

## Plenary Speakers MedSci 2019:

### Professor Rosalind John

**Professor John** is head of the Biomedicine Division at Cardiff University and Professor of Developmental Epigenetics. She has an impressive track-record in the area of epigenetics of fetal and placental development, as reflected by the high impact publications highlighted on the website. The work from Rosalind's group focuses on how maternal lifestyle during pregnancy can influence gene expression in the placenta, and effect maternal and offspring behaviour. Her work involves using cutting-edge transgenic techniques through to translating their findings to humans. Rosalind has published over 80 papers and been cited over 3500 times (H = 25). She is an excellent communicator and her work would be of broad interest to the NZ MedSci audience.

### Professor John Osborn

**Professor Osborn** is unequivocally one of the world's leading integrative physiologists, with well over 100 published scientific papers addressing the mechanisms underpinning cardiovascular disease. He has established numerous consultancies with pharma and device companies, ensuring that his research is highly clinically relevant, with his current work directly guiding the design of a number of clinical trials. He has an impressive publication record and has been the recipient of many prizes and awards. He is an exceptionally captivating speaker providing fresh insights and revelations that will appeal to a broad audience.

Although it is well established that the kidney is innervated by sensory fibers, the location and function of these nerve is relatively unstudied. Through the use of novel anatomical and physiological approaches, Professor Osborn's studies suggest that renal sensory nerves innervate several structures in the kidney and may play an important role in modulation of the sympathetic nervous system under physiological and pathophysiological conditions. He has recently discovered that renal inflammation activates these nerves resulting in chronic stimulation of the sympathetic nervous system and hypertension. The long-term goal of his team to develop novel methods for neuromodulation of renal sensory nerves to treat renal based neurogenic hypertension.

### Professor Herbert Herzog

**Professor Herzog** is one of the leading neuro-endocrinologists in Australasia, and heads the neuroscience program at the Garvan Institute of Medical Research. His research in metabolic disease spans multiple areas of endocrinology, physiology and neuroscience, as reflected in the high impact papers highlighted on this website. In all, he has published over 300 papers and been cited over 10,000 times (H = 58). He develops and uses sophisticated transgenic animals models that can be broadly applied to a number of research areas. I think his key strength is a willingness to collaborate, and share resources. As such he would be an excellent person to welcome into the NZ Medical research community, potentially fostering closer links between New Zealand and Australia.

## Symposia MedSci 2019

### 1. New Concepts and Emerging Therapies for Cardiac Dysfunction

This symposium will cover a range of topics featuring new fundamental knowledge based on mathematical modelling and recent pre-clinical mechanisms revealed whilst developing new therapies for cardiac dysfunction. The scientists that have been invited to present in this symposium are experts in their respective fields, both here in New Zealand and internationally. Prof. David Kaye from Melbourne will present the pathophysiology of heart failure, particularly on the identification of novel mechanisms that can be targeted for therapeutic intervention. Dr. Martin Stiles will present insights from his established ablation program treating atrial fibrillation and ventricular tachycardia. Assoc. Prof. Alona Ben-Tal will showcase how mathematical modelling unearths novel insights into the integrated behavior of the cardiorespiratory system including lung mechanics, neural control of breathing and heart rate control. Finally, Dr. Yonis Abukar, an early career investigator, will describe the role of respiratory sinus arrhythmia in improving cardiac function in a pre-clinical large animal model of heart failure.

**Proposer:** Yonis Akubar, Physiological Society of NZ.

#### Session Presenters:

1. Speaker: Prof. David Kaye  
Institution: Baker Heart and Diabetes Institute  
Title: Heart failure with preserved ejection fraction: Improving diagnosis and management
2. Speaker: Dr. Martin Stiles  
Institution: Waikato Heart and The University of Auckland  
Provisional Title: Targeting the Substrate in Ablation of Persistent Atrial Fibrillation: Recent Lessons and Future Directions
3. Speaker: Assoc. Prof. Alona Ben-Tal  
Institution: Massey University  
Title: Cardiorespiratory interactions in humans and animals: rhythms for life
4. Speaker: Dr. Yonis Abukar  
Institution: The University of Auckland  
Title: A Role for Respiratory Sinus Arrhythmia in Heart Failure

### 2. Novel insights into cerebral blood flow dysregulation in cardiovascular disease.

Cardiovascular diseases such as hypertension, stroke, heart failure and atrial fibrillation are associated with chronic reductions in blood flow to the brain, and both cardiovascular disease and brain under-perfusion are strongly linked to the risk of developing dementia. A current 'hot topic' in physiology is whether blood flow to the brain can act as a determinant of cardiovascular function, or vice versa. The research presented in this session will outline some revolutionary insights into how distinct cardiovascular diseases can involve pathological alterations in the regulation of cerebral blood flow. Our proposed symposium brings together a world-class group of basic and clinical scientists, with translational expertise in mathematical modelling of the cardiovascular and cerebral circulation (Tzeng, Allan), long-term in vivo recordings in animals (McBryde, Allan, Paton), and ground-breaking studies in human patients (Tzeng, Hart, Fisher). The speakers have been asked to address the causative associations between brain hypo-perfusion and cardiovascular diseases, and to discuss possible novel therapeutic approaches to normalize cerebral perfusion. We hope to generate discussion and debate regarding the mechanisms controlling and protecting brain blood flow in health and disease, and identify strategies to translate physiological insights to guide new approaches to the clinical management of cardiovascular disease.

**Proposer:** Julian Paton, Physiological Society of NZ.

#### Session Presenters:

1. Speaker: Associate Professor James Fisher (Senior Career)

- Institution: University of Auckland  
Title: Atrial fibrillation reduces cerebrovascular reactivity
2. Speaker: Dr Emma Hart (mid-career)  
Institution: University of Bristol  
Title: The selfish brain hypothesis of hypertension
  3. Speaker: Dr Philip Allan  
Institution: University of Otago  
Title: Determinants of cerebral perfusion stability
  4. Speaker: Dr Fiona McBryde (Early Career)  
Institution: University of Auckland  
Title: Blood pressure and cerebral perfusion after stroke

### **3. Novel targets and diagnostics in cardiovascular disease: from discovery science to clinical application**

This symposium brings together a series of talks on exciting basic mechanism discoveries in cardiovascular research and the various approaches to translating these findings to clinical application. A/Prof Enzo Porrello has developed a unique drug discovery platform using human stem-cell derived cardiac organoids and is a leading researcher in the field of cardiac regeneration (with publications in Science, PNAS & Nature). Prof Julian Paton will present data on novel drug targets for treating hypertension, outlining their pathway from basic science discovery through to the first phases of clinical trial. Novel diagnostics for rheumatic heart disease will be presented by Dr Nikki Moreland, covering their discoveries of antibodybased assay detection, patent journey and pathway to clinical utility. And lastly, Dr Amelia Power will present recent findings on cardiac signalling mechanisms in cardiac pathology, identifying new clinically relevant drug targets for disease. This symposium promises to deliver an engaging and informative session on cardiovascular discovery science and clinical translation, of interest to MedSci attendees.

**Proposer:** Kim Mellor and Lorna Daniels, Physiological Society of NZ.

#### **Session Presenters:**

1. Speaker: A/Prof Enzo Porrello  
Institution: Murdoch Children's Research Institute, Melbourne, Australia  
Title: Human stem cell-derived cardiac organoids for accelerated drug discovery
2. Speaker: Prof Julian Paton  
Institution: University of Auckland  
Title: Novel drug targets for treatment of hypertension
3. Speaker: Ms Alana Whitcombe  
Institution: University of Auckland  
Title: New diagnostic approaches for rheumatic heart disease
4. Speaker: Dr Amelia Power  
Institution: University of Otago  
Title: Uncovering novel cardiac signalling pathways for targeting cardiac pathology

### **4. Perspectives and problems of puberty**

Correct timing of puberty requires exquisite coordination of multiple genes, hormones, and central nervous system circuits. The hypothalamic neurons that act to drive reproductive activity are released from the inhibitory influences that dominated the prepubertal period and begin to be activated by stimulatory inputs. Human puberty occurs over a strikingly variable (~5 year) time frame compared with puberty in other animals, and much remains unknown about its underlying etiology and the causes and management of disordered puberty onset. A decline in the age of occurrence has led to a lowering of the accepted lower limit of normal pubertal onset, and this has been paralleled by an increase in the number of children diagnosed with precocious puberty. This symposium will cover neuroendocrine timing mechanisms governing normal and metabolically-challenged puberty onset (Navarro and

Decourt) and the causes and management of variations in human puberty onset (Hofman and Gunn). We anticipate that it will be of interest to a wide audience.

**Session Presenters:**

1. Speaker: Dr Caroline Decourt  
Institution: University of Otago and French National Institute for Agricultural Research, Tours, France  
Title: Hypothalamic neurons driving puberty onset
2. Speaker: Dr Victor Navarro  
Institution: Harvard medical School  
Title: Initiation of puberty onset by kisspeptin neurons
3. Speaker: Prof Paul Hofman  
Institution: Liggins Institute  
Title: Causes and management of delayed and precocious human puberty
4. Speaker: Prof Alistair Gunn  
Institution: University of Auckland  
Title: Problems associated with human puberty

**5. Hypothalamic regulation of behaviour**

Behaviour is increasingly recognised as being regulated by the hypothalamus, which is the focus of the proposed symposium. The symposium is designed to appeal to a wide audience within the broader behaviour and neurophysiology fields with talks on the impact of hunger on memory (Lockie) followed by the impact of mental disorders on the effects of drugs used to treat obesity (Klockars) then bodyweight regulation in pregnancy (Ladyman) and finally consequences of maternal behaviour on offspring outcomes (Bosch).

The speakers and chairs are predominantly female early career researchers (including one of the overseas speakers) to promote career development and to redress the long-standing gender bias in representation at conferences. Oliver Bosch is a world-leader in neuroendocrine regulation of maternal behaviour; with an H-index of 28, Prof Bosch is, among other prestigious appointments, a senior editor of the Journal of Neuroendocrinology.

**Proposer:** Colin Brown, Otago Centre for Neuroendocrinology (CNE)

**Session Presenters:**

1. Speaker: Oliver Bosch (Professor)  
Institution: University of Regensburg, Germany  
Title: Why mom doesn't care: maternal neglect is caused by an increased brain CRF system activity
2. Speaker's Name: Sarah Lockie (Research Fellow)  
Institution: Monash University, Australia  
Title: Hunger and memory: exploring ghrelin signalling in the dentate gyrus
3. Speaker's Name: Anica Klockars (Research Fellow)  
Institution: University of Waikato  
Title: Differential responses to anorexigenic drugs in the valproic acid model of autism spectrum disorders in rats
4. Speaker's Name: Sharon Ladyman (Research Fellow)  
Institution: University of Otago  
Title: Metabolic and behavioural adaptations during pregnancy

## **6. New insight into the cellular and molecular regulation of aging muscle**

Skeletal muscle atrophy (sarcopenia) and degradation of the neuromuscular complex amongst the growing elderly population contributes to the frailty, morbidity, and health care costs of aging. Hence, understanding the physiological and cell-molecular processes underpinning muscle ageing has strong potential to contribute to individual and population aging-well endeavours. In this Symposium, A/Prof Phil Sheard (Otago) will present new data showing that loss of whole muscle fibres does not contribute significantly to sarcopenia, but that fibre atrophy is more closely associated with denervation due to the age-related loss of lower motor neurons. Exploring the novel molecular mechanisms regulating muscle mass in health, disease and ageing using gene delivery tools and mouse models will be the topic of A/Prof Paul Gregorevic (Melbourne). Advances in whole-genome epigenetics and telomere biology has allowed A/Prof Nir Eynon and his team to demonstrate that simple intense physical activity can knock years off the molecular aging processes in human muscle. Finally, the heart is not immune; Dr Kim Mellor will present age-associated functional adaptations in cardiomyocytes associated with aging and disease. The speakers represent a mix of NZ-Australian early career (Co-chair Navneet Lal), emerging mid-career (Eynon, Mellor), and senior (Gregorevic, Sheard) scientists.

**Proposer:** David S. Rowlands

### **Session Presenters:**

1. **Speaker:** A/Prof Phil Sheard  
**Institution:** University of Otago  
**Title:** Is sarcopenia a neurodegenerative disease?
2. **Speaker:** A/Prof Paul Gregorevic  
**Institution:** University of Melbourne  
**Title:** Exploring novel mechanisms regulating muscle mass in health, disease and ageing
3. **Speaker:** A/Prof Nir Eynon  
**Institution:** Victoria University Melbourne  
**Title:** Exercise slows down epigenetic ageing in human skeletal muscle
4. **Speaker's Name:** Dr Kim Mellor  
**Institution:** University of Auckland  
**Title:** Cardiomyocyte functional adaptations with aging and disease

## **7. Title: Computational and experimental physiology of our various organ systems**

This proposed symposium is affiliated with the Auckland Bioengineering Institute. It covers a range of experimental techniques integrated with mathematical modelling frameworks aiming to understand how our various organs function in health and in disease. Dr. Kenneth Tran is an emerging research fellow with research oriented on cardiac bioenergetics who will present recent findings on the balance between mitochondrial energy supply and cellular energy demands. Prof. Martyn Nash is a world-renowned expert in cardiac mechanics. He will present a multi-physics model of the heart which is constructed based on clinical and experimental recordings with the aim to understand the relationship between ventricular functions and structural integrity. Dr. Jichao Zhao is a senior research fellow who will speak on how an abnormal electrical rhythm in the heart and the altered structure of the atria leads to sudden cardiac death. Dr. Alys Clark is a senior research fellow who will speak on how blood vessels in the uterus contribute to blood flow to the placenta for diagnosing and treating abnormal pregnancies. Dr. Tim Angeli is a senior research fellow focusing on defining the underlying electrophysiological control of the small intestine using in vivo measurement techniques, translating the bioengineering space to clinical application.

**Proposer:** David S. Rowlands

### **Session Presenters:**

1. **Speaker:** Dr Kenneth Tran  
**Institution:** Auckland Bioengineering Institute  
**Title:** Cardiac bioenergetics: integrating experiments and modellings

2. Speaker: Professor Martyn Nash  
Institution: Auckland Bioengineering Institute  
Title: Relating microstructural remodeling and ventricular mechanics in heart failure
3. Speaker: Dr Jichao Zhao  
Institution: Auckland Bioengineering Institute  
Title: Novel computerized analysis to improve understanding and treatment of atrial fibrillation
4. Speaker: Dr Alys Clark  
Institution: Auckland Bioengineering Institute  
Title: Pregnancy and the uterine blood vessels in silico : from in vitro culture to the in vivo organ
5. Speaker: Tim Angeli  
Institution: Auckland Bioengineering Institute  
Title: Understanding the gut through translational physiology: bioengineering benchtop to clinical bedside

### **8. Homeostatic neural circuits**

Over the past 5-10 years, huge advances have been made in understanding how the brain controls homeostatic and survival functions. This symposium will focus on this topic.

I am proposing a session that would follow after the AWCBR plenary talk by Dr Zachary Knight. Both the plenary and the following symposia would focus on Homeostatic neural circuits. This session has been put together based on the idea that it would to both AWCBR, MEDSCI and delegates attending the Hypothalamic Neuroscience and Neuroendocrinology Australasia (HNNA) satellite meeting.

**Proposer:** Karl Iremonger, CNE & AWCBR

#### **Session Presenters:**

1. Speaker: Dr Stephanie Padilla  
Institution: University of Massachusetts Amherst, USA  
Title: Neural circuitry translating hormone status into circadian rhythms and mood symptoms
2. Speaker: Associate Professor Zane Andrews  
Institution: Monash University, Australia  
Title: Neural circuits controlling energy homeostasis
3. Speaker: Dr Stuart McDougall  
Institution: Florey Institute, Melbourne, Australia  
Title: Neurophysiology of viscerosensory circuits
4. Speaker: Dr Joon Kim  
Institution: University of Otago, NZ  
Title: Hypothalamic neural circuits controlling stress