaye Lewis
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WHO WE ARE We are a dedicated team of researchers and clinicians working at the forefront of cardiovascular disease prevention and management to optimise human health and wellbeing.

OUR VISION is to keep people healthier for longer by decreasing the progression and impact of cardiovascular diseases.

Our Mission: To optimise cardiovascular health across the lifespan by tailoring evidence-based preventative strategies which have direct impacts on cardiovascular function and health.

We combine translational research with service provision and vocational training to drive evidence provision, train the next generation of prevention specialists, deliver healthcare and impact patient benefit

WHO WE HELP

TRANSLATING RESEARCH FOR DIRECT COMMUNITY BENEFIT



Reversing childhood obesity and type 2 diabetes



Detecting early cardiovascular disease and optimising the benefits of exercise



Understanding elite physiology to translate benefit to patients



Preventing dementia, cardiovascular and metabolic diseases



Reducing the impacts of ageing



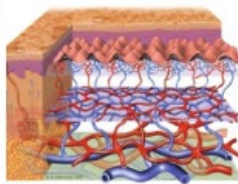
Rehabilitating patients with end stage heart disease

ARTERIOLOGY

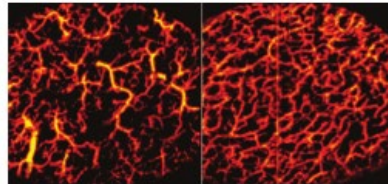
The study of large and small artery structure, function and health, to detect and prevent the world's leading causes of mortality and morbidity. We prevent and treat heart disease, stroke, dementia, limb amputation, blindness and kidney disease.



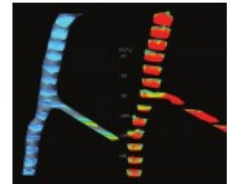
Early detection of atherosclerosis



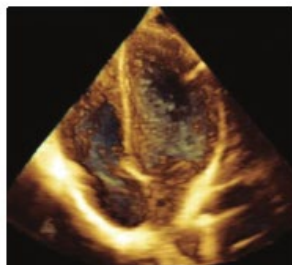
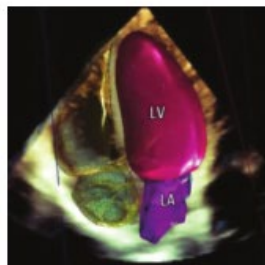
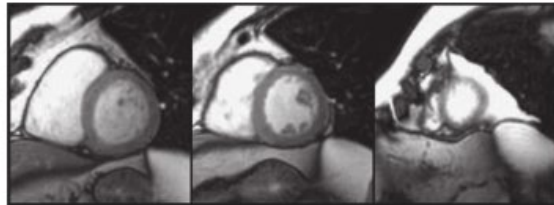
Inventing new imaging techniques to accelerate discovery



Visualising the impact of treatments to optimise health



Understanding artery function and health



HEART STRUCTURE AND FUNCTION

Novel insights into cardiac mechanics

State-of-the-art heart imaging including novel echocardiographic speckle tracking to assess heart stress and strain.

- Elite athletes
- Healthy aging
- Type 2 diabetics
- Bariatric surgery patients
- Heart failure
- Coronary artery disease



EXERCISE

A polypill for cardiovascular disease prevention and management



STRONG
collaborations



DISCOVERY

TRANSLATION

IMPACT

Lead Supervisors:

Winthrop Professor Danny Green: Danny is a cardiovascular exercise physiologist specialising in the prevention of chronic disease.

His research encompasses the lifespan; from exercise training in the prevention of the development of atherosclerosis in obese children and adolescents, to research on the best combination of exercise and medications in the management of patients with coronary disease, stroke, hypercholesterolaemia, diabetes and heart failure patients awaiting transplantation.

Ranked in the top 0.34% of cardiovascular scientists globally

- >350 peer-reviewed papers, 300 top quartile 14,000 cites
- 34 career category 1 grants (NHMRC, ARC, NHF)
- NHMRC Principal Research Fellow

Professor Louise Naylor: Louise uses exercise to treat, prevent, and reduce the impact of chronic diseases across the human lifespan.

Louise works across the health spectrum, from elite athletes to chronically ill individuals with conditions such as heart failure, cancer and obesity.

Putting research into practice, as an ESSA Accredited Exercise Physiologist Louise also works as a Senior Exercise Physiologist in the Cardiac Rehabilitation Service at Fiona Stanley Hospital.

Here are some of our latest research questions:

- Defence Force research - what does exercising in the heat do to your blood vessels?
- Responder or non-responder to exercise: nature or nurture. Why do some people have a great response to exercise while others don't?
- Testosterone, exercise or both? A new direction for ageing men.
- The cost of being sedentary – what does prolonged sitting do to your brain?
- What can twins teach us about exercise?
- Childhood origins of adult disease – what's the impact of exercise?
- How does exercise stack up for improving obesity, diabetes, Metabolic Syndrome, and heart disease, and what difference can it make to outcomes for heart failure patients or survivors of childhood cancer?
- Use it or lose it – what's the effect of inactivity on small or large arteries? (Hint: it's not good.)
- Cardiac response to exercise – what is 'Athlete's heart' and is it good or bad?
- The exercise paradox – why does exercise *acutely* increase cardiovascular risk but reduce it in the longer term.

The team produces world-leading research as well as being friendly and supportive. You will gain experience with great technologies, including echocardiography, OCT and ultrasound. We will teach you to look inside arteries in the brain and limbs and see what happens when people exercise (or don't). You will be guided every step of the way, from your research proposal, through developing your technical skills, to writing your thesis and presenting at conferences – maybe even publishing a paper or two.

Reach out for a chat.

Motor Development & Paediatric Exercise Physiology



Dr Siobhan Reid

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Our research broadly seeks to understand neurodevelopmental disability and motor impairment particularly in paediatrics, with the aim of developing targeted exercise interventions to improve outcomes for children and their families. We have many collaborative opportunities to work with clinical teams at **Perth Children's Hospital** and **The Kids Institute** as well as within our **Paediatric Exercise Programs**

Some of the projects we have on offer in 2027 include:

Barriers to Physical Activity in Children and Youth with Intellectual Disability – The Kids Institute

Children and youth with intellectual disability face significant barriers to participating in physical activity. Collaborating with the Kids Institute, this project aims to evaluate the barriers to physical activity from multiple viewpoints — children and youth themselves, their caregivers, and the professionals who support them (including AEP's) — to build a more complete picture of what stands in the way of participation and where interventions might be most effective.

Move-to-Improve – Perth Children's Hospital

The evidence is clear that exercise is beneficial for children living with chronic health conditions. This project involves collaboration with the Move-to-Improve Research and clinical team at Perth Children's Hospital, implementing evidence-based exercise and physical activity programs for children involved with PCH outpatient services.

Paediatric Exercise Programs

There are many opportunities to investigate the outcomes of children and their family's following participation in our paediatric exercise programs, Minigym, Unigym and iFit. If you want your research to have real impact for children and families – come and chat.

Motor Control & Exercise Rehabilitation



Dr Brendan Lay

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Project 1: Visual perceptual skill and anterior cruciate ligament (ACL) injury risk.

At UWA, we have a long history of investigating the Biomechanics of ACL injury risk when performing sidestepping manoeuvres. We know that the injurious loads carried by the ACL increase greatly when an individual has little time to organise a sidestep, therefore, more recently we have been investigating the visual perceptual skill and its role in giving an individual more time to plan a safe sidestep. We have also been investigating whether perceptual training (such as Above-Real-Time training) can improve an individual's capability to sidestep safely.

Project 2: Effect of diabetes on eye tracking and reaction time.

It is well established that diabetic individuals have a higher incidence of fall and are more prone to car accidents. Our goal is to elucidate some of the mechanisms involved.

Collaborator: *Prof. Paul Fournier*

Project 3: Visual perceptual expertise and movement assessment.

We are currently undertaking a series of experiments assessing the capability of parents, teachers, coaches and other movement experts to assess various motor skills including Fundamental Movement Skills (FMS) and swimming technique. A key question we are asking is what do experts see (perceive) that novices don't? For these experiments, we utilise the eye-tracker and a verbal report protocol.

Collaborator(s): *A/Prof Rebecca Braham, Prof Michael Rosenberg (FMS) & Dr Nat Benjanuvatra (swimming)*

Project 4: Equipment scaling in a range of children's sport.

Up until very recently there has been no scientific rationale for the different sized (smaller, shorter, lighter) equipment that is used in junior sports. Tennis Australia has recently led the world into the effects of equipment scaling on motor skill acquisition and performance and we are extending this research to other sports. A key question here is what are the effects of systematically manipulating equipment and playing area on the acquisition of sport specific motor skills in children?

Collaborator(s): *Dr Machar Reid (Tennis Australia)*



Dr Nat Benjanuvatra

E: nat.benjanuvatra@uwa.edu.au

I am interested in supervising students who want to undertake applied sport and exercise science research, particularly in the areas of aquatic sport, strength and conditioning, biomechanics, wearable technology and human performance. Projects can range from laboratory-based studies through to applied research with athletes, coaches and sporting organisations.

Aquatic sport, swimming and open-water performance

Swimming presents unique challenges for biomechanical and physiological analysis because performance occurs in an environment where traditional laboratory measurement techniques are difficult to apply. This research theme explores how emerging technologies can be used to better understand swimming performance and provide useful information to athletes and coaches.

Potential project areas include:

- swimming technique and its relationship with performance
- fatigue-related changes in swimming biomechanics
- biomechanical analysis of swimming starts, turns and relay changeovers
- validation and application of wearable inertial measurement units (IMUs) for swimming analysis
- development of practical measures of stroke characteristics and intra-cycle movement

Strength, power and neuromuscular performance

This research theme examines how training, fatigue and conditioning strategies influence strength, power and athletic performance. The overarching aim is to better understand acute neuromuscular responses to exercise and translate these findings into practical strength and conditioning applications.

Potential project areas include:

- neuromuscular fatigue and recovery following resistance or high-intensity exercise
- horizontal deceleration and braking performance
- post-activation performance enhancement (PAPE)
- blood-flow restriction (BFR) and low-load resistance exercise
- resistance-training prescription and athlete monitoring
- the influence of systemic or local hypoxia on exercise performance
- validity and reliability of force plates, wearable sensors and other technologies used to assess neuromuscular performance

Immersion pulmonary oedema in aquatic exercise

Immersion pulmonary oedema (IPO) is a potentially serious condition associated with swimming, diving and snorkelling. Despite increasing recognition of the condition, important questions remain regarding its underlying mechanisms, susceptibility, recognition and prevention.

This research program investigates physiological responses to aquatic exercise and immersion, with the longer-term goal of improving safety in swimming and other aquatic environments.

Potential project areas include:

- pulmonary responses to open-water swimming and snorkelling
- physiological and individual factors associated with susceptibility to IPO
- respiratory loading associated with snorkels and full-face snorkelling masks
- interactions between exercise intensity, immersion and respiratory function
- symptoms and physiological responses associated with prolonged aquatic exercise
- awareness and recognition of IPO among swimmers, coaches and aquatic organisations
- strategies for improving the prevention and early recognition of IPO.

Movement asymmetry and performance

Human movement is rarely perfectly symmetrical. Differences between the left and right sides of the body may develop through training, sport-specific movement patterns, injury history or individual anatomy.

Rather than assuming that asymmetry is inherently undesirable, this research theme examines when asymmetry matters: when it represents normal variation or sport-specific adaptation, when it changes with fatigue or training, and whether it is meaningfully related to performance.

Areas of interest include:

- the magnitude and consistency of movement asymmetries
- changes in asymmetry with fatigue or training
- relationships between asymmetry and athletic performance
- sport-specific asymmetries and long-term adaptation
- asymmetry in force, power or movement characteristics
- reliability and interpretation of commonly used asymmetry measures

Students interested in any of these areas are encouraged to discuss potential Honours or Masters projects. Specific research questions can be developed around the student's interests and current research opportunities.

Health Behaviour and Performance Psychology



Professor Ben Jackson

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Dr Aaron Simpson

E: aaron.simpson@uwa.edu.au

Any students with an interest in the psychology behind sport, exercise, physical activity, or other health issues (e.g., diet), please contact Ben or Aaron for a chat. Similarly, Ben is also involved in the coordination and evaluation of several exercise and physical/mental health promotion programs, with a range of supportive community partners and agencies.

Psychology of active, healthy living group (PAHL)

"Our group focuses on applying psychological research to solve health problems. We work with a variety of populations and contexts. If students are interested in working on a specific health problem, we are happy to explore Honours project options. Otherwise, current projects we would like to work on include:

Project 1: What mental health support do people want from their sport club?

- People spend a lot of time in sport clubs, but we know little about what mental health support they want there. This project would use qualitative methods to understand what support from a sport club would be useful to them; and would inform the design of mental health resources for WA community sport.

Project 2: What does mental health promotion in youth community sport look like, and what works?

- Sport-based mental health programs for young people are growing in number, but it isn't clear which approaches, delivery formats and components lead to meaningful outcomes. This project would involve a systematic review of mental health promotion programs delivered through youth community sport.

Project 3: How do young men in community sport experience sports betting, and what role could clubs play in reducing gambling harm?

- Sports betting is heavily promoted to young men through the sports they play and watch. Community clubs may be an untapped setting for prevention. This project would explore young men's (18–25) gambling behaviours, attitudes and exposure.

Importantly, we would encourage students to contribute to and refine any of the projects outlined above. Alternatively, we also encourage students to bring their own ideas, and we can help identify a feasible and engaging project topic.



Dr Caitlin Liddelow

E: caitlin.liddelow@uwa.edu.au

Project 1: The role of social support in women's ongoing sport participation.

This project aims to longitudinally (~8 weeks) investigate how teammates, family and partners support or hinder a women's involvement in community sport. Women's community/social sport participation often decreases due to time pressure, caregiving responsibilities, and club/sport culture. Social support, such as that from teammates, coaches, partners, friends, and the club itself may buffer these barriers by boosting belonging, self-efficacy, and enjoyment, which in turn sustain participation.

Co-supervisor: Dr Aaron Simpson

Project 2: Exploring psychological safety and gender in community sport clubs.

Psychological safety in sport refers to the "perception that one is protected from, or unlikely to be at risk of, psychological harm in sport" (Vella et al., 2021). Psychological safety often underpins help-seeking, speaking up about safety and wellbeing, and staying engaged in sport. In community sport in Australia, gendered norms, microaggressions, facilities and the club itself can significantly influence feelings of psychological safety, particularly for women and gender-diverse members. This project aims to understand how psychological safety differs by gender within community sport clubs, and if specific factors may predict greater feelings of psychological safety. This project will specifically focus on women playing traditionally male-dominated sports (e.g., AFL, NRL).

Co-supervisor: Dr Aaron Simpson

Project 3: Exploring the role of captains/leaders in supporting female teammates' wellbeing.

Captains and informal leaders in community sport teams are often the first line of support for teammates' wellbeing. Women playing sport often experience unique stressors (gendered barriers, body image pressures, balancing study/work/family, postpartum return, underrepresentation in leadership) compared to their male counterparts, yet little is known about how captains/leaders perceive their role in wellbeing support, how female athletes experience that support, and what behaviours make the most difference. Understanding this dynamic could shape captain training modules and club policies to foster mentally healthy environments. As such, this project aims to qualitatively explore the role of team sport captains in fostering mental health and wellbeing. You will be required to develop an understanding of qualitative analysis, if you don't already, to successfully complete this project.

Also open to having a discussion and developing other projects in this area (women in sport, women's/postpartum health, physical activity) that may be of interest to you.

Technology Based Sport Science and Health



Professor Michael Rosenberg

E: michael.rosenberg@uwa.edu.au

Technological advances in the measurement of physical activity have created new opportunities to understand and influence how people engage in regular physical activity. Our research group has been involved in the development of several innovative technologies that have the potential to significantly improve the health of the population. If you have an interest in technology and its use in novel ways the following research opportunities might be of interest to you. We are always happy to discuss these and other research opportunities.

Project 1: The use of RFID technology to determine the effect of a simple experiment.

Remote Frequency Identification (RFID) technology provides accurate information on whether a person is inside or outside an established boundary (Such as their house). The RFID system can also tell the amount of time a person spends within the boundary in certain locations (lounge room). We have developed the first available ad-hoc RFID system to determine the length of time people spend in a boundary and the amount of energy expended.

For an honours project we are interested in understanding the impact of simple household modifications to the way screen based activities, such as Fixed and portable screen use influences family sedentary behaviours. For example, does removing screen use before sunset influence activity levels and where people locate within their house, or outside? There is surprisingly little objective evidence to help answer these questions, as until now the technology has been unavailable.

Project 2: FITBIT (tracking of children's physical activity).

Advances in relatively inexpensive user-friendly wearable activity trackers like the Fitbit® mean it is now realistic to continuously measure movement patterns of children over several months, without considerable participant burden. This level of data offers previously unavailable insights into daily, weekly, monthly and seasonal variations in physical activity (PA). Children's PA and sedentary behaviours influence a range of health, social and academic outcomes and children's development in the early years may influence the development of disease in later life. To date, patterns of PA have either relied on self-report surveys, or objective monitoring over at most two-weeks at any one time. Therefore, we propose to measure PA continuously over a six month period to develop the most comprehensive description of children's PA to date. If you want to be involved in internationally leading research around children's physical activity, please come and discuss this topic with us.

Project 3: Classification of movement during active video gaming.

For several years we have been capturing children's movement during active video game play. Our research team has developed software to classify fundamental movement skills of children to parse game play data and count the number of movements children perform within a 15 minute game play situation. The advancement of this system requires several experiments using the Vicon System to match movements captured by our system and the gold-standard Vicon System. If you are interested in this study, or any research related to the health impact of active video gaming please speak with us.

Project 4: Music based motor control development.

The link between music and physical movement is both entrained and observable in neurological development. There is perhaps no stronger behaviour to unite humans than coordinated rhythmic movement. This is because humans have the capacity to become entrained with one another or an external stimulus. Entrainment is a powerful adaptive process that indicates a mutual perceptual and social experience from the sharing in time and space of music and rhythm. Evidence of the benefits of music entrainment in the development of motor control in children and in rehabilitation is plentiful. Recent advances in wearable sensor technology have transformed rhythmic entrainment into a self-sustaining biofeedback mechanism.

We have developed the first music based rhythmic entrainment mobile phone app that incorporates Bluetooth enabled wearable sensors to provide real time feedback. This breakthrough technology uses a range of Bluetooth enabled accelerometers, Stretch Sense material and force place sensors in socks to entrain the user to move rhythmically. It is like learning to dance or run with wearable sensors that give you feedback on how to achieve this goal.

We are looking for interested students to conduct a range of experience with this new technology on typically developing children, children with delayed coordination, and children undergoing rehabilitation.

KIDDO – Improve your move



Prof Michael Rosenberg
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Dr Ashleigh Thornton
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Prof Ben Jackson
E: ben.jackson@uwa.edu.au



Dr Aaron Simpson
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Amanda Derbyshire
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www.kiddo.edu.au



KIDDO is offering a **\$5000 Honours scholarship** to encourage and assist a student to undertake an Honours course with a thesis related to the KIDDO program.

KIDDO is a nationally significant, internationally recognised physical literacy program developed by the School of Human Sciences at UWA that has become a successful example of research translation and impact over the past decade. KIDDO is currently implemented in over 60% of Western Australian primary schools, 1,721 schools nationally, and 759 early childhood education and care services. The program supports a growing community of more than 16,000 registered educators and 9,000 parents, and has been used to assess the fundamental movement skills of over 120,000 children. KIDDO provides engaging, developmentally appropriate movement experiences for children aged 0–12 years, helping to build a strong foundation for lifelong physical activity.

KIDDO can provide extensive research opportunities across many different areas of interest. To find out more see our website: www.kiddo.edu.au

KIDDO has opportunities for students to work with existing data or collect new data and undertake projects across the following research topics:

1. Current state of children's Fundamental Movement Skill development – can children run, throw, catch & skip?
2. Implementation of a Fundamental Movement Skill program in the Special Education setting
3. Developing culturally appropriate resources and training for physical literacy
4. Engaging families in their children's physical literacy development
5. Can children's mental health and wellbeing be improved as part of a physical literacy program
6. Implementing KIDDO in remote schools across Australia – barriers and enablers
7. Mapping movement skill proficiency across metropolitan and rural areas

Musculoskeletal Rehabilitation and Clinical Exercise Physiology

Dr Jay Ebert

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Dr Ebert is currently involved in a range of research projects, largely focused in the fields of musculoskeletal and orthopaedic rehabilitation, and pertinent to the improvement of current clinical practice. These areas of research are varied and, while a number of smaller student research projects may be available, the primary areas of research include:

- Anterior cruciate ligament (ACL) and multi-ligament knee injury, surgical reconstruction methods, improving rehabilitation and return to activity/sport pathways.
- Lateral hip pain, including hip abductor pathology (tendinopathy and gluteal tendon tears), surgical intervention and rehabilitation.
- Hip pathology, including the investigation of conservative management, as well as improving outcomes after arthroscopic hip surgery.
- Proximal hamstring tendon injuries: improving surgical, rehabilitation and return to activity/sport pathways.
- Knee and hip osteoarthritis and joint replacement surgery.
- Shoulder injury, rehabilitation and return to sport.

Mental Health & Exercise Research Group (MHEX)



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W: <https://www.thrivinginmotion.org/mhex>

IN COLLABORATION WITH



THE UNIVERSITY OF
WESTERN
AUSTRALIA



UNSW
SYDNEY

Honours and Masters research projects 2027

MHEX works where exercise science, clinical practice and mental health meet. We focus on people who face the biggest barriers to being active, or who are under-represented in research and care, and we work alongside hospital, community and lived experience partners so our findings reach practice.

Students work alongside our clinical and community partners, including Fremantle Hospital Mental Health Service, Perth Children's Hospital and Thriving in Motion. Depending on the project, you can build skills in physiological testing, fNIRS, qualitative research and co-design, and we support students to publish and present their work, with a pathway into PhD study for those who want it.

We don't offer a fixed list of discrete studies. Each area below has several possible questions, and we shape the project with you to suit your degree, interests and timeline. Quantitative, qualitative and mixed methods options are available across most areas.

Get to know us first. Our team, publications, blogs and news are at thrivinginmotion.org/mhex.

Interested? Email mhex@uwa.edu.au or bonnie.furzer@uwa.edu.au with the area(s) you would like to explore and a line or two on why. All enquiries come to us, so there is no need to contact individual team members.

Eating disorders and maladaptive exercise: the role of sex, gender and culture

Eating Disorders

Mental Health

Gender & Culture

Health Services

Over one million Australians live with an eating disorder, and 40 to 80% experience maladaptive exercise such as compulsive exercise or exercise dependence. Alongside disordered eating it is linked to poorer prognosis, longer hospitalisation and higher risk of relapse. Supervised, non-compulsive exercise, by contrast, can support recovery.

Most of the evidence comes from studies of young, white, cisgender women. Far less is known about how sex, gender identity and cultural background shape eating disorders, relationships with exercise and experiences of care. That gap matters for trans and gender diverse people, men and boys, and culturally and linguistically diverse communities.

Project options include:

- How maladaptive exercise presents across sex, gender and cultural groups, and whether current screening tools capture it
- Experiences of exercise and movement in eating disorder care for trans and gender diverse people or people from culturally diverse communities
- Evaluation of our exercise physiology led recovery program within adult mental health services
- Inclusive, recovery-focused practice training for exercise professionals

Status: Ethics approved; data available.

Suits: Clinical exercise physiology, psychology or public health students, with quantitative (screening tools) or qualitative (lived experience) options.

Research team: Bonnie Furzer, Kemi Wright, Kai Schweizer (PhD Candidate), Conor Boyd, Exercise Physiology Team @Freo + collaborators

Collaborators: Fremantle Hospital Mental Health Service

Chest binding, exercise and health: the next phase

Trans & Gender Diverse Health

Exercise Physiology

Thermoregulation

Long-term Health

Chest binding compresses chest tissue to create a flatter chest. It is common among trans and gender diverse people registered female at birth and can ease gender dysphoria and support wellbeing. Many guidelines still advise against exercising in a binder, largely without evidence, which can put people off being active.

In 2025 we completed one of the first studies of chest binding and physical function. The next phase links with Better Binding, a national NHMRC-funded project led by Murdoch Children's Research Institute.

Project options include:

- Long-term binder wearing and its effects on health, physical function and physical activity
- Thermoregulatory responses to exercise while wearing a binder

Find out more: [Chest binding and exercise blog and video series](#)

Suits: Exercise physiology and sport science students keen on lab-based physiological and thermoregulation testing.

Research team: Bonnie Furzer (she/her), Brett Buist (he/him), Grant Landers (he/him), Claire Munsie (she/her), Ben Kramer (he/him, PhD Candidate), Kai Schweizer (they/he, PhD Candidate), Felicity Austin (she/her), Ben Quick (they/he)

Collaborators: Thriving in Motion, The Kids Research Institute Australia, Curtin University, Better Binding Study Team (Murdoch Children's Research Institute)

SPaCE: cue-based exercise and sensory processing in children

Children

Neuroscience

Sensory Processing

fNIRS

SPaCE is a supervised exercise program built around auditory and visual cues that children hear or see and respond to. Our pilot showed an early, promising signal for auditory processing. It is not proof, and a trial in children aged 7 to 12 is now testing it, including whether the cue and response pairing, rather than exercise alone, is the active ingredient. A separate study in adults is also getting under way.

Project options include:

- Visual processing outcomes following cue-based exercise
- Using functional near-infrared spectroscopy (fNIRS) to explore brain activity during cue-based exercise
- Auditory and visual processing in adults

Find out more: [SPaCE pilot paper](#)

Status: Ethics approved; data available.

Suits: Neuroscience, psychology or exercise science/physiology students interested in brain imaging (fNIRS) and sensory or cognitive testing.

Research team: Bonnie Furzer, Robyn Choi, Chris Zhou (PhD Candidate), Kevin Gao (PhD Candidate)

Collaborators: Thriving in Motion (program delivery)

Move with Me: activity buddies for child and youth mental health

Youth Mental Health

Physical Activity

Peer Support

Co-design

Being active supports mental health, but starting and keeping going alone is hard, particularly for the young people who face the most barriers. Move with Me pairs children and young people experiencing, or at risk of, mental ill-health with a chosen exercise buddy (a peer, mentor, family member or support worker) to be active together in their community.

The model is being co-designed with young people, families and community partners, with a focus on neurodivergent, LGBTIQ+ and culturally diverse young people and those living with disability.

Project options include:

- Co-design of how buddies are recruited, matched, trained and supported
- Experiences of socially supported activity for young people and their buddies
- Digital tools and wearables for check-ins and encouragement
- Wellbeing, social connection and help-seeking outcomes in early pilots

Status: Ethics in progress, expected early 2027.

Suits: Exercise science, psychology, public health or health promotion students interested in co-design and qualitative methods.

Research team: Bonnie Furzer, Kemi Wright, Ben Quick + national collaborators

Collaborators: Thriving in Motion + university and community partners across Australia

Physical literacy and wellbeing in children with hypothalamic dysfunction

Children

Physical Literacy

Endocrinology

Multidisciplinary Care

Damage to the hypothalamus, from brain tumours such as craniopharyngioma and their treatment, genetic conditions or other causes, can lead to rapid weight gain, reduced energy expenditure, fatigue and poorer quality of life. There is no consistently effective medical treatment, and very little is known about how these children move, play and take part in activity.

Working with Perth Children's Hospital Endocrinology, this study looks at physical literacy, activity, fitness and wellbeing, and at the community-based, multidisciplinary support children and families want.

Project options include:

- Physical literacy, fitness, motor competence and quality of life compared with population norms
- Needs and preferences of families and clinicians for community-based support
- Education and recommendations on physical activity and nutrition for families and health professionals

Status: Ethics in progress, expected early 2027.

Suits: Clinical exercise physiology, paediatric health or nutrition students, with fitness and physical literacy assessment or interview-based options.

Research team: Bonnie Furzer, Kemi Wright, Felicity Austin, Ben Kramer (PhD Candidate), Ashley Almarjawi + collaborators

Collaborators: Perth Children's Hospital Endocrinology, Western Kids Health, Thriving in Motion

Supported by: Stan Perron Charitable Foundation

Bone, Muscle and Balance (BoMB): high intensity and impact training for community-dwelling older adults

Healthy Ageing

Exercise Physiology

Exercise Prescription

Experimental

Implementation

Age-related changes in balance and neuromusculoskeletal health raise the risk of injurious falls and make daily activities harder. High intensity resistance and impact training improves musculoskeletal health, but little is known about its broader effects on health and wellbeing, or whether it works outside the gym. BoMB examines the feasibility of this training in community settings and its effects on falls, daily function, neuromusculoskeletal function and quality of life.

Project options include:

- How much 'impact' is impact training?
- Getting out of the gym: feasibility and outcomes of high intensity and impact training in community (non-gym) settings
- Barriers and facilitators of high intensity impact training in older adults
- Feasibility of play-based impact training

Status: Ethics in progress, expected early 2027.

Suits: Exercise physiology, sport science or biomechanics students interested in strength, balance and impact testing with older adults.

Research team: Brett Buist, Ben Kramer (PhD Candidate), Grant Landers, Marion Mundt (Edith Cowan University), Bonnie Furzer, Kemi Wright + collaborators

Other areas and your own ideas

We are happy to discuss projects across our wider work, including:

- Youth Moves: gender-affirming exercise for trans and gender diverse young people ([project page](#))
- Stride: mentor-supported exercise for university students experiencing mental health challenges
- Neurodivergent health and physical activity
- Children's physical literacy and sport
- Hospital-based exercise physiology in mental health services

Have your own idea that sits where exercise and mental health meet?

Get in touch at mhex@uwa.edu.au.



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