Sydney Musculoskeletal, Bone & Joint Health Alliance

Inaugural Scientific Meeting 2017

Friday, 27th October, 2017

The Great Hall, The University of Sydney
Welcome

Welcome to the first Scientific Meeting of the Sydney Musculoskeletal, Bone & Joint Health Alliance (SydMSK) which is being facilitated by the Faculty of Health Sciences and the Sydney Medical School. The SydMSK Alliance is an initiative born of the University of Sydney’s investment to expand research strength in musculoskeletal health across the University and affiliated institutions, partnering with Local Health Districts, Primary Health Networks and Sydney Health Partners.

SydMSK Alliance Vision
End the burden of musculoskeletal conditions.

SydMSK Alliance Mission
The Sydney Musculoskeletal, Bone and Joint Health Alliance aims to be the world leader in musculoskeletal science, research, education and treatment. Our mission is to discover new methods to prevent, manage and cure disabling musculoskeletal conditions. Together we will work collaboratively with clinicians, researchers, consumers and policy makers, and facilitate rapid translation of new knowledge into improved care and better health outcomes.

Currently, our membership of >230 staff and students is drawn from 6 Faculties, 7 research institutes or centres, and 4 Local Health Districts. Our two main achievements for 2017 is holding this Scientific Meeting to showcase our research in musculoskeletal health, as well as the launch of the Musculoskeletal Enabling Research Grants-in-aid (MSK ERG) scheme with a total of $60,000 in funding being awarded to support collaborative research across our diverse University activities.

We are fortunate to have world-renowned guest speakers: Professor Garry Jennings (Sydney Health Partners), Professor Ian Harris (University of NSW), Professor Fiona Blyth, Professor Hala Zreiqat and Professor Andrew McLachlan (University of Sydney).

A special thank you to our Organising sub-committee members: Professor Chris Maher, Dr Marina Pinheiro, Dr Christina Abdel Shaheed, Dr Xia Wang, Dr Premarani Sinnathurai, Dr Meilang Xue and Dr Alison Evans for their assistance in preparing our inaugural Scientific Meeting. Also thank you to staff and students from the Musculoskeletal Health groups at the Faculty of Health Sciences, Sydney Medical School and the School of Public Health for their time and effort given ensuring the day runs smoothly.

We hope that you enjoy the inaugural SydMSK Scientific Meeting.

SydMSK Alliance Steering Group:
Professor Joshua Burns, Professor Lyn March, Professor David Hunter, Professor Chris Maher

Contact
Dr Alison Evans (SydMSK Alliance Project Manager)
Email: sydmsk@sydney.edu.au
Twitter: @sydmsk
Web: www.sydney.edu.au/sydmsk
Invited guests

Professor Garry Jennings

Garry Jennings AO is Executive Director of Sydney Health Partners. He is Chief Medical Advisor of the Heart Foundation and Senior Director at the Baker Heart and Diabetes Research Institute where he was Director and CEO from 2001-2015.

His previous positions include head of Cardiology and Chair Division of Medicine of the Alfred Hospital, Melbourne and National CEO of the Heart Foundation. He has served as President of a number of national and international scientific societies and of the Association of Australian Medical Research Institutes (AAMRI). A cardiologist, over 500 of his publications have been cited more than 25,000 times on subjects ranging from prevention, pathophysiology and treatment of cardiovascular disease to aboriginal health and health policy.

Professor Laurent Rivory

Laurent Rivory is the Pro Vice-Chancellor (Strategic Collaborations & Partnerships) in the office of the Deputy Vice Chancellor Research at the University of Sydney.

His role has a particular focus on the areas where cross-faculty engagement and external partnerships are integral to the academic enterprise. Responsibilities include large scale collaborations such as the Charles Perkins Centre and the Brain and Mind Centre, the Core Research Facilities and the management of external partnerships, particularly in health.

Professor Laurent Rivory has over 20 years’ experience in research and leadership, which has spanned the higher education, hospital and industry sectors.
Keynote Speakers

Professor Fiona Blyth

Fiona Blyth is a Professor of Public Health and Pain Medicine, and is also Head of Concord Clinical School.

She has been involved in population studies of chronic pain conditions for almost 2 decades, including large prospective cohort studies, RCTs, pharmacoepidemiological studies, and health services research using linked routinely collected datasets. She is internationally recognised for her work conceptualising pain as a public health problem, and was on the expert reference group for low back pain for the 2010 Global Burden of Disease (GBD) Project. She has close collaborative links with local and international groups researching healthy ageing, arthritis/musculoskeletal conditions, and comorbidity/multimorbidity.

Professor Andrew McLachlan

Andrew McLachlan is a pharmacist, academic and researcher with experience in clinical pharmacology, research into variability in response to medicines and the quality use of medicines.

He is the Professor of Pharmacy (Aged Care) in the Faculty of Pharmacy and Centre for Education and Research on Ageing at the University of Sydney and Concord Hospital, Sydney. Andrew is the chair of a human research ethics committee and is the Director of a NHMRC Centre for Research Excellence in Medicines and Ageing. He has served as a member of the NHMRC Assigners Academy and Grant Review Panels. Andrew is involved in Australian government committees related to medicines policy, evaluation, regulation and anti-doping.

Professor Ian Harris

Ian Harris is Professor of Orthopaedic Surgery at UNSW and is an academic and clinician based in Liverpool, in Sydney.

His clinical interests are in trauma and his research interests are in surgical outcomes, incorporating registries, randomised trials, cohort studies, systematic reviews and methodological studies.

Professor Hala Zreiqat

Hala Zreiqat is Professor of Biomedical Engineering at the University of Sydney, Director: ARC Training Center for Musculoskeletal Biomedical Technologies; Head Tissue Engineering and Biomaterials Research Uni; Radcliffe-Harvard Fellow; National Health and Medical Research Senior Research Fellow; Honorary Professor Shanghai JiaoTong University and Adjunct Professor Drexel University.

Upon joining the University of Sydney in 2006, she established the Tissue Engineering & Biomaterials Research Unit, which she continues to direct. Her lab works on the development of novel engineered materials and 3D printed platforms for regenerative medicine, particularly in the fields of orthopaedics, dental and maxillofacial applications. Her pioneering development of innovative biomaterials for tissue regeneration has led to one awarded (US) and 6 provisional patents, 5 as a lead inventor, and several collaborations with inter/national industry partners.

She is the Founder and Chair of the Alliance for Design and Application in Tissue Engineering (ADATE). She is an Advisor of the World Orthopaedic Alliance (WOA); member of the National Health and Medical Research Senior Research grant review panel and the Australian Research Council Expert College and German Research Foundation.
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<th>Time</th>
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<tr>
<td>8.00-9.00</td>
<td>“Meet the Professor” Breakfast Mentoring Session</td>
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<td>Post-graduate students, early- and mid-career researchers will be able to “Meet the Professor”. You will have the chance to exchange ideas, share challenges and gain exposure to a variety of perspectives on establishing and pursuing career and life goals. This is an opportunity for you to meet with inspirational, successful researchers across the field of musculoskeletal health research.</td>
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<td>Chair: Dr Marina Pinheiro</td>
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<tr>
<td>9.15-9.40</td>
<td>Welcome</td>
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<td>Invited Guest: Garry Jennings from Sydney Health Partners</td>
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<td>Chair: Prof Joshua Burns</td>
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<td>9.40-11.00</td>
<td>Session 1: Plenary</td>
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<td>Chair: Prof Christopher Maher</td>
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<td>Professor Fiona Blyth</td>
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<td>Associate Dean, Concord Clinical School, Professor of Public Health &amp; Pain Medicine</td>
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<td>10.20-11.00</td>
<td>Improving the scale and impact of clinical research.</td>
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<td>Professor Ian Harris</td>
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<td>Professor of Orthopaedic Surgery, UNSW, South Western Sydney Clinical School, Director of the Injury Research Stream, Ingham Institute; Director of the Whitlam Orthopaedic Research Centre</td>
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<td>11.00-11.30</td>
<td>Morning Tea</td>
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<td>11.30-1.00</td>
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<td>Chair: A/Prof Karen Ginn</td>
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<td>11.30-11.40</td>
<td>Activity and mobility using technology (AMOUNT)</td>
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<td>rehabilitation trial-support and health coaching during the community program.</td>
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<td>Dr Leanne Hassett</td>
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<td>General Lecture Theatre (K2.05)</td>
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<td>Chair: Dr Alison Harmer</td>
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<td>Systems based identification of patients with osteoporotic vertebral fractures.</td>
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<td>Dr Kirtan Ganda</td>
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<td>Oriental Room (S204)</td>
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<td>Chair: Dr Gustavo Machado</td>
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<td>A family history of low back pain influences patient outcomes and treatment effects following a home-based video-game exercise program in older people with chronic low back pain: a secondary analysis of a randomised controlled trial (GAMEBACK).</td>
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<td>Mr Joshua Zadro</td>
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<tr>
<td>Time</td>
<td>Session 2: Paper Presentations – cont'd</td>
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| 11.40-11.50 | **Effect of micropatterned bioceramics on the growth and differentiation of adipose derived stem cells.**  
Dr Yogambha Ramaswamy | **Repair of large bone defects in sheep using novel bioceramic implants.**  
Dr Jiao Jiao Li | **Intervention efficacy of a sleep quality intervention for people with low back pain: feasibility randomized co-twin controlled trial.**  
Mr Kevin Ho |
| 11.50-12.00 | **Integrated care for pain and lifestyle-related health risk factors: cohort multiple RCT.**  
A/Prof Steven Kamper | **Long-term effects of current knee osteoarthritis treatment options: a narrative literature review.**  
Dr John Orchard | **The perspectives of medical specialists from different disciplines on the management of systemic lupus erythematosus: an interview study.**  
Mr David Tunnicliffe |
| 12.00-12.10 | **Utilizing exosome from adipose tissue-derived mesenchymal stems cells for regeneration.**  
Dr Zufu Lu | **Endogenous glucocorticoid signalling in chondrocytes attenuates joint inflammation and damage.**  
Dr Jinwen Tu | **Optimised structural assessment of ACL reconstruction: development, validation and clinical experience of a novel MRI protocol.**  
Mr Samuel Grasso |
| 12.10-12.20 | **Exercise and fall prevention self-management after fall-related lower limb fracture: the RESTORE (Recovery Exercises and Stepping On after fracture) trial.**  
Prof Cathie Sherrington | **The discordant prescription of medicines for spinal pain.**  
Dr Stephanie Mathieson | **Advice for acute low back pain: a comparison of what the RCT literature supports and what guidelines recommend.**  
Mr Matthew Stevens |
| 12.20-12.30 | **Physical and psychosocial characteristics of current child dancers and nondancers with systemic joint hypermobility: a descriptive analysis.**  
A/Prof Leslie L. Nicholson | **1000 Norms project: reference values for functional outcome measures across the lifespan.**  
Dr Marnee J. McKay | **A novel tendon autograft for cartilage resurfacing: an ovine model.**  
Ms Sara Biasutti |
| 12.30-12.40 | **Dietary intervention rescues a myopathy associated with neurofibromatosis type 1.**  
A/Prof Aaron Schindeler | **Exercise as medicine – evidence for prescribing exercise for Australia's nine national health priority areas: an umbrella review.**  
Dr Pip Inge | **Effect of strain stimulus on rate of new bone in-growth for a novel ceramic bone scaffold.**  
Mr Ali Entezari |
| 12.40-12.50 | **Bioactive synthetic fibre-hydrogel composites designed for tendon and ligament prostheses.**  
Dr Young Jung No | **Prognosis of physical function following ankle sprains: a systematic review with meta-analysis.**  
Dr Paula Beckenkamp | **Attitudes, beliefs and common practices of hand therapists for base of thumb osteoarthritis in Australia (The ABC thumb study).**  
Ms Vicky Duong |
| 12.50-1.00 | **Efficacy and tolerability of muscle relaxants for low back pain.**  
Dr Christina Abdel Shaheed | | **The profile of chiropractors managing patients with low back-related leg pain: analyses of 1907 chiropractors from the ACORN practice-based research network.**  
Dr Matthew Fernandez |
<p>| 1.00-1.40 | <strong>Lunch</strong>                                                                                               |</p>
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| 1.40-3.00 | Session 3: Plenary | The Great Hall | Dr Leanne Hassett  | Professor Andrew McLachlan                                                  | Working across disciplines and sectors.  
Professor of Pharmacy (Aged Care), Program Director, NHMRC Centre for Research Excellence in Medicines and Ageing |
| 1.40-2.20 |         | Oriental Room (S204) | Dr John Orchard | Professor Hala Zreiqat                                                   | Synthetic approach to musculoskeletal regeneration.  
Professor of Biomedical Engineering, NH&MRC Senior Research Fellow, Head: Tissue Engineering & Biomaterials Research Unit, School of AMME/Faculty of Engineering |
| 2.20-3.00 |         | History Room (S223)  | Dr Paula Beckenkamp |                                                                 |                                                                                         |
| 3.00-3.30 |         | Philosophy Room (S249) | Dr Marnee McKay |                                                                 |                                                                                         |
| 3.30-3.40 | Session 4: Paper presentations | The Great Hall | Dr Leanne Hassett  | A/Prof Christine Lin                                                      | Anticonvulsants for the treatment of lumbar radicular pain.  
A/Prof Anne Tiedemann  
A/Prof Karen Ginn  
Dr Verity Pacey  
Dr Mark Halaki  
Dr Mark Halaki |
| 3.40-3.50 |         | Oriental Room (S204) | Dr John Orchard | Mr Kai Fu                                                                 | The role of hip injury in pain exacerbation in hip osteoarthritis: an internet-based case-crossover study.  
Ms Sophie Sebak  
Ms Aila Nica Bandong  
Mr Sudarshan Kc  
Ms Hema Urban |
| 3.50-4.00 |         | Oriental Room (S204) | Dr John Orchard | Ms Tara Lambert                                                           | The effectiveness of an app with remote support for improving adherence to home exercise programs prescribed by physiotherapists: a randomised trial.  
Ms Tara Lambert  
Ms Aila Nica Bandong  
Mr Sudarshan Kc  
Ms Hema Urban |
| 4.00-4.10 |         | History Room (S223) | Dr Paula Beckenkamp | Dr Marita Cross                                                           | Development of a FLARE-OA tool for the self-assessment of flare in patients with osteoarthritis of lower limbs.  
Dr Marita Cross  
Ms Aila Nica Bandong  
Mr Sudarshan Kc  
Ms Hema Urban |
| 4.10-4.20 |         | Philosophy Room (S249) | Dr Marnee McKay | Mr Thiago Jambo Alves Lopes                                                | Phase one of a musculoskeletal injury prediction model validation: a prospective study in Navy cadets.  
Mr Thiago Jambo Alves Lopes  
Ms Juliana Oliveira  
Ms Aila Nica Bandong |
| 4.10-5.20 | Session 4: Paper presentations | The Great Hall | Dr Leanne Hassett  | A/Prof Christine Lin                                                      | Anticonvulsants for the treatment of lumbar radicular pain.  
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A/Prof Karen Ginn  
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Mr Thiago Jambo Alves Lopes  
Ms Juliana Oliveira  
Ms Aila Nica Bandong |

**Session 3: Plenary**

Chair: Prof David Hunter

**Session 4: Paper presentations**

The Great Hall

Oriental Room (S204)

History Room (S223)

Philosophy Room (S249)
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<td>4.20-4.30</td>
<td>Fabrication of a biodegradable implant with tuneable characteristics for bone</td>
<td>Dr Iman Manavitehrani</td>
<td>Cloisters</td>
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<td>implant applications.</td>
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<td>4.30-4.40</td>
<td>Shoulder muscle activation patterns and levels differ between open and closed-</td>
<td>Dr Darren Reed</td>
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<td>chain abduction.</td>
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<td>4.40-4.50</td>
<td>Genetic and environmental influences to symptoms of depression and low back</td>
<td>Dr Marina Pinheiro</td>
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<td>pain: a population-based twin study.</td>
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<td>4.50-5.00</td>
<td>Dietary fat independent of caloric intake impairs cortical bone structure via</td>
<td>Ms Sarah Kim / Prof Hong Zhou</td>
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<td>glucocorticoid signalling in osteoblasts and osteocytes.</td>
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<td>5.00-5.10</td>
<td>Knock-down of the vitamin D receptor in human breast cancer cells increases</td>
<td>Mr Konstantin Horas / Prof Hong Zhou</td>
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<td>metastatic potential to bone via a Wnt/E-cadherin signaling pathway.</td>
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<td>5.10-5.20</td>
<td>Mortality rates of hip resurfacing compared to total hip arthroplasty.</td>
<td>A/Prof William Walter</td>
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<td>5.30-5.45</td>
<td>Announcement of Prizes and closing address</td>
<td>Invited guest: Professor Laurent Rivory</td>
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<td>Invited guest: Professor Laurent Rivory</td>
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<td>Chair: Prof Lyn March</td>
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<td>5.45-7.00</td>
<td>Cocktail Reception</td>
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Useful information

Visitors using a wireless-enabled device like a laptop, tablet or phone, can use the University's guest wireless network to connect to the internet.

Getting access to the UniSydney-Guest network is easy. Visitors, simply connect their device to UniSydney-Guest wireless and visit the guest account creation page. Please see the registration desk, to request a University of Sydney staff member to sponsor and confirm your guest account.
Efficacy and tolerability of muscle relaxants for low back pain

Christina Abdel Shaheed1,2, Chris Maher1,2, Kylie Williams3 and Andrew McLachlan4

1 School of Public Health, University of Sydney | 2 Sydney Medical School, University of Sydney |
3 Department of Pharmacy, Graduate School of Health, University of Technology Sydney | 4 Faculty of Pharmacy, University of Sydney

Background

Muscle relaxants are commonly prescribed for low back pain (LBP); however, there is limited evidence of their clinical efficacy and tolerability.

Aims

To evaluate the efficacy and tolerability of muscle relaxants in people with acute or chronic LBP.

Methods

For this systematic review and meta-analysis we searched online databases including Medline, EMBASE, CENTRAL and PsycINFO (inception to end October 2015) and performed citation tracking for eligible placebo-controlled and head-to-head randomized controlled trials (RCTs). Two authors independently extracted data and assessed risk of bias of randomized controlled trials of muscle relaxants. Pain outcomes were converted to a common 0–100 scale. Data were pooled using a random effects model with strength of evidence assessed using GRADE.

Results

Fifteen trials (3362 participants) were evaluated in this review. A total of five placebo-controlled trials (496 participants) provide high quality evidence that muscle relaxants provide clinically significant pain relief in the short term for acute LBP; MD −21.3, [−29.0, −13.5]. There was no information on long-term outcomes. The median adverse event rate in clinical trials for muscle relaxants was similar to placebo 14.1% IQR (7.0–28.7%) and 16.0% (4.1–31.2%); p = 0.5, respectively. There was no eligible RCT evidence to support the efficacy of benzodiazepines in LBP.

Conclusion

For people with acute LBP, muscle relaxants provide clinically significant short-term pain relief. For chronic LBP, the efficacy of muscle relaxants is largely unknown. Prolonged use of these medicines in LBP cannot be guided by trial evidence.

Keywords

muscle relaxants; acute low back pain; adverse events; efficacy

Funding and Conflict of Interest

CGM is funded by a research fellowship from the National Health and Medical Research Council of Australia. AJM is the Program Director for the National Health and Medical Research Council of Australia Centre for Research Excellence on Medicines and Ageing.

AJM and CGM were investigators on the PACE clinical trial which was jointly funded by the National Health and Medical Research Council and GlaxoSmithKline.

Address for correspondence

Christina Abdel Shaheed, Level 10 North, King George V Building, Royal Prince Alfred Hospital (C39), University of Sydney
Email: christina.abdelshaheed@sydney.edu.au
Integrating mobile health and physical activity to reduce the burden of chronic low back pain trial (IMPACT): A pilot trial

Anita B Amorim, Evangelos Pappas, Milena Simic, Manuela L Ferreira, Anne Tiedmann, Matthew Jennings, Paulo H Ferreira

1 Faculty of Health Sciences, The University of Sydney, Sydney, NSW, Australia.
2 The George Institute for Global Health, Sydney Medical School, The University of Sydney, Sydney, NSW, Australia.
3 Liverpool Hospital, Department of Physiotherapy, South Western Sydney Health District, NSW, Australia.

Background

Exercise is effective in reducing pain and disability associated with chronic low back pain (LBP). However, a rapid decline in symptoms after treatment discharge is common.

Aims

The aim of this study was to investigate the effectiveness of a mobile health (mHealth) supported physical activity intervention in decreasing care-seeking, pain, and disability in people with chronic LBP after treatment.

Methods

Individuals with chronic LBP were recruited following physiotherapy treatment discharge. Participants were randomly allocated to a mHealth supported physical activity intervention (n=34) or the standard care group (n=34) and followed for six months. Both groups received a physical activity advice booklet. Participants in the mHealth group also received one face-to-face health coaching session, twelve fortnightly telephone-based health coaching sessions, and were provided with a specifically designed WebApp and pedometer (FitBit) to support physical activity engagement.

Results

At baseline the mean and standard deviation (SD) for pain intensity (Visual Analogue Scale), was 5.4 (1.7) and 5.1 (1.8), and for Disability (Rolland-Morris Questionnaire) was 9.1 (5.5) and 8.9 (6.1) in the mHealth and Standard care group, respectively. During the weekly follow-up period, 49% of the participants reported having at least one episode of LBP, 37% reported activity limitation, and 9% reported care-seeking for their LBP.

Discussion

Patients who experience recurrences of LBP after treatment are prone to continue care-seeking and increase the health-care costs of LBP. Therefore, if mHealth is shown to be effective, this approach will constitute a major advance in the management of LBP.

Keywords

Physical activity, Low back pain, Mobile health, Health coaching, goal setting.

Funding and Conflict of Interest

This study was funded by a competitive grant awarded by the Medibank Health Research Fund.

Address for correspondence
Anita B Amorim - Faculty of Health Sciences, The University of Sydney, 75 East Street, Lidcombe, Sydney NSW 2141, Australia.
Telephone: +61 2 9351 9010  Email: abar3926@uni.sydney.edu.au
Injury patterns, physiological profile, and performance in university rugby union:

Shane Ball, Mark Halaki, Tristan Sharp, Rhonda Orr
Discipline of Exercise and Sport Science, Faculty of Health Sciences, The University of Sydney

Background

Rugby union is a physically demanding collision sport with high injury rates. There is a common perception that higher training loads result in greater injury risk in field-based sports.

Aims

This study aims to determine injury, anthropometric and physical performance characteristics in junior rugby union players and investigate the interaction between training load and injury across a competitive season

Methods

Fifty-one players (age 19.2±0.7 years) from an under-20 university rugby union team (forwards: n=27, backs: n=24) participated in a study conducted over a competition season. Training load, injury characteristics, anthropometry, physiological performance, and match time-loss injury incidence were observed.

Results

Backs had significantly lower body mass (ES [95% CI]=1.6 [0.9, 2.2]), skinfolds thickness (ES=1.1 [0.5, 1.7]), strength (squat ES=0.6 [0.0, 1.2], deadlift ES=0.6 [0.0, 1.1], bench press ES=0.9[0.4, 1.5]), lower body power (ES=0.4 [-0.2, 1]) and higher maximal aerobic capacity (ES=-0.3 [-0.8, 0.3]) than forwards. Match injury incidence was 107.3 injuries/1000 player hours (forwards: 91.4/1000, backs: 125.5/1000) during pre-season and 110.7 injuries/1000 player hours (forwards: 124.1/1000, backs: 95.2/1000) during in-season. Forwards showed higher incidence of joint and ligament (p=0.049) and upper limb (p=0.011) injuries than backs. No significant relationship between overall training load and match injury incidence was found. However, lower match injury was associated with higher weekly training volume in backs (p=0.007).

Conclusion

Positional differences in body composition, performance, injury characteristics and match injury patterns were identified in junior university rugby union players, indicating the need for position-specific training programs to reduce risk of injury.

Keywords

rugby football; athletic training; injury incidence; body composition; adolescent

Funding and Conflict of Interest

None to declare

Address for correspondence

Shane Ball, Discipline of Exercise and Sport Science, Faculty of Health Sciences, The University of Sydney, Sydney, Australia, PO Box 170, Lidcombe, NSW, 1825, Email: sbal2417@uni.sydney.edu.au
Practitioner perceptions about whiplash guidelines: A qualitative descriptive study

Aila Nica Bandong1,2, Andrew Leaver1, Martin Mackey1, Michele Sterling3, Joan Kelly3, Carrie Ritchie3, Trudy Rebbeck1
1 Discipline of Physiotherapy, Faculty of Health Sciences, The University of Sydney
2 Department of Physical Therapy, College of Allied Medical Professions, University of the Philippines
3 Recover Injury Research Centre, NHMRC Centre of Research Excellence in Recovery Following Road Traffic Injuries, Menzies Health Institute Queensland, Griffith University

Background
Whiplash guidelines published by the NSW State Insurance Regulatory Authority advocate an evidence-based approach to whiplash management.

Aims
To explore healthcare practitioners’ attitudes and beliefs around the current acute whiplash guidelines.

Methods
Qualitative descriptive study involving focus group discussions among primary care allied-health practitioners (n=16) and specialist physiotherapists (n=12) in NSW and QLD, Australia. Discussions were audio recorded and verbatim transcripts produced. Thematic analysis was conducted to identify commonly held beliefs.

Results
Themes generated centred on acceptance and applicability of the guidelines. Participants demonstrated good awareness and general support for the use of guidelines in practice. However, opinions regarding the acceptability of key recommendations were mixed and in many cases seemed conditional; particularly around recommendations on classification, first line treatments and the role of manual therapies. Acceptance appeared to be influenced by factors such as alignment with the healthcare providers’ practice framework, perceived ambiguity in the recommendations and patient expectations. The extent to which guidelines are applicable to practice appeared to be informed by factors related to practitioner experience and patient population. There was a feeling that the guidelines applied mostly to novice practitioners and to patients who have good prognosis.

Conclusion
Practitioners demonstrated a positive attitude towards use of the guidelines in general; however, in some cases acceptance and applicability of key messages appeared conditional. Future guideline revisions and implementation might focus on explaining the themes underpinning the guidelines, and challenging inconsistent beliefs, practices and approaches.

Keywords
guideline adherence; primary health care; whiplash injuries; focus groups; evidence-based practice

Funding and Conflict of Interest
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Address for correspondence
Aila Nica Bandong, Discipline of Physiotherapy, Faculty of Health Sciences, The University of Sydney, 75 East Street, Lidcombe, NSW, 2141; Email: aban9213@uni.sydney.edu.au
Home-based exercise programs to prevent falls and upper limb dysfunction among community-dwelling older people: study protocol for the BEST (Balance Exercise Strength Training) at home randomised controlled trial

Amanda Bates1, Susan Furber1, 2, Anne Tiedemann3, Karen Ginn4, Paul van den Dolder1, Kirsten Howard3, Adrian Bauman3, Cathy Chittenden1, Lisa Franco1, Michelle Kershaw1, Cathie Sherrington3

1 Ambulatory and Primary Health Care, Illawarra Shoalhaven Local Health District, NSW, Australia  
2 School of Public Health and Community Medicine, University of New South Wales, Sydney, Australia  
3 School of Public Health, The University of Sydney, Sydney, Australia  
4 School of Medical Sciences, The University of Sydney, Sydney, Australia

Background
Falling and upper limb dysfunction in older age are major public health issues that can be ameliorated with specific exercises. Home-based exercise programs appeal to some older people due to their convenience.

Aims
This trial aims to determine the effectiveness and cost-effectiveness of a home-based lower limb exercise program compared with a home-based upper limb exercise program to prevent falls and upper limb dysfunction among community-dwelling people aged 65+.

Methods
A randomised controlled trial involving 576 people will be conducted. Participants will be randomised to either the lower limb or upper limb exercise interventions. The lower limb program is designed to improve balance and strength in the lower limbs. The upper limb program is designed to improve upper limb strength and mobility. Participants will attend three group-based instruction sessions to learn and progress the exercises and will be instructed to perform the exercises three times/ week at home. The two primary outcomes will be fall rates, recorded with monthly calendars for 12-months; and upper limb dysfunction, measured with the Disability of the Arm, Shoulder and Hand (DASH) questionnaire. Negative binomial regression models will be used to estimate the between-group difference in falls. Linear regression models will assess the effect of group allocation on the DASH. Program cost-effectiveness will also be assessed.

Results
This presentation will outline the trial protocol, recruitment methods and progress to date.

Conclusion
If effective, the trial will provide a model for two home-based exercise programs which can be implemented at scale to community-dwelling older adults.

Keywords
fall prevention; exercise; older people; shoulder function; randomised controlled trial

Funding and Conflict of Interest
This trial is funded by the National Health and Medical Research Council of Australia. There are no conflicts of interest.

Address for correspondence
A/Prof Anne Tiedemann, Musculoskeletal Health Sydney, School of Public Health, The University of Sydney, PO Box 179, Missenden Road NSW 2050; Email: anne.tiedemann@sydney.edu.au
Prognosis of physical function following ankle sprains: A systematic review with meta-analysis

Paula R Beckenkamp¹, Robert D Herbert², Sakina Rashid-Chagpar³, Hidde van der Ploeg⁴, and C-W Christine Lin³

¹ Faculty of Health Sciences, Discipline of Physiotherapy, The University of Sydney
² Neuroscience Research Australia (NeuRA)
³ School of Public Health, Sydney Medical School, The University of Sydney
⁴ Department of Public and Occupational Health, VU University Medical Centre

Background

Ankle sprains are among the most common musculoskeletal injuries of the lower limb, associated with pain, swelling and stiffness soon after injury, with a large proportion of people experiencing residual pain 1 year after sprain. Information regarding the course of recovery of physical function after ankle sprain can aid on management decisions and improve rate of functional recovery.

Aims

To quantify the prognosis of physical function following ankle sprains.

Methods

A systematic review with meta-analysis was performed. Electronic databases and gray literature were searched from inception to February 2017. Studies reporting on the level of physical activity or activity limitation following ankle sprain were included. Two independent reviewers screened references, performed data extraction and assessed risk of bias. Outcomes were converted to a common 100-point scale, where higher scores indicate better outcomes. Meta-regression was conducted using generalized estimating equations.

Results

A total of 59 studies (63 articles) were included in the review and 26 were included in the meta-analysis. Activity limitation improved rapidly in the short term following ankle sprain (mean [95% CI] at 1 month: 70.2 [63.0 to 77.4]), improved only marginally in the short to medium term (mean at 3 months: 75.2 [67.9 to 82.4] and at 6 months: 76.4 [69.2 to 83.7]), and remained incomplete in the long term (mean at 12 months: 77.1 [69.8 to 84.3]).

Conclusion

Although physical function improves substantially in the first month following ankle sprain, very little improvement is seen in the following months, remaining incomplete 1 year post injury.

Keywords

ankle injuries; meta-analysis, disability evaluation; function; motor activity

Funding and Conflict of Interest

None to declare.

Address for correspondence

Paula R Beckenkamp, Faculty of Health Sciences, Discipline of Physiotherapy, The University of Sydney
75 East St, Lidcombe NSW 2141; Email: paula.beckenkamp@sydney.edu.au
A novel tendon autograft for cartilage resurfacing:
An ovine model

Biasutti S.1, Dart A.1, and Jeffcott, L.1
1 University Veterinary Teaching Hospital Camden, University of Sydney

Background
Recent studies have identified that partially transected flexor tendon develops a cartilage-like phenotype in early healing so it may have potential as an autograft for cartilage repair.

Aims
To determine whether pathological tendon would provide a superior cartilage grafting material compared to normal tendon tissue or no graft.

Methods
Twenty-one sheep were divided into 3 groups of 7. Six sheep underwent a partial transection of the hindlimb superficial digital flexor tendon (SDFT). Eight weeks later 18 sheep had chondral lesions created in the trochlear groove while 3 sheep acted as non-operated controls. Sheep were treated with either no graft, a normal SDFT graft, or pathological SDFT graft. Tissues were harvested 6 months later for histological and gene expression analysis.

Results
Grossly, the normal tendon graft showed most potential as a resurfacing material, with 4 of 6 defects filled with cartilage-like material while in the non-grafted and normal tendon grafted joints the defects were largely devoid of tissue. Histologically the pathological SDFT grafts performed worse than normal tendon grafts and non-grafted cartilage lesions (P<0.05). Stifles with either normal tendon or pathological tendon grafts had higher gene expression for some collagens, proteoglycans and metalloproteinases and higher synovial collagen, metalloproteinase and IL-8 expression than non-grafted joints (P<0.05). Limitations included small experimental numbers and possible poor graft adherence.

Conclusion
Although histological and gene expression differences are observed at least until 6 months post-operatively, the results suggest normal tendon shows potential as an autograft for cartilage lesions. More studies are warranted to assess graft performance in the longer term.

Keywords
tendon; tendinopathy; flexor; cartilage; resurfacing

Funding and Conflict of Interest
None

Address for correspondence
Sara Biasutti, Research and Clinical Teaching Unit, University of Sydney, 410 Werombi Rd, Cobbitty, NSW, 2570
Email: sara.biasutti@sydney.edu.au
Development of a FLARE-OA tool for the self-assessment of flare in patients with osteoarthritis of lower limbs

Preliminary results

Marita Cross¹, Annica-Barcenilla-Wong¹, Joanna Makovey¹, Lyn March¹, Claudia Rutherford², Francis Guillemin³, David J. Hunter¹

¹ IBJR, University of Sydney
² Quality of Life, School of Psychology, University of Sydney
³ School of Public Health, University of Lorraine, Nancy, France

Background
A tool to identify flare in osteoarthritis (OA) is essential to capture its occurrence, and subsequently implement and adapt treatment strategies. Two treatments may provide similar improvements over the long-term, but one may prevent more flares between assessments, therefore improving quality of life.

Aims
FLARE-OA is a multicenter study which aims to define the flare construct through a conceptual framework, develop a measure, the Flare-OA tool, and evaluate the psychometric properties of the new measure.

Methods
OA hip or knee patients and health professionals participated in structured telephone interviews. Themes arising were identified and combined into item lists which will be reduced as necessary through Delphi rounds.

Results
Focus groups and semi-structured interviews with 39 patients and 22 health professionals were conducted in Australia and France. Themes arising included pain, other clinical signs, triggers, consequences of symptoms, psychological aspects, protective factors.

180 items were generated, then reduced to 50 items which will be presented to 150 OA patients and 150 health professionals in Australia, Canada and France as Delphi Rounds to determine which of the items must be kept, could be kept, or could be removed. Delphi rounds will continue to result in a survey of 10-15 items, which will then undergo psychometric testing.

Conclusion
The Flare-OA tool will be a useful addition to measures assessing outcome and response to treatment in OA. This instrument will capture the comprehensive aspects of OA flare, beyond the exacerbation of pain, as described by patients.

Keywords
osteoarthritis; flare; qualitative; delphi; questionnaire

Funding and Conflict of Interest
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No conflict of interest

Address for correspondence
Marita Cross, IBJR, Department of Rheumatology, 7C Administration Royal North Shore Hospital, St Leonards NSW 2065, Email: marita.cross@sydney.edu.au
E-health to empower patients with musculoskeletal pain in rural Australia: The EMPOweR project

Phillip Roland Davis1, Milena Simic1,2, Manuela Ferreira3, Kim Bennell4, Evangelos Pappas1,2, Adrian Bauman5, Jennifer Alison2, Tim Shaw6, Stephen Bunker7, Ornella Clavisi8, Georgina Luscombe9, Tony Lower10, Katrina Scurrah11, Mathew Jennings12, Marcos Noronha13, Jenny Wheeler14, Grahame Knox15, Paulo Ferreira1,2

1 Musculoskeletal Health, University of Sydney | 2 Discipline of Physiotherapy, University of Sydney | 3 The Institute of Bone and Joint Research, University of Sydney | 4 Centre for Health, Exercise and Sports Medicine, University of Melbourne | 5 School of Public Health, University of Sydney | 6 Implementation Science and eHealth, University of Sydney | 7 Medibank Private Limited, Melbourne | 8 Move Muscle Bone & Joint Health Ltd, Melbourne | 9 School of Rural Health, University of Sydney | 10 Australian Centre for Agricultural Health & Safety, University of Sydney | 11 Melbourne School of Population and Global Health | 12 South Western Sydney Local Health District, Sydney, Australia | 13 La Trobe Rural Health School, La Trobe University | 14 Physiotherapy department, Dubbo Base Hospital | 15 Physiotherapy department, Orange Health Service

Background

Low back pain (LBP) and knee osteoarthritis (OA) are the highest contributors to disability worldwide. Engagement in regular physical activity and exercise programs are known to improve function in both chronic LBP and knee OA populations. For people outside major cities, musculoskeletal conditions are often more common and disabling compared to urban populations, however, they have reduced access to appropriate health services. E-health is an innovative solution to help provide equitable access to treatment for people with musculoskeletal pain living in rural settings.

Aims

To investigate the effectiveness of an e-health intervention compared to usual care, for people with chronic non-specific LBP and/or knee OA in rural Australia.

Methods

We will recruit 624 participants with non-specific chronic LBP (n=312) and/or knee OA (n=312) from rural NSW and Victoria. Following completion of baseline questionnaires, participants will be randomly allocated to the e-health intervention group (n=312) using remote physiotherapy consultations and online resources, or usual care (n=312). Outcomes will be measured at baseline, 6 months and 12 months. The primary outcome is physical function measured using the patient specific functional scale. Secondary outcomes include measures of pain, physical activity, activity limitations, quality of life, pain coping strategies and perceived work ability.

Conclusion

The findings from this research will help to inform rural and primary health care policy and clinical practice in Australia and beyond by using a novel cost-effective model for the delivery of interventions that are known to be beneficial to people with LBP and knee OA.

Keywords

low back pain; knee osteoarthritis; telehealth; e-health; rural health

Funding and Conflict of Interest

A NHMRC partnership grant application is currently being processed in collaboration with our strong partners from industry (Medibank Private), public health (Western NSW Local Health Districts, Bendigo Health Victoria), and consumer (MOVE organisation) sectors. There are no conflicts of interest declared.

Address for correspondence

Phillip Davis, Musculoskeletal Health, Faculty of Health Sciences The University of Sydney, 75 East St Lidcombe, Sydney, NSW, 2141; Email: pdav6646@uni.sydney.edu.au
A novel 4D navigation device for acetabular cup positioning in total hip arthroplasty – comparison with an established optical navigation system

RM Drummond¹, D Marsden Jones¹, and WL Walter²
¹ Suite 1.08, 3 Gillies St, Wolstonecraft, NSW, 2065
² Department of Orthopaedics, University of Sydney

Background
Component positioning is of great importance in total hip arthroplasty (THA) and navigation systems can help guide surgeons in the optimal placement of the implants. We report on a newly developed navigation system which employs an inertial measurement unit (IMU) to measure acetabular cup inclination and anteversion at the time of impaction.

Aims
To assess the accuracy of the IMU when used for acetabular cup placement and compare this with an established optical navigation system (ONS).

Methods
At the time of acetabular cup impaction, the IMU and ONS were separately mounted on the impactor handle. Cup inclination and anteversion as measured by each device were recorded. Post-operative CTs were acquired for all patients and used to determine the final cup position.

Results
Data were recorded for a total of 62 patients undergoing THA; 27 had a direct anterior approach (DAA) and 35 had a posterior approach (PA).

In the DAA group, the mean difference in IMU versus CT measured cup inclination was 2.1° compared with mean difference of ONS versus CT of 0.6°. Mean difference in IMU versus CT measured anteversion was -1.7° compared with a mean difference of -1.5° between ONS and CT.

In the PA group, mean difference in IMU versus CT inclination was 1.9 compared with mean difference between ONS versus CT of 5°. Mean difference in anteversion was 3.7° between IMU and CT and 8.2° between ONS and CT.

Conclusion
The novel IMU can be used to accurately determine the position of the acetabular cup at the point of impaction, demonstrating comparable accuracy with an established navigation system in the direct anterior approach, and even greater accuracy in the posterior approach.

Keywords
hip; arthroplasty; navigation; inclination; anteversion

Funding and Conflict of Interest
The senior and second authors are on the design and development team for the new navigation system analysed.

Address for correspondence
W.L. Walter.
Suite 1.08, 3 Gillies St, Wolstonecraft, NSW, 2065, Australia.
Email: bill.walter@hipknee.com.au
Patient-reported outcomes in robotic hip arthroplasty: A systematic review and meta-analysis

Michael Duan¹, Sascha Karunaratne², Mark Horsley³, Paul Stalley³, Brett Fritsch³, Richard Boyle³, Sanjeev Gupta³, Evangelos Pappas⁴ and Daniel Steffens²

¹ Faculty of Medicine, University of Sydney, Camperdown, NSW, 2050
² Surgical Outcomes Research Centre, Royal Prince Alfred Hospital, Camperdown, NSW, 2050
³ Department of Orthopaedic Surgery, Royal Prince Alfred Hospital, Camperdown, NSW, 2050
⁴ Faculty of Health Sciences, University of Sydney, Camperdown, NSW, 2050

Background
Robotic hip arthroplasty has become increasingly popular amongst surgeons. However, high level of evidence comparing the effectiveness of robotic to conventional hip arthroplasty on patient-reported outcomes is lacking.

Aims
To examine differences in patient-reported outcomes of function and quality-of-life (QOL) between robotic and conventional hip arthroplasty.

Methods
Comparative studies were searched using electronic databases (Medline, Pubmed, Embase and CENTRAL) and grey literature till 16th March, 2017. Studies investigating the effectiveness of robotic hip arthroplasty (active or semi-active) compared to conventional hip arthroplasty were included. Outcomes included post-operative measures of function and QOL. Methodological quality was assessed using the Downs & Black checklist and quality of evidence was assessed using the GRADE approach. A random-effects model was used for meta-analysis.

Results
Of the 1274 articles screened, 13 studies (10 reporting active and three semi-active) involving 762 participants were included. The methodological quality of the included studies ranged from poor to excellent. The meta-analysis provided low to very-low evidence of no differences between robotic and conventional hip arthroplasty on functional outcomes at short, Merle d’Aubigne (MD: -0.07; 95%CI: -0.96 to 0.81) and long-term, Merle d’Aubigne (MD: -0.22; 95%CI: -0.70 to 0.25) and Harris Hip (MD: -2.64; 95%CI: -10.62 to 5.34). Single studies also reported non-significant differences on all relevant outcomes.

Conclusion
Limited low quality evidence suggests that in terms of patient self-reported outcomes at short and long-term, robotic hip arthroplasty and conventional hip arthroplasty have similar outcomes. These results demonstrate the need for more and larger randomised controlled trials in this potentially important and evolving area.

Keywords
hip; arthroplasty; robotic; conventional; patient-reported

Funding and Conflict of Interest
The authors listed on this study certify that they have NO funding or conflicts of interest.

Address for correspondence
Michael Duan, Surgical Outcomes Research Centre (SOuRCe), Royal Prince Alfred Hospital, Level 9, Building, 89 Missenden Rd, Camperdown, NSW, 2050; Email: mdua4531@uni.sydney.edu.au
Attitudes, beliefs and common practices of hand therapists for base of thumb osteoarthritis in Australia (The ABC thumb study)

Vicky Duong1, Kim L Bennell2, Leticia A Deveza1, Jillian Eyles1, Paul W Hodges3, Melanie A Holden4, David J Hunter1, Ray Jong5, Donna Knapp1, Yifang Mei5, Bill Vicenzino3, Anne Wajon6, Sarah R Robbins1

1 Royal North Shore Hospital, Rheumatology Department, and Institute of Bone and Joint Research, Kolling Institute, University of Sydney, NSW 2065, Australia | 2 Centre for Health, Exercise and Sports Medicine, Department of Physiotherapy, University of Melbourne, Victoria 3053, Australia | 3 NHMRC Centre of Clinical Research Excellence in Spinal Pain, Injury and Health, The University of Queensland, QLD 4072, Australia | 4 Arthritis Research UK Primary Care Centre, Research Institute for Primary Care and Health Sciences, Keele University, Keele, United Kingdom | 5 Department of Rheumatology and Immunology, the First Affiliated Hospital of Harbin Medical University, Harbin, China 150001 | 6 Macquarie Hand Therapy, Macquarie University Hospital, NSW 2109, Australia

Background
The hand joints are frequently affected in osteoarthritis, with a prevalence of radiographic hand OA (43%) greater than hip and knee osteoarthritis combined (11% and 24%). There is a paucity of research demonstrating the most effective treatments for hand osteoarthritis, in particular base of thumb osteoarthritis.

Aims
To identify attitudes, beliefs and common practices of hand therapists in Australia regarding assessment and management of base of thumb osteoarthritis

Methods
Monthly emails were sent to the members of the Australian Hand Therapy Association between November 2015 and February 2016. The survey included a case scenario of a patient with base of thumb osteoarthritis with questions about assessment and non-pharmacological/non-surgical treatment interventions for this case. Participants also rated their agreement with a series of 20 attitude and belief statements on a 6-point Likert scale.

Results
A total of 124 therapists accessed the survey, of which 77 (62%) returned completed answers and 47 (38%) partially completed it. The majority were occupational therapists (n=92, 74%), and the remaining were physiotherapists. The most common clinical assessment methods used for base of thumb osteoarthritis were palpation (96%), range of motion (90%), the grind test (85%) and pain on opposition across the palm (82%). The most commonly reported treatments included a combination of orthosis prescription (92%), pain education (78%), heat (75%) and exercise (74%).

Conclusion
The findings highlight commonly used assessment tools and treatments for a typical patient with base of thumb osteoarthritis. Despite the low response rate, there is consistency among general treatment for base of thumb osteoarthritis.

Keywords
osteoarthritis; thumb; carpometacarpal; scaphotrapeziumtrapezoidal; physiotherapy

Funding and Conflict of Interest
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Address for correspondence
Vicky Duong, 7C Clinical Administration Rheumatology Department, Royal North Shore Hospital, Reserve Road, St Leonards 2065; Email: vicky.duong@sydney.edu.au
Effect of strain stimulus on rate of new bone in-growth for a novel ceramic bone scaffold

Ali Entezari¹, Qing Li¹, Colin Dunstan¹, Roland Steck², Iman Roohani¹, Hala Zreiqat¹

¹ The School of Aerospace, Mechanical and Mechatronic Engineering, University of Sydney
² Institute of Health and Biomedical Innovation, Queensland University of Technology

Background

Healing large bone defects, especially in load-bearing locations, remains a challenge using available engineered bone scaffolds. There are a series of biochemical and mechanobiological issues associated with in vivo scenarios. One of the main factors influencing bone formation is the role of mechanical stimuli generated in such scaffolds.

Aims

This study aimed at investigating the effect of strain distribution pattern on the rate of new bone in-growth within a novel ceramic bone substitute (Sr-HT-Gahnite) in a critical size defect of the sheep tibia.

Methods

Fifteen Sr-HT-Gahnite scaffolds (~70% porosity, diameter and height of 20 mm and 30 mm respectively) were placed in three centimeter defects created in the mid-diaphysis of the sheep tibia with a bridge plating technique, involving application of a dynamic compression plate (DCP) with bi-cortical screw placement. Eight scaffolds were explanted at a time point of three months. The remaining scaffolds were harvested after one year. Explanted specimens underwent micro computed tomography (μCT) scanning followed by undecalcified histological examination to quantify the extent of new bone in-growth.

A comparison between the X-ray images related to the defect sites in all the sheep groups showed that the arrangement of fixation constructs and the quality of the interface between scaffolds and bone were different from one sheep to another. Therefore, three dimensional (3D) models of defect sites including the scaffolds, fixation constructs, and the whole sheep tibia were modelled based on the x-ray images for each sheep. Then, 3D finite element analysis (FEA) was carried out in Abaqus in order to simulate the specific strain distribution pattern generated in each scaffold due to the abovementioned inconsistency between the sheep groups.

Results

The computational modelling (in-silico) results showed that different arrangement of fixation constructs, and more importantly, the quality of the interface between the scaffolds and bone could result in different strain distribution patterns within each scaffold. Good correlation between the certain level of strain in-silico and new bone formation in-vivo (12 month) was identified inside the bone-scaffold construct. Furthermore, it was demonstrated that in the regions with negligible strain, minimal new bone was formed indicating that strain stimulus may be a driving factor for new bone in-growth in engineered implant constructs. It was also observed that at the sides of the scaffolds where more uniform strain was generated, complete bridging occurred.

Conclusion

This study demonstrated that there is a direct correlation between strain distribution pattern and the rate of new bone in-growth in the newly developed ceramic bone scaffolds, implying the role of strain as a biomechanical stimulus for bone formation within such bone scaffolds.

Keywords

ceramic bone scaffolds; in-vivo study; strain; mechanical stimulation; finite element analysis

Funding and Conflict of Interest

NSW Medical Device funds; ARC Linkage grant, Allegra Orthopedics

Address for correspondence

Professor Hala Zreiqat, The School of Aerospace, Mechanical and Mechatronic Engineering, University of Sydney, Darlington Campus, Darlington, NSW, 2018, Email: hala.zreiqat@sydney.edu.au
Which instrument best measures patient attitudes and capabilities regarding osteoarthritis self-management? A systematic review

Eyles, JP1,2,3; Hunter, DJ1,2; Meneses, S1,2; Collins, N4; Dobson, F5; Lucas, BR1,2; Mills, K6 PhD

1 Kolling Institute of Medical Research, Institute of Bone and Joint Research, University of Sydney, Australia | 2 Department of Rheumatology, Royal North Shore Hospital and Northern Clinical School, University of Sydney, Australia | 3 Physiotherapy Department, Royal North Shore Hospital, Sydney, Australia | 4 School of Health & Rehabilitation Sciences, University of Queensland, Australia | 5 Centre for Health, Exercise and Sports Medicine, Department of Physiotherapy, School of Health Sciences, The University of Melbourne | 6 Centre for Physical Health, Department of Medicine and Health Sciences, Macquarie University, Sydney, Australia.

Background
Although osteoarthritis self-management programs aim to influence the attitudes toward and/or capabilities of participants managing their condition, there are no recommendations as how to best measure this construct.

Aims
To make a recommendation on the “best” instrument to assess attitudes toward and/or capabilities regarding self-management of OA based on available measurement property evidence.

Methods
Electronic searches identified studies testing measurement properties of instruments assessing self-reported attitudes and/or capabilities regarding self-management of OA (MEDLINE [PubMed], EMBASE and PsychINFO [OvidSP], CINAHL [Ebsco]; from inception to 27 December 2016). Two reviewers independently screened abstracts, reviewed full-texts and extracted data. Two reviewers independently rated the measurement properties of included studies using the Consensus-based Standards for the selection of Health Measurement Instruments (COSMIN) 4-point scale and quality criteria for rating results of measurement properties. Best evidence synthesis considered COSMIN ratings, quality criteria and the level of evidence available for each measurement property of each instrument.

Results
From 5653 publications retrieved from the search strategy, eight unique measurement tools were identified: Multidimensional Health Locus of Control, Perceived Behavioural Control, Patient Activation Measure-13, Educational Needs Assessment, Perceived Efficacy in Patient–Physician Interactions -5 (PEPPI-5) and -10 versions, Stages of Change Questionnaire in Osteoarthritis and Effective Consumer Scale. The Dutch PEPPI-5 demonstrated the best measurement property evidence: strong evidence for internal consistency and structural validity but limited evidence for reliability and construct validity.

Conclusion
The evidence for measurement properties of instruments assessing attitudes toward and/or capabilities regarding OA self-management is poor; further well-designed measurement property studies are required.

Keywords
Instrument; measures; patient; attitudes; osteoarthritis; self-management

Address for correspondence
Email: jillian.eyles@sydney.edu.au
The profile of chiropractors managing patients with low back-related leg pain: Analyses of 1907 chiropractors from the ACORN practice-based research network

Matt Fernandez a,b,c Craig Moore b,e,g Wenbo Peng f Katie De Luca b,d Katherine A Pohlman b,e Michael Swain b,c and Jon Adams f

a Private Practice, Drummoyne, Australia | b Chiropractic Academy for Research Leadership (CARL) | c Department of Chiropractic, Faculty of Science and Engineering, Macquarie University, Australia | d Private Practice, South West Rocks, Australia | e Research Institute, Parker University, USA | f Australian Research Centre in Complementary and Integrative Medicine (ARCCIM), University of Technology Sydney, Sydney; g Private Practice, Lane Cove, Australia.

Background

Current guidelines for low back pain recommend non-pharmacological approaches, including spinal manipulation - a common therapy provided by chiropractors. However, limited empirical data outlines how chiropractors manage low back related leg pain (LBRLP).

Aims

To describe Australian chiropractors who regularly treat LBRLP.

Methods

This is a secondary analysis of a nationally representative sample from the Australian Chiropractic Research Network - a practice-based research network (n=2,005). This cross-sectional study investigates chiropractors who ‘often’ treat patients with LBRLP versus those treat the condition ‘never/rarely/sometimes’. Descriptive data were presented for three key characteristic areas: practitioner, clinical practice, and clinical management characteristics, while multiple logistic regression analysis identified predictors of any one or group of characteristics.

Results

This study found over three-quarters of Australian chiropractors report frequently managing LBRLP. Like those who ‘never/rarely/sometimes’ treat LBRLP, chiropractors that ‘often' treat this condition infrequently work in multidisciplinary settings, nor do they have a broad interdisciplinary referral network. Chiropractors who treat LBRLP are likely to manage patients with multi-site pain; axial low back pain (OR=21.08; 95%CI: 9.65-46.05), referred/radicular neck pain (OR=10.81; 95%CI: 6.86-17.03) and referred/radicular thoracic pain (OR=3.14; 95%CI: 1.80-5.46). Chiropractors who ‘often' treat LBRLP frequently discuss medication, consider lifestyle choices, counsel on pain and manage degenerative spine conditions as well as treatment of women during pregnancy.

Conclusion

Australian chiropractors frequently manage LBRLP. Characterizing chiropractors that treat LBRLP can better inform policy makers and educators interested in upskilling chiropractors to deliver safe and effective treatment of LBRLP.

Keywords

Chiropractic; referred; radicular; low back pain; practice-based research network

Funding and Conflict of Interest

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Address for correspondence

Matt Fernandez, Private practice. Suite 103/169 Victoria Road, Drummoyne, NSW 2047, Australia. T: +61 2 9819 7800| F: +61 2 9819 6318 | Email: matthew.fernandez@mq.edu.au
Physiotherapists in the emergency department: A scoping review

Giovanni Ferreira¹, Adrian Traeger², and Chris Maher²

¹ Federal University of Health Sciences, Porto Alegre
² School of Public Health, University of Sydney

Background

Overburdened healthcare systems around the world are increasingly employing physiotherapists in emergency departments.

Aims

Outline the breadth of research on issues such as the efficiency, cost-effectiveness, safety, and acceptability of employing physiotherapists in emergency departments.

Methods

We performed a scoping review. Scoping reviews evaluate the state of research on several different topics in a research area. We searched four databases (MEDLINE, EMBASE, CINAHL, and Cochrane CENTRAL) for research on physiotherapists working in emergency departments.

Results

Our search retrieved 2012 records and we included 28 studies. There were 5 RCTs (n=1434), 12 prospective observation studies (n=153,767), 2 retrospective studies (n=7532), 2 case reports, 2 surveys (n=62), and 5 qualitative studies (n=144). Studies were conducted in Australia (16 studies), UK (6 studies), USA (5 studies), and Hong Kong (1 study). For low-urgency musculoskeletal conditions in the emergency department, care provided by physiotherapists appeared to be equally effective on patient-related outcomes (e.g. disability) compared to care provided by other clinicians (5 RCTs). Among observational studies, the majority found an association between physiotherapists working in the emergency department and shorter wait times. Safety data were unreliably reported. Results of qualitative studies suggested patients were receptive to seeing a physiotherapist in the emergency department. Other staff had concerns about efficiency and overlapping roles.

Conclusion

Preliminary evidence suggests care from physiotherapists in emergency departments is acceptable to patients and could improve efficiency. Future high-quality research should investigate the safety and cost-effectiveness of this model of care.

Keywords

pain; emergency department; physiotherapy; scoping review; cost-effectiveness

Funding and Conflict of Interest

None to declare

Address for correspondence

Adrian Traeger, School of Public Health, University of Sydney, Level 10 North, King George V Building, Royal Prince Alfred Hospital, Sydney, NSW, 2050; Email: adrian.traeger@sydney.edu.au
The role of hip injury in pain exacerbation in hip osteoarthritis: An internet-based case-crossover study

Kai Fu1, Joanna Makovey1, Ben Metcalf2, Kim L Bennell2, Yuqing Zhang3, Rebecca Asher4, Sarah Ferreira De Meneses1, Leticia A Deveza1, David J Hunter1

1 Kolling Institute of Medical Research, Institute of Bone and Joint Research, University of Sydney, NSW, Australia; Department of Rheumatology, Royal North Shore Hospital and Northern Clinical School, University of Sydney, NSW, Australia
2 Centre for Health, Exercise and Sports Medicine, Department of Physiotherapy, University of Melbourne, VIC, Australia
3 School Division of Rheumatology, Allergy and Immunology, Massachusets General Hospital, Harvard School of Medicine, Boston, MA, United States | 4 NHMRC Clinical Trials Centre, University of Sydney, Sydney, NSW, Australia

Background
Pain is the main symptom in hip osteoarthritis (OA) and many patients experience recurrent pain exacerbations.

Aims
The purpose of this study is to evaluate the association between hip injury and hip pain exacerbations in persons with symptomatic hip OA.

Methods
We conducted an internet-based case-crossover study to assess potential risk factors, including hip injury, for hip pain exacerbation. Eligible participants with symptomatic hip OA were followed for 90 days and asked to complete online questionnaires at 10-day intervals (control periods). They also logged on to the study website to complete questionnaires in the episode of a hip pain exacerbation (case periods) defined as an increase of 2 points in pain intensity compared with baseline on the numeric rating scale (0-10). Participants were asked whether they had hip injury that limited usual activities (such as falls, sports injuries, etc.) during the last 7 days and whether they experienced any episodes of hip “giving way” in the last 2 days at both control and case periods. The relationship of hip injury and hip “giving way” to the risk of pain exacerbation was examined using conditional logistic regression.

Results
Of 249 patients recruited 133 (53%) and 132 (53%) with both control periods and case periods were included in the analysis of injury and “giving way” respectively. Hip injury during the last 7 days increased the risk of pain exacerbations (odds ratio [OR] 2.74, 95% CI 1.62, 4.62) compared with no injury to the hip. Hip “giving way” during the last 2 days was also associated with an increased risk of hip pain exacerbation (OR 2.50, 95% CI 1.68, 3.73), and showed a significant dose-response relationship between the number of hip “giving way” events and risk of hip pain exacerbations during the last 2 days (≥ 6 vs. 0 episodes; OR 7.86, 95% CI 2.74, 22.55).

Conclusion
The findings of this study indicate that hip injury and episodes of hip “giving way” are significantly related to pain exacerbation in persons with symptomatic hip OA. It allows us to understand the mechanism of pain exacerbation through injury. Reducing and avoiding such episodes may decrease the risk of hip pain exacerbations and improve the pain situation in persons with hip OA.

Keywords
osteoarthritis; hip, pain, internet

Funding and Conflict of Interest
There are no conflict of interest.

Address for correspondence
Kai Fu, Institute of Bone and Joint Research, University of Sydney, Sydney, NSW, 2065; Email: kafu7690@uni.sydney.edu.au
Systems based identification of patients with osteoporotic vertebral fractures

Kirtan Ganda1,2, Jay Pandya and Markus Seibel1,3
1 Department of Endocrinology, Concord Repatriation General Hospital
2 Concord Clinical School, The University of Sydney
3 Bone Research Program, ANZAC Research Institute, The University of Sydney

Background
Secondary Fracture Prevention (SFP) programs exist worldwide to address the ‘care gap’ in osteoporosis management. These programs primarily identify patients with symptomatic non-vertebral fractures. However, asymptomatic vertebral fractures are not systematically identified, despite conferring a higher risk of re-fracture.

Aims
To develop a Natural Language Processing (NLP) method to systematically identify patients with radiographically verified vertebral fractures via searching free-text electronic radiology reports and to determine its clinical utility.

Methods
The study consisted of two phases:
1. Development Phase: used twelve search terms to identify patient reports with vertebral fractures. Each report was reviewed to confirm the presence or absence of vertebral fractures. The total output (number of reports extracted from the search term), and positive predictive value (reports verified as fracture relative to output) was then calculated.
2. Implementation Phase: applied the three most effective search terms from Phase 1 to identify patients with vertebral fractures. The patients were then invited to attend the SFP program for further management.

Results
The search terms with the highest total output in Phase 1 were: ‘Loss of Height’ (LoH), ‘Compression Fracture’ (CoF) and ‘Crush Fracture’ (CrF). During the Implementation Phase, 126 reports were identified, representing 96 individual patients. Sixty-nine patients (72%) had a vertebral fracture, of whom 20 (29%) agreed to attend the SFP program. The term ‘LoH’ was more effective in identifying patients with vertebral fractures compared to ‘CoF’ and ‘CrF’. The term ‘CoF’ was similar to the term ‘CrF’ in its ability to identify vertebral fractures.

Conclusion
Simple NLP methods can be utilised to identify patients with vertebral fractures via electronic radiology report searches. This may be translated to other SFP programs to further narrow the ‘care gap’ in osteoporosis management.

Keywords
system-based; identification; osteoporotic; vertebral; fractures

Funding and Conflict of Interest
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Conflicts of interest
Nil.

Address for correspondence
Dr Kirtan Ganda, Concord Clinical School, The University of Sydney, Hospital Road, Concord, NSW, 2129; Email: Kirtan.ganda@sydney.edu.au
Capsular contracture is not a major contributor to range of motion loss in some patients with frozen shoulder

Luise Hollmann¹, Mark Halaki², Mark Haber³ and Karen Ginn⁴

¹ Faculty of Health, University of Canberra
² Faculty of Health Sciences, University of Sydney
³ Faculty of Medicine, University of Wollongong
⁴ Sydney Medical School, University of Sydney

Background
Frozen shoulder is a common cause of prolonged musculoskeletal disability. It is characterised by the spontaneous onset of pain with progressive movement restriction and is commonly believed to be due to contracture of capsulo-ligamentous tissue at the shoulder. However, treatment aimed at lengthening tight capsulo-ligamentous tissue has proven of limited clinical benefit. It remains unclear to what extent contracture of capsule-ligamentous shoulder tissue is responsible for the significant range of motion loss experienced by patients with frozen shoulder.

Aims
To investigate the role of muscle guarding (active stiffness) to movement restriction in patients with frozen shoulder.

Methods
Passive shoulder abduction and external rotation range of motion (ROM) were measured in patients scheduled for capsular release surgery for frozen shoulder before and after the administration of general anaesthesia

Results
Five patients with painful, global restriction of passive shoulder movement volunteered for this study. Passive abduction ROM increased following anaesthesia in all participants, with increases ranging from 53° to 111°. Three of these participants also demonstrated increases in passive external rotation ROM following anaesthesia ranging from 16° to 42°.

Conclusion
This case series of five patients with frozen shoulder demonstrates that capsule-ligamentous contracture is not a major contributor to movement restriction in all patients who exhibit the classical clinical features of frozen shoulder. These findings highlight the need to reconsider our understanding of the pathoanatomy of frozen shoulder and offer an explanation for why treatment aimed at stretching tight passive structures has not proven to be more effective.

Keyword
frozen shoulder; adhesive capsulitis; contracture; rotator cuff; shoulder pain

Funding and Conflict of Interest
This study did not receive external funding. No conflict of interest was reported

Address for correspondence
Karen Ginn, Discipline of Anatomy & Histology, Sydney Medical School, The University of Sydney, 75 East St, Lidcombe, NSW, 2151; Email: karen.ginn@sydney.edu.au
Optimised structural assessment of ACL reconstruction: development, validation and clinical experience of a novel MRI protocol

Samuel Grasso1, Qing Li1, and David A. Parker2, 3

1 School of Aerospace, Mechanical and Mechatronic Engineering, University of Sydney
2 Northern Clinical School, Sydney Medical School, University of Sydney
3 Sydney Orthopaedic Research Institute

Background
Presently, no standardised methodology and objective criteria exist to accurately and objectively assess tunnel placement and consequent graft orientation in ACL reconstruction (ACLR) through a single imaging modality. Advances in MRI technology have enabled the use of volumetric high spatial and contrast resolution proton density weighted sequencing, which allows precise delineation of graft orientation, tunnel position and quantitative assessment of tunnel position relationship to adjacent reproducible anatomic landmarks.

Aims
To establish a novel and validated MRI-based method, which would provide an accurate and standardised assessment of tunnel placement in ACL reconstructed knees as a component of assessing ACLR outcomes, whilst also providing a whole joint assessment, and to demonstrate its utility in assisting with pre-surgical planning for revision ACLR.

Methods
To validate the new MRI protocol, 24 revision ACLR patients underwent 3T MRI, 3D-CT and intraoperative registration of existing bone tunnels during surgery. Surface models from the imaging datasets were generated and aligned to the intraoperative data to measure accuracy of the models at the tunnel aperture. The tunnel aperture location was evaluated relative to a location called Surgical Placement of Optimised Tunnel (S.P.O.T) using reproducible bony landmarks. To date, 148 patients have undergone the new MRI protocol 12m postoperatively to objectively assess the positioning and signal of their ACL reconstruction, as part of the clinical pathway and return to sport assessment within our clinic.

Results
Validation results showed that the MR protocol can assess placement of tunnel apertures within 0.6±0.24 mm. The mean deviation of the femoral tunnel aperture centre from the S.P.O.T location was 4.3±3.4 mm (S-I) and 3.5±3.8 mm (A-P), respectively. At the tibia, the mean deviation was 3.8±3.4 mm (M-L) and 2.9±3.7 mm (A-P).

Conclusion
Accurate assessment of tunnel position is a critical variable to include when evaluating outcomes of ACLR. Establishment and validation of a new specialised MR protocol provides an accurate and accessible platform for standardised assessment of bone tunnel placement, whilst also allowing whole joint assessment. The utility of this technique includes clinical and research applications, and inclusion of this protocol should be considered in routine postoperative assessment, pre-surgical planning for revision surgery, and also in any study attempting to analyse outcomes of ACLR in a meaningful manner.

Keywords
anterior cruciate ligament; ACL reconstruction; tunnel position; MRI; validation

Funding and Conflict of Interest
Nil.

Address for correspondence
Samuel Grasso, School of Aerospace, Mechanical and Mechatronic Engineering, University of Sydney, NSW, 2006; Email: sgra8795@uni.sydney.edu.au
Evidence-based care (EBC) in high- and low-risk groups following whiplash injury: A multi-centre inception cohort study

Griffin, AR.,1,2 Jagnoor, J.,2,3 Arora, M.,2 Cameron, ID.,2 Kifley, A.,2 Sterling, M.,4 Kenardy, J.,5 Rebbeck, T.1,2

1 Faculty of Health Sciences, The University of Sydney
2 John Walsh Centre for Rehabilitation Research, Royal North Shore Hospital.
3 The George Institute for Global Health, The University of Sydney.
4 RECOVER Injury Research Centre, Griffith University.
5 NHMRC Centre of Research Excellence in Road Traffic Injury, Griffith University.

Background
In New South Wales, Australia, clinical practice guidelines aim to inform the management of acute whiplash-associated disorders (WAD). However, little is known as to whether guideline-based recommendations are associated with improved recovery. Given recovery following whiplash is poor, it is important to establish the relationship with provision of evidence-based care (EBC) and recovery. Mitigating the effect of EBC is how it is delivered, namely the therapeutic relationship.

Aims
To evaluate whether EBC is differentially provided to people with whiplash, stratified for risk. Secondary aims were to determine whether risk status, receiving EBC and the therapeutic relationship, are associated with outcome at 3 months.

Methods
Multi-centre inception cohort study of individuals with acute whiplash (<28 days). Participants completed interviews at baseline (assessing risk of non-recovery and health outcomes) and 3 months (assessing EBC, therapeutic relationship and recovery). Treating primary healthcare professionals (HCP) also completed questionnaires at 3-months.

Results
The majority of the cohort received EBC, including correct application of the Canadian C-Spine Rule (73%), and active treatments including exercise (69%). However, the ability of primary HCPs to identify individuals at high risk of non-recovery and tailor management accordingly was poor. Both risk level and the therapeutic relationship (OR 1.3 95%CI 1.1-1.6) were associated with recovery at 3 months.

Conclusion
Compliance with guideline-based content, such as providing active treatment, was implemented well in this cohort. However, process of care recommendations such as routine risk identification and matched care was not followed. Clinicians should identify risk and develop rapport with their patients for health outcomes to improve.

Keywords:
whiplash injury; evidence-based health care; clinical practice guidelines; practice guidelines; cohort

Funding and Conflict of Interest
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Address for correspondence
Ms Alexandra Griffin | Faculty of Health Sciences | The University of Sydney | 75 East St Lidcombe NSW 2141
Email: agri3036@uni.sydney.edu.au
Altered glenohumeral and axioscapular muscle patterning in people with chronic shoulder pain

Mark Halaki1, Ian Cathers2, Craig Boettcher3, and Karen Ginn4

1 Exercise and Sport Science, Faculty of Health Sciences, The University of Sydney
2 School of Science, Faculty of Health Sciences, Australian Catholic University
3 Regent Street Physiotherapy, Newcastle
4 Discipline of Anatomy and Histology, Sydney Medical School, The University of Sydney

Background
Optimal exercise therapy for people with shoulder pain is unknown due to limited information regarding specific changes in shoulder muscle function associated with pain. Timing of muscle activity with respect to movement can provide information about muscle recruitment patterns without requiring electromyography data normalisation, which is problematic in the presence of pain.

Aims
The aim of this study was to compare the timing of glenohumeral and axioscapular muscle recruitment in people with and without shoulder pain during cyclical shoulder movement.

Methods
Fourteen people with shoulder pain and 14 without pain were recruited. Electromyography from nine shoulder muscles was recorded. Approximately 20 cycles of small range (30°-45°) rapid shoulder flexion/extension task were performed in standing with the arm by the side. Shoulder movement was measured using a draw-wire. A cross-correlation and spectrographic analysis provided a measure of phase (relative timing of muscle activity with respect to movement) at the movement frequency per muscle per subject. T-tests were used to compare mean phase values between groups.

Results
Subjects with shoulder pain had greater variability in the relative timing compared to no pain group. The relative timing was significant different between groups in all muscles (p<0.05) except subscapularis (p=0.64) and latissimus dorsi (p=0.11).

Conclusion
People suffering from chronic shoulder pain recruit axioscapular and glenohumeral (including rotator cuff) muscles in patterns which differ from asymptomatic subjects. Exercise strategies focusing on the restoration of normal motor patterning and not simply muscle strengthening should form part of the rehabilitation of chronic shoulder pain conditions.

Keywords
shoulder pain; shoulder muscle recruitment timing; shoulder muscle activation timing; shoulder motor patterning; shoulder motor control;

Funding and Conflict of Interest
This study did not receive external funding. No conflict of interest was reported.

Address for correspondence
Mark Halaki, Exercise and Sport Science, The Faculty of Health Sciences, The University of Sydney, 75 East St, Lidcombe, NSW, 2151; Email: mark.halaki@sydney.edu.au
Activity and Mobility Using Technology (AMOUNT) rehabilitation trial-support and health coaching during the community program

Hassett L1,2, van den Berg MEL3, Weber H3, Rabie A4, Chagpar S1, Wong S4, Schurr K4M, McCluskey MA2, Lindley R5, Crotty M3, Sherrington C1
on behalf of the AMOUNT rehabilitation trial team1

1 Musculoskeletal Health Sydney, School of Public Health, University of Sydney
2 Faculty of Health Sciences, University of Sydney
3 Department of Rehabilitation, Aged and Extended Care, Flinders University
4 South Western Sydney Local Health District
5 Westmead Clinical School, University of Sydney

Background
Technologies to support ongoing exercise are likely to become increasingly important as the proportion of older people in the population increases and rehabilitation resources become limited.

Aim
To describe physiotherapy support provided to participants using technology to improve mobility and physical activity in the post-hospital phase of the AMOUNT rehabilitation trial.

Methods
Process evaluation including participants (mean age 70 (SD18)) randomised to the intervention group (n=149). Intervention was additional to standard rehabilitation, prescribed using a protocol which matched games/exercises from eight technologies to the participant’s mobility limitations. Technologies included video and computer games/exercises, tablet applications and activity monitors. Participants were taught to use the technologies during inpatient rehabilitation and were then discharged home to use the technologies ≥ 5 days a week for the remainder of the 6-month trial. Trial protocol required the physiotherapist to provide support every 1–2 weeks using a health coaching approach. Intervention datasheets were audited to determine frequency, duration, mode and type of support provided.

Results
Physiotherapists had contact with participants on average 15 (SD5) times (approximately every 11 days), of which eight were phone calls (11min duration), six home-visits (46min duration) and one other. Contact primarily incorporated health coaching (68%) with 8% for technology support. Topics discussed during health coaching included discussing data from prescribed technologies (79%), physical activity and mobility status (70%), adherence (64%) and goal setting (47%).

Conclusion
A health coaching model to support technology-based rehabilitation post hospitalisation is feasible. Some support can be provided remotely limiting the need for frequent home visits.

Keywords
rehabilitation; health coaching; technology; mobility; physical activity

Funding and Conflict of Interest
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Address for correspondence
Leanne Hassett, Musculoskeletal Health Sydney, University of Sydney. Level 10, KGV Building, Missenden Rd, Camperdown, Sydney, NSW, 2050; Email: Leanne.hassett@sydney.edu.au
Efficacy of a sleep quality intervention for people with low back pain: Feasibility randomized co-twin controlled trial

Ho KK1, Pinheiro MB1, Ferreira ML2, Refshauge K1, Grunstein R3, Hopper JL4,
Maher CG5, Koes B6, Ordoñana JR7, Simic M1, Ferreira PH1

1 Faculty of Health Sciences, The University of Sydney | 2 The George Institute for Global Health and Institute of Bone and Joint Research, The Kolling Institute, Sydney Medical School, The University of Sydney | 3 CIRUS, Centre for Sleep and Chronobiology, Woolcock Institute of Medical Research, University of Sydney and Sydney Health Partners | 4 Centre for Epidemiology and Biostatistics, Melbourne School of Population and Global Health, The University of Melbourne | 5 The George Institute for Global Health, Sydney Medical School, The University of Sydney | 6 Department of General Practice, Erasmus MC, Rotterdam, The Netherlands | 7 Murcia Twin Registry, Department of Human Anatomy and Psychobiology, University of Murcia, and IMIB-Arrixaca, Murcia, Spain

Background

Over 59% of people with low back pain (LBP) have insomnia symptoms. Emerging evidence suggests that sleep interventions can improve pain and insomnia symptoms in people with LBP. In addition, genetic factors account for up to 67% of the variance of LBP and 33% of the variance of insomnia.

Aims

To establish the feasibility of a randomised co-twin controlled trial exploring the efficacy of a six week online sleep quality intervention for improving pain in people with LBP, allowing for control of genetic factors.

Methods

60 twins and 30 people with LBP (>6 weeks) will be recruited in collaboration with Twins Research Australia. Participants receive either an online insomnia intervention or an online education control. Patient outcomes are collected electronically at baseline, post-treatment, and 3-months follow-up. Feasibility outcomes include recruitment rate, adherence, follow-up rate and patient opinions. ACTRN12615000672550

Results

Preliminary results: Of 711 pairs approached from 2016-2017, 12 pairs completed the study (1.7% recruitment rate). Participants' baseline mean age was 47 years (SD=11, range 29-59, 75% female), LBP intensity 44.3/100 (SD=17.8), and mean insomnia severity 17/28 (SD=4.2). Adherence rate was 64% and dropout 12.5%. The Sleepio program appears to be better than control in improving insomnia severity (mean difference: 4.88, CI 95% 0.64 to 9.1) and pain self-efficacy (-11.5, -22.86 to -0.19) at post-intervention.

Conclusion

This trial is still underway, however preliminary findings reveal slow recruitment as both twins need to consent and be eligible. Efficacy of the sleep intervention on clinical LBP outcomes are yet to be determined.

Keywords

low back pain; sleep; cognitive behavioural therapy; randomised control trial; twins

Funding and Conflict of Interest

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Address for correspondence

Kevin Ho, Faculty of Health Sciences, University of Sydney, C&RS FRG, O Block, 75 East St, Lidcombe, Sydney, NSW 2141, Email: kevin.ho@sydney.edu.au
Exercise as medicine – evidence for prescribing exercise for Australia’s nine national health priority areas: An umbrella review

Philippa Inge¹, Nirmala Kanthi Panagodage Perera¹, Leigh Golding¹, John Orchard ¹,²

¹ Australasian College of Sport and Exercise Physicians
² School of Public Health, University of Sydney

Background
The Australian National Health Priority Areas (NHPA) were established in 2006. Currently no reviews are available to explore the effect of exercise as part of a treatment regimen for Australia’s nine NHPAs.

Aims
Umbrella review of the empirically published literature to describe the relationship of exercise on Australia’s nine national health priority areas (NHPAs).

Methods
CINAHL, Cochrane Database of Systematic Reviews, PubMed and SPORTDiscus were searched from 2007 to 2017. Systematic reviews and meta-analyses reporting the effect of exercise on the development of conditions in nine NHPAs and of treating eight areas (all excepting injury prevention) were included.

Results
75 reviews fulfilling inclusion criteria were synthesised. Moderate exercise effectively treats and manages symptoms of osteoarthritis and prevents recurrences of lower back pain. Exercise improves maximal oxygen uptake in patients with asthma, prevents breast cancer and reduces hospital admissions for patients with heart failure. Physical activity significantly reduces the risk of type 2 diabetes mellitus and helps weight control. Exercise reduces the risk of vascular dementia, delays cognitive decline, and is effective in falls prevention. Exercise reduces symptoms of anxiety and is an effective treatment for people with depression.

Conclusion
Overall, exercise had a positive/beneficial effect (either in prevention or treatment) in all nine NHPAs. However, it does not have universal beneficial effect for every sub-disease in the on the NHPAs possibly due to unavailability of comprehensive studies and/or some adverse effects associated with exercise. Dose-response is evident for exercise in cardiovascular disease, injury prevention, arthritis and musculoskeletal conditions thus there is a need for accurate, evidence-based guidelines to maximise benefits of exercise whilst avoiding harmful effects.

Keywords
Exercise; health priority; injuries; musculoskeletal; cancer

Funding and Conflict of Interest
Authors declare there are no direct conflicts of interest relevant to the context of this review. Indirectly all authors practice and/or research in the field of Exercise Medicine. No funding was received for this review.

Address for correspondence
Email: lgolding@doctors.org.uk
Knock-down of the vitamin D receptor in human breast cancer cells increases metastatic potential to bone via a Wnt/ E-cadherin signaling pathway

Konstantin Horas1, Yu Zheng1, Colette Fong-Yee1, Yunzhao Chen1, Jeremy Qiao1, Mingxuan Gao1, Nancy Mourad2, Michelle McDonald2, Peter Croucher2, Hong Zhou1,3,4, Markus J. Seibel1,3,4

1 Bone Research Program, ANZAC Research Institute, The University of Sydney | 2 Garvan Institute of Medical Research, University of New South Wales | 3 Department of Endocrinology & Metabolism, Concord Hospital | 4 Concord Clinical School, The University of Sydney.

Background and Aims

Up to 40% of patients with breast cancer develop skeletal metastases. We have previously demonstrated that vitamin D deficiency promotes breast cancer growth in bone, mostly through changes in the bone microenvironment. Here we aimed to further define the role of the vitamin D receptor (VDR) in systemic breast cancer spread to bone.

Methods

Following knock-down of VDR expression in the human breast cancer cell line, MDA-MB-231 (MDAVDR-/-), and subsequent luciferase gene transfection, both MDAVDR-/- and non-target (NT) control cells were injected via the intra-cardiac route into female nude mice (n= 73). Systemic cancer cell spread and local tumour growth were monitored by sequential in vivo bioluminescent and high resolution X-ray imaging for 30 days. At endpoint, affected bones were analysed by µ-CT, histomorphometry and immunohistochemistry (IHC). Cancer cells were isolated from the bone marrow via FACS and quantitative data were generated for days 3, 7, 14 and 21 post injection. VDR, E-cadherin and ß-catenin expression levels in MDAVDR-/- and NT cells were analysed both in vitro (Western blot) and in vivo (IHC) to determine whether loss of VDR affects the expression of cell adhesion proteins. In a translational approach, VDR, CYP24A1, E-cadherin and ß-catenin expression were measured by IHC in clinical breast cancer specimens (n=170) and correlated with tumour characteristics and disease progression over 5 years.

Results

Compared to NT controls, MDAVDR-/- cells demonstrated increased cell migration and cell invasion in vitro. This was associated with significantly reduced protein expression (Western blot) of ß-catenin and E-cadherin in MDAVDR-/- compared to NT cells. Following intra-cardiac injection, systemic spread occurred earlier and the number of cancer cells found in the bone marrow was significantly greater at all time points in MDAVDR-/- injected mice compared to those receiving NT cells. Protein expression of E-cadherin was significantly reduced in tumours derived from MDAVDR-/- cells compared to NT-derived lesions. Analysis of human breast cancer specimens confirmed a strong association between VDR expression, tumour grade and patient prognosis. Of note, CYP24, ß-catenin and E-cadherin protein expression were positively associated with VDR expression.

Conclusion

We conclude that loss of the VDR in human breast cancer promotes cell mobility, systemic spread and skeletal tumour burden by altering ß-catenin and E-cadherin expression.

Keywords

vitamin D; vitamin D receptor; breast cancer; bone metastasis; breast cancer metastasis

Funding and Conflict of Interest

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Address for correspondence

Markus J Seibel, Bone Research Program, ANZAC Research Institute, University of Sydney, Hospital Road, Concord, NSW, 2139; Email: markus.seibel@sydney.edu.au
Rotation in total knee replacement – are we accurate?

HW Jacobs, Daniel Marsden-Jones, W Walter
Specialist Orthopaedic Group, Mater Hospital Wollstonecraft, NSW

Background
Accuracy of the rotational profile in total knee replacements (TKR) is imperative. The aim is coronal conformity between the femoral and tibial implants with parallelism between the two. Landmarks of measuring femoral rotation include Whiteside’s line, transepicondylar axis (TEA) and posterior condylar axis (PCA) with fair accuracy. Less has been written on tibial rotation and the accuracy thereof. Classically the medial third of the of the patellar tendon insertion (tibial tuberosity) is used but other landmarks include the long axis (medial to lateral) of the plateau, anterior edge of the tibia, symmetry of tibial plateau, transmalleolar axis or second metatarsal.

Aims
The aim of this study is to determine tibial rotation accuracy post TKR when medial third of the tibial tuberosity is used as reference.

Methods
Following TKR CT scans were done of the lower limb as per standard protocol. Rotational measurements were done on inteleviewer with the use of the series function translating landmarks to other CT slices. The rotation of the tibial tray was compared to preoperative tibial rotation and postoperative femoral rotation.

Results
The femoral rotation was more accurate with mean internal rotation (IR) of the posterior condylar line of the femur 5.1deg (range 1.69 to 10.06) preoperative and 4.03deg (range -1.31 to 10.96) postoperative. Tibial rotation differed more with mean IR 4.32 (range -4.86 to 10.37) preoperative and 2.84 (range -1.85 to 10.91).

Conclusion
Post total knee replacement, only 35% of the tibial rotation measurements aligned to the medial third of the tibial tuberosity. There is also less internal rotation of the tibial baseplate than the femoral component. Accuracy of the tibial rotation is therefor variable and other methods to improve accuracy should be explored.

Keywords
rotation; accuracy; transepicondylar axis; total knee replacement; tibial tuberosity

Funding and Conflict of Interest
No conflict of interest

Address for correspondence
HW Jacobs, Specialist Orthopaedic Group, Mater Clinic, Suite 1.08, 3-9 Gillies Street, Wollstonecraft, NSW. 2065
Email: hanswjacobs@gmail.com
Mortality rates of hip resurfacing compared to total hip arthroplasty

Christopher Jones¹, S. Graves², M. Lorimer², W. Walter¹

¹ Suite 1.08, 3 Gillies St, Wolstonecraft, NSW, 2065
² Department of Orthopaedics, University of Sydney

Background

Increased interest has followed reports of low revision rates for hip resurfacing in young active males with >50mm femoral heads. Recent studies from the British National Joint Registry have demonstrated a difference in mortality between resurfacing and total hip replacement (THR).

Aims

We aimed to study adjusted mortality rates between hip resurfacing and other forms of THR in the Australian population.

Methods

We reviewed data from the AOANJRR. We studied mortality and yearly cumulative percent survival (CPS) in all primary hip resurfacing and conventional total hip replacement (THR) procedures performed for osteoarthritis since 1999. Results were further analysed by age, gender, ASA and method of fixation.

Results

There were 12,910 hip resurfacings (79% male) and 234,484 THR (46.8% male). When adjusted for age and gender, there was a difference in CPS between THR and hip resurfacing (HR 1.66, p<0.001), between cemented THR and hip resurfacing (HR 2.19, p<0.001), between uncemented THR and hip resurfacing (HR 1.58, p<0.001) and between hybrid THR and hip resurfacing (HR 1.82, p<0.001). When adjusted for ASA (for the 3-years where data was available), there was no difference in CPS between hip resurfacing and any individual fixation type of THR.

Conclusion

There is a difference in age and sex adjusted survival for hip resurfacing compared to THR, which varies with fixation methods for THR. These findings are consistent with previous studies. This difference may be due to confounding from patient selection, which is supported by the lack of difference in survival when adjusted for ASA grade.

Keywords

total hip arthroplasty; total hip resurfacing; cement; revision; survivorship; mortality

Funding and Conflict of Interest

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Address for correspondence

W.L. Walter.
Suite 1.08, 3 Gillies St, Wolstonecraft, NSW, 2065, Australia. Email: bill.walter@hipknee.com.au
Integrating care for pain and lifestyle-related health risk factors:
Cohort multiple RCT

Kamper SJ1, Williams CM2, O’Brien K2, Williams AJ2, Robson E2, Haskins R3, Yoong S2,
Campbell E2, Hodder R2, Wolfenden L2, Wiggers J2

1 School of Public Health, University of Sydney | 2 Hunter New England Local Health District Population Health, and School of Medicine and Public Health, University of Newcastle Ambulatory Care, John Hunter Hospital

Background
Recent evidence shows that people with chronic musculoskeletal pain have higher prevalence of lifestyle-related health risk factors such as obesity, inactivity, smoking and alcohol misuse than the general population.

Aims
To develop a model of care for patients with musculoskeletal pain that integrates clinical care with support for healthy lifestyle, and evaluate its effectiveness on patient-centred outcomes.

Methods
Cohort multiple RCT. A longitudinal cohort was established including patients referred for orthopedic consultation at John Hunter Hospital using annual telephone surveys. Patients from the cohort were included into two RCTs; for knee OA (n=120) and back pain (n=160). The intervention group were offered a single clinical consult with a physiotherapist and referral to a telephone-based healthy lifestyle coaching service. Control participants remained on the wait-list. Following completion of these RCTs, a 3rd trial was designed to address some identified issues with the intervention, this RCT (n=346) is currently underway.

Results
Members of the cohort with back pain or OA had high rates of overweight, smoking and alcohol misuse. In our initial RCTs, the intervention was not successful in reducing pain and disability. However, attendance to the clinical consultation was poor (<50%) and most participants received 5 or fewer of the scheduled 10 telephone coaching calls. The current NHMRC-funded RCT includes a more intensive clinical intervention (4 sessions), and measures designed to better integrate the clinical, and health coaching service components.

Conclusion
The cohort multiple RCT offers an efficient model for evaluating and refining successive iterations of health interventions.

Keywords
integrated care; cohort multiple RCT; musculoskeletal pain; lifestyle risk factors; health coaching

Funding and Conflict of Interest
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Address for correspondence
Steven J Kamper, School of Public Health, University of Sydney, PO Box M179 Missenden Rd, Camperdown, NSW, 2050;
Email: steven.kamper@sydney.edu.au
Cross-cultural adaptation, reliability and validation of the Nepali version of the Disability of Arm, Shoulder and Hand (DASH) questionnaire

KC S1, Sharma S2, Almadi T1, Ginn K1, Reed D1
1 Sydney Medical School, University of Sydney
2 School of Medical Sciences, Kathmandu University

Background

Patient-reported outcome measures are important tools in both clinical practice and research. No upper extremity patient-reported outcome measure is available in Nepali. The most commonly used and recommended measure for shoulder pain is the 30-item Disability of Arm, Shoulder and Hand (DASH) questionnaire.

Aims

To translate and cross-culturally adapt the DASH into Nepali and evaluate its psychometric properties.

Methods

The translation and cultural adaption process followed international standard procedures. The translated questionnaire was completed by 156 participants at an initial assessment and 138 at follow-up. A Nepali version of Global Rating of Change was also completed at follow-up and was used as an external anchor to dichotomize improved and stable participants. Internal consistency (Chronbach α), Minimal Detectable Change (MDC), test-retest reliability (Interclass Correlation Coefficient ICC), concurrent validity (Spearman’s Correlation=ρ) and responsiveness (area under receiver operator curves (AUC) with minimal important change) were determined.

Results

Cultural adaptions such as ‘5kg’ instead of ‘10lbs’, ‘bowling in cricket’ instead of ‘golf’ were incorporated. Questions on recreation and sexual activity had low response rates (<75%) with participants commonly reporting ‘not usual activities in rural areas’ and ‘cultural sensitivity’ respectively as reasons for omission. Excellent internal consistency (α=0.92), MDC=11 and test-retest reliability (ICC=0.97, 95%CI:0.94-0.98, p<0.001) were demonstrated. Moderate concurrent validity (ρ=0.40, p<0.001) and AUC=0.69, p<0.001 with minimal important change of 11.2 indicated a responsive outcome measure.

Conclusion

The Nepali version of DASH was easily understood and administered without any lingual difficulty. It has excellent validity, reliability and responsiveness properties and would be recommended for use in a Nepali context.

Keywords

DASH, Nepali translation, reliability, validity, responsiveness

Funding and Conflict of Interest

None Declared

Address for correspondence

Sudarshan KC, Discipline of Biomedical Science, Sydney Medical School
The University of Sydney, Lidcombe, NSW 2141, AUSTRALIA. Email: sukc5405@uni.sydney.edu.au
Dietary fat independent of caloric intake impairs cortical bone structure via glucocorticoid signaling in osteoblasts and osteocytes

Sarah Kim1, Holger Henneicke1, Sylvia J. Gasparini1, Markus J. Seibel1,2,3, Hong Zhou1,2,3

1 Bone Research Program, ANZAC Research Institute, University of Sydney, Sydney
2 Department of Endocrinology & Metabolism, Concord Hospital, Sydney
3 Concord Clinical School, The University of Sydney, Sydney, Australia.

Background and Aims
High-fat diets adversely affect bone morphology, strength and development while simultaneously increasing systemic glucocorticoid levels. We hypothesized that a mechanistic link exists between high dietary fat content, increased glucocorticoid signaling in osteoblasts and osteocytes and structural bone changes. We tested this hypothesis in a transgenic (tg) mouse model in which glucocorticoid signaling has been selectively disrupted in osteoblasts and osteocytes via targeted overexpression of the glucocorticoid-inactivating enzyme, 11β-hydroxysteroid dehydrogenase type 2.

Methods
Seven-week-old male tg mice and their wild type (WT) littermates (n=12-15/group) were fed ad libitum a control diet (13.8kJ/g total energy (TE), 14% TE as fat, 26% TE as protein) or an isocaloric high-fat diet (iHFD; 13.8kJ/g TE, 43% of TE as fat, 26% TE as protein) for 18 weeks. Body weight and food intake were measured weekly and serum corticosterone (CS) levels were quantified after 10 weeks of feeding. At endpoint, body composition was assessed by DXA, and both the L3-vertebra and tibia were analyzed by micro-CT.

Results
As animals were fed an isocaloric diet, changes in body weight, lean mass and fat mass did not differ between groups. Mice fed the iHFD had higher serum CS concentrations than mice on the control diet (iHFD: 365±24nM CS vs. control: 291±33nM CS; p=0.07). Serum CS levels in WT and tg mice fed the same diets were similar (control: WT 288±32nM CS, Tg 295±56nM CS; iHFD: WT 352±36nM CS, Tg 378±33nM). Isocaloric high-fat feeding resulted in significant loss of tibial cortical volume (WT: -14% vs. tg:-1%, p<0.01), cortical thickness (WT: -15% vs. tg: -1%, p<0.05) and area (WT: -14% vs. tg:-1%, p<0.01) in WT but not tg mice when compared to their respective controls. Similarly, WT iHFD mice exhibited loss of tibial trabecular bone mass when compared to WT controls (BV/TV: -23%, p=0.07). This difference was due to a decrease in trabecular number and a corresponding increase in trabecular separation, while trabecular thickness remained unaffected. In iHFD tg mice, tibial trabecular bone was not significantly affected compared to control fed tg mice (BV/TV: -15%, p=0.54). Trabecular bone in the vertebra was unaffected in both WT and tg iHFD mice.

Conclusion
We conclude that high dietary fat intake, independent of overall caloric intake and obesity induces severe loss of cortical bone via glucocorticoid signaling in osteoblasts and osteocytes.

Keywords
glucocorticoid; high-fat diets; osteoblasts; osteocytes; bone loss

Funding and Conflict of Interest
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Address for correspondence
Hong Zhou, Bone Research Program, ANZAC Research Institute, University of Sydney, Hospital Road, Concord, NSW, 2139; Email: h.zhou@sydney.edu.au
Compartmental distribution of osteoarthritic features amongst people with chronic knee pain: A magnetic resonance imaging study

Sarah Kobayashi¹, Evangelos Pappas¹, Marlene Fransen¹, Kathryn Refshauge¹, and Milena Simic¹

¹University of Sydney, Faculty of Health Sciences

Background
Knee osteoarthritis (OA) is a highly prevalent chronic joint condition leading to pain, activity limitations and poor quality of life. The knee is comprised of three compartments; the patellofemoral (PF), medial and lateral tibiofemoral (TF) compartments. There is evidence that the different compartments exhibit unique risk factors, which could lead to disease phenotyping. However, this is limited evidence to show compartmental patterns of OA in a knee OA cohort.

Aim
To explore the prevalence of osteoarthritic features identified on magnetic resonance imaging (MRI), in the compartments of the knee amongst people with chronic knee pain.

Methods
304 MRI scans from people aged 45 to 75 years with chronic knee pain participating in a randomised clinical trial evaluating dietary supplements were assessed. The MRIs were evaluated by the primary investigator (SK) using the MRI Osteoarthritis Knee Score (MOAKS). Bone marrow lesions (BML) size, cartilage loss and osteophytes were assessed on sagittal, axial and coronal plane scans. The knee was divided into the patellofemoral (PF), medial TF and lateral TF compartments. Weighted kappa was used to assess intra-rater reliability. Frequency and vend diagrams were used to assess prevalence patterns of OA features in the compartments.

Results
For all severities of BML size and full thickness cartilage loss, isolated PF involvement was the most common pattern (BML: 7.9 – 15.1%; cartilage loss: (13.2 – 20.7%). Tricompartmental patterns (14.8 – 22.4%) were the most common for osteophytes, followed by combined PF joint and medial TF joint involvement (13.8%) for mild osteophytes.

Conclusion
Amongst a cohort of people with chronic knee pain, there was more involvement in the PF joint than the TF joint. Management strategies for knee OA should target risk factors for the PF joint.

Keywords
knee, osteoarthritis, magnetic resonance imaging, prevalence, compartment

Funding and conflict of interest
The MRI scans that were used for this manuscript came from the Longitudinal Evaluation of Glucosamine Sulfate (LEGS) trial, which was funded by the National Health and Medical Research Council of Australia (ID: 402511), the Department of Health and Aging (Australia) (ID 402781) and by some supplementary funding (<15% total) from Sanofi-Aventis Consumer Healthcare Pty Ltd, Australia. The funders had no role in the design of the study; collation, analysis or interpretation of the data; or preparation, review or approval of the manuscript.

Address for correspondence
Sarah Kobayashi, Musculoskeletal Health Group, University of Sydney, Faculty of Health Sciences, 75 East Street, Lidcombe NSW 2141
Email: skob9241@uni.sydney.edu.au
The effectiveness of an app with remote support for improving adherence to home exercise programs prescribed by physiotherapists: A randomised trial

Tara Lambert¹, Lisa A. Harvey², Christos Avdalis¹, Lydia Chen¹, Sayanthinie Jeyalingam¹, Carin Pratt¹, Holly Tatum¹, Jocelyn Bowden² and Barbara Lucas¹

¹ Royal North Shore Hospital, University of Sydney
² John Walsh Centre for Rehabilitation Research, Kolling Institute, University of Sydney

Background

Adherence to prescribed home exercise programs is often poor, resulting in poor outcomes for patients. The development of mobile technology and apps may provide a platform to improve adherence in this group, but there is currently no high quality evidence to support this hypothesis.

Aims

To assess the effect of home exercise programs delivered through an app with remote support on adherence in people with musculoskeletal conditions.

Methods

Design: Randomised, parallel-group trial with intention-to-treat analysis.

Participants: Eighty participants with upper or lower limb musculoskeletal conditions who were prescribed a 4-week HEP by a physiotherapist at Royal North Shore Hospital were recruited to the trial. Participants were randomly assigned via a computer-generated concealed block randomisation procedure to either intervention (n = 40) or control (n = 40) groups between 25/02/16 and 13/01/17.

Intervention: Participants in the intervention group received their HEPs on an app linked to www.physiotherapyexercises.com. They also received supplementary phone calls and motivational text messages. Participants in the control group received their HEPs as a paper handout.

Outcome measures: Outcome measures were collected at baseline and at 4 weeks by blinded assessors. The primary outcome was self-reported exercise adherence.

Results

Outcomes were available on 77 participants. The mean between-group difference for self-reported exercise adherence at 4 weeks was 1.3/11 points (95% CI, 0.2 to 2.3), favouring the intervention group.

Conclusion

Patients with musculoskeletal conditions better adhere to their HEPs when these are provided to them on an app with remote support compared to paper handouts, however, the clinical importance of this added adherence is unclear.

Keywords

adherence; musculoskeletal; behavior change; therapeutic exercise

Funding and Conflict of Interest

Ramsay Research and Teaching Fund

Address for correspondence

Tara Lambert, Physiotherapy Department, Royal North Shore Hospital, Sydney Australia.
Email: tara.lambert@health.nsw.gov.au
Repair of large bone defects in sheep using novel bioceramic implants

Jiao Jiao Li¹, Seyed-Iman Roohani-Esfahani¹, Colin R. Dunstan¹, Terrence Quach¹, Roland Steck², Siamak Saifzadeh², Peter Pivonka³, and Hala Zreiqat¹

¹ Biomaterials and Tissue Engineering Research Unit, School of Aerospace, Mechanical and Mechatronic Engineering, University of Sydney | ² Institute of Health and Biomedical Innovation (IHBI), Queensland University of Technology | ³ St Vincent’s Department of Surgery, University of Melbourne

Background
Musculoskeletal disease is a primary co-morbidity contributing to disability, frailty, and unhealthy ageing. Large bone defects, arising from traumatic injury or tumour resection, are a common cause of musculoskeletal disease and their effective treatment remains a significant clinical challenge. Defects involving segmental bone loss are particularly difficult to treat, and often fail to heal from conventional reconstructive methods such as bone grafting. To address this clinical need, we developed a bioactive ceramic named baghdadite, which can be fabricated into highly porous scaffold implants for repairing large bone defects.

Aims
To evaluate the efficacy of using baghdadite scaffolds to induce healing of large bone defects in a clinically relevant in vivo model.

Methods
Baghdadite scaffolds (unmodified or modified with a nanocomposite coating to improve toughness) were implanted into critical-sized segmental bone defects in sheep tibiae (n=8) for 26 weeks. Radiographic, biomechanical, micro-CT and histological analyses were performed on the explanted bone containing the implants.

Results
The unmodified and modified baghdadite scaffolds achieved similar outcomes of defect repair, although the latter had an initial mechanical advantage due to the nanocomposite coating. Both unmodified and modified baghdadite scaffolds withstood physiological loads at the defect site, and induced substantial bone formation without the addition of cells or growth factors. Notably, all samples achieved significant bridging of the critical-sized defect (average 80%), with evidence of bone infiltration and remodelling within the implants.

Conclusion
Baghdadite scaffolds show promise for clinical translation as purely synthetic bone graft substitutes to augment the reconstruction of large bone defects.

Keywords
bone graft substitute; bioactive ceramic; scaffold; critical-sized bone defect; sheep model

Funding and Conflict of Interest
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Address for correspondence
Jiao Jiao Li, Kolling Institute, University of Sydney, Reserve Road, St Leonards, NSW, 2065; Email: jiaojiao.li@sydney.edu.au
Anticonvulsants for the treatment of lumbar radicular pain

Christine Lin¹, Stephanie Mathieson¹, Chris Maher¹, Andrew McLachlan², Jane Latimer¹, Bart Koes³, Mark Hancock⁴, Ian Harris⁵, Ric Day⁶, Laurent Billot⁷, Justin Pik⁸, Steve Jan⁷, Oliver Enke⁹, Heather Newⁱ⁰ and Charles New⁹

¹Musculoskeletal Health Sydney, Sydney School of Public Health, The University of Sydney | ²Faculty of Pharmacy and Centre for Education and Research on Ageing, The University of Sydney | ³Department of General Practice, Erasmus University Medical Center | ⁴Faculty of Human Sciences, Macquarie University | ⁵The South Western Sydney Clinical School, Faculty of Medicine, University of New South Wales | ⁶St Vincent’s Clinical School, Faculty of Medicine, University of New South Wales | ⁷The George Institute for Global Health, University of New South Wales | ⁸ACT NeuroSpine Clinic, Deakin, Australian Capital Territory | ⁹Sydney Medical School Nepean, The University of Sydney | ¹⁰Westmead Hospital

Background
Anticonvulsant medications are increasingly used to treat lumbar radicular pain, but the evidence is limited.

Aims
To examine the efficacy and safety of anticonvulsants in lumbar radicular pain

Methods
We conducted a randomised controlled trial where people with sciatica received either the anticonvulsant medication pregabalin (up to 600mg/day) or placebo for up to 8 weeks. Outcomes, including leg pain intensity (primary), disability and adverse events, were measured over 1 year, with Week 8 as the primary time-point.

Additionally, a systematic review was conducted for clinical trials comparing anticonvulsants to placebo in lumbar radicular pain (sciatica and spinal stenosis). Studies had to report pain intensity, disability or adverse event outcomes. Data were pooled where possible. The level of evidence was evaluated using GRADE.

Results
209 participants were randomised; 108 received pregabalin and 101 received placebo. No between-group differences were seen in leg pain intensity at Week 8 (mean difference = 0.5 on a 10-point scale, 95% CI = −0.2 to 1.2) or 1 year (mean difference = 0.3 on a 10-point scale, 95% = CI −0.5 to 1.0), or in any secondary outcome. More people in the pregabalin group reported an adverse event (n = 68 versus 43 in the placebo group, p = 0.002).

Five studies were included in the systematic review, and the quality of evidence varied from very low to high. Gabapentinoids had no effect on pain or disability in lumbar radicular pain (e.g. at the immediate term, mean difference = -1.1 on a 100-point scale, 95% CI -7.0 to 4.7, 2 studies). The same results were seen for topiramate, based on 1 study. Gabapentinoids were associated with an increased risk of adverse events.

Conclusion
Anticonvulsants have no treatment effect in lumbar radicular pain, and are associated with more adverse events.

Keywords
lumbar radicular pain; sciatica; anticonvulsants; treatment; clinical trials

Funding and Conflict of Interest
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Address for correspondence
Christine Lin, Musculoskeletal Health Sydney, Sydney School of Public Health, The University of Sydney, Level 10 North, King George V Building, Royal Prince Alfred Hospital (C39), The University of Sydney, NSW, 2050; Email: Christine.lin@sydney.edu.au
Phase one of a musculoskeletal injury prediction model validation: 
A prospective study in Navy cadets

Thiago Jambo Alves Lopes, Milena Simic, and Evangelos Pappas
Physiotherapy Department, Faculty of Health Science, University of Sydney

Background
Musculoskeletal injuries are a major burden to the military worldwide; however, clinical factors predictive of injury risk are poorly understood.

Aims
To investigate clinical predictors of musculoskeletal injury in a cohort of Brazilian Navy cadets.

Methods
We conducted a prospective cohort study of 545 Brazilian Navy cadets. The following clinical factors were evaluated at baseline: lower extremity isometric strength, lower limb power, trunk endurance and flexibility, knee kinematics and history of lower back or lower extremity symptoms. During the eight months follow up, any injury sustained requiring medical care was recorded. Predictive associations were examined using multivariable logistic regression, $\alpha = 0.05$.

Results
Using sex as covariate, cadets that had lower flexibility during the sit and reach test (below 18 cm), failed the 60-second plank test, and reported two or more symptoms in the lower back or lower extremity over the previous 12-months had approximately three to four times greater odds of sustaining an overuse injury (OR= 4.0 [95% CI, 1.4-11.2], $p = 0.01$; OR= 3.3 [95% CI, 1.2-8.8], $p = 0.02$ and OR= 2.7 [95% CI, 1.02-7.3], respectively) than their counterparts.

Conclusion
This finding has important clinical relevance as these tests are easy to apply in a big cohort in order to identify cadets at risk of sustaining an overuse injury. Therefore, the Brazilian Navy should now routinely use these three tests for screening of vulnerable cadets at risk of overuse injury which is mostly preventable with appropriate prevention programs.

Keywords
injury; military; overuse injury; risk factor; performance test

Funding and Conflict of Interest
No funding or conflict of interest

Address for correspondence
Thiago Lopes, Physiotherapy, University of Sydney, 75 East St - Lidcombe, Sydney, NSW, 2141; Email: tjam7956@uni.sydney.edu.au
Utilizing exosomes from adipose tissue-derived mesenchymal stem cells for regeneration

Lu ZuFu, Chen YongJuan, Dunstan Colin, and Zreiqat Hala
Biomaterials and Tissue Engineering Research Unit, School of AMME, the University of Sydney, 2006, Australia

Background
Mesenchymal stem cells (MSCs) have been widely used for tissue repair and regeneration. However, the inherent drawbacks, including limited cell survival after cell transplantation, have hindered direct MSC transplantation for tissue repair and regeneration.

Aims
The aim of this study was to investigate if exosomes isolated from MSCs can promote the proliferation and differentiation of human primary osteoblastic cells (HOBs) and be potentially used for bone tissue regeneration.

Methods
Adipose tissue-derived MSC (ASC)-derived exosomes (ASC-EXO) and tumour necrosis factor-alpha (TNF-α) pre-treated ASCs-derived exosomes (TNF-ASC-EXO) were used to test their ability to promote the proliferation, mobilization and osteogenic differentiation of human primary osteoblasts (HOBs), and its underlying mechanisms were also investigated.

Results
We showed that ASC-EXO were able to promote the proliferation and osteogenic differentiation in HOBs; and the trophic effects of ASC-EXO on HOBs were further harnessed when ASCs were preconditioned with TNF-α for 3 days, which mimics the acute inflammatory phase upon bone injury. In addition, we showed that Wnt-3a content was elevated in ASC-EXO when ASCs were preconditioned by TNF-α, and inhibiting Wnt signaling decreased the osteogenic gene expression levels in HOBs which were cultured in TNF-α preconditioned ASCs conditioned medium.

Conclusion
It was demonstrated that ASC-EXO, especially primed by TNF-α preconditioning on ASCs, offer a promising approach to replace direct stem cell transplantation for bone repair and regeneration.

Keywords
stem cells; TNF-α; bone regeneration; Wnt-3a; exosomes

Funding and Conflict of Interest
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Address for correspondence
Dr. Zufu Lu; Address: Biomaterials and Tissue Engineering Research Unit, School of AMME, the University of Sydney, Sydney, 2006; Email: zufu.lu@sydney.edu.au
Smartphone apps for the self-management of low back pain: A systematic review

Gustavo C Machado1, Marina B Pinheiro2, Hopin Lee3, Osman H Ahmed4, Paul Hendrick5, Chris Williams3, and Steven J Kamper1,3

1 School of Public Health, Sydney Medical School, The University of Sydney
2 Faculty of Health Sciences, The University of Sydney
3 Centre for Pain, Health and Lifestyle
4 Faculty of Health and Social Sciences, Bournemouth University
5 School of Health Sciences, University of Nottingham

Background
Smartphone apps could be a potentially useful way for people to self-manage their low back pain. However, to date there has been no rigorous evaluation of low back pain apps, and no guidance for consumers on how to select high quality, evidence-based apps.

Aims
To evaluate the quality of smartphone apps for the self-management of low back pain, and to assess whether these apps recommend evidence-based interventions.

Methods
This review followed PRISMA recommendations for traditional systematic reviews. Using relevant keywords, we searched the Australian iTunes and Google Play stores in November 2016 for smartphone apps designed for the self-management of low back pain. Two independent reviewers screened the retrieved apps for eligibility and extracted data. The 2016 NICE guideline was used to identify whether interventions recommended in apps were evidence-based. Apps were rated for quality using the Mobile Application Rating Scale (MARS).

Results
We identified 723 apps and 61 were included. The median cost for 22 paid apps was A$1.99 (A$0.99–A$14.99). All but three apps recommended at least one guideline-endorsed intervention. The most commonly recommended interventions were biomechanical (e.g. strengthening) and mind-body (e.g. Yoga) exercises. None have been tested in the published scientific literature. Generally, apps were of low quality (mean MARS score 2.4; 0–5 scale). Apps lacked engaging and customisable features, offered poor quality information, had poor layout, and questionable credibility.

Conclusion
There are many apps available for the self-management of low back pain, but their quality is low and none have been tested for effectiveness.

Keywords
low back pain; smartphone; apps; review; eHealth

Funding and Conflict of Interest
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Address for correspondence
GC Machado, PO Box M179, Missenden Rd, Camperdown NSW 2050 Australia; Email: gustavo.machado@sydney.edu.au
Fabrication of a biodegradable implant with tuneable characteristics for bone implant applications

Iman Manavitehrani¹,², Ali Fathi³, Yiwei Wang⁴, Peter K. Maitz⁴,⁵, Farid Mirmohseni³, Tegan L. Cheng⁶, Lauren Peacock⁶, David G. Little⁶,⁷, Aaron Schindeler⁶,⁷, Fariba Dehghani³

¹ Kids Heart Research, Heart Centre for Children, The Children’s Hospital at Westmead, Westmead, 2145, Australia
² Sydney Medical School, University of Sydney, Sydney, 2006, Australia,
³ The University of Sydney, School of Chemical and Biomolecular Engineering,
⁴ Burns Research Group, ANZAC Research Institute, University of Sydney,
⁵ Burns and Reconstructive Surgery Unit, Concord Repatriation General Hospital,
⁶ Orthopaedic Research & Biotechnology, The Children’s Hospital at Westmead,
⁷ Paediatrics & Child Health, University of Sydney,

Background

Biodegradable polymers are appealing material for the manufacturing of musculoskeletal implants as such implants break down in vivo, negating the need for a subsequent operation for removal. Despite the dramatic advances in using biodegradable polymers, many of them produce acidic breakdown products that can lead to localized inflammation and osteolysis. The acidic nature of the degradation products of polyesters often leads to unpredictable clinical complications, such as necrosis of host tissues and massive immune cell invasions.

Aims

The aim of this study was to develop a biocompatible, biodegradable implant with favorable mechanical strength as an alternative to conventional biodegradable polymers for load-bearing tissue regeneration.

Methods

A melt blending method was used to prepare a homogenous 3D implant constructed from a mixture of polymers and ceramic components.

Results

A mixture of PPC-starch composite was prepared to form a 3D bone screw implant. The mechanical, biocompatibility and the bioactivity properties of the implant were characterized. The bioactivity of the blends is increased by the addition of bioglass microparticles (10% w/w) as shown by in vitro osteoblast differentiation assay and mechanical testing. MicroCT analysis confirms that the bioglass microparticles are evenly distributed throughout biomaterial. A murine subcutaneous pellet degradation assay demonstrates that the PPC-starch-bioglass blend’s volume fraction loss is 46% after 6 months post-surgery, whilst it is 27% for poly(lactic acid). In a rat knee implantation model, PPC-starch-bioglass screws inserted into the distal femur show osseointegration with no localized adverse effects after 3 and 12 weeks.

Conclusion

These data support the further development PPC-starch-bioglass as a medical biomaterial.

Keywords

poly(propylene carbonate); starch; bioglass; biodegradation; biomaterials

Funding and Conflict of Interest

N/A

Address for correspondence

Dr. Iman Manavitehrani, The University of Sydney, School of Chemical and Biomolecular Engineering, Sydney, 2006, Australia;
Email: i.manavitehrani@sydney.edu.au
Resilience and total knee replacement: An observational study

Marie K. March\textsuperscript{1,2}, Alison Harmer\textsuperscript{1}, Adrienne Kirby\textsuperscript{3}, Bijoy Thomas\textsuperscript{2} and Sarah Dennis\textsuperscript{1,4,5}

\textsuperscript{1} Faculty of Health Sciences, University of Sydney
\textsuperscript{2} Blacktown Mt Druitt Hospital, Western Sydney Local Health District
\textsuperscript{3} Faculty of Medicine, University of Sydney
\textsuperscript{4} South Western Sydney Local Health District
\textsuperscript{5} Ingham Institute for Applied Medical Research

Background

Current prediction tools for hospital length of stay (LoS) after total knee replacement (TKR) account for demographic, medical and social factors. Few studies have investigated the effect of psychological health on LoS after TKR, and none have investigated psychological resilience. Resilience is the ability to bounce back from stress, and affects functional ability in chronic disease.

Aims

Our primary aim is to investigate the association between resilience and LoS after TKR.

Methods

We are conducting an ongoing, prospective, observational study of 100 participants. Recruitment and baseline data collection occurs at two hospitals during pre-admission education classes. Data collection includes demographics, resilience score, clinical data and secondary outcomes. We dichotomized participants into low resilience (score < 3/5) and normal/high resilience groups. Preliminary descriptive data will be presented.

Results

Pilot data are presented for 35 participants. Baseline data demonstrate this cohort is representative of the TKR population (mean age 69 years SD 8.1, 74\% female, 57\% right knees, mean BMI 34 SD 8.0, WOMAC mean 40.6 SD 16.3). Overall mean LoS was 6.3 days (SD 2.2); 49\% had an acceptable LoS of five days or less. Among the 29\% of patients with low resilience, mean LoS was 7.6 days (SD 3.4) compared to a mean LoS of 5.8 days (SD 1.4) among those with high/normal resilience.

Conclusion

Psychological health is important when predicting LoS after TKR. It is feasible for physiotherapists to assess psychological resilience in this group. Psychologically-informed treatment provided to this group may improve patient satisfaction, financial costs and inpatient utilisation.

Keywords

total knee replacement; psychological health; resilience; length of stay; osteoarthritis

Funding and Conflict of Interest

Nil funding or conflicts of interest identified

Address for correspondence

Marie K. March, Physiotherapy Department, Blacktown Mt Druitt Hospital, Marcel Cres, Blacktown, NSW 2148; Email: Marie.March@health.nsw.gov.au
Quantifying the relationship between kinematics and Patient-Reported Outcome Measures (PROMS) for osteoarthritic knees

Maricar Maandal¹, Emily Bogue², Joshua Twiggs², Qing Li¹, Edgar A Wakelin², and Brad Miles²

¹ Engineering and IT, The University of Sydney, Sydney, NSW, Australia
² 360 Knee Systems, Suite 3, Building 1, 20 Bridge Street, Pymble, NSW, Australia

Background

Approximately 20% of patients who undergo total knee replacement (TKR) experience poor outcomes[1] with no strong evidence to explain dissatisfaction[2-3]. Though attempts have been made to compare patient reported outcome measures (PROMS) and knee kinematics, PROMS are subjective[4] and do not account for other contributing factors.[5] A promising approach to bridge the gap between PROMS and kinematics is gait biomechanics.

Aims

The purpose of this study is to determine the influence of pre-operative leg alignment and kinematics on PROMS, with the aim of identifying patients with kinematic risk factors for a poor outcome.

Methods

Subjects will be recruited and allocated into 3 groups: with osteoarthritis (OA), with OA booked for TKR, and healthy subjects as control. Radiographic images will be obtained for joint space and severity of OA. Pre-operative bone models will be generated from CT scans to analyse alignment and kinematics of the surgery group. Wearable accelerometers (dorsaVi) are used to capture tibial motion and gait parameters during walking and sit-to-stand. Clinical outcomes include range of motion, strength, and balance. PROMS measures will be collected for satisfaction, function, pain level, psychological factors, and quality of life both pre-operatively and 6 weeks post-surgery for the operative group. PROMS captured include KOOS, low back pain, falls, and patient expectation assessment.

Results

Clinically assessing the pre-operative function of OA patients and knee kinematics allows identification of patients whose reported outcomes do not correlate with objective clinical measures. Those who report high levels of pain and low function pre-operatively without corresponding clinical evidence may be a higher risk of dissatisfaction post-operatively.

Conclusion

Patient selection for TKR may be improved by comparing objective clinical measures with patient reported outcomes.

Keywords

knee osteoarthritis; total knee replacement; gait; kinematics; patient outcomes

Funding and Conflict of Interest

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Address for correspondence

Maricar Maandal, Engineering and IT, University of Sydney, Suite 3, Building 1, 20 Bridge Street, Pymble, NSW, Australia, 2073; Email: mmaa5395@uni.sydney.edu.au
The discordant prescription of medicines for spinal pain

Mathieson S1, Valenti L2, Maher C1, Britt H2, Li Q3, McLachlan, A4, Lin C1

1 Musculoskeletal Health Sydney, University of Sydney | 2 Family Medicine Research Centre, University of Sydney. | 3 The George Institute for Global Health, University of New South Wales. | 4 Faculty of Pharmacy and Centre for Education and Research on Ageing, The University of Sydney and Concord Hospital.

Background

Limited evidence exists on secular trends of analgesics for spinal pain.

Aims

We investigated general practitioner’s (GP) recommendations of analgesic medicines for spinal pain and investigated characteristics associated with their recommendation.

Methods

We accessed data on spinal pain consultations from the Bettering the Evaluation and Care of Health (BEACH) database, a nationally representative database on GP activity in Australia. Data extracted included consultation details and management provided. Medicines recommended were grouped as simple analgesics, non-steroidal anti-inflammatory drugs (NSAIDs), opioid analgesics or neuropathic pain medicines. Multivariate logistic regression determined if patient characteristics and GP characteristics were associated with medication recommendations.

Results

We analysed BEACH data for 9,100 GPs who managed 39,303 patients with spinal pain between 2004-2014. Over the decade, analgesic recommendations increased. After accounting for patient and GP characteristics, there was a significant increase in the rate single-ingredient opioid analgesics (annual relative increase of 6% (RR 1.06 [95% CI 1.05 to 1.07], P <0.001)) and neuropathic pain medicines (annual relative increase of 19% (RR 1.19 [95% CI 1.16 to 1.22], P <0.001)) were recommended; and a significant decrease in the rate NSAIDs were recommended (annual relative decrease of 4% (RR 0.96 [95% CI 0.95 to 0.97], P <0.001)). Logistic regression identified several patient and GP characteristics associated with medicine recommendations e.g. stronger opioids were less likely recommended for Indigenous patients (odds ratio 0.15 [95%CI 0.04 to 0.56].

Conclusion

GP’s analgesic recommendations for spinal pain have become increasingly divergent from guideline recommendations over time.

Keywords

low back pain; spinal pain; discordant; analgesic medicines; secular

Funding and Conflict of Interest

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Address for correspondence

Stephanie Mathieson, Musculoskeletal Health Sydney, University of Sydney, Level 10 North, King George V Building, Royal Prince Alfred Hospital (C39), University of Sydney, NSW, 2050; Email: stephanie.mathieson@sydney.edu.au
1000 Norms Project: Reference values for functional outcome measures across the lifespan

Marnee J. McKay¹, Jennifer N. Baldwin², Milena Simic¹, Natalie Vanicek³, Paulo Ferreira¹ and Joshua Burns¹,⁴ for the 1000 Norms Project Consortium

¹ Sydney Musculoskeletal Health, Faculty of Health Sciences, The University of Sydney | ² School of Clinical Sciences, Faculty of Health and Environmental Sciences, Auckland University of Technology | ³ School of Life Sciences, University of Hull | ⁴ Children’s Hospitals Network (Randwick and Westmead) and Paediatric Gait Analysis Service of NSW, Children’s Hospital at Westmead.

Background

Progress in clinical research to improve the care of children and adults with musculoskeletal and neuromuscular disorders depends on the ability to accurately track and identify age-related functional decline. Knowledge of what is considered normal is essential to accurately identify and evaluate presentations that are abnormal.

Aims

To generate reference values for functional outcome measures across the lifespan and to investigate the influence of demographic, anthropometric, strength and flexibility characteristics.

Methods

Twelve functional outcome measures were collected from 1000 healthy individuals aged 3-101 years: six-minute walk test, 30-second chair stand test, timed stairs test, long jump, vertical jump, choice stepping reaction time, static and dynamic balance and dexterity. Correlation and multiple regression analyses were performed to identify anthropometric, isometric muscle strength, and joint flexibility factors independently associated with each measure.

Results

Age- and sex-stratified reference values for functional outcome measures were generated. Functional performance increased through childhood and adolescence, plateaued during adulthood, and declined in older adulthood. Height was the most consistent correlate of functional performance in children, while lower limb muscle strength was a major determinant in adolescents and adults. In older adults, age, lower limb strength, and joint flexibility explained up to 63% of the variance in functional measures.

Conclusion

The normative reference values generated from this study provide a framework to identify and track age-related functional decline. These data may also assist in the diagnosis of musculoskeletal and neuromuscular disorders and contribute to the development and validation of responsive outcome measures for disease-modifying therapeutic trials.

Keywords

functional performance; outcome measures; normative values; musculoskeletal; lifespan

Funding and Conflict of Interest

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Address for correspondence

Marnee McKay, Faculty of Health Sciences, The University of Sydney, 75 East St, Lidcombe, NSW, 2141; Email: marnee.mckay@sydney.edu.au
Osteoarthritis impaired molecular transport between tissue compartments of the knee

Lucy Ngo, Damien Schnebelen, and Melissa Knothe Tate

Graduate School of Biomedical Engineering, University of New South Wales, Sydney, Australia

Background

Characterised joint degradation and persistent pain, osteoarthritis (OA) is the cardinal cause of disability worldwide. In spite of its prevalence and great socioeconomic burden the underlying mechanisms of OA are not entirely understood. Previously associated with cartilage loss, OA is now considered a disease of the entire joint and constituent tissues. Dunkin-Hartley guinea pigs (DHGP) exhibit spontaneous age-related OA of the knee, similar to the condition in humans.

Methods

A mixture of Texas-red (70 kDa) and Rhodamine-green (10 kDa) tagged-dextran s of neutral charge were delivered in a single bolus via heart injection into two cohorts of DHGP. Skeletally mature, 8-10 month old guinea pigs correspond approximately to middle-aged humans and 17-19 month old guinea pigs corresponding to aged humans. Knees were imaged immediately after euthanasia (after 5 minutes' circulation), with serial block-face episcopic cryo-imaging. Degradation to cartilage and subchondral bone was quantified using image analysis (Fiji, NIH). Slices exhibiting the severe defects were analyzed qualitatively using the Kellgren-Lawrence grading system.

Results

All animals exhibited multiple defects with disruptions in mass transport compared to surrounding tissue. The spatial distribution of defects was scattered in younger animals and clustered in older animals. Older animals exhibited a significant increase in defect volume compared to younger animals. Qualitative observations revealed corresponding discontinuities in knee joint condition.

Discussion

This data is indicative of molecular sieving and compartmentalization of musculoskeletal tissues not unlike other organ systems. The disturbances in molecular transport observed may have important implications in OA pathogenesis.

Keywords

molecular crosstalk, molecular transport, molecular sieve, osteoarthritis, knee joint,

Funding and Conflict of Interest

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Address for correspondence

Melissa Knothe Tate, Graduate School of Biomedical Engineering, University of New South Wales, Sydney, NSW, 2052;
Email: m.knothetate@unsw.edu.au
Physical and psychosocial characteristics of current child dancers and non-dancers with systemic joint hypermobility: A descriptive analysis

Leslie L Nicholson1, Roger Adams2, Louise Tofts3 and Verity Pacey4

1 Discipline of Biomedical Science, Sydney Medical School, The University of Sydney,
2 Discipline of Physiotherapy, Faculty of Health Sciences, The University of Sydney
3 Discipline of Paediatrics and Child Health, Sydney Medical School, The University of Sydney
4 Department of Health Professions, Faculty of Medicine and Health Sciences, Macquarie University

Background

The effect of current participation in dance training on joint pain and instability, fatigue, and quality of life is unknown.

Aims

To examine differences in joint pain, instability, gross motor skills, non-musculoskeletal systemic manifestations, health-related quality of life (HRQoL), and fatigue between children with joint hypermobility syndrome/Ehlers-Danlos syndrome- hypermobility type (JHS/EDS-HT) who currently undertake formal dance training and those who do not.

Methods

Children with JHS/EDS-HT and one parent completed reports providing data on demographic variables, symptoms, organized activity participation, HRQoL, and fatigue. Physical and functional measures included extent of hypermobility, aerobic fitness, balance, and muscle endurance.

Results

Currently, 22 of 102 participating children undertook dance classes, averaging 3.3 h/wk. A similar number of painful joints was reported by dancers and nondancers (p = .36). Dancers reported significantly lower pain levels on a 0-to-10 scale (p = .04), and found pain to be less problematic, affecting less of their body. They reported fewer unstable joints (p = .001), despite being more hypermobile (Beighton score, p = .047; Lower Limb Assessment Score, p = .02). The dancers had significantly better HRQoL, particularly in the subdomain of school functioning (p = .004), and reported less fatigue (p = .024).

Conclusion

Children with JHS/EDS-HT who are currently undertaking formal dance training have less joint pain and instability symptoms, less fatigue, and better HRQoL; however, the cross-sectional nature of the study means that causation cannot be determined.

Keywords

Ehlers-Danlos syndrome; joint hypermobility syndrome; quality of life; dance training; fatigue

Funding and Conflict of Interest

The researchers have no affiliations with or financial involvement in any organization or entity with a direct financial interest in the subject matter or materials presented here.

Address for correspondence

Assoc Prof Leslie Nicholson, Discipline of Biomedical Science, The University of Sydney, Camperdown, NSW, 2006; Email: leslie.nicholson@sydney.edu.au
Ultrasound guidance does not improve the results of shock wave for plantar fasciitis or calcific achilles tendinopathy: A randomized control trial

Masiwa M, Njawaya, Bassam Moses, David Martens, Jessica J. Orchard, Tim Driscoll, John Negrine and John W. Orchard

1 Sydney East Sports Medicine and Orthopaedics, Double Bay, Sydney | 2 The Sports Clinic, The University of Sydney | 3 Sydney Medical School, University of Sydney | 4 School of Public Health, University of Sydney | 5 Orthosports, Randwick, Sydney

Background

Extracorporeal shock wave therapy is now a well-established treatment modality in sports and musculoskeletal medicine. In current clinical foot and ankle practice, shock wave therapy is often aimed at the site of the patient’s pain. Studies have shown that pain in calcific tendinopathy does not necessarily correlate with area of calcification. However, studies of calcification in the shoulder in particular have shown navigation-guided shock wave to the site of calcification may be more effective in improving patient pain and function.

Aims

To establish whether the use of ultrasound to direct shock waves to the area of greater calcification in calcaneal enthesopathies was more effective than the common procedure of directing shock waves to the point where the patient has the most tenderness.

Methods

Two-armed nonblinded randomized control trial with allocation concealment. Participants 18 years or older with symptomatic plantar fasciitis (PF) (with heel spur) or calcific Achilles tendinopathy (CAT). Seventy-four of 82 cases completed treatment protocol and 6-month follow-up. Patients were randomized to receive either ultrasound-guided (UG) or patient-guided (PG) shock wave at weekly intervals over 3 to 5 weeks. Main Outcome Measures were reduced pain on visual analog scale (VAS) and improved functional score on Maryland Foot Score (MFS) (for PF) or Victorian Institute of Sport Assessment-Achilles (VISA-A) (for CAT). Follow-up was at 6 weeks and 3 and 6 months.

Results

Comparative 6-month improvements in MFS for the 47 PF cases were PG +20/100 and UG +14/100 (P = 0.20). Comparative 6-month improvement in VISA-A score for the 27 CAT cases were PG +35/100 and UG +27/100 (P = 0.37). Comparative (combined PF and CAT) 6-month improvement in VAS pain scores for all 38 PG cases were +38/100 with +37/100 for all 36 UG shock wave cases.

Conclusion

Although both treatment groups had good clinical outcomes in this study, results for the 2 study groups were almost identical. This study shows that there is no major advantage in the addition of ultrasound for guiding shock waves when treating calcaneal enthesopathies (PF and CAT).

Keywords

shock wave; plantar fasciitis; achilles; calcaneal enthesopathy; tendinopathy; ultrasound guided

Funding and Conflict of Interest

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Address for correspondence

Masiwa M. Njaway, Sydney East Sports Medicine and Orthopaedics, Level1, 101 &102, 451 New South Head Rd, Double Bay, Sydney, NSW 2028; Email: dr.masiwa@gmail.com
Bioactive synthetic fibre-hydrogel composites designed for tendon and ligament prostheses

Young Jung No1, Solaiman Tarafder2, Yogambha Ramaswamy1, Chang Hun Lee2, Hala Zreiqat1

1 Biomaterials and Tissue Engineering Research Unit, University of Sydney, Sydney, Australia
2 Regenerative Engineering Laboratory, Columbia University, New York, United States

Background

There is an immense clinical need for off-the-shelf synthetic scaffolds for tendon and ligament (T/L) repair in order to circumvent issues associated with autologous and allograft tendons. The development of suitable synthetic scaffolds for prostheses to treat T/L ruptures remains a significant clinical challenge.

Aims

The aim of this study was to develop and characterize novel synthetic fibre-reinforced hydrogel (FRH) scaffolds for off-the-shelf synthetic T/L prostheses.

Methods

The FRH consists of longitudinally aligned polyethylene fibres impregnated with polyvinyl alcohol-based hydrogel, in order to mimic the hierarchical structure of tendons. Additionally, we have incorporated FRH with Sr-hardystonite (Sr-HT) bioactive ceramic microparticles, herein labeled FRHS, as a strategy to improve the biological properties of FRH without the use of biologics.

Results

Both FRH and FRHS exhibit equilibrium water content (~67%), equivalent to values of human Achilles’ tendons (65–70%). Tensile strengths of FRH (109±6 MPa) and FRHS (125±17 MPa) lie within the upper values reported for the human Achilles tendon (50~120 MPa). In vitro histology of scaffolds cultured with rat tendon stem cells (rTSCs) showed that FRHS exhibited superior cell and tissue infiltration compared to FRH. Consistently, tendon-related gene expression (collagen-I, collagen-III and tenasin-C) were significantly higher in FRHS than FRH.

Conclusion

We have developed a synthetic bioactive scaffold that mimics the physical structure and properties of human tendons. The addition of Sr-HT microparticles enhanced the expression of tenogenic markers of rTSCs. The results suggest that the FRHS scaffold is a promising candidate for synthetic T/L prostheses.

Keywords

bioactive scaffold; tendon repair; composites; tendon stem cells; fibres

Funding and Conflict of Interest

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Address for correspondence

Young Jung No, Biomaterials and Tissue Engineering Research Unit, University of Sydney, Shepherd St, Darlington, NSW, 2006; Email: young.no@sydney.edu.au
Factors associated with the setting of health-related goals among community-dwelling older people

Juliana S Oliveira¹, Leanne Hassett¹, Catherine Sherrington¹, Elisabeth Ramsay¹, Catherine Kirkham¹, Shona Manning², Anne Tiedemann¹

¹ Sydney Medical School, University of Sydney
² School of Biomedical Sciences, Charles Sturt University

Background

Goal setting is widely used to facilitate physical activity behavior change. Balance challenging exercise prevents falls among older people. Understanding the goal setting process may assist with maximising participation in physical activity programs among older people.

Aims

To describe the health-related goals set by older people and to explore gender differences in goal selection, and associations between balance-related goals and fall history, self-rated balance and fear of falling.

Methods

We included community-dwelling people aged 60+ participating in two randomised controlled trials. Participants nominated two health-related goals, which were summarised into components of the International Classification of Functioning, Disability and Health (ICF). Chi-square analyses were used to explore associations between goal types and participant characteristics.

Results

We included 205 participants who selected 408 goals. Goals related to recreation and leisure and walking were the most common goals selected. Sixty-eight people (33%) set a balance-related goal. We found no difference between the proportions of males (32%) who set balance-related goals compared to the proportion of females (34%) who selected balance-related goals. A significantly higher proportion of participants with poor/fair self-rated balance selected a balance-related goal (44%) compared to those with good balance (29%, p=0.04). People who had fallen in the past year were as likely to set a balance-related goal (37%) as non-fallers (32%, p=0.43). People with self-rated fear of falling were as likely to select a balance-related goal (38%) as people with no fear of falling (31%, p=0.38).

Conclusion

Males and females selected similar goals. People with poor/fair self-rated balance were more likely to set a balance-related goal.

Keywords

fall prevention; goal setting; balance; physical activity; ageing.

Funding and Conflict of Interest

We declare that we have no conflict of interest.

Address for correspondence

Juliana Souza de Oliveira, Sydney Medical School, University of Sydney, Level 10 North, King George V Building, Royal Prince Alfred Hospital (C39), Email: juliana.oliveira@sydney.edu.au
Long-term effects of current knee osteoarthritis treatment options: A narrative literature review

John Orchard1, Jonathon Charlesworth 2, Nirmala Perera23 and Jane Fitzpatrick 2

1 School of Public Health, University of Sydney, NSW Australia
2 Australasian College of Sport and Exercise Physicians, 257 Collins Street, Melbourne, VIC, 3000, Australia
3 Australian Collaboration for Research into Injury in Sport and its Prevention (ACRISP), SMB Campus, Federation University Australia, Lydiard Street South, Ballarat VIC 3350, Australia

Background

The average knee OA case lives for 30 years with the disease, yet the vast majority of RCTs performed to investigate knee OA treatments focus on short-term results (e.g. 3-6 months).

Aims

To appraise the current evidence for long-term (>=12 months) efficacy, risks and harms of common knee OA treatments

Methods

Cochrane library, Medline and PubMed were systematically searched in July 2017. The outcomes measures were pain and function scores, measurements of radiological severity at 12 months or longer in addition to long-term safety and side effect considerations.

Results

Lifestyle modifications (exercise and weight loss), paracetamol, glucosamine, hyaluronan and platelet-rich-plasma (PRP) injections generally have low risk of harm and beneficial 12 month+ RCT outcomes. NSAIDs give pain relief but are associated with increased cardiac and other complications when used long-term. Cortisone injections are associated with radiological cartilage degeneration at >12 months. Arthroscopy for degenerative meniscal tears in OA leads to a 3 fold increase in Total Knee Arthroplasty (TKA). TKA itself improves knee OA primary outcomes but with significant risk of medical complications.

Conclusion

Given the effectiveness of lifestyle interventions, these should be advocated in all patients due to the low risk of harms. NSAID use should be minimized to avoid increased cardiac risk. Opiate treatments have no long-term benefit demonstrated and high risk of long-term harm (addiction, overdose and death). Surgery is associated with high risks of medical complications (DVT, infection) which may be justified by the efficacy of joint replacement in late-stage disease but which are not justified for knee arthroscopy.

Keywords

osteoarthritis; knee; exercise; injections; surgery

Funding and Conflict of Interest

No funding was received. Jane Fitzpatrick declares a conflict as Member of the Medical Advisory Board Bioventus Global

Address for correspondence

John Orchard, Sports Clinic, Cnr Western Ave & Physics Rd University of Sydney; Email: john.orchard@sydney.edu.au
The natural history of children with joint hypermobility syndrome and Ehlers-Danlos hypermobility type: a longitudinal cohort study

Scheper M.C.1,2, Nicholson L.L.3,4, Adams R.D.5, Tofts L.3,6, Pacey V.7,8

1 Department of Rehabilitation, University of Amsterdam | 2 Centre for Applied Research, University of Applied Sciences
3 Kids Rehab, The Children’s Hospital at Westmead | 4 Discipline of Biomedical Sciences, The University of Sydney
5 Discipline of Physiotherapy, The University of Sydney | 6 Discipline of Child and Adolescent Health, The University of Sydney
7 Department of Endocrinology, The Children’s Hospital at Westmead | 8 Department of Health Professions, Macquarie University

Background

Many children with generalised joint hypermobility have chronic musculoskeletal complaints. It is unclear which children will improve or decline with time, providing clinicians no guidance as to which children require close monitoring and intervention.

Aims

To describe the natural history and underlying constructs that contribute to functional decline of children with symptomatic hypermobility.

Methods

101 children with symptomatic hypermobility aged 6 – 16 years were observed over three years. Child-reported quality of life, physical activity and objective walking ability assessed functional ability. Multisystemic complaints, postural control, muscle endurance, fatigue, pain and joint hypermobility were also assessed. Baseline cluster-analysis identified severity subgroups. Mixed linear regression models determined subsequent trajectories. Exploratory factor analysis investigated underlying constructs contributing to function three years later.

Results

Cluster analysis identified children as mildly (n = 40), moderately (n = 31) or severely affected (n = 30) at baseline. Reduced functional ability at baseline was predictive of trajectories of reduced walking ability (B = -0.40 (95% CI -0.73 to -0.08) p = 0.02) and decreased quality of life (B = -1.19 (95% CI -1.41 to -0.96) p < 0.001) over three years. Factor analysis identified four underlying constructs explaining 83.5% of variance in functional ability at three years: multi-systemic effects, pain, fatigue and loss of postural control (p = 0.046).

Conclusion

Children with symptomatic hypermobility who have a high number of multi-systemic complaints, high pain intensity, worse fatigue and poor postural control are most likely to deteriorate over the next three years, suggesting treatment prioritisation is warranted.

Keywords

hypermobility; pain; fatigue; function; paediatric

Funding and Conflict of Interest

Nil conflicts of interest. Funding was provided by Arthritis Australia and the Dutch Organization for Scientific Research.

Address for correspondence

Verity Pacey, Department of Health Professions, Macquarie University, 75 Talavera Rd, Macquarie University, NSW, 2109;
Email: verity.pacey@mq.edu.au
Effects of genetics on pain and activity limitation in low back pain

Ana Paula M. C. Carvalho-e-Silva¹, Marina B. Pinheiro¹, Alison R. Harmer¹, Juan Ordonana², Paulo H. Ferreira¹

¹ Discipline of Physiotherapy, Faculty of Health Sciences, University of Sydney, 75 East St, Lidcombe, New South Wales, 2141
² Department of Human Anatomy and Psychobiology, Biomedical Research Institute of Murcia (IMIB-Arrixaca-UMU), University Clinical Hospital “Virgen de la Arrixaca,” University of Murcia, Murcia, Spain

Background

It is known that genetics play a role in the development of chronic low back pain (LBP), although only a few studies have investigated the genetics influence on pain intensity and activity limitation in individuals with a recent episode of LBP.

Aims

The aim of this study was to investigate to what extent genetics influence pain intensity and activity limitation in LBP.

Methods

724 complete twin pairs from the Murcia Twin Registry who answered self-reported questions on LBP were included in this study. The outcome variables included lifetime prevalence, activity limitation (any and the last LBP episode), and pain intensity (last and worse LBP episode). Within-pair correlation coefficients were obtained for monozygotic (MZ) and dizygotic (DZ) twins using tetrachoric and Pearson correlations to estimate the effects of genetics on LBP phenotypes.

Results

The prevalence of chronic LBP was 37.4%. Correlations were higher for MZ twins than DZ for the prevalence of LBP [MZ(r=0.31;SE 0.09) and DZ twin(r=0.03;SE 0.07), n=724 pairs]; activity limitation in any and last LBP episode [MZ (r=0.23;SE 0.31); DZ(r=0.02;SE 0.24),n=115 pairs]]; [MZ(r=0.40;SE 0.28); DZ(r=0.01;SE 0.26),n=70 pairs] and pain intensity in the last LBP episode [MZ(r=0.47;95% CI 0.19-0.68); DZ(r=0.11;95% CI -0.13-0.35),n=105 pairs]. However, correlation was lower for MZ twins than DZ for pain intensity in the worse LBP episode [MZ (r=0.12;95% CI -0.20-0.42); DZ (r=0.25;95% CI -0.01-0.46),n=104 pairs].

Conclusion

Genetics appears to effect the variation of pain intensity for the last episode and activity limitation for any and the last episode associated with LBP.

Key words

low back pain; genetics influence; twins; pain intensity; activity limitation

Funding and Conflict of Interest

No conflict of interest

Address for correspondence

Ana Paula de Moura Campos Carvalho Silva, 1 Discipline of Physiotherapy, Faculty of Health Sciences, University of Sydney, 75 East St, Lidcombe, New South Wales, 2141, Australia;
Email: amou6759@uni.sydney.edu.au
Genetic and environmental influences to symptoms of depression and low back pain: a population-based twin study

Marina B. Pinheiro¹, Jose J. Morosoli², Lucia Colodro-Conde²,³, Paulo H. Ferreira¹*, Juan R. Ordoñana²*

¹ The University of Sydney, Faculty of Health Sciences, Sydney, Australia
² Department of Human Anatomy and Psychobiology, Biomedical Research Institute of Murcia (IMIB-Arrixaca-UMU), University Clinical Hospital “Virgen de la Arrixaca”, University of Murcia, Murcia, Spain
³ Department of Genetics and Computational Biology, QIMR Berghofer Medical Research Institute, Brisbane, Australia
* Share senior authorship

Background

Previous studies have shown a consistent link between symptoms of depression and low back pain. However, the mechanisms underlying this relationship remain largely unknown.

Aims

In light of the moderate to large effects of genetic factors on chronic pain and depression, we aimed to estimate the relative contribution of genetic and environmental factors to the relationship between chronic low back pain and symptoms of depression.

Methods

Cross-sectional data on symptoms of depression and low back pain were collected in a population-based sample of Spanish adult twins (n = 2,134) registered with the Murcia Twin Registry. We used a classical twin design and employed a bivariate analysis and structural equation modelling to estimate the relative influences of genetics and the environment on the covariation between symptoms depression and low back pain.

Results

We found heritability estimates of 0.26 (95% Confidence Interval (CI) 0.11, 0.41) for chronic low back pain and 0.45 (95% CI 0.29, 0.50) for symptoms of depression and anxiety. The phenotypic, genetic, and unique environment correlations in the bivariate analytical model were, respectively, rph=0.26 (95% CI 0.19, 0.33); rG=0.47 (95% CI 0.42, 0.70); rE=0.14 (95% CI -0.04, 0.25). The percentage of covariance between pain and depression attributable to additive genetic factors was 63.6%, and to unique environment 36.4%.

Conclusion

Our findings confirm the relationship between symptoms of depression and low back pain in a non-clinical sample. Shared genetic factors affect significantly the covariation between these conditions, supporting the role of common biological and physiological pathways.

Keywords

depression; low back pain; twin studies; genetics; heritability

Funding and Conflict of Interest

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Address for correspondence

Marina B Pinheiro, Faculty of Health Sciences, University of Sydney, 75 East St Lidcombe NSW 2141;
Email: marina.pinheiro@sydney.edu.au
Functional consequences of hip dysplasia in paediatric Charcot-Marie-Tooth disease

Leanne Purcell1,2, Elizabeth Wojciechwski1,2, Paul Gibbons1,2, Kamal Jamil1,3
Manoj Menezes1,2 and Joshua Burns1,2
1 Sydney Children’s Hospital Network (Randwick and Westmead), New South Wales, Australia
2 University of Sydney, New South Wales, Australia
3 Universiti Kebangsaan, Kuala Lumpur, Malaysia

Background
Charcot-Marie-Tooth disease (CMT) is an inherited neuropathy affecting 1 in 2500 Australians. 6-20% of children with Charcot-Marie-Tooth disease have hip dysplasia.

Aims
Identify reliable radiological hip dysplasia indicators and investigate their relationship between hip dysplasia indicators and with walking pattern in children with CMT.

Methods
Thirty children with CMT underwent 3D gait analysis (3DGA) and a pelvis radiograph. Two orthopaedic surgeons reviewed radiographs to assess the reliability of 14 measures of dominant limb hip health. 8 measures had an intraclass correlation coefficient >0.75 between raters. The 8 measures of acetabular index (AI), centre edge angle (CEA), neck shaft angle (NSA), medial joint space, head width, lateral uncoverage, migration percentage and triradiate were used to investigate correlations with dominant lower limb kinematic and kinetic 3DGA variables, temporal-spatial parameters and Gait Profile Score. Gait data were compared to 50 typically developing children.

Results
Maximum hip abductor moment in terminal stance was significantly lower than normative reference values, and was moderately correlated with 3 of the 8 radiographic measures (AI r=-0.52, p=0.023; NSA r=-0.50, p=0.006 and medial joint space r=-0.59, p=0.001). Walking speed (normalised to leg length) was correlated with medial joint space (r=0.51, p=0.004), head width (r=-0.68, p=0.0001) and triradiate (r=-0.51, p=0.004). Double limb support correlated with medial joint space (r=0.56, p=0.001), head width (r=-0.78, p=0.0001) and triradiate (r=-0.63, p=0.0001).

Conclusion
These results suggest evidence of a relationship between radiographic indicators of hip dysplasia and hip abductor function during gait in children with CMT.

Keywords
hip; dysplasia; gait; Charcot-Marie-Tooth; paediatric

Funding and Conflict of Interest
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Address for correspondence
Leanne Purcell, Sydney Musculoskeletal, Bone & Joint Health Alliance, University of Sydney; 75 East St, Lidcombe NSW 2141; Email: leanne.purcell@sydney.edu.au
In vitro biocompatibility studies of Microscopy-Aided Designed and Manufactured (MADAMe) textiles inspired by periosteum

Vina Putra¹, Melissa Knothe Tate¹, Lilian Knothe² and Joanna Ng¹

¹ Graduate School of Biomedical Engineering, University of New South Wales (UNSW) Australia, Sydney, Australia
² School of Art & Design, University of New South Wales (UNSW) Australia, Sydney, Australia

Background

The remarkable regenerative power of periosteum lies in its resident stem cells and its complex weave of collagen and elastin that actuates these cells. The effort to replicate this tissue's structural organization through textile technology provides a potential materials engineering tool for bone regeneration.

Aims

Here we investigated the biocompatibility of textile fibres in vitro, including cell-fibres interaction and their effect on cell differentiation, aimed for textile manufacture.

Methods

Stiff fibre (F1, \(\varnothing=0.2\text{mm}\)) and elastic fibre (F2, \(\varnothing=0.13\text{mm}\)) were woven in different warp and (weft) combinations: F1(F1), F2(F2), F1(F2) and F2(F1). C3H10T1/2 cells were cultured on the textiles for 15 days. Their proliferation and metabolic activity were assessed every 3 days. Adipogenic and osteogenic differentiation were assessed with Oil Red O and Alizarin Red staining, respectively.

Results

Cells cultured on F1(F1) and F1(F2) showed linear proliferation characteristic and 2-fold higher proliferation rate than the F2 warp groups. In contrast, cells cultured on F2(F2) and F2(F1) displayed decreasing proliferation up to 6% and 82% respectively over the first 9 days of culture. Cells in these groups also exhibited irregular metabolic activity over 15 days of culture. Confocal laser scanning microscope analysis revealed the cells prominent attachment and axial alignment on F1 which was absent on F2. Finally, the highest Alizarin Red absorbance was found in the stiff textile, F1(F1), whereas insignificant amount of Oil Red O stained lipid droplets, were found highest in F2(F1).

Conclusion

These studies demonstrate the significance of fibres' properties in textiles biocompatibility and provide reference for future design of more functional textiles.

Keywords

periosteum; textile technology; fibers; biocompatibility; MADAMe

Funding and Conflict of Interest

This project is funded by NHMRC. M.K.T has patent pending on the biologically-inspired functional textile intellectual property (filed August 2014 and June 2016).

Address for correspondence

Melissa Knothe Tate, Graduate School of Biomedical Engineering, University of New South Wales, Library Rd, Kensington, Sydney, NSW, 2033; Email: m.knothetate@unsw.edu.au
Back pain in rural India: A case study of Gadchiroli, Maharashtra

Pavithra Rajan1, Yogeshwar Kalkonde2, Claire Hiller1, Andrew Leaver1, Kathryn Refshauge1, Michelle Lincoln1, Abhay Bang2

1 Faculty of Health Sciences, The University of Sydney, Australia
2 Society for Education, Action and Research in Community Health, Gadchiroli, Maharashtra, India

Background

Back pain has emerged as a major health priority in rural India. However, there is currently no effective population-based management of back pain.

Aims

Our overall goal is to assess feasibility, design and implement innovative, community-based, scalable physiotherapy interventions to address the burden of back pain in rural populations. The objectives of the current study are to understand the attitudes, beliefs and coping strategies of village residents in Gadchiroli district in India.

Methods

The research will consist of 3 parts: an observational study, focus group interviews and a translation of relevant validated questionnaires into Marathi. The observational study will inform the cultural context and environmental influences of back pain. Focus Group Discussions will be undertaken with 50-60 participants recruited from 10 villages, which will be sampled based on their distance from Gadchiroli town. The sample will be drawn from a target population of 1,00,000 rural residents of the 86 villages in Gadchiroli district. In addition, three back pain questionnaires will be translated into local language Marathi and checked for validity and reliability in a sample of 130 village residents with back pain. These questionnaires will be used to assess outcomes pre and post intervention.

Results

The findings from the current population-based study will inform the feasibility and development of an innovative, culturally sensitive, community-centric, and sustainable intervention for back pain in a rural region of India.

Conclusion

Back pain is a global burden with increased health-care costs from rural areas. Population-based non-pharmacological solutions need to be explored.

Keywords

interviews; focus group discussions; Marathi

Funding and Conflict of Interest

None

Address for correspondence

Mrs Pavithra Rajan, Musculoskeletal Health Research Group, The University of Sydney, 75 East Street, Lidcombe, NSW, 2142; Email: praj6490@uni.sydney.edu.au
Effect of micropatterned bioceramics on the growth and Differentiation of adipose derived stem cells

Yogambha Ramaswamy *, Seyediman Roohaniesfahani, Genevieve Madafiglio, Frank Chang, Furong Zhao, Hala Zreiqat
Biomaterials and Tissue Engineering Research Unit, University of Sydney, Sydney, Australia

Background
Biomaterial substrates with ordered nano/micro patterns can stimulate cellular responses in terms of adhesion, migration, cytoskeletal organisation, proliferation and differentiation. Ordered nano/micro patterned surfaces can be an important design criteria for enhancing the bioactivity of currently available implants.

Aims
Develop a simple and novel method to produce ordered microtopographies of ceramic substrates and evaluate their effects on the osteogenic differentiation of human adipose derived stem cells

Methods
Hydroxyapatite (HAp) nanoparticles were synthesized by wet chemical precipitation method and HAp bioceramic substrates with ordered micropatterns were fabricated. Three unique and distinct micropatterned structures were developed and the unmodified flat surface was used as the control. The effect of the different micropatterns on the bioactivity of the ceramics was evaluated using primary human adipose derived stem cells.

Results
Three different types of ordered micropatterns were successfully fabricated on ceramic disks and the variation in the micropatterns induced marked differences in cell morphology, cytoskeletal organisation, proliferation and differentiation of adipose derived stem cells. There was a significant difference in the expression of osteogenic markers by adipose derived stem cells between the varied microtopographic patterned substrates.

Conclusion
The cellular responses to the unique patterns developed in this study shows that inducing the topographical changes to the currently available implant materials may be an important design criteria for enhancing the bioactivity of currently available implants.

Keywords
bioactive ceramics; micropatterns, implants, adipose derived stem cells

Funding and Conflict of Interest
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Address for correspondence
Yogambha Ramaswamy, Biomaterials and Tissue Engineering Research Unit, University of Sydney, Shepherd St, Darlington, NSW, 2006; Email: Yogambha.ramaswamy@sydney.edu.au
Development and implementation of ‘My Whiplash Navigator’: An online tool to assist recovery after whiplash

Trudy Rebbeck¹, Michele Sterling², Andrew Leaver¹, Carrie Ritchie³, Aila Nica Bandong¹, Joan Kelly², Angelo Basteris², Martin Mackey¹

¹ Discipline of Physiotherapy, Faculty of Health Sciences, The University of Sydney | ² Recover Injury Research Centre, NHMRC Centre of Research Excellence in Recovery Following Road Traffic Injuries, Menzies Health Institute Queensland, Griffith University | ³ Department of Physical Therapy, College of Allied Medical Professions, University of the Philippines

Background

Whiplash-associated disorders (WAD) continue to be a worldwide health and economic burden. To date clinicians do not provide differential management to patients based on risk of non-recovery. Adopting this approach should improve health outcomes.

Aims

To develop, implement and implement an online resource to facilitate a risk based approach to managing whiplash.

Methods

The website was developed using a process analysis following the NSW Research Translational Framework. Firstly, idea generation involved stakeholder consultations involving policy makers, clinicians, insurers, researchers and patients. Feasibility involved surveys and focus group discussions. The third stage, efficacy involved implementing the pathway amongst generalist and specialist clinicians, insurers and patients.

Results

An online tool to support a risk-based clinical pathway of care with matched interventions was the outcome of the idea generation phase. Key suggestions from the focus groups (feasibility) were to develop automated screening using a validated screening tool and to provide resources to assist matched clinical pathways of care. My Whiplash Navigator (www.mywhiplash.com.au) was launched in July 2016. Features include an online version of a clinical prediction rule that stratifies patients into low and high risk of non-recovery. Feedback is provided to patients and clinicians and they are directed to resources based on risk category. Low risk are directed to guideline-based resources on WAD, accessible by patients and generalists. A separate section guides specialist practitioners on how to assess and manage high risk patients. To date 145 healthcare providers have used the website, and have managed their patients according to risk with data indicating appropriate management in all cases.

Conclusion

Implementation of the website and the matched clinical pathway of care has resulted in appropriate risk-based management being delivered to people with whiplash.

Keywords

primary health care; whiplash injuries; decision support systems; clinical pathway; online tool

Funding and Conflict of Interest

This study was supported by funding from the State Insurance Regulatory Authority of NSW and Motor Accident Insurance Commission of QLD.

Address for correspondence

Trudy Rebeck, Discipline of Physiotherapy, Faculty of Health Sciences, The University of Sydney, 75 East Street, Lidcombe, NSW, 2141; Email: trudy.rebbeck@sydney.edu.au
Shoulder muscle activation patterns and levels differ between open and closed-chain abduction

Reed D.1, Cathers 1,2, Halaki M.3, Ginn K.1

1 Sydney Medical School, The University of Sydney
2 Faculty of Health Science, The University of Sydney
3 Faculty of Health Science, Australian Catholic University

Background

Open and closed-chain abduction of the shoulder are commonly used in rehabilitation and exercise programs to assess and/or improve shoulder muscle function. However, it is not known if shoulder muscle activation patterns differ between these two exercises.

Aims

To compare muscle activation patterns during closed-chain shoulder abduction performed using a shoulder press machine with open-chain abduction using free weights.

Methods

Open and closed chain abduction were performed by 15 and 14 subjects respectively at low (25%), medium (50%) and high (75%) load. Surface and indwelling electrodes were used to record the activation patterns of seven shoulder muscles during the concentric phase of each exercise. Data were normalised to maximum voluntary contractions (MVC), time normalised and compared over the common range of motion (40º-140º abduction).

Results

Only the activity pattern of middle deltoid was strongly positively correlated between exercises (r≥0.65, p<0.05) with similar activation levels at all loads (35%, 50% and 60%MVC, p=1.0). The activation pattern of all other muscles tested had inconsistent, low or negative correlations between exercises. Significantly lower average muscle activation levels were recorded during the closed-chain shoulder press exercise for subscapularis at all loads, upper trapezius at medium and high loads and infraspinatus and lower trapezius at high load (p<0.05).

Conclusion

Open-chain abduction is required to facilitate the stabilising role of the rotator cuff and axioscapular muscles, in response to middle deltoid activity. Closed-chain exercises may enable full range shoulder abduction earlier in rehabilitation programs, with an inherent stability and less demand on the rotator cuff.

Keywords

electromyography; rotator cuff; axioscapular muscles; scapulothoracic muscles; deltoid

Funding and Conflict of Interest

Non declared

Address for correspondence
Darren Reed, Discipline of Biomedical Science, Sydney Medical School
The University of Sydney, Lidcombe, NSW 1825, AUSTRALIA.
Email: darren.reed@sydney.edu.au
Long-term safety of using local anesthetic injections in professional rugby league for modified indications: A retrospective case series review

Sophie Sebak¹, John Orchard², Leigh Golding³, Elizabeth Steet⁴, Steph Brennan⁵, and Ameer Ibrahim⁵

¹ Sydney Medical School, University of Sydney, NSW Australia
² School of Public Health, University of Sydney, NSW Australia
³ Sports Medicine at Sydney University, University of Sydney, NSW Australia
⁴ South Sydney Sports Medicine, NSW Australia
⁵ Sydney Roosters, Sydney Australia, NSW Australia

Background

Local anesthetic is commonly used in the management of some professional athletes due to their immediate pain relief, so that an injured player may continue match play. Currently, there are no major guidelines in place regarding their use in Rugby league, and there is a scarcity of medical literature regarding their safety in the long-term.

Aims

To assess and evaluate the long-term safety of local anesthetic injections prior to or during games in professional rugby league players

Methods

Athletes who played for the Sydney Roosters, who had been administered a local anesthetic injection for an injury before or during a match over a 6-year period (2008-2013) were contacted to complete a self-reported satisfaction survey. Survey results were compared with a previous cohort who had received local anesthetic injection from 1998-2007.

Results

Thirty-two players who had been injected with local anesthetic on 249 occasions for 81 injuries completed the current survey at an average of 5.64 years post-injection. In the cohort of 2008-2013, fewer injections were performed to areas deemed higher risk compared to the 1998-2007 cohort (p<0.00002). The vast majority of players (80/81 cases) would repeat the injection in the same circumstances, and reported that ongoing side effects were uncommon. There were 6 cases (8%) where players reported significant ongoing pain in the area of injection at long-term follow-up.

Conclusion

A limited number of injections (e.g. A/C joint) may be given safely and effectively to professional rugby league players when administered by an experienced physician, although there is a small risk of long-term complications.

Keywords

local anesthetic; sports medicine; injuries; bupivacaine; rugby league

Funding and Conflict of Interest

No outside funding was received for this work and no financial conflict of interest exists. There is a non-financial conflict in that John Orchard previously, and Steph Brennan, and Ameer Ibrahim currently worked/work for the Sydney Roosters team

Address for correspondence

John Orchard, Sports Clinic, Cnr Western Ave & Physics Rd University of Sydney; Email: john.orchard@sydney.edu.au
Exercise and fall prevention self-management after fall-related lower limb fracture: the RESTORE (Recovery Exercises and Stepping On after fracture) trial

Sherrington C¹, Fairhall N¹, Kirkham C.¹, Clemson L², Tiedemann A¹, Howard K³, Vogler C⁴, Close JCT⁶, O'Rourke S¹, Moseley AM¹, Cameron ID⁸, Jenson Mak⁸,9, Sonnabend D⁴ and Lord SR⁷

¹Musculoskeletal Health Sydney, School of Public Health, The University of Sydney | ²Discipline of Occupational Therapy, Faculty of Health Sciences, The University of Sydney | ³Sydney School of Public Health, The University of Sydney | ⁴Northern Clinical School, Sydney Medical School, The University of Sydney | ⁵Department of Aged Care, Royal North Shore Hospital, Sydney | ⁶Prince of Wales Clinical School, University of New South Wales | ⁷Neuroscience Research Australia, University of New South Wales | ⁸John Walsh Centre for Rehabilitation Research, Sydney Medical School Northern, The University of Sydney | ⁹Department of Geriatric Medicine, Gosford Hospital, Gosford

Background

Exercise interventions can improve mobility after fracture and reduce falls in older people, but the optimal approach to rehabilitation after fall-related lower limb and pelvic fracture remains unclear.

Aims

To evaluate the effect of exercise self-management on mobility-related disability and falls in older people after lower limb or pelvic fracture.

Methods

Randomised controlled trial with 336 community-dwellers aged 60+ who had completed usual care. Primary outcomes were falls and mobility-related disability (AM-PAC), Late Life Functioning and Disability Instrument and the Continuous Summary Performance Score (CSPS) at 12 months. The intervention group received 10 physiotherapist home visits and 5 telephone calls, to teach individualised weight-bearing strength and balance exercises. Fall education was also provided.

Results

There were no significant between-group differences in the mobility-related disability outcomes or in falls over the 12-month study period (IRR 1.04, 95% CI 0.75 to 1.44, p = 0.83). Pre-planned sub-group analyses revealed a greater impact on CSPS in those who walked more quickly at baseline (p for interaction 0.045), differences in AM-PAC score were significant at 6 months (-2.13, 95% CI -4.23 to -2.13, p=0.046, n=275) and there was a positive impact of the intervention on the 12-point SPPB (0.68, 95% CI 0.15 to 1.22, p = 0.012), choice stepping reaction time and PPA fall risk scores.

Conclusion

No impact of the intervention was detected on the primary outcomes. There were potentially important benefits on key secondary outcomes and greater mobility performance gains in those who walked more quickly at baseline.

Keywords

hip fracture; exercise; physiotherapy; falls; ageing

Funding and Conflict of Interest

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Address for correspondence

Prof Cathie Sherrington Musculoskeletal Health Sydney, School of Public Health, University of Sydney,
Email: cathie.sherrington@sydney.edu.au
Advice for Acute Low Back Pain: A comparison of what the RCT literature supports and what guidelines recommend

Matthew L. Stevens¹, Ching-Wei C. Lin¹, Flavia A. de Carvalho², Kevin Phan³, Bart Koes⁴ and Chris G. Maher¹

¹Musculoskeletal Health Sydney, School of Public Health, Sydney Medical School, The University of Sydney, Australia
²Department of Physiotherapy, University of Sao Paulo State, Brazil.
³Westmead Clinical School, Sydney Medical School, The University of Sydney, NSW, Australia.
⁴Department of General Practice, Erasmus MC, Rotterdam, The Netherlands.

Background

Advice is widely considered an effective treatment for acute low back pain (LBP) however details on what and how to deliver this intervention is less clear.

Aims

To assess and compare clinical trials which test advice for acute LBP to practice guidelines for their completeness of reporting and concordance on the content, method of delivery and treatment regimen of advice interventions.

Methods

Advice RCTs were identified through a systematic search. Guidelines were taken from recent overviews of guidelines for LBP. Completeness of reporting was assessed using the TIDieR Checklist. Thematic analysis was used to characterise advice interventions into topics across the aspects of content, method of delivery and regimen. Concordance between clinical trials and guidelines was assessed by comparing the number of trials that found a statistically significant treatment effect for an intervention that included a specific advice topic against the number of guidelines recommending that topic.

Results

The Median (IQR) completeness of reporting for clinical trials and guidelines was 8 (7-9) and 3 (2-4) out of 9 items on the TIDieR Checklist, respectively. Guideline recommendations were discordant with clinical trials for 50% of the advice topics identified.

Conclusion

Completeness of reporting was less than ideal for RCTs and extremely poor for guidelines. The recommendations made in guidelines of advice for acute LBP were often not concordant with the results of clinical trials. Taken together these findings mean that the potential clinical value of advice interventions for patients with acute LBP is probably not being realised.

Keywords

low back pain; advice; TIDieR checklist; randomized controlled trials; clinical practice guidelines

Funding and Conflict of Interest

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Address for correspondence

Matthew Stevens, Musculoskeletal Health Sydney, University of Sydney, PO Box 179 Missenden Rd, Sydney NSW, 2050; Email: matthew.stevens@sydney.edu.au
Dietary intervention rescues a myopathy associated with neurofibromatosis type 1

Matthew A. Summers 1,2, Thusitha Rupasinghe 6, Emily R. Vasiljevski 1,2, Frances J. Evesson 3, Kathy Mikulec 1, Lauren Peacock 1, Kate G.R. Quinlan 2,3,4, Sandra T. Cooper 2,3, Ute Roessner 5, David A. Stevenson 6, David G. Little 1,2, Aaron Schindeler 1,2*

1 Orthopaedic Research & Biotechnology, The Children’s Hospital at Westmead | 2 Discipline of Paediatrics & Child Health, Faculty of Medicine, University of Sydney | 3 Institute for Neuroscience and Muscle Research, The Children’s Hospital Westmead | 4 School of Biotechnology and Biomolecular Sciences, University of New South Wales | 5 Metabolomics Australia, University of Melbourne | 6 Division of Medical Genetics, Stanford University, Stanford, CA, USA.

Background

Neurofibromatosis type 1 (NF1) is an autosomal dominant genetic disorder with complex symptomology. In addition to a predisposition to tumours, children with NF1 present with reduced muscle mass, global muscle weakness, and impaired motor skills, which can have a significant impact on quality of life.

Aims

Genetic mouse models have shown a lipid storage disease phenotype may underlie muscle weakness in NF1. We aimed to use these models to identify the underlying pathobiology and develop a targeted treatment.

Methods

Human muscle biopsies were analysed for lipid content and fibrosis. Targeted mouse models for a muscle-specific Nf1 knockout mouse (Nf1MyoD-/-) and a limb-specific Nf1 knockout mouse (Nf1Prx1-/-) were examined. Mechanistically, RNASeq analysis and lipid profiles by mass spectrometry were tested in the Nf1MyoD-/- mouse. Subsequently, the Nf1Prx1-/- model was used to test dietary intervention.

Results

Human biopsies were found to manifest features of a lipid storage myopathy analogous to the mouse models of NF1 deficiency in muscle. An RNASeq profile from the Nf1MyoD-/- mouse revealed alterations in genes associated with glucose regulation and cell signalling. Comparison by lipid mass spectrometry revealed enrichment for long chain fatty acid (LCFA) containing neutral lipids, suggesting fundamentally impaired LCFA metabolism. This led to the evaluation of a dietary intervention of reduced LCFA's, and enrichment of medium-chain fatty acids (MCFAs) with L-carnitine. Following 8-weeks of dietary treatment, Nf1Prx1-/- mice showed a 45% increase in maximal grip strength, and a 71% reduction in intramyocellular lipid staining compared with littermates fed standard chow.

Conclusion

These data link NF1 deficiency to fundamental shifts in muscle metabolism, and provide strong proof of principal that a dietary intervention can ameliorate symptoms.

Keywords

neurofibromatosis type 1 (NF1); muscle weakness; myopathy; diet; lipidomics

Funding and Conflict of Interest

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Address for correspondence

Aaron Schindeler, The Children’s Hospital at Westmead, Locked Bag 4001, Westmead, NSW 2145;
Email: aaron.schindeler@sydney.edu.au
Vitamin K: A disjointed narrative

Andrea Talbot\textsuperscript{1,2}, Thomas Tarento\textsuperscript{1}, Hub Regtop\textsuperscript{2}, Ray Biffin\textsuperscript{2}, Peter Valtchev\textsuperscript{1}, John Kavanagh\textsuperscript{1} and Fariba Dehghani\textsuperscript{1}

\textsuperscript{1} University of Sydney, School of Chemical and Biomolecular Engineering, Darlington, NSW 2006, Australia.
\textsuperscript{2} Agricure Scientific Organics Pty. Ltd., 6 Gantry Place, Braemar, NSW 2575, Australia.

Background

Vitamin K (VK) is recognised as a vital factor in coagulation homeostasis, bone integrity and cardiovascular health. More recently, it has been implicated in chronic inflammatory diseases and cognitive decline. It has therefore been proposed that many of the diseases of aging are the result of lifelong Vitamin K deficiency. The current health information regarding vitamin K intake is extremely sparse and guidelines are largely based on dietary questionnaires. It is likely that the Vitamin K intake of the general population is inadequate.

Aims

To determine if current reported intakes of Vitamin K are valid estimates and if they can be used to inform Vitamin K status

Methods

Review publish data on Vitamin K intake associated with various health and disease outcomes in human populations globally.

Results

No published Recommended Daily Intake (RDI) was found for any country.

Countries that provided health information, reported Adequate Intakes (AI) which are based on dietary self-reporting and inferred food VK content.

There are currently no routine tests for VK sufficiency in humans.

Vitamin K requirements vary depending on age, gender, ethnic background and other factors.

VK supplements and copious advice is available on the Internet.

Conclusion

Despite the large amount of information, we found no health authority sets RDI's for VK. The use AI's is a limited and simplistic method of assessing dietary intake. Sound, evidence-based VK advice is lacking therefore 'Dr Google' is filling the information void.

Keywords

vitamin K; adequate intake; bone; aging

Funding and Conflict of Interest

Nothing to declare

Address for correspondence

Thomas Tarento, Chemical & Biomolecular Engineering, University of Sydney, Chemical Engineering Building (J01), University of Sydney, NSW 2006; Email: thomas.tarento@sydney.edu.au
Endogenous glucocorticoid signalling in chondrocytes attenuates joint inflammation and damage

Jinwen Tu1,6,8, Shihani Stoner1, Phillip D Fromm2, Tingyu Wang1,3, Di Chen4, Jan Tuckermann5, Mark S Cooper6,7,8, Markus J. Seibel1,7,8, Hong Zhou1,7,8

1 Bone Research Program, ANZAC Research Institute, Sydney | 2 Dendritic Cell Research, ANZAC Research Institute, Sydney | 3 Department of Pharmacy, Shanghai Ninth People's Hospital, Shanghai JiaoTong University School of Medicine, Shanghai | 4 Department of Orthopedic Surgery, Rush University Medical Center, Chicago | 5 Institute of Comparative Molecular Endocrinology, University of Ulm | 6 Adrenal Steroid Laboratory, ANZAC Research Institute, Sydney | 7 Department of Endocrinology & Metabolism, Concord Hospital, Sydney | 8 Concord Clinical School, The University of Sydney

Background and Aims

Previous studies demonstrated that endogenous glucocorticoid signalling in osteoblasts promotes inflammation in murine immune arthritis. The current study determined whether disruption of endogenous glucocorticoid signalling in chondrocytes also modulates the course and severity of arthritis.

Methods

Tamoxifen-inducible chondrocyte-targeted glucocorticoid receptor knockout (chGRKO) mice were generated using a Col2CreERT2-LoxP system. Antigen-induced arthritis (AIA) and K/BxN serum transfer-induced arthritis (STIA) were induced in both chGRKO mice and their Cre-negative GRflox/flox littermates (WT). Arthritis was assessed by measurement of joint swelling and histology of joints harvested at D14. Neutrophil activity and gene expression patterns associated with cartilage damage were also evaluated.

Results

The inflammatory response was significantly greater in chGRKO mice compared to WT mice in both arthritis models, as assessed by knee joint width and ankle size (AIA model and STIA model, respectively). Correspondingly, when compared to WT mice, histological analysis revealed significantly increased inflammatory activity in chGRKO mice. The STIA model was further characterised by local up-regulation of CXCR2/CXCR2 ligand gene expression in ankle tissues, and a significant and selective expansion of splenic CXCR2+ neutrophils in chGRKO arthritic mice (compared to WT arthritic mice) at D7. While the above chemokine gene expression changes were less pronounced on D14, the expression of MMP-9, an enzyme involved in cartilage degradation, was significantly up-regulated in chGRKO mice.

Conclusion

Chondrocytes actively mitigate local joint inflammation, cartilage degradation and systemic neutrophil activity via a glucocorticoid-dependent pathway.

Keywords

Glucocorticoids; glucocorticoid receptor; chondrocytes; antigen-induced arthritis; K/BxN serum transfer induced arthritis

Funding and Conflict of Interest

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Address for correspondence

Hong Zhou, Bone Research Program, ANZAC Research Institute, University of Sydney, Hospital Road, Concord, NSW, 2139; Email: h.zhou@sydney.edu.au
The perspectives of medical specialists from different disciplines on the management of systemic lupus erythematosus: an interview study

David J. Tunnicliffe1,2, Davinder Singh-Grewal3,4,5, Jonathan C. Craig1,2, Shilpanjali Jesudason6, Peter Tugwell7, Ming-Wei Lin8,9, Sean G. O’Neill5,10,11, Daniel Sumpton1,2,10, Allison Tong1,2

1 Sydney School of Public Health, The University of Sydney | 2 Centre for Kidney Research, The Children’s Hospital at Westmead | 3 Discipline of Child and Adolescent Health, Sydney Medical School, The University of Sydney | 4 Department of Paediatric Rheumatology, The Sydney Children’s Hospital Network | 5 Faculty of Medicine, The University of New South Wales | 6 Central and Northern Adelaide Renal and Transplantation Service, Royal Adelaide Hospital | 7 Department of Medicine, University of Ottawa | 8 Sydney Medical School, The University of Sydney | 9 Department of Immunology, Westmead Hospital | 10 Department of Rheumatology, Concord Repatriation General Hospital

Background
Systemic lupus erythematosus (SLE) is a complex autoimmune disease that can affect multiple organ systems, with specialists from many disciplines often involved, which may lead to inconsistent care.

Aims
We aimed to describe the attitudes and perspectives of specialists from different medical disciplines on the management of people with SLE.

Methods
Face-to-face, semi-structured interviews were conducted with rheumatologists (n=16), nephrologists (n=16), and immunologists (n=11) providing care to adults with SLE from 19 centers across Australia in 2015. All interviews were transcribed and analyzed thematically.

Results
Five themes were identified: uncertainties in judgments (hampered by unknown and unclear etiology, inapplicable evidence, comprehending information dispersion); reflexive responses (anchoring to specialty training, anticipating outcomes, avoiding disaster, empathy for the vulnerable); overarching duty to patients (achieving patient priorities, maximizing adherence, controlling the disease, providing legitimate information, having adequate and relevant expertise); safeguarding professional opportunities (diversifying clinical skills, protecting colleagues’ interests); and optimizing access to treatment (capitalizing on multidisciplinary care, acquiring breakthrough therapies).

Conclusion
Specialists strive to deliver evidence-informed patient-centered care, but recognize they are anchored by their training. To overcome uncertainties in clinical management due to lack of high-quality evidence and specialty silo structures, specialists translated evidence from other disease settings and collaborated with other specialists in routine care. Developing robust evidence, tools to support evidence informed decisions, and multidisciplinary shared-care pathways may improve the management of people with this complex disease.

Keywords
systemic lupus erythematosus; qualitative research; health personnel; patient care management; clinical decision-making

Funding and Conflict of Interest
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Address for correspondence
David J Tunnicliffe, Sydney School of Public Health, The University of Sydney, Centre for Kidney Research, Locked Bag 4001, Westmead, NSW, 2145; Email: david.tunnicliffe@health.nsw.gov.au
Inflammation of the infrapatellar fat pad & clinical outcomes of the knee: Protocol for an observational study

Hema Urban¹, ², ³, David John Hunter², ³, and Christopher B. Little¹, ³

¹ Raymond Purves Bone & Joint Research Labs, Kolling Institute, Northern Sydney Local Health District, and the University of Sydney at Royal North Shore Hospital, St. Leonards, New South Wales, Australia | ² Rheumatology Department, Royal North Shore Hospital, Kolling Institute, University of Sydney, Sydney, New South Wales, Australia | ³ Institute of Bone and Joint Research, Sydney, New South Wales, Australia

Background

Evidence of osteoarthritis (OA) in non-weight-bearing joints linked to obesity implicates a biological role of adipose inflammation. The infrapatellar fat pad (IFP) is a local adipose depot in the knee joint that is associated with OA. While techniques such as imaging and tissue culture, have provided further information, still little is known about the relationship between IFP inflammation and clinical outcomes of knee OA.

Aims

To investigate the relationship between inflammation of the IFP and clinical outcomes in end stage knee OA.

Methods

This is a cross-sectional observational study with a single study visit before joint surgery. Fifty-two participants will be recruited from surgical pre-admission clinics. During the study visit, self-reported measures (including ‘knee injury and osteoarthritis outcome score’ and ‘photographic knee pain map’), physical function measures (including quadriceps strength measure and pressure pain threshold), adiposity, MRI, and serum will be collected. Participants will then undergo surgery as scheduled and all joint tissues routinely removed including IFP, soft tissue, and a piece of subcutaneous-fat will be collected. Tissue samples will be assessed for inflammation by measuring levels of cytokines and adipokines, immune cell types by flow cytometry and immunohistochemistry. The primary outcome is inflammation levels of the IFP as assessed by the cytokine assays, and correlation with pain measures will be assessed using Pearson’s correlation if the data is normally distributed.

Discussion

This study will improve understanding of the fat pad and joint interaction, and may potentially identify a new target for management and monitoring in patients with OA.

Keywords

osteoarthritis; obesity; pain; infrapatellar fat pad; inflammation

Funding and Conflict of Interest

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Address for correspondence

Hema Urban, Raymond Purves Bone & Joint Research Labs, Kolling Institute, Northern Sydney Local Health District, and the University of Sydney at Royal North Shore Hospital, St. Leonards, New South Wales, Australia;

Email: hemalatha.umsopathy@sydney.edu.au
Parents and therapists working in partnership: a questionnaire to explore parent perceptions of the impact of a connective tissue dysplasia on their child’s daily functioning

Wesley A.1,2, Munns C.2,3, Bray P.2,4, Pacey V.3,5

1 Occupational Therapy Department, The Children’s Hospital at Westmead, Sydney, Australia,
2 Discipline of Child and Adolescent Health, The University of Sydney, Sydney, Australia
3 Department of Endocrinology, The Children’s Hospital at Westmead, Sydney, Australia,
4 Discipline of Occupational Therapy, Faculty of Health Sciences, The University of Sydney, Sydney, Australia
5 Department of Health Professions, Macquarie University, Sydney, Australia

Background

Children with a Connective tissue dysplasia (CTD), such as Ehlers-Danlos Syndrome (EDS) and Osteogenesis Imperfecta (OI), can experience hypermobility, bone fragility, pain and fatigue. The mainstay of non-medical management is symptom reduction. The relationship between these symptoms and a child’s daily function and participation is unclear.

Aims

To explore parental perceptions of the impact of a CTD on their child’s daily activities, and compare between group differences.

Methods

A parent reported survey was undertaken, measuring impact of symptoms related to a CTD of children aged 8 – 18 years. Self-care, school and leisure participation questions were included. Questionnaire data were analysed descriptively and between group differences were explored with Chi-Square.

Results

135 surveys were distributed with 102 returned (78% response rate). Pain (73%) and fatigue (68%) were the most common symptoms affecting participation. Parents were more satisfied with their child’s participation in self-care activities (61%) than school activities (37%). When participating in school activities, handwriting was more problematic for children with EDS (80%) than OI (56%) (p = .01). Outside of school, children with OI (46%) reported their condition was a greater barrier to spending time with friends compared to children with EDS (19%) (p <0.01).

Conclusion

Parents were more concerned about their child’s participation in school and leisure tasks than self-care. Social isolation is a major barrier requiring the attention of professionals in collaboration with families. Prioritising therapy based on family and child preference and need, is essential for health professionals working with children with CTDs.

Keywords

participation; allied health; personalised medicine; hypermobility; ADL

Funding and Conflict of Interest

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Address for correspondence

Alison Wesley, Occupational Therapy Department, The Children’s Hospital at Westmead Locked Bag 4001 Westmead NSW 2145
Email: alison.wesley@health.nsw.gov.au
Personalised orthotic therapy using 3D printing technologies

Elizabeth Wojciechowski, David Little, Manoj P Menezes, Sean Hogan and Joshua Burns

1 University of Sydney, New South Wales, Australia
2 Sydney Children’s Hospital Network (Randwick and Westmead), New South Wales, Australia

Background

Children and adolescents with Charcot-Marie-Tooth disease (CMT) are often prescribed ankle-foot orthoses (AFO) to manage lower limb impairments such as foot drop. They are usually handmade by a plaster cast of the patient’s lower limb followed by thermoplastic vacuum forming. This traditional approach provides limited design options, is labour-intensive and often with long outpatient wait times. 3D printing, also known as additive manufacturing, has the potential to transform the way orthoses are prescribed, designed and manufactured.

Aims

The aim of this project is to evaluate personalised 3D printed AFOs versus traditional handmade AFOs in children with CMT.

Methods

A 3D printing design and validation pipeline for personalised AFOs was developed. This includes understanding the requirements and types of AFOs for children with CMT, acquiring 3D surface images of the lower limb using a 3D surface scanner, developing a computer aided design model of an AFO, 3D printing working prototypes and optimising the design.

Results

CAD models of AFOs have been generated from 3D scans of the lower limb and prototyped using 3D printers. A clinical algorithm for the optimal AFO prescription for children with CMT has also been developed.

Conclusion

The 3D printing design and validation pipeline is a feasible work flow for developing AFOs and may offer many potential benefits over traditional manufacturing methods. Further research is required to evaluate 3D printing AFOs verse traditional handmade AFOs for children with CMT, and the most appropriate and effective printing pathway and materials to improve walking ability of affected patients.

Keywords

3D printing; additive manufacturing; ankle foot orthoses; Charcot-Marie-Tooth disease; CMT

Address for correspondence

Elizabeth Wojciechowski, The Children’s Hospital at Westmead, Cnr Hawkesbury Road and Hainsworth Street, Westmead, NSW, 2145
Email: Elizabeth.wojciechowski@sydney.edu.au
A family history of low back pain influences patient outcomes and treatment effects following a home-based video-game exercise program in older people with chronic low back pain: a secondary analysis of a randomised controlled trial (GAMEBACK)

Joshua Robert Zadro1, Debra Shirley1, Milena Simic1, Seyed Javad Mousavi1, Dragana Cerpina2, Katherine Maka2, Paulo H. Ferreira1

1 Discipline of Physiotherapy, Faculty of Health Sciences, The University of Sydney
2 Physiotherapy Department, Westmead Public Hospital, Western Sydney Local Health District

Background

A family history of low back pain (LBP) decreases the likelihood of recovering from chronic LBP, although the influence it has on the effects of a physical activity intervention are unknown.

Aim

To investigate whether a family history of LBP influences patient outcomes and treatment effects following a video-game exercise program for older people with chronic LBP.

Methods

We conducted a secondary analysis of a randomised controlled trial comparing an 8 week video-game exercise program to a control group instructed to maintain their usual activities for people over 55 years old with chronic LBP (≥3 months). Video-game exercises were performed at home for 60 minutes, 3 times/week. At baseline, participants indicated whether any of their immediate family had a history of LBP. Data on pain self-efficacy, physical activity, pain, and function were collected at baseline and 8 weeks. We performed separate regression analyses to determine whether a family history of LBP predicted patient outcomes or moderated the effects of treatment.

Results

A family history of LBP negatively influenced physical activity, pain self-efficacy, and pain scores at follow-up. Participants in the video-game exercise group without a family history of LBP demonstrated significantly greater post-intervention increases in function compared to the control group ($\beta=1.78$ 95%CI: 0.56 to 3.00, p=0.006).

Conclusion

Home-based video-game exercises are particularly beneficial for improving function in older people with chronic LBP who don’t have a family history of LBP. These findings should guide future research investigating familial characteristics that modify treatment effects for individuals with chronic LBP.

Keywords

exercise therapy; low back pain; video-game; older people; familial characteristics

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Address for correspondence

Joshua Robert Zadro, Discipline of Physiotherapy, Faculty of Health Sciences, University of Sydney, 75 East St, Lidcombe, New South Wales,