Welcome to JCSMR

As Australia’s national medical research institute, The John Curtin School of Medical Research (JCSMR) is home to some of the best researchers in the country, who are undertaking ground-breaking work.

This short guide provides both an overview of the projects available at the school, as well some information about the application process.

Honours/Masters in Medical Research, JCSMR
The Honours/Masters research year is challenging but also an exciting and incredibly rewarding experience: this is your first chance to be part of a laboratory group doing cutting edge science. Honours/Masters provides the opportunity to become a valued member of the scientific community. You will develop skills in laboratory-based research; inductive reasoning; literature analysis; as well as written and oral communication to help launch your career in Biomedical Research or a related field.

Doctor of Philosophy (PhD), JCSMR
As a PhD student you will work with increased independence carrying out full-time research towards the production of a thesis, which is done under the direction of a supervisory panel of experts in the field. Your research will make an original and important contribution to human knowledge, research and development. There is normally no assessed coursework involved, although all students are expected to attend a series of postgraduate lectures, seminars and workshops. The duration of a full-time PhD course is no less than two (2), and no more than four (4) consecutive years.

Master of Philosophy (MPhil), JCSMR
As a PhD student you will work with increased independence carrying out full-time research towards the production of a thesis, this will be done under the direction of a supervisory panel of experts in the field. Your research will make an original and important contribution to human knowledge, research and development. There is normally no assessed coursework involved, although all students are expected to attend a series of postgraduate lectures, seminars and workshops. The duration of a full-time MPhil course is no less than one (1) and no more than two (2) consecutive years.
The Hannan Group - Cancer Therapeutics

Professor Ross Hannan & Dr Kate Hannan

> Discovery of novel small molecules targeting the ribosome as cancer therapeutics
> Understanding how Pol I inhibitors synergise with standard and novel therapies to overcome drug resistance in cancers

Dr Maurits Evers

> Identification of genetic signatures of acquired resistance to Pol I transcription inhibitors in cancer by applying Bayesian modelling to high-throughput genomic data
> Simulation of “in-silico” genomic high-throughput sequencing data to assess and benchmark results from different computational tools, in order to obtain robust and interpretable estimates of model parameters

Dr Rita Ferreira

> Investigate the effects of ribosomal DNA transcription modulation in haematopoiesis and cancer
> Identify genes required for ribosomal DNA class switching during cancer development using CRISPR-Cas9-mediated high-throughput screening

Dr Amee George

> Use of robotic high throughput screening approaches to the role of nucleolar surveillance in regulating the tumour suppressor p53
> Understanding the molecular mechanisms mediating ribosomopathies as a means to identify novel approaches for their treatment
Dr Steve Lee

> Developing laser-induced vascular injury models in mice
> Measuring cellular mechanosensing with lightsheet microscopy
> Understanding multiphoton photomodulation for genetic and drug delivery

The Gardiner Group - Mechanisms of Thrombosis and Cancer

Associate Professor Elizabeth Gardiner

> The molecular architecture of a thrombus in flowing blood
> Platelet destruction by the body's own immune system
> Investigating the role of platelets, neutrophils and other vascular cells in the tumour vascular environment, driving tumour metastasis and cancer-related thrombosis
> Molecular mechanisms controlling thrombosis
> Platelet-tumour cell interactions in flowing blood

The Casarotto Group - Biomolecular Interactions

Associate Professor Marco Casarotto

> Unravelling the molecular machinery that drives skeletal muscles
> Designing novel drugs to treat ischemic reperfusion injury
> Understanding how glutathione transferase O1 impact inflammatory diseases

Dr Nadine Hein

> Investigate the role of Pol I transcription and rDNA chromatin during differentiation and malignant transformation
> Evaluate the therapeutic efficacy of second generation Pol I inhibitors for cancer treatment

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The Parish Group - Cancer and Vascular Biology

**Professor Chris Parish**

> Role of heparan sulfate and heparanase in tumour growth and metastasis and in autoimmunity
> Enhancing the immunotherapeutic potential of radiation therapy
> Investigating why sarcomas are more highly metastatic than carcinomas
> Development of novel drugs that inhibit a range of immunopathologies, such as sepsis, by neutralising extracellular histones
> Designing novel cancer immunotherapies

The Quinn Group - Cancer Models

**Associate Professor Leonie Quinn**

> Identify new tumour markers and drug targets, by dissecting complex signalling and transcriptional mechanisms underlying cancer using Drosophila developmental models combined with molecular genetics
> Determine how the stem cell microenvironment or “niche” behaves to prevent cancer stem cell formation and tumour progression
> Elucidate molecular mechanisms driving brain tumours, ovarian cancer and leukaemia

**Dr Keisuke Horikawa**

> Mouse models for lymphoma associated mutations
> Mouse models for lymphocyte signalling pathways
The Thompson Group - Epilethal Biology

Professor Barry Thompson

> Hippo-YAP/TAZ signalling in Squamous Cell Carcinoma formation and invasion
> Hippo-YAP/TAZ signalling in Colorectal Carcinoma formation and invasion
> Overcoming resistance to immunotherapy in metastatic cancer by targeting YAP/TAZ
**The Andrews Group - Genome Informatics**

**Dr Dan Andrews**

- Relative contribution of mutation to disease, including measurement of mutational load in gene networks and complex disease
- The functional contribution of mutation in related genes and severity of resultant disease phenotype
- ‘Big data’ information systems to aggregate and mine very large volumes of human genome to identify causal variation specific to disease
- Human mutation as ‘devolution’ for insight into recent functional evolution

**The Arkell Group - Early Mammalian Development**

**Associate Professor Ruth Arkell**

- Understanding how genetic mutations cause congenital disease
- Using CRISPR modified mice and cells to investigate gene expression

**The Bruestle Group - Inflammatory T Cell Responses/ Autoimmune Models of Neuroinflammation**

**Dr Anne Bruestle**

- Migration, effector function and transcriptional regulation of Th17 cells
- Neutrophils and their extracellular traps in multiple sclerosis pathology
- Novel treatments for multiple sclerosis
The Burgio Group - Genome editing/Genetics of Host-pathogen interactions

Dr Gaetan Burgio

> Unravelling the role of CRISPR systems in the defence of the bacteria against phages
> Development of CRISPR gene editing technology

The Cockburn Group - Malaria Immunology

Associate Professor Ian Cockburn

> Using live imaging to determine how T cells find pathogens in the liver
> How does the immune system mount antibody responses against the malaria parasite?

The Cook Group - Translational Immunology/ Centre of Personalised Immunology

Professor Matthew Cook

> Monogenic human immune deficiency disease
> NF-kB signalling in human inflammatory disease
> Human genomics and immune disease

The Enders Group - Immunization Genomics

Associate Professor Anselm Enders

> B cell development and function
> Primary human immunodeficiencies
> Regulation of the actin cytoskeleton in immune cells
The Man Group - Innate Immunity and Inflammasome

Professor Si Ming Man

> Uncovering the molecular mechanisms of immune recognition of intracellular pathogens and danger signals
> Unravelling the molecular mechanisms of inflammasome formation
> Understanding the role of innate immune sensors in regulating the development of cancer and the composition of the gut microbiota
> Identifying novel activators and inhibitors of the innate immune system to prevent and treat infection, autoinflammatory diseases and cancer

The McMorran Group - Genetics and Infectious Diseases

Associate Professor Brendan McMorran

> Synthetic platelet microbicidal peptides as novel anti-malarial drugs
> Platelet-erythrocyte interactions in the bloodstream
> Understanding how platelets protect the host during malarial infection

The Ramasinghe Group - Molecular Mucosal Vaccine Immunology

Associate Professor Charani Ranasinghe

> Assess novel vaccine adjuvants to enhance mucosal immunity
> Identification of antigen presenting cell subsets following mucosal vaccination
> Study IL-4/IL-13 cytokines and their receptor regulation specifically at the mucosae
> Study different innate lymphoid cell subsets at the mucosae
The Simeonovic Group - Diabetes/Transplantation Immunobiology

Associate Professor Charmaine Simeonovic

> Contribution of platelets and neutrophils to the development of Type 1 diabetes
> NET and histone-mediated damage of insulin-producing islet beta cells and prevention
> The role of heparanase in Type 1 diabetes

The Tscharke Group - Viruses and Immunity

Professor David Tscharke

> Relating antigen presentation to immune responses
> Understanding how viruses evade immune responses
> The role of viral gene expression in herpes simplex virus latency
> Understanding genetic susceptibility to virus infection

The Vinuesa Group - Humoral Immunity & Autoimmunity

Dr Julia Ellyard

> Identifying genetic variants that induce autoimmune disease
> Understanding the cellular and molecular pathways that cause autoimmune disease
> Regulation of cytokine signalling in autoimmune disease
The Eyras Group - Computational RNA Biology

Professor Eduardo Eyras

> Novel algorithms and computational tools to process and analyse long reads from Nanopore sequencing
> Study of the links between RNA biochemical modifications and differential splicing
> Development of physics-based models for the analysis of Nanopore signal data
> Identification of the immunogenic impacts of RNA processing alterations in cancer

Dr Akanksha Srivastava

> Integration of short and long read sequencing data to study differential splicing in cancer
> Development of deep-learning models for the detection of RNA biochemical modifications from Nanopore sequencing

The Fischer Group - Epigenetics and Genomic Stability

Associate Professor Tamas Fischer

> The role of chromatin in the repression of pervasive transcription
> Chromatin and RNA surveillance
> RNA-DNA hybrids in genome stability and DNA repair
> Development of a molecular tool for personalised cancer treatment: a synthetic biology approach
The Hayashi Group - Transposon defence and Animal Development

Dr Rippei Hayashi

> Enigmatic small RNA: Uncovering the function of non-transposon-targeting piRNAs in the sperm development
> Nibbling the end: investigating the role of small RNA processing in the muscle development

The Preiss Group - RNA Biology

Professor Thomas Preiss

> Messenger RNA processing diversity in cardiac biology
> Gene regulation through interactions between RNA, enzymes and metabolites
> The role of epitranscriptomic marks on RNA in cancer
> Tracking ribosome footprints to reveal the intricacy and control of translation

The Soboleva Group - Germ Cell and Cancer Epigenetics

Dr Tanya Soboleva

> Understanding the role of testis-specific epigenetic regulators in Hodgkin Lymphoma carcinogenesis
> Characterization of the role of H2A.B3 epigenetic regulator in spermatogenesis and male fertility
> piRNAs, short non-coding RNAs of testis: what is their role in sperm differentiation and genome regulation?
The Tremethick Group - Chromatin and Transcriptional Regulation during Development

Professor David Tremethick

> Uncovering new epigenetic-based regulatory mechanisms of gene expression: novel links between histone variants, RNA function and disease
> The special role of histone variants in regulating the inheritance and three-dimensional organisation of the epigenome
> A new paradigm for the control of cellular function: the dynamic reshaping of the epigenome by histone variants

Dr Sebastian Kurscheid

> Cancer cell-line specific genome reconstruction using HiC and ChIP-Seq
> Heterochromatin protein 1 dependent chromatin landscape in a model of human breast cancer

The Wen Group - Computational Biology of RNA and Functional Genomics

Dr Jean Wen

> Genome-wide investigation of cooperation and competition of RNA binding proteins
> Roles for RNA binding proteins in regulating alternative polyadenylation (APA) in the central nervous system
> Small silencing RNA modification and their associated proteins
> Single cell analysis in immunity
> Gene regulation by cell-type specific transcription factor networks controlling neural cell fate specification
> Epigenetic regulation by histone acetylation
The Arabdzadeh Group - Neural Coding

Professor Ehsan Arabzadeh

> Signal processing in the sensory cortex
> Sensory decision making in rodent whisker system
> Neuronal mechanisms underlying selective attention in rodents
> Sensory adaptation

The Bekkers Group - Olfaction

Professor John Bekkers

> Electrical properties of neurons in the olfactory cortex
> Development of olfactory circuits in the brain
> Epilepsy and olfaction
> Odour-learning behaviours in mice and the brain circuits that underlie them

The Billups Group - Synaptic Mechanisms in the Central Nervous System

Associate Professor Brian Billups

> The role of astrocytes in regulating synaptic transmission
> Mechanisms of neurotransmitter recycling at central synapses
> NMDA receptor co-agonists and regulation synaptic activation
> Novel fluorescent probes for measuring brain amino acids
> The role of astrocytes in regulating synaptic transmission
The Dehorter Group - Neuronal Development

Dr Nathalie Dehorter

- Role of a transcription factor involved in cell identity and function
- Developmental expression and role of a receptor involved in schizophrenia
- Early signs of impaired neuronal activity in a mouse model of autism

The Maddess Group - Diagnostic for Eye Diseases

Professor Ted Maddess

- Multifocal pupillographic objective perimetry
- Retest variability of ophthalmic instruments
- Testing for neurological disorders
- Higher order image statistics and image texture

The Natoli Group - Clear Vision Research

Dr Riccardo Natoli

- Role of miRNA in retinal degenerations
- The use of miRNA as potential therapeutic targets in diseases causing retinal degenerations
- Understanding the role of glia in the progression of Age-Related Macular Degeneration
- Novel therapeutics for reducing inflammation and oxidative stress in the progression of Age-Related Macular Degeneration
**The Stuart Group - Neuronal Signalling**

**Professor Greg Stuart**

- Discovering how neurons integrate information
- Determining the properties and role of dendrites in neuronal function
- Understanding how visual information from the eyes is processed by the brain

**The Valter Group - Retinal Cell Damage and Repair**

**Associate Professor Krisztina Valter**

- Photobiomodulation to mitigate retinopathy of prematurity
- Effects of photobiomodulation on vascular development and health
Cross-departmental Computational Biology Program
Dr Dan Andrews
The Andrews Group - *Genome Informatics, Department of Immunology and Infectious Disease, JCSMR*

> Relative contribution of mutation to disease, including measurement of mutational load in gene networks and complex disease
> The functional contribution of mutation in related genes and severity of resultant disease phenotype
> ‘High-performance data tools’ to aggregate and mine very large volumes of human genome to identify causal variation specific to disease
> Human mutation as ‘devolution’ for insight into recent functional evolution

Dr Maurits Evers
The Hannan Group - *Cancer Therapeutics, ACRF Department of Cancer Biology and Therapeutics, JCSMR*

> Identification of genetic signatures of acquired resistance to Pol I transcription inhibitors in cancer
> Application of Bayesian modelling of high-throughput genomic data to obtain robust and interpretable estimates of model parameters
> Robust and reproducible high-throughput data analysis workflow using snake- make
> Simulation of “in-silico” genomic high-throughput sequencing data to assess and benchmark results from different computational tools, and to guide parameter optimisation
**Professor Eduardo Eyras**  
The Eyras Group – *Computational RNA Biology, Department of Genome Sciences, JCSMR*

- Novel algorithms and computational tools to process and analyse long reads from Nanopore sequencing
- Study of the links between RNA biochemical modifications and differential splicing
- Development of physics-based models for the analysis of Nanopore signal data
- Identification of the immunogenic impacts of RNA processing alterations in cancer

**Dr Sebastian Kurscheid**  
The Tremethick Group – *Chromatin and Transcriptional Regulation during Development, Department of Genome Sciences, JCSMR*

- Cancer cell-line specific genome reconstruction using HiC and ChIP-Seq
- Heterochromatin protein 1 dependent chromatin landscape in a model of human breast cancer

**Dr Hardip Patel & Professor Simon Easteal**  
*National Centre for Indigenous Genomics*

- Various projects around characterisations of repeat elements in diverse human populations
- Identification of gene duplications in diverse human populations and their role in local adaptations
- Development of human genome assembly evaluation metrics
- Population specific reference bias in variant identification in whole genome sequencing
Dr Akanksha Srivastava
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> Epigenetic regulation by histone acetylation
Honours at JCSMR

Applying for Honours at JCSMR

Before you apply for Honours at JCSMR, you will need to contact a potential supervisor. Once they have agreed to take you as a Honours student, you will need to

1. Apply to the program following the instructions available on science.anu.edu.au/study/how-apply/honours-year-application

2. Make sure you nominate the Medical Research Specialisation

3. Complete the JCSMR supplementary form, available on jcsmr.anu.edu.au/study/honours, including your supervisor’s signature and send it to jcsmr.gradprog@anu.edu.au

Enquires:
Please contact the Student Administrator on jcsmr.gradprog@anu.edu.au

JCSMR Honours Scholarships

Paul Bunyan Scholarship in Medical Sciences
This scholarship is awarded in memory of Paul Bunyan. It provides a stipend for one year for a fourth year (Honours) student in medical science related to cancer research.

Alexander McTaggart Memorial Scholarship
This scholarship is awarded in memory of Alexander McTaggart. It provides a stipend for one year for a Fourth Year (Honours) student in medical science related to cancer research and allied fields.

Helen Winslade Honours Scholarship in Cancer Research
This Scholarship is awarded in memory of Mrs Helen Winslade. It provides a stipend for one year for a fourth year (Honours) student in medical science related to cancer research.

Joyce Fildes Scholarship in Medical Science
This scholarship has been generously endowed by Dr Joyce Fildes, an original member of The John Curtin School of Medical Research. It provides a stipend for one year for a fourth year (Honours) student in medical science.
Applying for PhD at JCSMR

To be admitted to the Doctor of Philosophy program you will be required to have completed at least a four-year Australian degree or equivalent, with a significant research component equivalent to at least six months full-time research, in an area relevant to your proposed research.

To apply:

Before applying for a PhD at JCSMR, you will need to contact a potential supervisor. Once they have agreed to take you as a PhD student, you will need to:

1. Apply to the program via the ANU Program and Courses website – Program 9710
   programsandcourses.anu.edu.au/2020/program/9710XPHD

2. Upload the following documentation:
   > Degree transcripts and certificates
   > Research proposal
   > The name and email of three referees
   > CV
   > Proof that you meant the English language requirements

Enquires:
Please contact the student administrator on jcsmr.hdr.sa@anu.edu.au

JCSMR PhD scholarships

> Doherty Scholarship
> Eccles PhD Scholarship in Medical Sciences
> Elizabeth Greene PhD Scholarship
> James Rice Postgraduate Award
> John Curtin School of Medical Research PhD Scholarship
> Zinkernagel PhD Scholarship

Supplementary Scholarships

> Doherty PhD Supplementary Scholarship
> Fenner Merit Scholarship in Medical Sciences
> Gordon Ada PhD Scholarship in Immunology or Virology
> Peter Gage Memorial Supplementary Scholarship in Membrane Physiology