THE UNIVERSITY OF MELBOURNE

Melbourne Veterinary School

Faculty of Science

Melbourne Veterinary School Research Prospectus

Contents

About the School

Melbourne Veterinary School (MVS) is one of Australia's leading veterinary schools, attracting talented and passionate students and academics.

By recognising and improving understanding of the complex interplay between the health of animals, humans, and our shared environment, we can achieve better outcomes for all. The School works across disciplines to tackle major global issues through world-renowned research, training, professional practice, industry engagement, and public outreach.

MVS staff are internationally recognised as leaders in their field. They are recipients of multiple awards from national and international veterinary and scientific organisations, and consulted by the Australian Veterinary Association, World Health Organization, Food and Agriculture Organization and World Organization for Animal Health on global issues.

The University of Melbourne's Faculty of Science acknowledges the Traditional Owners of the lands on which we work: the Wurundjeri Woi-Wurrung and Bunurong peoples (Burnley, Fishermans Bend, Parkville, Southbank and Werribee campuses), the Yorta Yorta Nation (Dookie and Shepparton campuses), and the Dja Dja Wurrung people (Creswick campus). We pay respect to their Elders, past and present. We also acknowledge and respect that Aboriginal and Torres Strait Islander people are this country's first scientists, with deep and enduring knowledge of the land, waters and skies.

Professor Joanne Devlin

Head of the Melbourne Veterinary School

Professor Joanne Devlin

- Veterinary virology
- Vaccines
- Diagnostics
- Infectious diseases
- Herpesviruses

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I focus on veterinary virology, including studying herpesvirus evolution and developing new vaccines and diagnostics for a range of pathogens impacting animal health.

Viral discovery and evolution

I engage with veterinarians in the field and combine clinical information and samples with laboratory research to study herpesviruses and prevent diseases – particularly infectious laryngotracheitis virus (ILTV) in poultry, but also herpesviruses of other species, including wildlife. This work has revealed the important role of natural recombination in herpesvirus evolution, and contributes to wildlife translocation and conservation efforts by improving screening for herpesvirus infection.

Molecular pathogenesis

I study and manipulate the genomes and molecular biology of ILTV and other veterinary herpesviruses, using traditional and CRISPR/Cas9 assisted homologous recombination techniques. I have used transcriptomics to study a range of herpesvirus infections in vitro and in vivo.

Veterinary vaccines and diagnostics

My applied research focuses on developing and testing novel vaccines and diagnostic tests for herpesviruses and other diseases. For example, I conduct vaccine trials in poultry in specialised facilities under controlled conditions.

Specialised facilities for poultry vaccine trials and other studies.

We work with wildlife veterinarians to better understand herpesvirus infections in Australian wildlife, including macropods such as eastern grey kangaroos.

Ms Joanne Allen

Ms Joanne Allen

- Bacterial genomics
- Diagnostic tests
- Vaccine development
- Bacterial pathogenesis
- Antimicrobial resistance

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Aligned with the mission of the Asia-Pacific Centre for Animal Health, I aim to understand the epidemiology and pathogenesis of infectious diseases of animals and improve strategies for vaccination, diagnosis, and management.

I focus on the molecular epidemiology of bacterial pathogens isolated from a wide variety of animal host species and environments. I have used genotyping tools, whole genome sequencing, and comparative phylogenetic analyses to investigate bacterial populations and outbreaks of disease.

My current research projects include:

- investigating mortality events of the captive bred Lord Howe Island stick insect (Dryococelus australis)
- improving diagnosis of strangles, an infectious disease of horses caused by Streptococcus equi equi
- genomic characterisation of Pasteurella multocida, the agent that causes fowl cholera, associated with avian species in Australia.

In future, I aim to investigate the levels of antimicrobial resistance in Escherichia coli and Staphylococcus species isolated from dogs in Bhutan.

Associate Professor Stuart Barber

Associate Professor Stuart Barber

- Virtual reality
- Veterinary education
- Sheep mastitis
- Sheep pneumonia

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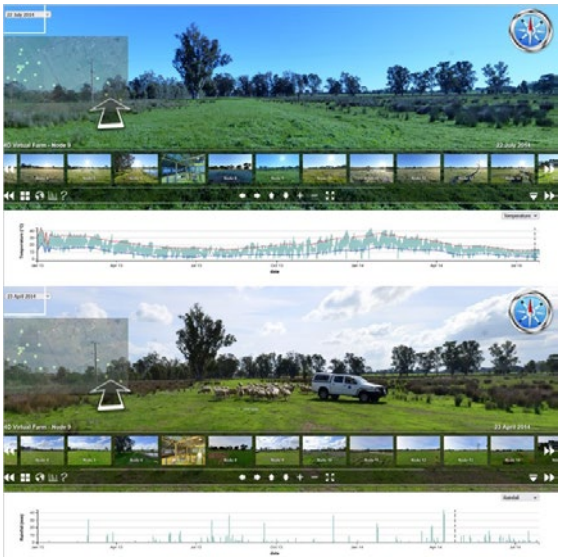
I use virtual reality to reduce the urban-rural divide and enhance education about agricultural and natural resource systems.

Virtual reality

In Australia, about 90% of the population lives in urban regions, disconnected from rural areas where food and fibres are produced. For urban students, virtual and augmented reality can bring the farm into the classroom through integrated learning programs such as 4DVirtualFarm and DookieVR. I plan to broaden the scope of the latter program, to include the history of the region.

Sheep mastitis

I investigate the causes of mastitis on-farm, and potential options to reduce the impact of disease on sheep flocks in the short- and longer term.



The same view in different seasons – from 4DVirtualFarms.

Associate Professor Vernon Bowles

Associate Professor Vernon Bowles

- Ectoparasites
- Flies
- Lice
- Drug targets
- Vaccines

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I aim to improve the health and wellbeing of sheep. Ectoparasites, such as blowflies and lice, have significant impacts on the Australian sheep and wool industry, and are developing resistance to insecticides. I seek to identify new targets in the parasites that could be the basis for a new insecticide or a vaccine (in the case of blowflies).

Improved control of the sheep blowfly

I am focused on understanding the interaction of fly larvae with the host during the initiation of a flystrike wound. We have identified several genes and associated proteins that are upregulated when the larvae contact the sheep. We are investigating options for inhibiting these proteins to break the lifecycle of the fly and thereby reduce the incidence of flystrike in sheep.

In future, I aim to investigate the precise molecular events that enable the larvae to survive on the host sheep. This may lead to control strategies that focus on altering insect behaviour, as an alternative to insecticides.

Professor Glenn Browning

Professor Glenn Browning

- Veterinary microbiology
- Vaccines
- Pathogenesis
- Antimicrobial stewardship

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I aim to improve diagnosis, treatment and control of infectious diseases of animals by building understanding of the mechanisms through which bacterial and viral pathogens cause diseases. I also seek to optimise the use of antimicrobial agents in treating bacterial diseases of domestic animals.

Microbial pathogenesis

I identify, and examine the functions of genes and proteins of bacteria and viruses that contribute to animal diseases and pathogen virulence. For example, I investigate the role and function of surface proteins of pathogenic mycoplasmas in their virulence.

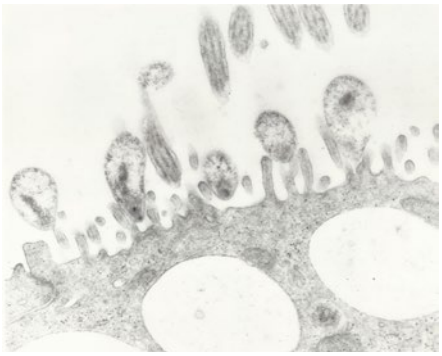
Vaccine and diagnostic test development

I apply understanding of microbial pathogenesis to identify genes that can be deleted or altered to create avirulent bacteria and viruses, which could be used as vaccines. I am also studying the immune response of chickens infected with Mycoplasma gallisepticum to help develop more effective vaccination.

In addition, we examine whether the proteins that play an important role in virulence could be the basis for better diagnostic tests to detect animals infected with bacterial or viral pathogens.

Veterinary antimicrobial stewardship

I study the links between treatment of domestic animals and the development of antimicrobial resistance. I analyse the antibiotic prescribing practices of veterinarians and develop and test interventions to reduce inappropriate prescribing. We also build the capacity of animal health practitioners in low and middle-income countries to monitor antimicrobial use and resistance in domestic animals, and develop tools to support antimicrobial stewardship in animal health.



Mycoplasma gallisepticum infecting the trachea.

Mycoplasmal pneumonia in a calf.

Dr Laura Hardefeldt

Dr Laura Hardefeldt

- Antimicrobial resistance
- Antimicrobial stewardship

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My research in antimicrobial resistance drives advancements in veterinary antimicrobial stewardship (AMS), addressing critical gaps nationally and internationally and empowering veterinarians and stakeholders to positively impact animal and public health.

I work with social scientists, microbiologists, epidemiologists, clinicians, and computer scientists to tackle many challenges of antimicrobial resistance and inappropriate antimicrobial use. We examine drivers of prescribers' behaviour, design interventions for inappropriate prescription, and conduct implementation trials.

The National Centre for Antimicrobial Stewardship supports a One Health approach, collaborating with medical doctors, pharmacists, dentists, and allied health professionals to improve health and welfare for all. We have established the level, and appropriateness, of veterinary antimicrobial use in Australia, and identified many of the enablers of and barriers to improved AMS and areas requiring policy change.

We produced a webpage with evidence-based, practical AMS advice for veterinarians in Australia, and developed antimicrobial use guidelines (used by 200+ veterinary practices nationally). Our research has also led to the relabelling of one antimicrobial substance to improve adherence to recommended guidelines.

Guidelines produced by our research team.

Traffic light system for raising awareness about the importance of antimicrobials.

Associate Professor Carol Hartley

Associate Professor Carol Hartley

- Virology
- Host-pathogen interactions
- Virus evolution
- Virus vaccines

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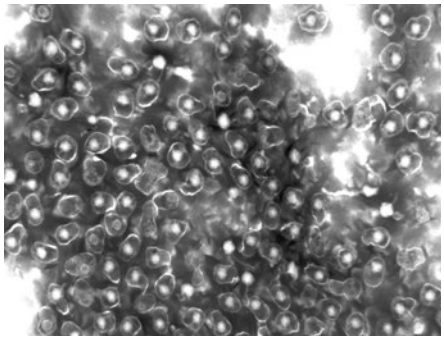
I investigate the mechanisms of viral pathogenesis, virus evolution, and interactions between viruses and hosts' immune systems, and apply this knowledge to develop and improve infection control measures for better animal health outcomes.

Herpesviruses have been co-evolving with their hosts – including humans – for millions of years. Viruses can adapt to a new host environment in small or big steps. Smaller steps might include infection of a vaccinated host after infection of an unvaccinated host. A big step may be a jump to an entirely new host species.

I investigate how herpesviruses evolve and adapt to these changing environments, and how these changes influence virus virulence, pathogenesis and the efficacy of vaccines. I aim to inform vaccination strategies to enable more effective control of these viruses in poultry, horses and wildlife.

I also explore a range of other virus-host systems to improve animal health, or as a model for human infections and diseases, using methodologies including genomics and high performance microscopy.



Purified herpesvirus particles (Asinine herpesvirus-3. Photo courtesy of N.P. Ficorilli).

Dr Lauren Hemsworth

Dr Lauren Hemsworth

- Animal welfare
- Human-animal interactions
- Human-animal relationship
- Animal behaviour
- Behaviour change

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I aim to contribute to animal welfare research and teaching that improves the lives of domesticated animals and those kept in captivity.

My multi-species and multi-industry (farm, zoo and companion animals) research focuses on four key areas:

1. Development and validation of animal welfare indicators (positive and negative), assessment methodologies and tools, as well as animal welfare training programs for animal handlers and companion animal owners.
2. The effects of human-animal relationships and interactions on the welfare of domestic animals and animals kept in captivity (using meerkats as a model species).
3. The effects of the social and physical environment (housing and husbandry practices) on the behaviour and welfare of domestic animals.
4. Attitudes of the community and animal handlers and carers to animal welfare and the impact of public perceptions on the sustainability of animal industries.

Piglets.

Farmer interacting with their cattle.

Associate Professor Peta Lee Hitchens

Associate Professor Peta Lee Hitchens

- Epidemiology
- Risk analysis
- Injury prevention
- Animal welfare
- Human-animal interaction

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I develop evidence-based strategies that reduce health, safety, and welfare issues for horses and the people who work alongside them.

I am the lead epidemiologist in the Equine Orthopaedic Research Group, where I combine my expertise in epidemiological research of equine and human health, safety, and welfare, with experience in the racing industry. I have a keen interest in risks associated with human-animal interaction.

My research group works with the racing industry to develop evidence-based strategies that reduce the occurrence of musculoskeletal injuries in horses. We aim to determine the causes of such injuries by developing mathematical and epidemiological models of bone biology processes. Our approach is multidisciplinary, combining biomechanics, microstructural analysis, machine learning, diagnostic imaging, and epidemiology.

My previous research has identified:

- inexperience of horse and rider as risk factors for jockey falls, injuries, and fatalities
- catastrophic musculoskeletal injury to the racehorse as the leading cause of substantive jockey injury
- training and exercise programs associated with increased risk of racehorse injury; and
- changes in racehorse stride characteristics that could enable early injury detection.

I also investigate the health and welfare of working horses in developing countries.

Dr Jasmin Hufschmid

Dr Jasmin Hufschmid

- Wildlife health
- Conservation medicine
- One health
- Ecotoxicology

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I collaborate with colleagues across a range of disciplines to explore the population-level impacts of infectious and non-infectious diseases on wildlife, and how these are best mitigated.

Fluorosis in marsupials

Exposure to chronically elevated fluoride levels emitted by industry results in deposition of fluoride in marsupials' bones and teeth (mineralised tissues), causing arthritis, bony protuberances and other disease or damage. I assess bone fluoride concentrations and associated pathological impacts to inform management of affected marsupial populations.

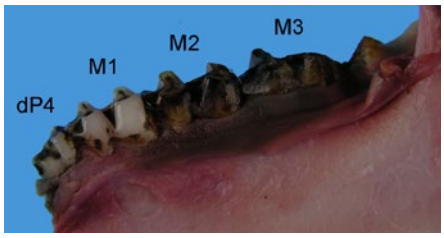
Toxoplasmosis

The parasite Toxoplasma gondii was introduced to Australia with cats and can be transmitted to other warm-blooded animals. Some marsupial species appear to be particularly susceptible. I am establishing the prevalence of the parasite across different species, and developing strategies to assess environmental contamination and population-level impacts.

Microbat health and immunology

Bats play important roles in ecosystems. White nose syndrome has had devastating impacts on microbat populations in North America, and there is a high chance the disease will eventually be introduced to Australia. It is unclear how this might impact native bat populations. We have previously conducted a health survey of bent-wing bats in Victoria, and are currently studying the immune system of microbats, especially in relation to torpor and hibernation.

Restraining an agile antechinus for examination.



Dental fluorosis in the last two molars of a kangaroo.

Dr Sathya Kulappu Arachchige

Dr Sathya Kulappu Arachchige

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- Metagenomics
- Genomics
- Transcriptomics

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I aim to improve understanding and management of upper respiratory tract infection (URTI) in chickens, which impacts their welfare and is a costly issue for the Australian egg industry.

Investigating pathogens involved in URTI for faster diagnosis and more effective control

URTI in chickens is often complex, involving co-infection with bacteria and DNA and RNA viruses. Antibiotics can provide transient relief but do not eliminate the disease, which has a major impact on chicken welfare. Costs for the egg industry include vaccination, medication, and productivity losses. I study commercial free-ranging layer flocks in Australia to characterise the microbial pathogens present, determine their role in URTI, and identify their route of entry. My research informs URTI mitigation, including whether vaccination is necessary and, if so, with what strain of what pathogen.

My team has developed molecular tools to investigate host gene transcription (RNA-seq) in response to chronic infection with the bacterium Mycoplasma gallisepticum. These tools reveal post-infection changes in immune, metabolic, and cellular pathways in the chicken trachea and show the efficacy of a novel vaccine. We aim to develop a molecular assay to quickly and accurately identify all strains of bacteria and/or viruses involved in URTI cases. A similar approach could be applied in other host species to investigate other economically important disease complexes and inform control strategies.

Happy chickens mean more eggs.

Crusty nostrils of a chicken suffering from upper respiratory tract disease.

Dr Alistair Legione

Dr Alistair Legione

- Animal infectious diseases
- Pathogen genomics
- Wildlife disease detection
- Rapid diagnostics

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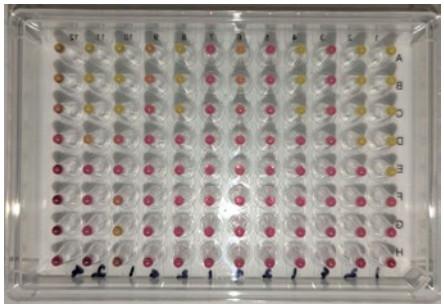
To improve the health and welfare of wildlife, companion animals, and livestock, I investigate viral and bacterial pathogens using genomic sequencing and molecular diagnostics.

I have used advanced genomic sequencing techniques and other molecular tools to study pathogens impacting koalas, possums, macropods, reptiles, native birds, poultry, cattle, horses, dogs and cats and improve diagnosis and management in care and captive settings.

Pathogen genomics helps to characterise organisms and determine their diversity, virulence factors and relationships to other pathogens. It also identifies regions suitable for targeting with traditional diagnostic methods such as PCR (both conventional and quantitative) and newer diagnostic tools for low resource settings, such as loop-mediated isothermal amplification.

Leghorn male hepatoma cells infected with laryngotracheitis virus, which has been sequenced using Nanopore and Illumina methods.



A colormetric LAMP assay, where yellow/orange tubes indicate the presence of the target pathogen and red tubes are negative.

Collection of environmental avian samples for pathogen surveillance using next generation sequencing methods

Dr Panos Loukopoulos

Dr Panos Loukopoulos

- Veterinary pathology
- Comparative oncology
- Veterinary diagnostic investigation
- Osteosarcoma

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As a veterinarian and veterinary pathologist, I focus on diagnosing veterinary disease, identifying and describing novel disease entities or presentations, and investigating the pathogenesis of diseases by combining conventional autopsy and histopathology with genomic approaches and study of molecules involved in metabolism.

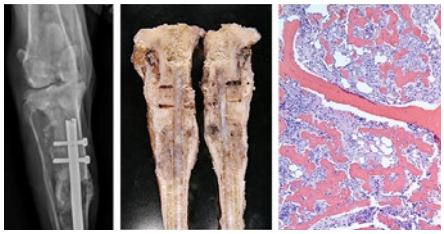
Veterinary pathology

I provide clinical teaching for veterinary students while servicing a range of stakeholders. I have completed thousands of diagnostic investigations including autopsies and histopathologic examination of a wide range of domestic and wildlife species.

Ongoing projects include:

- Using polyacrylamide gel to treat equine osteoarthritis
- Studying metabolites in canine osteosarcoma
- Investigating tissue distribution of Koala retrovirus by employing RNA in situ hybridisation
- Analysing autopsy reports to determine causes of mortality and morbidity of koalas
- Examining upper respiratory tract pathogens in poultry
- Researching novel aspects of spontaneous animal disease, including gastric parasites of dolphins, neoplasia (abnormal growth of cells or tissues) in lagomorphs, and microchip-induced neoplasia in marsupials.

Autopsy of a whale.



Canine osteosarcoma associated with an orthopaedic device.

Dr Karim Mardani

Dr Karim Mardani

- Molecular virology
- Avian diseases
- Epidemiology

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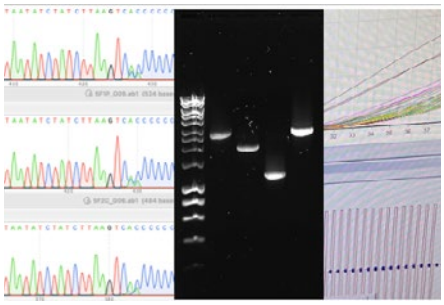
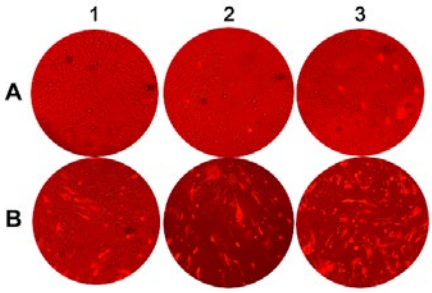
I aim to prevent and control infectious bronchitis (IB) in chickens, which is caused by strains of a highly contagious coronavirus, and generates major economic losses for the global poultry industry.

Characterisation and genotyping of IB virus (IBV)

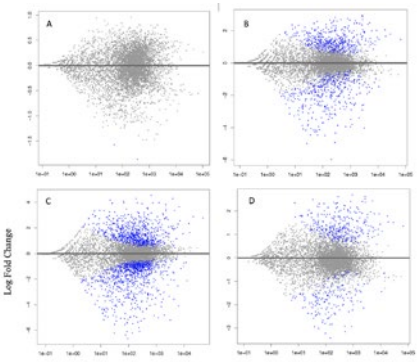
I use Golden Gate Assembly and Circular Polymerase Extension Reaction in reverse genetics to study IBV genome replication, gene transcription, pathogenicity and virulence, and virus-host interactions. Reverse genetics can also be used for developing recombinant vaccines. RNA sequencing and comparative transcriptome analysis of publicly available gene expression data also enable investigation of the gene regulation process in host cells after infection by a virus, building understanding of pathogenesis and pathogen–host interaction.



Infectious bronchitis virus (IBV) characterisation.



IBV transfection experiment using BHK cells.



MA plots produced using DESeq2 for differential gene expression analysis.

Dr Charles Pagel

Dr Charles Pagel

- Protease-activated receptors
- Muscle cells and myogenesis
- Bone development, turnover and repair
- Muscle disease, injury and repair
- Periodontal disease

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I aim to improve understanding of the development, growth and regeneration of the musculoskeletal system.

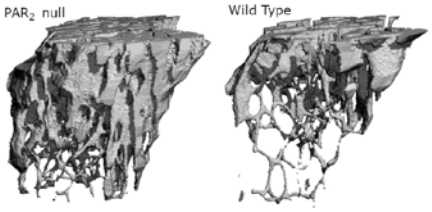
I use in vitro and in vivo models to understand the formation and pathological conditions of skeletal muscle, bone and cartilage tissue. I have studied bone loss and formation in high yielding dairy cattle during pregnancy and lactation, the in vitro growth and differentiation of muscle cells from commercially relevant species, the structural basis for bone injury in racehorses, and the osteointegration of titanium implants into bone.

Protease-activated receptors

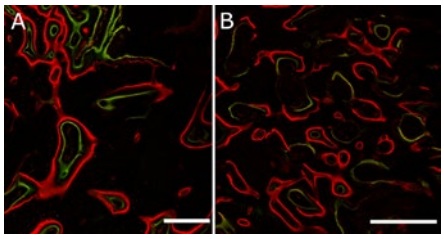
A major focus of my work is protease-activated receptors in a variety of contexts including muscle-bone interaction, skeletal muscle inflammation and injury in Duchenne muscular dystrophy, bone loss associated with periodontal disease, and the interaction of bone cells with metastatic prostate cancer cells.

Osteopontin

Another focus is the multifunctional protein osteopontin in skeletal muscle. I have shown that osteopontin is expressed by muscle precursor cells and damaged muscle fibres after muscle injury and that it helps recruit immune cells to the injured site, promoting the clearance of cellular debris and facilitating the inflammatory response for tissue repair.



MicroCT analysis of bones of dystrophic mice without (PAR2 null) or with (Wild type) a functional PAR2 gene.



Dynamic labelling of mineralising bone surfaces with fluorescent labels to measure the rates of bone matrix apposition.

Dr Reza Sanaei

Dr Reza Sanaei

- Bone biology
- Periodontal disease
- Endoprosthetic reconstruction
- Titanium lattice
- Functional genomics

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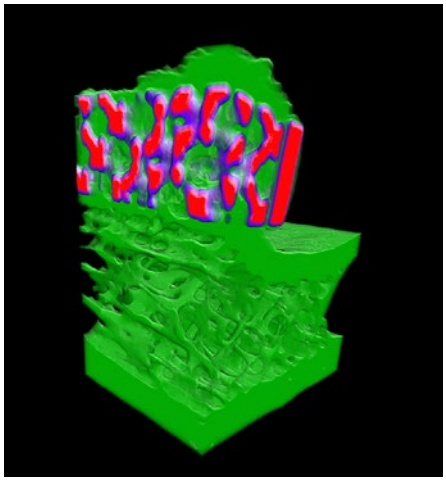
I aim to optimise the 3D design of prosthetic implants (endoprostheses) to improve host tissue integration and functional outcome while reducing the risk of periprosthetic infection and fractures.

In vitro screening / in vivo validation of 3D printed titanium lattices

Historically, animal models have guided design of prosthetic lattices for implants and reconstructions and ethical constraints have significantly limited testing of design variations. I am developing a high throughput cell culture system to enable rapid screening of titanium lattices to find designs that most efficiently promote host tissue response and integration. In vivo validation will be used to adjust the in vitro model to develop a more realistic evaluation platform.



An example of a highly osteoconductive lattice which has allowed near perfect osteointegration. Bone has been depicted in green. Red depicts the titanium lattice and blue represents the naturally occurring oxide layer on the surface of Ti6Al4V alloy.

Professor Josh Slater

Professor Josh Slater

- Equine internal medicine
- Equine infectious diseases and biosecurity
- Veterinary education

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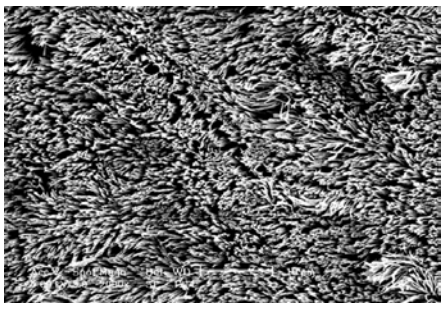
My research aims to improve our understanding of how viral and bacterial pathogens cause disease to provide with better methods of controlling and preventing equine infectious diseases.

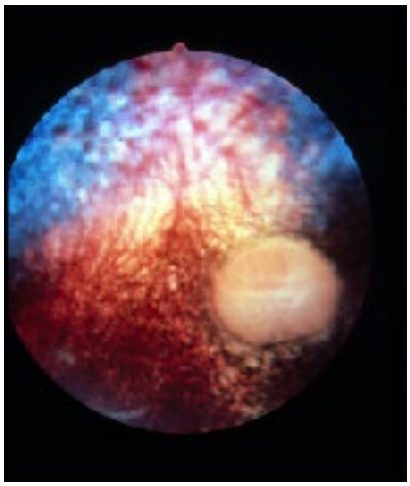
I am an expert in equine infectious diseases and work at the interface between the molecular sciences and clinical practice. My research is focused on the mechanisms that viruses and bacteria use to cause disease, in particular the genetics of virulence and immune recognition by the host. The equine industry is a truly global industry with significant national and international movement of horses for competition, breeding and trade. The highly mobile nature of the industry creates inherent risks for infectious disease outbreaks, which can have enormous animal welfare and economic impacts, including suspension of competition and country-level trade barriers.

My research extends from clinical practice into the research laboratory and has expanded our understanding of how key equine pathogens, such as herpesviruses and streptococci, cause disease. This has improved our ability to recognise and control disease, develop new diagnostic tests to improve disease detection and develop new vaccines. My research findings have shaped biosecurity procedures for the international equine industry.

Infectious disease research underpins biosecurity procedures at equestrian competitions.



The respiratory tract is protected from viruses and bacteria by a carpet of rapidly beating cell projections called cilia.



Some respiratory viruses cause damage to other organs: this retina in this eye has been destroyed by a herpesvirus.

Dr Paola Vaz

Dr Paola Vaz

- Virology
- Coinfection
- Host-pathogen dynamics
- Wildlife
- Genomics

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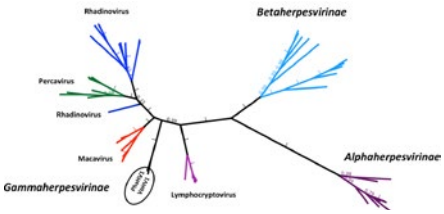
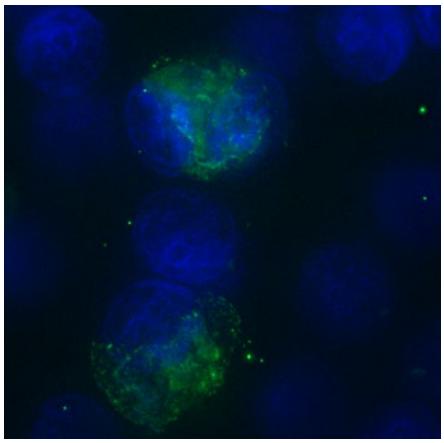
I investigate interactions between common viral and bacterial pathogens in avian and mammalian culture systems, and in their natural hosts, to improve wildlife population health.

Real-world models of infectious diseases

Understanding multi-pathogen interactions is crucial as many pathogens in animals establish chronic or life-long infections, creating opportunities for concurrent infections. I study coinfections of herpesviruses and bacterial co-pathogens and viral mechanisms of evolution, such as genomic recombination and the impact of host-switching events. I examine the epidemiology, genomics and evolutionary relationships between marsupial herpesviruses and other herpesviruses and describe the clinical significance of infection.



Phylogenetic relationships between koala and wombat herpesviruses and other representative herpesviruses, showing the formation of the new gammaherpesvirus genus 'Manticavirus'.



Internalised bacteria within mammalian cells.

Dr Nadeeka Wawegama

Dr Nadeeka Wawegama

- Pathogenic mycoplasmas
- Host pathogen interactions
- Vaccine efficacy and safety
- Diagnostic test development

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I aim to find better solutions for controlling and preventing mycoplasma diseases in cattle and poultry to enhance biosecurity, productivity, and animal health and welfare in Australian and global cattle and poultry industries.

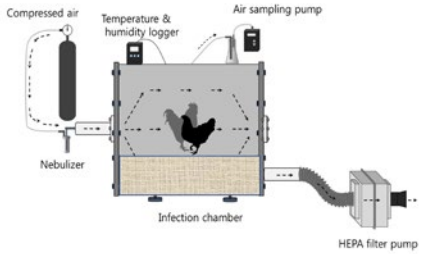
Bacterial virulence factors as vaccine targets

To develop mycoplasma vaccines, I use omics approaches and in vitro cell models to investigate the virulence factors of bovine mycoplasma, including how these bacteria gain access to the host cells, how they spread and cause disease, and which genes are involved in survival and virulence. I also test the safety and efficacy of the resulting commercial vaccines.

Diagnostic test development

I have developed and commercialised a diagnostic test for Mycoplasma bovis (M. bovis) in cattle, which is used globally to control, prevent, and eradicate M. bovis. My test has been used to investigate the epidemiology of M. bovis infection in Australia, Finland, Denmark, Brazil, Sri Lanka, and New Zealand. I am currently collaborating with a commercial diagnostic company to develop a more sensitive diagnostic tool for M. bovis.

Training of researchers from CoVet Lab project, to perform our own M. bovis diagnostic test to use it in M. bovis epidemiological studies in their respective countries.



The purpose-built aerosol infection chamber in APCAH laboratory, Werribee used to mimic natural infection of Mycoplasma spp in production animals (Kanci et al., 2017. Vet microbiology).

Professor Chris Whitton

Professor Chris Whitton

- Equine orthopaedics
- Bone microstructure
- Biomechanics

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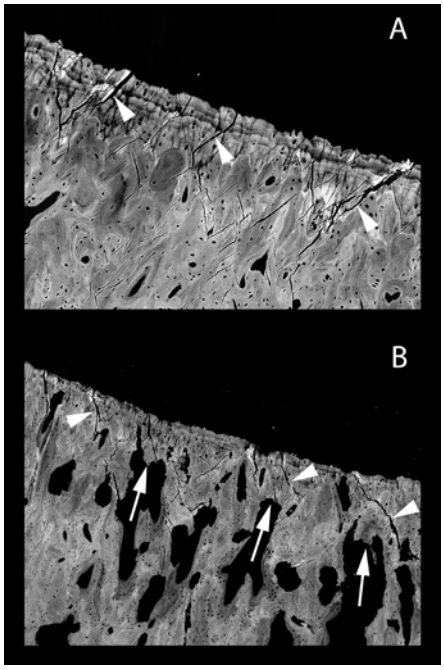
I investigate strategies for predicting and preventing musculoskeletal injury in athletic horses.

My multidisciplinary group combines expertise from biomechanical engineering, epidemiology, bone microstructure analysis, and veterinary clinical expertise to better understand mechanisms and risk factors contributing to musculoskeletal injury in racehorses.

Some of our approaches include:

- monitoring bone biomarkers to identify horses at risk of injury
- epidemiological studies of racehorse injury and fatalities
- developing musculoskeletal models of galloping horses to calculate loads generated in the limbs
- microstructural analysis of subchondral bone to understand how it may adapt to high-speed galloping and repair microdamage
- applying inertial sensors to predict limb injury
- using standing CT to determine injury risk; and
- mathematical modelling of bone injury.



Electron microscopy images of bone from the fetlock joint of A: a horse in race training, and B: a horse resting from training showing microdamage (arrowheads) in both, and bone resorption (arrows) in the horse that is resting from training.

A computed tomography (CT) image of the lower limb of a horse.

Dr Anke Wiethoelter

Dr Anke Wiethoelter

- One Health
- Epidemiology
- Wildlife-livestock-human interface
- Emerging infectious diseases
- Evidence-based practice

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I focus on understanding the patterns, causes, and effects of diseases in populations. Acknowledging the interconnectedness of human, animal, and environmental health, I recognise that effective prevention, intervention, and management strategies require a holistic OneHealth approach that encompasses diverse disciplines and ways of thinking.

I discovered that just 10 diseases, mostly zoonoses, account for nearly half of the globally published knowledge on diseases at the wildlife-livestock interface. Thus, our understanding of ecosystem dynamics for multi-host infectious diseases remains limited. Environmental and social changes have been linked to disease patterns, but further research is needed to understand and prevent emergence of diseases in new host populations, ultimately advancing the well-being of individuals, communities, and ecosystems.

I am engaged in diverse projects investigating epidemiology of infectious diseases shared between wildlife, domestic animals, and humans, including Hendra, brucellosis, Q fever, parasites, and vector-borne diseases. These diseases pose threats to all populations involved, leading to significant economic losses.

A current project focuses on Brucella suis, a zoonotic pathogen endemic in feral pig populations in Australia, which has recently also emerged in dogs. I am investigating the reasons for this emergence, the natural history of infection in dogs, and the risks posed to humans.

Direct contact between a horse and a bat entangled in barbed wire in Queensland, Australia.

Associate Professor Neil Young

Associate Professor Neil Young

- Parasitology
- Genomics
- Transcriptomics
- Protein annotation
- Malacology

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Roundworms and flatworms are significant burdens on global health and agriculture. I apply genomic, transcriptomic, and proteomic technologies to better understand these parasites and their vectors, to inform development of new vaccines and drug treatments.

Parasite genomics and genetics

My laboratory group uses the latest genomics technology to assemble and annotate chromosome-level reference genomes for parasites. This enables us to conduct research in comparative genomics, bioinformatics, molecular parasitology, and drug target and vaccine candidate discovery.

Host-parasite interactions

I investigate the mechanisms of disease development, transmission, and host immune responses, informing strategies to prevent parasitic infections and mitigate their impacts on humans and animals. My research includes parasites unique to Australian wildlife.

Collecting samples of parasite eggs from urine in Cameroon for genome sequencing

Australian freshwater snail that is a host for parasites of humans and livestock.

Haematuria (blood in urine) is a classic sign of urogenital schistosomiasis, an important parasitic disease affecting people in Africa.

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