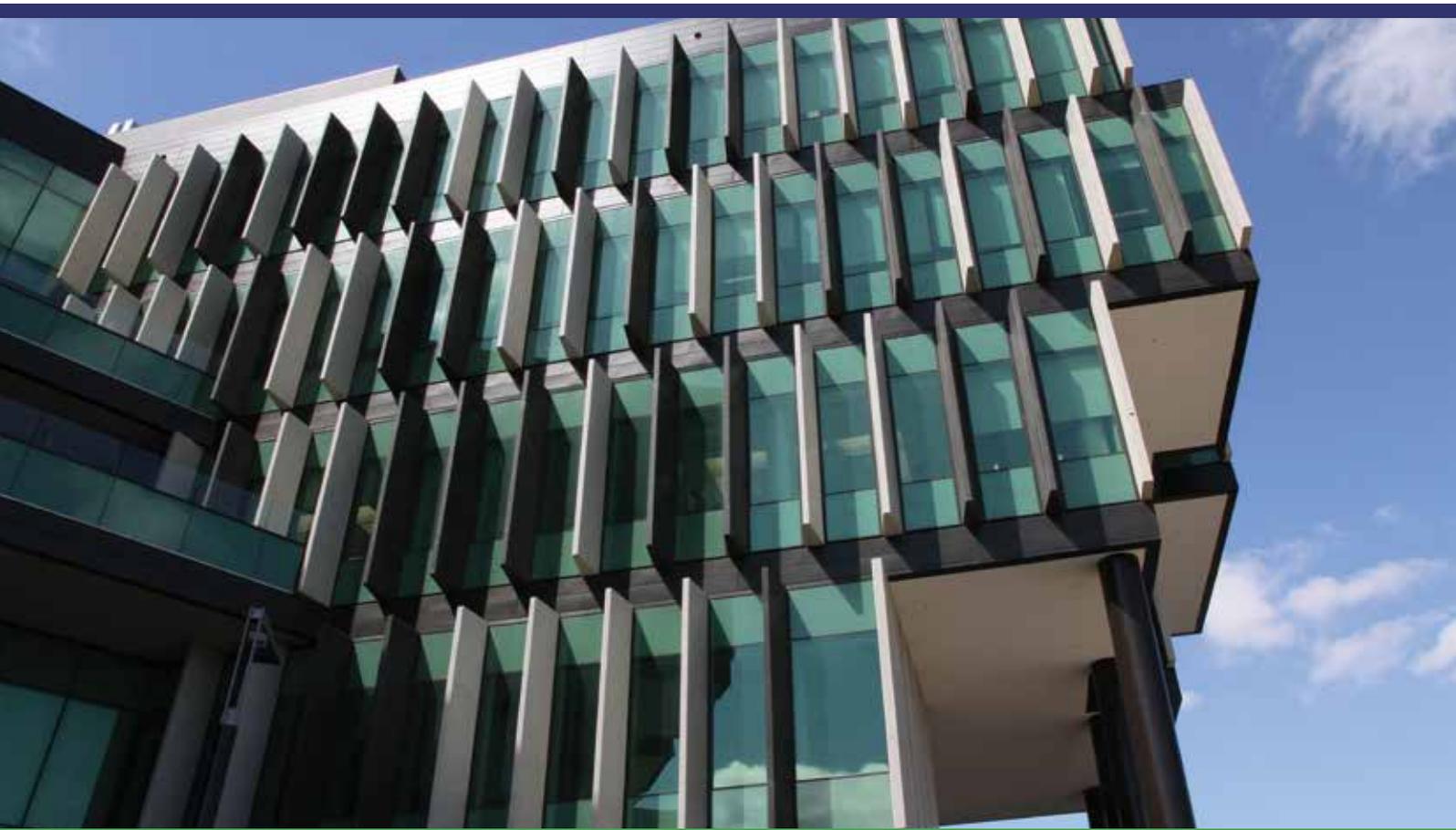




ANNUAL REPORT 2016



The Australian Institute for Musculoskeletal Science (AIMSS) is a collaborative institute that brings together researchers and clinicians from the University of Melbourne, Victoria University and Western Health, to research on ageing and disorders of bone, muscle and joints. Reflective of our goals of improving health and wellbeing of the public, AIMSS advocates disease prevention and evidence-based interventions, which are informed by our research.

Western Health 

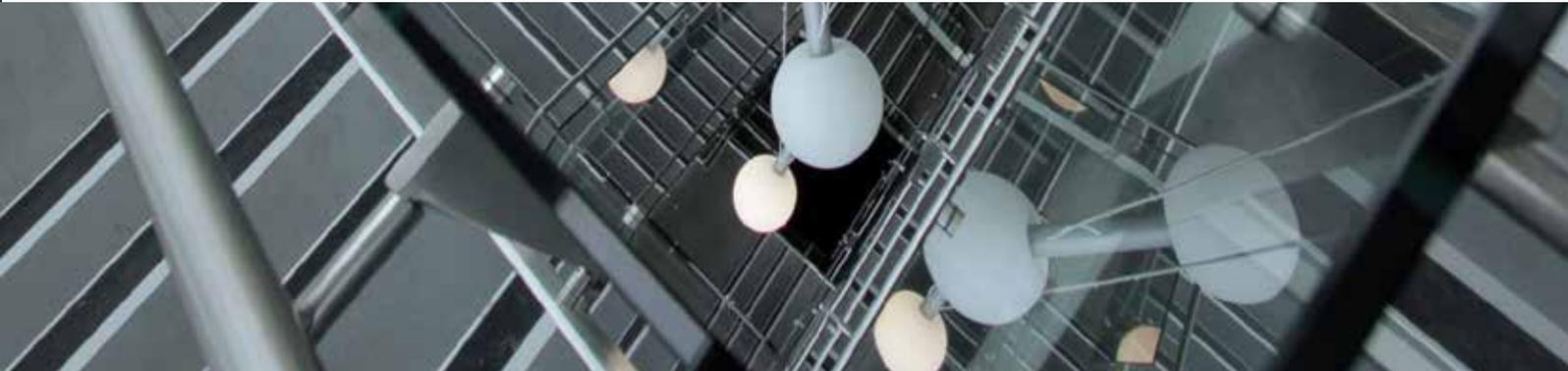
 **VICTORIA
UNIVERSITY**
MELBOURNE AUSTRALIA

 **THE UNIVERSITY OF
MELBOURNE**

A vibrant Research Institute focused on developing and promoting collaboration between our members, while performing high quality multi-disciplinary and translational research on ageing and musculoskeletal diseases.



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Welcome



Professor Gustavo Duque, MD, PhD, FRACP, GSAF

Director, AIMSS

Welcome to the Australian Institute for Musculoskeletal Science (AIMSS). Our Institute was initially created by our three stakeholders (The University of Melbourne, Victoria University, and Western Health) as a “virtual” platform to bring researchers closer and to improve the health and well-being of the communities in which we live and work through innovative and integrative musculoskeletal research and advocacy.

After its re-structuring in 2016, AIMSS is now a vibrant research institute which occupies an important area of the Western Centre for Health, Research and Education (WCHRE). Our renewed mission is to develop and promote collaboration between our members, while focusing on performing high quality multi-disciplinary and translational research on ageing and musculoskeletal diseases. Whereas we maintain our original mission to serve our local communities, results from our translational research activities go beyond our borders. AIMSS is now an internationally projected research institute with more than 50 academic members, and ongoing collaborations with more than 85 universities and research groups around the world. We are members of the Research Ageing Network of the IAGG and the WHO, the Capture the Fracture Program of the IOF, and of many other international initiatives dedicated to the promotion of healthy ageing and musculoskeletal research around the world.

Our research goes from biomedical to clinical sciences. We also run a busy clinical trials unit and *state-of-the-art* imaging facilities with capacity to analyse any component of the musculoskeletal system from the cell to the organ. Our Gait and Balance Gym (Gabagym) is a unique research program in which our participants are trained to maintain their independence, improve their quality of life, and prevent falls and fractures.

We also perform high-class research on population health, clinical epidemiology and health economics.

Our activities and research programs are varied AIMSS Program Directors are leaders in the field with strong networks of collaborators locally and around the world. Our Postgraduate programs, which are run by the University of Melbourne and Victoria University, bring many fantastic opportunities to students at all levels, and from many different nationalities.

In summary, AIMSS is intended to become one of the most important musculoskeletal research institutes worldwide. We are a happy and very productive team of researchers working to improve the quality of life of our communities. This annual report summarises our accomplishments for 2016 and our plans for 2017, which are being fully and successfully accomplished.

A handwritten signature in black ink, appearing to be 'G. Duque', written in a cursive style.

Professor Gustavo Duque
Director AIMSS

Our Stakeholders



Western Health is a **foundation partner** of AIMSS which is located in the Western Centre for Health Research and Education (WCHRE) at Sunshine Hospital. In addition, all hospitals affiliated to Western Health (Sunshine, Footscray and Williamstown) are research hubs attached to AIMSS.

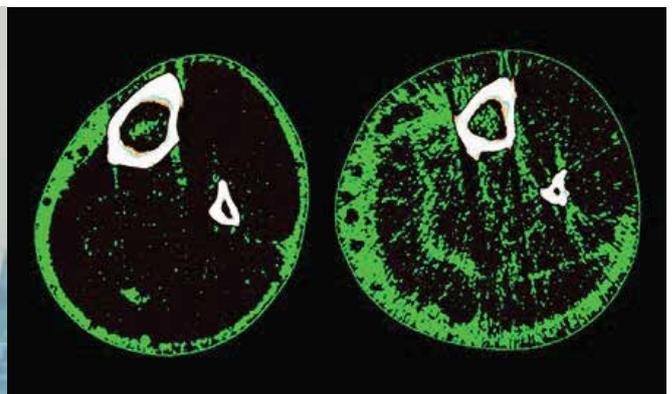
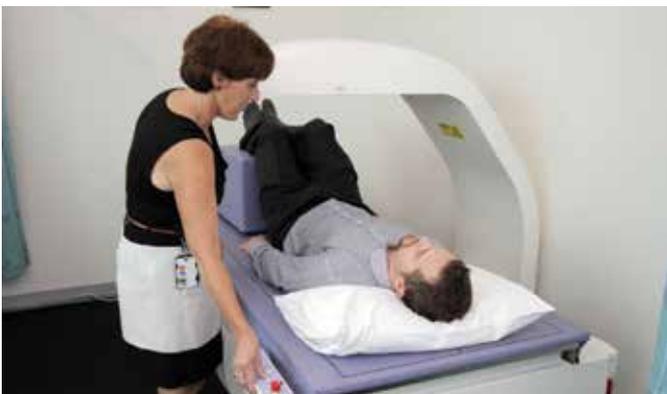


Victoria University is a **foundation partner** of AIMSS through the College of Health and Biomedicine and College of Sport and Exercise Science.



The University of Melbourne is a **foundation partner** of AIMSS through the Department of Medicine-Western Health and Melbourne Medical School.

One of the core strengths behind AIMSS's ability to undertake high quality research and foster collaborations between researchers, clinicians and the wider general community is our state of the art facilities.



At AIMSS, we have access to critical facilities including a state-of-the art imaging unit for diagnostics and musculoskeletal health assessments including bone densitometry, body composition and pQCT. We also have a Gait and Balance Gym (Gabagym) and a metabolic gym to support research on exercise and exercise-based interventions, as well as traditional laboratory spaces at the Western Centre for Health Research and Education.

Our Structure in 2016



AIMSS Advisory Committee

Professor Geoff McColl, UoM

Professor Warren Payne, VU

Professor Karen Dodd, VU

Dr. John Gallichio, WH

Dr Arlene Wake, WH

Professor Gustavo Duque, Director AIMSS

AIMSS Management Committee

Professor Gustavo Duque (Director – AIMSS)

Professor Alan Hayes (Deputy Director – AIMSS)

Dr Sharon Brennan-Olsen

A/Professor John Price

Dr. Lakshman Singh

Rita Kinsella

James Sorensen

Bill Karanatsios

AIMSS Scientific Advisory Committee

Gustavo Duque, Chair

Alan Hayes, Deputy Chair

Rita Kinsella, SAC Coordinator

Andrea Maier, Director – Head
Geriatric Medicine, RMH

Keith Lim, HOU Rheumatology, WH

Kris Ghosh, Head of Sub Acute and Aged Care, WH

Michael McKenna, Director – ISEAL, VU

Natalie Sims, Director – Director,
MSK Research at SVH, UOM

Phong Tran, Head of Orthopaedics, WH

Shane Hamblin, Head of Endocrinology, WH

Tissa Wijeratne, Head of Neurology, WH



Program Director

A **Program Director** should be based at AIMSS, Western Health affiliated Hospitals or AIMSS Partner Research Institutes, and should demonstrate a high level of commitment with our Institute. Optimally, a Program Director should have sufficient funding to run his/her own research programs at AIMSS and should also have graduate students under his/her supervision, which could be based at AIMSS.

Program Directors (2016)

Prof. Gustavo Duque (Director-AIMSS) – Ageing & osteosarcopenia – Biomedical, translational and clinical

Prof. Alan Hayes (Deputy Director – AIMSS) – Sarcopenia – Biomedical, and translational

A/Prof. John Price (Graduate Program Coordinator – Basic sciences) – Cancer and musculoskeletal system – Biomedical and translational

Ms. Rita Kinsella (Clinical Research Manager) – Musculoskeletal and allied health

Dr. Sharon Brennan-Olsen – Population Health and Musculoskeletal Diseases

A/Prof. Damian Myers – Imaging – Biomedical and translational

Dr. Lakshman Singh – Bone – Biomedical and translational

A/Prof. Christine Rhoda – Musculoskeletal research in children and adolescents

A/Prof. Keith Lim – Joint – Clinical

Prof. John Hamilton – Joint – Basic Sciences

Prof. Kim Bennell – Joint – Translational and allied health

Prof. Andrea Maier – Ageing and Sarcopenia – Clinical

Mr. Phong Tran – Musculoskeletal Surgery

A/Prof. Shane Hamblin – Hormones/Endocrinology

A/Prof. Kris Ghosh – Ageing – Clinical

Project Directors (2016)



Dr Emma Rybalka



Dr Craig Goodman



Dr David Rouffet



A/Prof Nigel Stepto



Dr Rachel Duckham



Prof Andrew McAinch



Dr David Scott

A **Project Director** will be responsible for one or several research projects within the priority research areas at AIMSS. The Project Director does not have to be based at AIMSS but should commit to perform at least **25%** of his/her project at AIMSS or at one of Western Health affiliated Hospitals. Project Directors will be under the guidance and supervision of a Program Director according to his/her areas of expertise.

Members in-training (2016)



Students/trainees under the supervision of a Program or Project or Director will be automatically considered **Member-in-Training** of AIMSS with the same privileges and responsibilities than the other members of AIMSS. To apply to a Member-in-Training Membership, the Member's training program is expected to last at least 6 months. The Member-in-Training should be nominated by his/her Supervisor and should be based at AIMSS or at one of Western Health affiliated Hospitals.

| Surname | First Name | Uni | Degree | Site Location | Project | Team | Primary Supervisor | Secondary Supervisor | Degree Status |
|-------------|------------|-----|-----------|------------------|---|---------------|--|----------------------|-------------------|
| Al-Saedi | Ahmed | UoM | PHD | WCHRE | Role of Circulating Osteoprogenitors (COP) in Musculoskeletal Biology and Function | Basic Science | Gustavo Duque | | Current |
| Ausan Rizvi | Syed | UoM | PHD | Northam Hospital | Lean Mass and Muscle Strength: The Role of Inflammation and Social Determinants in Older Men | | Sharon Brennan | David Scott | Current |
| Bullen | Michael | | PHD | | | | | | Current |
| Campelj | Dean | VU | PHD | WCHRE | Exercise mimetics as a treatment for chemotherapy-induced cachexia | | Emma Rybicka | | Current |
| Chen | Tabitha | VU | PHD | WCHRE | Investigating the role of PKC δ binding proteins in quiescent, mitotic, and post-mitotic cells. | BMU | Craig Goodman | John Price | Current |
| Debrule | Danielle | VU | PHD | WCHRE | Effect of adjunct therapies and vitamin D on the prevention of sarcopenia, dyspnea and obesity | | Alan Hayes | | current |
| Freedman | Nick | - | Intern | | Associations between socioeconomic factors and proinflammatory cytokines prior to the achievement of peak bone mass. | | Sharon Brennan | | Current |
| Giuliani | Charlett | VU | PHD | WCHRE | | | | | Completed |
| Green | Darci | NA | NA | WCHRE | Musculoskeletal health: Inflammation and Social Determinants in young adults (MS-D Study) | | Dr. Sharon Brennan-Dixon | | Current |
| Hill | Karen | VU | PHD | | How do different proteins ingested during post-exercise recovery affect adaptations to endurance training? | | Prof Andrew McIninch and Prof David Bishop | | Current |
| Hesking | Sarah | | PHD | | Health literacy and osteoporosis prevention? | | Sharon Brennan | | Completed |
| Hyde | Natalie | | PHD | | Gestational Vitamin D and Offspring Development | | Sharon Brennan | | Current |
| Mereno-Asse | Alba | VU | Post. Doc | | Insulin resistance in Polycystic ovary syndrome | | Nigel Stepto | | current |
| Polidore | Joe | UoM | PHD | WCHRE | Identification of Compounds to inhibit the Stress Transcription Factor, Heat Shock Factor 1, as Novel Anti-Cancer Agents | | John Price | | Current |
| Sharma | Shilpa | VU | PHD | WCHRE | Osteoporosis associated with inflammatory bowel disease: Mechanism of action and therapeutic targets | osteoporosis | Gustavo Duque | Kulmira Nurgali | Current |
| Shi | Min | VU | PHD | VU Werribee | The effects of supplementation with blueberry extract and yogurt peptides on obesity related comorbidities | | A/Prof Xiao Su and Prof Andrew McIninch | | Current |
| Sorensen | James | VU | PHD | WCHRE | Do common paediatric chemotherapy regimens induce life-long skeletal muscle dysfunction and wasting when administered during childhood? | | Emma Rybicka | | Current |
| Staveland | Rhian | VU | PHD | WCHRE | Inflammatory bowel disease-associated osteoporosis: Identification of mechanisms and therapeutic targets | Neuro/gastro | Kulmira Nurgali | Samy Sakic | Current |
| Timpani | Cara | VU | PHD | WCHRE | | | Alan Hayes | | This is submitted |
| Walker | Emily | VU | PHD | | Energy Requirements and Body Composition of Professional Team-Sport Athletes | | Prof Andrew McIninch and A/Prof Rob Aghay | | Current |
| Wilson | Rebin | UoM | PHD | VU Werribee | | | Alan Hayes | | Current |

AIMSS is a multi-profession and interdisciplinary research Institute. All our research programs focus on ageing and/or musculoskeletal research. Our Program and Project Directors are leaders in the field developing strong collaborations between their disciplines and areas of expertise.

Benefits of becoming a Member of AIMSS:



Staying abreast of AIMSS research: invitations to AIMSS seminars, meetings, workshops and opportunities to participate in working groups

Discovering opportunities to collaborate or sponsor research

Access to a unique environment for networking within the musculoskeletal health and research-community

Enhanced relationships between clinicians and researchers

Eligible for Seed Grants, Scholarships and Travel Grants

Limited access for researchers to AIMSS facilities/equipment/instrumentation

Potential to co-fund new collaborative research activities with AIMSS

Potential to co-fund and co-supervise student scholarships for collaborative research between AIMSS and the affiliate organisation

Access to new research funding through joint grant applications

Eligible for financial support for activities that support the strategic goals of AIMSS

Joint education programs and symposia

Translating research into clinical outcomes through the AIMSS network

Developing new strategies for promoting musculoskeletal health and interventions

AIMSS is a leader in basic, translational and clinical research as evidenced by our strengths and abilities.

Our integration into the Western Centre for Health and Research and Education has also provided AIMSS with consultation facilities where we work closely with Western Health and other universities to conduct clinical trials.

Our Facilities





Western CHRE

AIMSS is housed within state-of-the-art facilities at the Centre for Health Research and Education (CHRE) at Sunshine Hospital, a \$51.6 million development provides unprecedented opportunities for researchers from Western Health, Victoria University, and The University of Melbourne. The centre also provides training facilities for undergraduate and postgraduate doctors, and a centre for the education and training of nurses and allied health professionals.

Musculoskeletal Imaging Unit

The Musculoskeletal Imaging Unit offers diagnostic tools to support a comprehensive platform for musculoskeletal health assessment including DXA (Dual-emission X-ray absorptiometry) densitometer, used primarily to evaluate bone mineral density and total body composition, and pQCT (Peripheral Quantitative Computed Tomography) for measuring peripheral bone mineral density, volumetric bone mineral density, plus other measures such as the stress-strain index (SSI) and the geometry of the bone. The bone density unit is available to both clinical and research patients.

Gait and Balance Gym (Gabagym)

The Gait and Balance Gym is a novel model of care that provides comprehensive evaluation and treatment programs to improve gait and balance and to prevent falls and fractures in high risk patients. Our tools are directed to study the effects of exercise on muscle function, body composition, glucose uptake and bone density. It also provides the opportunity to develop exercise interventions into disease states such as sarcopenia and frailty.

The Gabagym contains a broad suite of modern equipment including resistance and cardiotraining equipment, 3D virtual reality balance training, gait assessment mats, and wholebody vibration platforms.

Clinical rooms

AIMSS has access to eight clinical consulting rooms facilitating the large numbers of clinical trials conducted by our Institute. We have the capacity to run Phase II, III and IV clinical trials.

Laboratories

AIMSS has access to state-of-the-art laboratory space within the WCHRE building including PC2 containment, cell culture, imaging, flow cytometry, bone histomorphometry, muscle biology and function, living cells imaging, and animal holding facilities.

Research Programs

Our research goes from biomedical to clinical sciences. We also run a busy clinical trials unit and some state-of-the-art imaging facilities with capacity to analyse any component of the musculoskeletal system from the cell to the organ and from bench to bedside.



Research Programs at AIMSS 2016

Ageing & Osteosarcopenia: Biomedical & Translational



Program Director Professor Gustavo Duque

Senior Scientist

Dr Lakshman Singh

Research Coordinator, Imaging

Dr Ebrahim Bani-Hassan

Clinical Research Manager

Ms Rita Kinsella

PhD Student

Ms Shilpa Sharma

Research Assistants

Mr Ahmed Al Saedi, Mr. Steven Phu

Exercise Physiologist

Mr Steven Phu

Fracture Care and Prevention Coordinator

Mrs Solange Bernardo

Biostatistician

Dr Sara Vogrin

Research Fellow

Dr Jesse Zanker

This is a strong translational research program aimed to identify the mechanisms of age-related musculoskeletal diseases and frailty. This program focus' on the age-related changes in muscle and bone and their significance in the pathogenesis of sarcopenia, osteoporosis, osteosarcopenia and physical frailty.

The biomedical section of this program is dedicated to the understanding of age-related changes in mesenchymal stem cell differentiation and the mechanisms that explain their predominant differentiation into fat. This team also investigates the mechanisms of lipotoxicity in the pathogenesis of sarcopenia and osteoporosis, while looking at new potential therapeutic approaches to prevent this phenomenon. This programs also involves the development and testing of multiple animal models of accelerated ageing and osteosarcopenia. Our translational team focuses on the development and testing of new therapies for osteoporosis, sarcopenia and osteosarcopenia. With several patents already obtained by this team, our research activities focus on understanding the mechanism of action of these new treatments, their potential toxicity and therapeutic modalities, and completion of the preclinical validation of these compounds.

Sarcopenia: Biomedical & Translational



Program Director Prof Alan Hayes

Project Directors:

Prof Andrew McAinch, Dr David Rouffet, Dr Emma Rybalka, Dr Craig Goodman

Members in training:

Dr Cara Timpani, James Sorensen, Danielle Debruin, Dean Campelj, Robin Wilson, Benjamin Butcher, Jessica Clark, Shakya Dayaratne, Salih Alagic, Abudulatif Dib, Min S

The overall program investigates the importance of muscle mass and function for healthy ageing. Loss of muscle mass and strength is an independent risk factor for morbidity and mortality in a range of diseases, such as diabetes and cancer, and of course ageing.

Key focus areas of the Program are mitochondrial dysfunction exhibited in muscular dystrophy and chemotherapy-induced muscle wasting; investigation of the molecular regulators of muscle growth and atrophy and investigation of possible therapeutic compounds; fatty obesity acid signalling in and diabetes; muscle coordination and neuromuscular fatigue, and investigation of the mechanisms driving sarcopenic obesity and a search for possible treatments.

The research team use a wide range of skills, particularly in the basic science areas of cell culture and animal models to identify the mechanisms behind the clinical conditions being investigated, and undertaking pre-clinical testing of therapeutic compounds. Human-based evaluations are performed in collaboration with other members of AIMSS as well as external collaborators to translate findings into clinical practice.

Cancer & Musculoskeletal System



Program Director A/Prof John T. Price

Project Director

A/Prof Nigel Stepto

Members in training:

Joseph Polidano, Charlett Giuliani

Cancer currently accounts for approximately 30% of all deaths within Australia. The progression of a tumour from one that is localised at the initial or primary site of growth, such as the breast or prostate, to one that spreads to other sites within the body, a process known as metastasis, is a major cause of death amongst patients.

Although cancers that originate within the joints, muscle and bone are relatively rare, many common cancers such as breast, prostate, melanoma, lung, and kidney spread to the bone causing severe pain, fractures and even paralysis in some instances. In addition, therapies that are used to treat many cancers can negatively impact upon the musculoskeletal system such as loss of bone density (osteoporosis) and increased fracture risk, joint pain and stiffness, bone pain, muscle pain and muscle weakness all adding to a poor quality of life for the cancer patient.

The focus areas of the program are to better understand the biology and the key molecular determinants of cancer metastasis, especially as it relates to the bone; to identify novel therapeutics that can effectively target the metastatic cancer cell; and to investigate the pathways responsible for the negative impact of cancer therapeutics upon the musculoskeletal system.

Musculoskeletal & Allied Health



Program Director Rita Kinsella

Linked Project Directors:

Dr Lakshman Singh, Dr Ebrahim Bani Hassan, A/Prof Keith Lim

Exercise Physiologist & Research Assistant:

Steven Phu

Senior Critical Care Physiotherapist & Allied Health Research Lead:

Dr Kimberley Haines

Senior Clinician Physiotherapists:

Kelly Fleury, Lucy Troup

Team members:

Narelle Watson, Will Sullivan

The Musculoskeletal and Allied Health program focuses on investigator initiated research trials with a specific emphasis on translational and tangible outcomes aimed at improving the health and wellbeing of those from both the hospital and wider community in which we serve.

Musculoskeletal disorders are highly prevalent in the Australian population, imposing a substantial burden both at the health-care system and individual level. Musculoskeletal disorders are a primary cause of impaired physical functioning globally with many conditions having high chronicity rates and significant long-term impacts, leading to reduced mobility, increased risk of falls, impaired ability to undertake activities of daily living and overall, fostering a negative impact on family and social life. Allied health professional plays a key role in the management of many musculoskeletal conditions and the team at AIMSS is involved in many areas of research using rehabilitation focused interventions to address falls and fear of falling, balance and proprioceptive deficits, osteoporosis, sarcopenia and frailty in older adults.

The Gait and Balance Gym (GABA Gym) housed at AIMSS provides state-of-the-art facilities for many of the research initiatives undertaken by this team.

Imaging: Biomedical & Translational



Program Director A/Professor Damian Myers

Linked Program Directors:

Prof Gustavo Duque, A/Prof John Price, Prof Alan Hayes, A/Prof Kulmira Nurgali, Dr Ebrahim Hassan

The study of the musculoskeletal system relies upon diverse imaging modalities such as X-ray imaging, Magnetic Resonance Imaging (MRI) and Positron emission tomography (PET). In basic science projects the key imaging technique used is microscopy and this includes many advanced forms of microscopy such as fluorescence imaging, live-cell imaging and confocal microscopy.

The imaging unit at AIMSS is committed to providing the best possible services to patients in western Melbourne and also researchers from Australia and around the world through our collaborations. We are committed to conducting cutting edge research on musculoskeletal diseases and their pathophysiology in collaboration with several leading national and international institutes. We welcome collaborations with different interests.

Bone: Biomedical & Translational



Program Director Dr Lakshman Singh, PhD

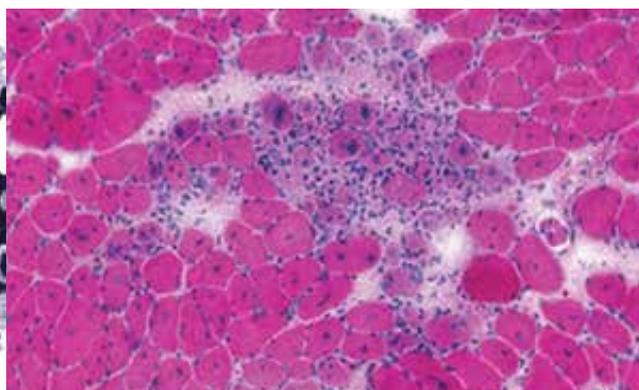
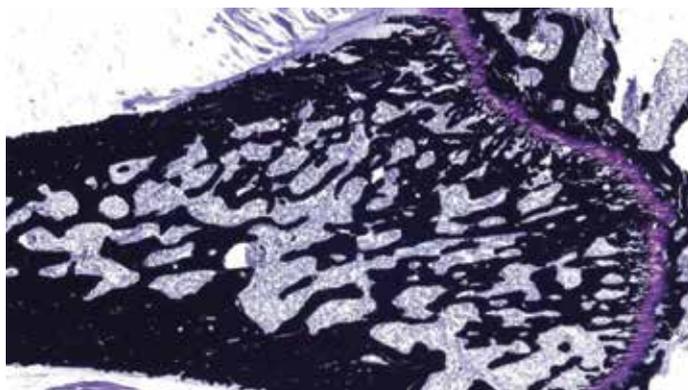
PhD Candidate & Research Assistant:

Mr Ahmed al Saedi

Research students:

Ms Katherine Gourley, Mr Ben Lam

AIMSS, we endeavour to develop novel therapies and interventions at the basic science level, to steadfast its translation into the clinic. Under the Bone – Biomedical and Translational Program, we are working on a few interesting projects including the search for novel bone anabolic(s) (bone forming agent(s)), identifying bone disorders by measuring a rare population of cells (circulating osteoprogenitor cells – COP cells), and developing a novel animal model that could facilitate in understanding Inflammatory Bowel Disease (IBD) and association of bone degradation with this disease. We are also working toward understanding the role of vitamin D in protecting our bones from the fat attack (adipocytes (fat cells) in the bone that decrease bone strength), and also have research focus in exploring novel molecules as candidates for use against bone and muscle degradation.



Musculoskeletal Research in Children & Adolescents



Program Director A/Prof Christine Rodda

Project Director:

Dr Rachel Duckham

Post Graduate Student:

Dr Michael Bullen, orthopaedic trainee; Masters of Surgery

Currently the musculoskeletal development division is being developed by A/Professor Christine Rodda, Paediatric Endocrinologist with establishes expertise in growth, skeletal development and vitamin D metabolism and Dr Rachel Duckham, a senior research scientist with considerable depth and breadth of experience in RCT's concerning children's musculoskeletal health.

Together we very much look forward to applying Dr Duckham's expertise to study specific paediatric clinical conditions. Our specific areas of focus within this division comprise: Musculoskeletal development during childhood and adolescence in both health and disease Effects of Vitamin D deficiency on musculoskeletal development. Genetic abnormalities of vitamin D metabolism. Embryonic musculoskeletal development and imprinting (this area is yet to be established).

Joint: Clinical



Program Director A/Prof Keith Lim

Team members:

Dr Cecil Hor, Dr Kim Le Marshall, Dr Matthew Jiang, Dr Chamila Dabare,
Dr Thiline De Silva

The program has diverse research interests building on a solid clinical and teaching base of eight consultants, an advanced trainee registrar, a clinical/research fellow, a research clinical trials nurse, and research fellows/students. The main research: Prospective cohort of 1000 patients with OA of the hip and knee (K Lim, C Page, P Choong, A Leung, C Dabare) Large database on rheumatic diseases in public and private clinics (about 4000), which is a very valuable resource. (Matthew Jiang)Twin study on the role of knee effusions in RA and OA; 1) Quantifying effusions and 2) Qualifying effusions.

Population Health: Musculoskeletal



Program Director Dr Sharon Brennan-Olsen

Members in training:

Dr Natalie Hyde, Dr Nick Fredman, Dr Sarah Hosking, Darci Green, Aoun Rizvi,
Elizabeth Degabriele

This program of research investigates musculoskeletal diseases as a socioeconomic related health outcome: health and disease are shaped not only by biology, but also by several demographic, economic, policy and behavioural factors – ‘the social determinants of health’. This unique program of research also investigates the meeting of the ‘social’ and the ‘biological’ in musculoskeletal disease.

This element of the research program focuses on their conceptual model regarding how social and environmental stressors –beginning in utero and occurring during early life and adolescence – influence inflammatory dysregulation, and thus predispose populations to an increased risk of musculoskeletal disease.

In September 2016 Dr Sharon Brennan-Olsen joined AIMSS as Senior Research Fellow and established the Population Health-Musculoskeletal research program. Sharon is supported by a Career Development Fellowship from the National Health and Medical Research Council (NHMRC) of Australia (2016-2019), and represents AIMSS (rotating roster) at Biomedical Research Victoria. This research program is highly multidisciplinary and translational, and the population-based studies investigate social disparities in musculoskeletal disease, including understanding the social-biological nexus.

In addition to Australian datasets, studies undertaken by the Population Health - Musculoskeletal team during this year have spanned many countries, including Canada, the United States, China, Russian Federation, Ghana, India, Mexico, and South Africa. In addition, the body of work has investigated osteoporosis, arthritis and sarcopenia, as well as the uptake of preventive testing, lifestyle behaviours, and the utilisation of end-stage surgeries. Some of our major research outcomes this year included the development of a conceptual model that proposed a role of DNA methylation in the social gradient of osteoporotic fracture, the finding of few geographic and socioeconomic variations in the uptake of primary total shoulder arthroplasty across Australia, continent-specific variations in fracture rates between Indigenous and non-Indigenous persons, and the role of maternal nutrition during pregnancy on offspring outcomes.

Imaging: Clinical



Program Director Dr Ebrahim Bani Hassan

Project Director:
Dr David Scott

This newly established program that is growing fast includes multitudes of projects that involve state-of-the-art image acquisition and analyses. This centre also provides services to the referrals by external departments and collaborators that want to assess their patients and/or research subjects for musculoskeletal health or losing/gaining weight and fat mass.

Musculoskeletal system declines with ageing and in many other system diseases (e.g. metabolic, cardiovascular or neurologic conditions). In addition to bone, muscle and fat volume assessment in the body (imaging), we can measure the degree of fat infiltration into various tissues (most notably bone and muscle, that exerts lipotoxic effects on those tissues) using our image analyses software and in-house skills.

Our imaging unit has established several research collaborations with internationally leading institutes in Australia and constantly exchanges research materials and expertise with such institutes. Also, the imaging unit is an integral part of AIMSS extension programs such as Osteosarcopenia Roadshow (for GPs), and is also involved in attracting research volunteers or provision of free imaging services in the International Osteoporosis Day. Hence, this unit is involved in the education of the both specialists and public.

Endocrinology: Clinical



Program Director & Head Endocrinology & Diabetes Unit A/Prof Shane Hamblin

Director of Endocrine Research:
Dr Christopher Yates

Head Metabolic Bone:
Dr Vivian Grill

The Endocrinology & Diabetes Unit at Western Health provides a broad clinical service covering type 1 and type 2 diabetes, diabetic foot, insulin pumps, endocrinology, obstetric endocrinology and metabolic bone. Clinical research areas focus on diabetes, metabolic bone disease and obstetric endocrinology. Diabetes research projects include: the psychosocial factors involved in diabetic ketoacidosis; the impact of glucocorticoids ('steroids') on blood glucose control in obstetric and oncology patients; diabetic foot studies; Chronic disease IMPACT study (Western Health Chronic Disease Alliance) which uses software to identify cardiovascular risks (including diabetes) in general practice and helps GPs manage patients with established disease; Type 1 diabetes data registry development (Australian Diabetes Data Network: ADDN2) which facilitates type 1 diabetes research nationally in adults with type 1 diabetes.

Metabolic bone studies include the effect of parathyroidectomy on a number of outcomes in Western Health patients who have a variety of ethnic backgrounds and often low Vitamin D levels; collaborative research with Prof Duque on the effects of parathyroidectomy in frail older persons (Frail-pathy study); obstetric endocrinology: studies of trimesterspecific normal thyroid function reference intervals in the Western Health population.



Joint: Translational



Program Director Prof Kim Bennell

Senior Staff:

Prof Rana Hinman, A/Prof Adam Bryant, Mr Tim Wrigley

Post-Doctoral Staff:

Dr Thorlene Egerton, Dr Michelle Hall, Dr Kade Paterson, Dr Kim Allison

Research Assistants

Mrs Penny Campbell, Miss Karine Fortin, Mr Ben Metcalf, Mrs Charlotte Marshall, Mrs Libby Spiers, Mr Alexander Kimp

PhD Students

Miss Rachel Nelligan, Miss Pippa Nicolson, Miss Belinda Lawford, Ms Sam Teo, Ms My-Linh Luong, Mr Joshua Farragher

Kim's research focuses on conservative non-drug management of osteoarthritis with an emphasis on the role of non-drug, non-surgical interventions in both prevention and management.

Education at AIMSS

Education is one of the main activities at AIMSS. Our Institute acts as a facilitator of learning and as a well structure site for practice and supervision. Our education programs go from biomedical to clinical and social sciences and benefit students from all disciplines including medicine, nursing, allied health professions and social sciences.





International Visitors program

Established via the Department of Medicine – Western Health (The University of Melbourne), the International Visitors Program offers multiple opportunities to physicians and allied health professionals to develop their research skills (biomedical or clinical) at AIMSS. This is a very flexible program regarding learning objectives and scope. Our visitors could spend a minimum of 1 months and a maximum of 6 months at AIMSS. For more information on this program, please contact: paula.casas@unimelb.edu.au

Higher Degree by Research

AIMSS hosts students from our two stakeholders, the University of Melbourne and Victoria University. Some of our members hold joint appointments with these two Universities. Potential students should identify their areas of research interest and identify their potential supervisor based on their specific research programs and ongoing projects. The application process will depend on the selected University.

For more information on how to apply to the University of Melbourne, please follow this link:

<https://futurestudents.unimelb.edu.au/info/research>

For more information on how to apply to Victoria University, please follow this link:

<https://www.vu.edu.au/study-at-vu/how-to-apply/graduate-research-applicants>

Honours at AIMSS

The Department of Medicine at Melbourne Medical School offers several Honours Programs. These programs could be completed at AIMSS under the supervision of our Program and Project Directors. For more information, please follow this link: <http://medicine.unimelb.edu.au/school-structure/medicine-and-radiology/study/honours>

Victoria University has a well-established Honours Program. This program could be completed at AIMSS under the supervision of one of our Program and Project Directors. For more information, please follow this link:

<https://www.vu.edu.au/courses/bachelorof-science-honours-biomedical-sciences-shbm>



UROP Students



This program was established in collaboration with Biomed Victoria. Our members supervise UROP students in a regular basis. For more information about this program, please visit this website: <http://biomedvic.org.au/urop/about-urop/>

Visiting Fellows

This Program is aimed to Australian physicians, allied health professionals, nurses and other researchers interested in either completing small research projects or developing specific research skills at AIMSS. Duration of this program goes from 1 month to one year. For more information about this program, please contact: gwen.mcmaster@unimelb.edu.au

AIMSS Seminar Series



Our AIMSS Seminar Series were implemented in 2016 to bring worldwide respected leaders in the field to present their results and to develop new potential collaborations with our local members. Our Seminars were a success in terms of content and audiences.

Our speakers for 2016 were:

February – Professor Craig Munns (University of Sydney)

March – Dr. Paul Miller (University of Colorado, USA)

April – David Jones (WH Foundation), Linda Martin (MOVE), and Gwen McMaster-Fay (former Chair of the Nepean Medical Research Foundation)

May – Professor Michael McKenna (ISEAL, Victoria University)

June – Professor Andrea Maier (University of Melbourne)

August – Professor Jacques Brown (Universite Laval, Canada)

September – A/Professor Markus Herrmann (Central Hospital of Bolzano, Italy)

November – Dr. Stephanie Studenski (NIA, USA)

AIMSS Symposium 2016

Our first AIMSS Symposium was held on Monday 24th October 2016. This Symposium is aimed to provide a platform to our local researchers to present their results. It is also an excellent networking opportunity to our members and visitors.

As part of **Western Health Research Week**
You are invited to our **AIMSS Symposium and**
Department of Medicine-Western Research EXPO



Guest Speaker:
Distinguished Professor Ian Reid
Deputy Dean, The University of Auckland

Keeping bones strong over a lifetime is a longstanding challenge in medical health research and treatment. Distinguished Professor Ian Reid's 30 year research career has led to discoveries and new treatments that can improve bone health. In this lecture, he will review several controversial issues associated with calcium and vitamin D supplementation to prevent falls and fractures in older persons.

| AIMSS SESSION (AUDITORIUM WCHRE SUNSHINE) | | |
|--|--|--|
| MONDAY 24th OCTOBER 2016 | | |
| TIME | TITLE | SPEAKER |
| 3:00pm-3:05pm | Introduction | Prof. Gustavo Duque Director AIMSS |
| 3:05pm -4:00pm | KEYNOTE ADDRESS: Vitamin D and calcium: The good and the bad | Distinguished Professor Ian Reid Deputy Dean, Faculty of Medicine The University of Auckland, New Zealand |
| PODIUM PRESENTATIONS | | |
| 4:00pm-4:10pm | Effect of 23-day muscle disuse on sarcolemmal reticulum Ca ²⁺ properties and contractility in human type I and type II skeletal muscle fibres | Dr. Cedric Lamboley Research Fellow, Institute of Sport, Exercise & Active Living (ISEAL) |
| 4:10pm-4:20pm | A Non-invasive Method to Analyze Lamin A Expression in Circulating Osteoprogenitor (COP) Cells as a Biomarker for Musculoskeletal Disease | Mr. Ahmed Al-Saedi PhD Student and Research Assistant, University of Melbourne and AIMSS |
| 4:20pm-4:30pm | Testosterone's Effect on Muscle Protein Synthesis during Androgen Deprivation Therapy for Prostate Cancer | A/Prof. Alan Hayes Assistant Dean, Western Centre for Health Research and Education Deputy-Director of AIMSS |
| 4:30pm-4:40pm | Age-Related Changes in Circulating Osteoprogenitor (COP) Cells: The COP Study | Prof. Gustavo Duque Chair of Medicine University of Melbourne and Western Health & Director AIMSS |
| 4:40pm-4:50pm | Functional Deficits Precede Muscle Mass Loss: Influence of obesity on Sarcopenia Diagnosis | A/Prof. Alan Hayes Assistant Dean, Western Centre for Health Research and Education Deputy-Director of AIMSS |
| 4:50pm-5:00pm | The Gabagym: Translating Research Into Practice for Falls Prevention in Older Persons | Mr. Steven Phu Exercise Physiologist Western Health & Exercise Programs Coordinator AIMSS |
| 5:00pm-6:00pm ATRIUM | AIMSS REFRESHMENTS AND NETWORKING | |

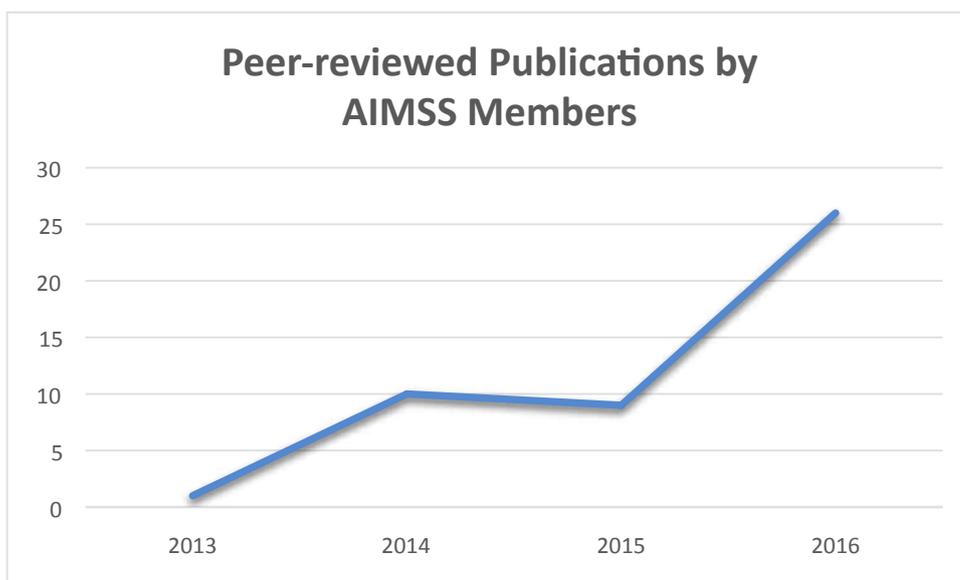
An EXPO will also be held in the Atrium area between 5-6 PM
Meet our Researchers and check out what is going on at the Department
of Medicine - Western!

First Australia and New Zealand Conference for Sarcopenia and Frailty Research

This Conference, which was sponsored and organised by AIMSS, was the founding activity for the successful new Australian and New Zealand Society for Sarcopenia and Frailty Research. More than 160 delegates from 8 countries met in Melbourne to share knowledge and research results on sarcopenia, ageing, frailty, osteoporosis and sarcopenia.



Publications



After a period of steady growth in the number of publications, our members duplicated their publication outputs in 2016. This increase in numbers were also associated with an increase in the average impact factors of the publications.

List of Publications 2016*

1. Estimation of anisotropic permeability in trabecular bone based on microCT imaging and pore-scale fluid dynamics simulations. Daish C, Blanchard R, Gulati K, Losic D, Findlay D, Harvie DJE, Pivonka P. *Bone Rep.* 2016 Dec 16;6:129-139.
2. Serum Parathyroid Hormone but Not Vitamin D Is Associated with Impaired Gait in Community-Dwelling Older Adults. Montero-Odasso M, Sakurai R, Muir-Hunter S, Islam A, Doherty T, Duque G, Crilly R. *J Am Geriatr Soc.* 2016 Dec;64(12):2606-2608
3. Associations of Vitamin D with Inter- and Intra-Muscular Adipose Tissue and Insulin Resistance in Women with and without Polycystic Ovary Syndrome. Scott D, Joham A, Teede H, Gibson-Helm M, Harrison C, Cassar S, Hutchison S, Ebeling PR, Stepto N, de Courten B. *Nutrients.* 2016 Nov 30
4. Development and implementation of Models of Care for musculoskeletal conditions in middle-income and low-income Asian countries. Lim KK, Chan M, Navarra S, Haq SA, Lau CS. *Best Pract Res Clin Rheumatol.* 2016 Jun;30(3):398-419
5. Dietary protein intake and risk of type 2 diabetes: results from the Melbourne Collaborative Cohort Study and a meta-analysis of prospective studies. Shang X, Scott D, Hodge AM, English DR, Giles GG, Ebeling PR, Sanders KM. *Am J Clin Nutr.* 2016 Nov;104(5):1352-1365
6. Mammographically dense human breast tissue stimulates MCF10DCIS.com progression to invasive lesions and metastasis. Huo CW, Waltham M, Khoo C, Fox SB, Hill P, Chen S, Chew GL, Price JT, Nguyen CH, Williams ED, Henderson M, Thompson EW, Britt KL. *Breast Cancer Res.* 2016 Oct 25;18(1):106.
7. The effect of taurine and β -alanine supplementation on taurine transporter protein and fatigue resistance in skeletal muscle from mdx mice. Horvath DM, Murphy RM, Mollica JP, Hayes A, Goodman CA. *Amino Acids.* 2016 Nov;48(11):2635- 2645. Epub 2016 Jul 21.
8. The Role of Health Literacy in the Treatment of Osteoporosis. Hosking SM, Buchbinder R, Pasco JA, Williams LJ, Brennan-Olsen SL. *J Bone Miner Res.* 2016 Oct;31(10):1909.
9. Adiposity assessed by anthropometric measures has a similar or greater predictive ability than dual-energy X-ray absorptiometry measures for abdominal aortic calcification in community-dwelling older adults. Shang X, Scott D, Hodge A, Khan B, Khan N, English DR, Giles GG, Ebeling PR, Sanders KM. *Int J Cardiovasc Imaging.* 2016 Sep;32(9):1451-1460.
10. Dietary protein from different food sources, incident metabolic syndrome and changes in its components: An 11-year longitudinal study in healthy communitydwelling adults. Shang X, Scott D, Hodge A, English DR, Giles GG, Ebeling PR, Sanders KM. *Clin Nutr.* 2016 Oct 1. pii: S0261-5614(16)31264-X.
11. An Ai Chi-based aquatic group improves balance and reduces falls in communitydwelling adults: A pilot observational cohort study. Skinner EH, Dinh T, Hewitt M, Piper R, Thwaites C. *Physiother Theory Pract.* 2016 Nov;32(8):581-590.
12. Comparison of fracture rates between indigenous and non-indigenous populations: a systematic review protocol. Brennan-Olsen SL, Quirk SE, Leslie WD, Toombs M, Holloway KL, Hosking SM, Pasco JA, Doolan BJ, Page RS, Williams LJ. *BMJ Open.* 2016 Aug 26;6(8):e012124.
13. Considerations concerning the definition of sarcopenia: comments. Scott D, Hayes A, Ebeling PR. *Osteoporos Int.* 2016 Nov;27(11):3145-3146.
14. Effect of Polyester and Plaster of Paris Casts on Determination of Volumetric Bone Mineral Density Assessed by Peripheral Quantitative Computed Tomography (pQCT). Bullen M, Blanchard R, Rodda C, Pivonka P. *Calcif Tissue Int.* 2016 Nov;99(5):454-461.
15. Treatment of Osteoporosis in Australian Residential Aged Care Facilities: Update on Consensus Recommendations for Fracture Prevention. Duque G, Lord SR, Mak J, Ganda K, Close JJ, Ebeling P, Papaioannou A, Inderjeeth CA. *J Am Med Dir Assoc.* 2016 Sep 1;17(9):852-9

16. Hindlimb Immobilization, But Not Castration, Induces Reduction of Undercarboxylated Osteocalcin Associated With Muscle Atrophy in Rats. Lin X, Hanson E, Betik AC, Brennan-Speranza TC, Hayes A, Levinger I. *J Bone Miner Res.* 2016 Nov;31(11):1967-1978.
17. Low Relative Lean Mass is Associated with Increased Likelihood of Abdominal Aortic Calcification in Community-Dwelling Older Australians. Rodríguez AJ, Scott D, Khan B, Khan N, Hodge A, English DR, Giles GG, Ebeling PR. *Calcif Tissue Int.* 2016 Oct;99(4):340-9.
18. Mitochondria: Inadvertent targets in chemotherapy-induced skeletal muscle toxicity and wasting? Sorensen JC, Cheregi BD, Timpani CA, Nurgali K, Hayes A, Rybalka E. *Cancer Chemother Pharmacol.* 2016 Oct;78(4):673-83
19. Phenotype of sarcopenic obesity in older individuals with a history of falling. Huo YR, Suriyaarachchi P, Gomez F, Curcio CL, Boersma D, Gunawardene P, Demontiero O, Duque G. *Arch Gerontol Geriatr.* 2016 Jul-Aug;65:255-9.
20. The Microbiome: A Biological Mechanism Underpinning the Social Gradient of Musculoskeletal Conditions? Brennan-Olsen SL, Pasco JA, Williams LJ, Hyde NK, Jacka FN. *J Bone Miner Res.* 2016 Jun;31(6):1315.
21. Experiences of Physical Therapists Working in the Acute Hospital Setting: Systematic Review. Lau B, Skinner EH, Lo K, Bearman M. *Phys Ther.* 2016 Sep;96(9):1317-32.
22. Associations of Sarcopenic Obesity and Dynapenic Obesity with Bone Mineral Density and Incident Fractures Over 5-10 Years in Community-Dwelling Older Adults. Scott D, Chandrasekara SD, Laslett LL, Cicuttini F, Ebeling PR, Jones G. *Calcif Tissue Int.* 2016 Jul;99(1):30-42.
23. Light physical activity is positively associated with cognitive performance in older community dwelling adults. Johnson LG, Butson ML, Polman RC, Raj IS, Borkoles E, Scott D, Aitken D, Jones G. *J Sci Med Sport.* 2016 Nov;19(11):877-882
24. High prevalence of vitamin D deficiency in 2-17 year olds presenting with acute fractures in southern Australia. Kwon DH, Krieser D, Harris C, Khot A, Ebeling PR, Rodda CP. *Bone Rep.* 2016 May 28;5:153-157.
25. Changes in Bone Mineral Density in the Year after Critical Illness. Orford NR, Lane SE, Bailey M, Pasco JA, Cattigan C, Elderkin T, Brennan-Olsen SL, Bellomo R, Cooper DJ, Kotowicz MA. *Am J Respir Crit Care Med.* 2016 Apr 1;193(7):736-44.
26. Drug diffusion, integration, and stability of nanoengineered drug-releasing implants in bone ex-vivo. Rahman S, Gulati K, Kogawa M, Atkins GJ, Pivonka P, Findlay DM, Losic D. *J Biomed Mater Res A.* 2016 Mar;104(3):714-725.
27. Non-hip and non-vertebral fractures: the neglected fracture sites. Holloway KL, Henry MJ, Brennan-Olsen SL, Bucki-Smith G, Nicholson GC, Korn S, Sanders KM, Pasco JA, Kotowicz MA. *Osteoporos Int.* 2016 Mar;27(3):905-913.

* This list only includes publications in which AIMSS has been acknowledged. Letters to the Editors, Books and Book Chapters are not included.

Seed Grants



Our local Seed Grants Programs, which is only available to AIMSS members, provides with funding to local projects with the aim of generating valuable data to be included in major funding applications.

The recipients of the 2016 Seed Grants were:

Emma Rybalka:

Adenylosuccinic Acid Therapy for the Treatment of Duchene Muscular Dystrophy: A Preclinical Evaluation of Safety and Efficacy.

Rita Kinsella:

A Randomised Double-Blind, Placebo Controlled Trial To Determine The Effect Of Vitamin D Supplementation On Balance Rehabilitation In Elderly Fallers.

A/Prof Damian Myers:

Establishing live-cell imaging capabilities to enable long-term characterization and assessment of 3D stem cell cultures for the study of musculoskeletal tissues.

Scholarships



AIMSS offers 1-2 PhD Scholarships/year. Applicants must be under the supervision of a member of AIMSS. The duration of the scholarship is up to 3 years. It provides a fortnightly allowance of approximately \$30,000 per year. Applicants must be Australian citizens and must have obtained an Australian Bachelor's Degree with Honours (or equivalent qualification) in a relevant area of study including science, medicine or health related field within the last five years. Acceptance to a PhD Program (either at the University of Melbourne or Victoria University) is mandatory.



The recipient of the 2016 PhD Scholarship is **Shilpa Sharma** with the project entitled:

"Musculoskeletal Changes in Inflammatory Bowel Disease"
under the supervision of A/Professor Kulmira Nurgali and
Professor Gustavo Duque.

International Collaborations



Our members have developed strong and very productive collaborations with world leaders in the field. 45% of AIMSS publications have at least one international collaborator.

Financial Report 2016 - 2017

INCOME

| | |
|--------------------------------------|----------------|
| Medical & Surgical-General | 1,138 |
| Income-S&W Recoveries-External Orgns | 90,333 |
| Income-Non S&W-External Orgns | 47,635 |
| Admin Exp T/f-In | 39,819 |
| Other Income-Training & Development | 700 |
| TOTAL INCOME | 179,625 |

EXPENSES

| | |
|--------------------------------------|-----------------|
| Occupational Requisites | 271 |
| Dressings, Bandages & Plas. | 6 |
| Taxi-Patient Transport | 269 |
| Food Supplies | 554 |
| Kiosk Expenses-Other | 88 |
| Functions | 7,588 |
| Kitchen & Tableware | 94 |
| Repl/Addn Equip<\$2.5k-Other | 315 |
| Locks & Keys | 38 |
| Repairs-Computer and Communication | 2,647 |
| Repairs-Other | 39 |
| Police Checks | 34 |
| Research Application Fee | 3,015 |
| Membership & Prof Fees | 3,507 |
| Postal Services | 71 |
| Printing & Stationery | 15,316 |
| Taxi-General | 61 |
| Conference Regn & Accommodation | 715 |
| Travel-5 Nights Or Less | 6,169 |
| Admin Expense-General | 4,957 |
| Scholarships | 26,727 |
| Staff Training & Development | 500 |
| Computer Consumables | 129 |
| Software Licence Fees-Other | 4,281 |
| Salaries | 38,325 |
| Seed grants | 45,000 |
| TOTAL EXPENSES | -160,716 |
| GRAND TOTAL (INCOME-EXPENSES) | -18,909 |

AIMSS Strategic Plan 2016-2020



Strategic plan 2016-2020 was approved by the Advisory Committee. Major components of this plan include:

- Re-focusing on ageing and musculoskeletal research
- Re-branding with a wide dissemination of its logo, new website, presence in social media, a tri-monthly bulletin, regular monthly seminar series and an annual symposium (held on the first day of Western Health Research Week
- New administrative structure: Advisory Committee, Management Committee and Scientific Advisory Committee
- Strong media strategy
- New membership system: Program Directors, Project Directors and Members-in Training
- Enlargement through appropriate use of office and lab space
- Modernisation of our imaging facilities and equipment
- Opening of a satellite hub in Williamstown Hospital
- Partnership with other organisations and Scientific Societies: Scientific Societies: ANZBMS, ANZSGM, IAGG Research Network Centre; IOF Capture the Fracture Program, Biomed Victoria, Australian Association of Research Institutes, other Research Institutes: ARMI, ISEAL, Garvan, ANZAC, etc.
- New funding and sustainability strategies





**AIMING FOR THE FUTURE IN HIGH QUALITY
TRANSLATIONAL MUSCULOSKELETAL RESEARCH**

