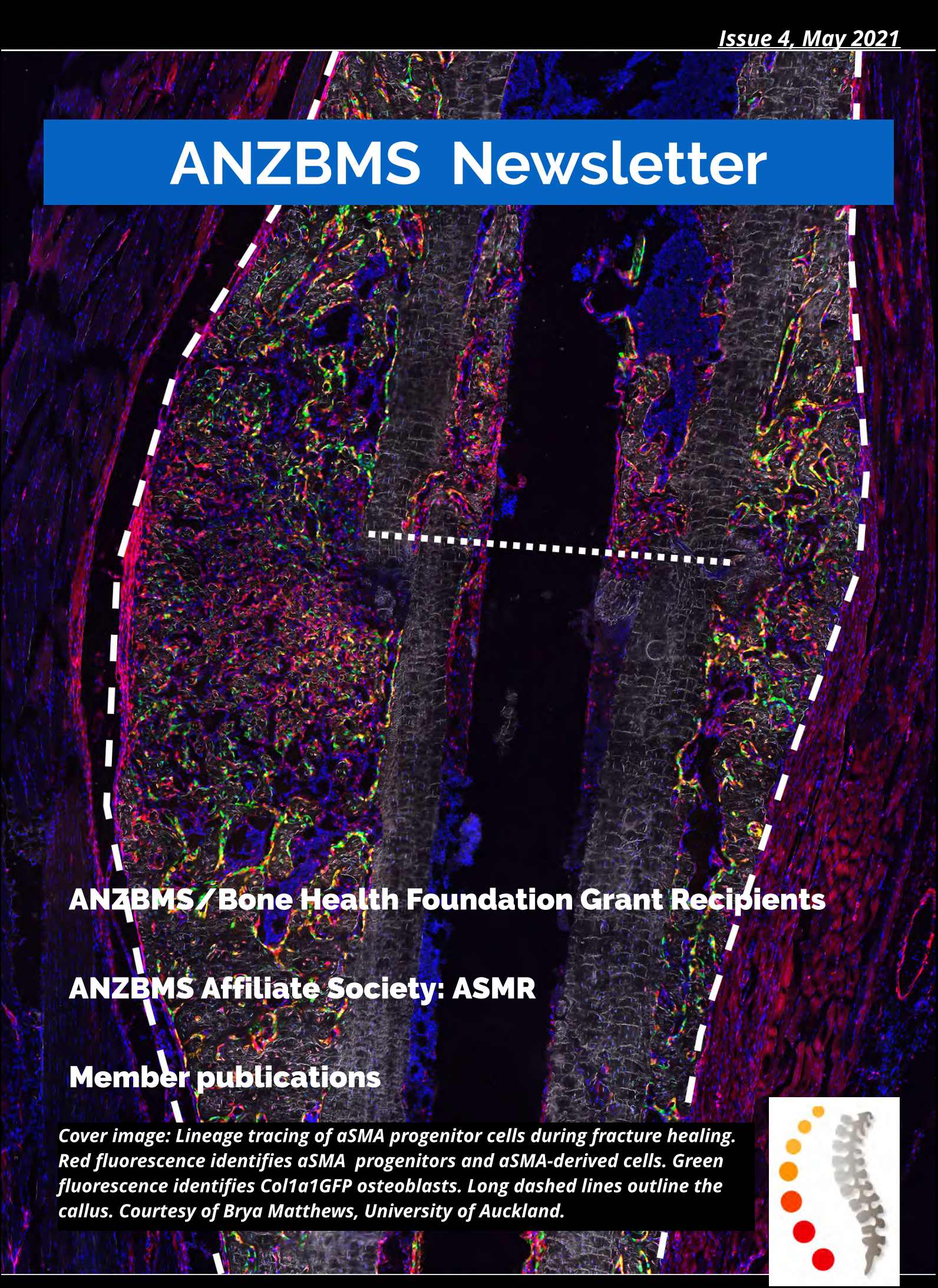
ANZBMS Newsletter



ANZBMS / Bone Health Foundation Grant Recipients

ANZBMS Affiliate Society: ASMR

Member publications

Cover image: Lineage tracing of aSMA progenitor cells during fracture healing. Red fluorescence identifies aSMA progenitors and aSMA-derived cells. Green fluorescence identifies Col1a1GFP osteoblasts. Long dashed lines outline the callus. Courtesy of Brya Matthews, University of Auckland.

In this issue

ECI Issue : Sept 2021

Next Issue: Aug 2021

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Welcome to ANZBMS newsletter

Welcome to the May Issue of the ANZBMS newsletter!

Excitingly, the details for the ANZBMS Annual Scientific meeting have been announced! This year's meeting will be held jointly with Endocrine Society of Australia (ESA) and the Society for Reproductive Biology (SRB) and will consist of both face-to-face and virtual components (pg. 3). ANZBMS awards and grants are now open for applications, deadline is the 13th August (pg. 3).

Congratulations to Frances and Michelle! They are the recipients of this year's ANZBMS/Bone Health Foundation grants (pg. 4). These grants were targeted to mid-career researchers and are jointly supported by the Bone Health Foundation (BHF). Further information on the BHF is on pg. 5 .

Did you know the ANZBMS is also affiliated with several societies? To keep you in the loop of our affiliations we will be providing information and details about our connections. This issue highlights the Australian Society for Medical Research (ASMR) outlining their priorities, what they do and how they will reach their goals, and how ANZBMS members can be involved.

This issue, we also highlight recent articles produced by ANZBMS members. Work includes: the identification of osteomorphs, characterisation of the periosteum during bone healing, influence of muscle on bone shape, vitamin D levels and BMD changes, and the effect of krill oil on osteoarthritis.

Have news to share? Want to provide us with feedback? Contact us at newsletter@anzbms.org.au

Happy reading!

Newsletter Editorial Board

ANZBMS Newsletter Editorial Board

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Annual Scientific Meeting Details

The Annual ANZBMS Scientific Meeting will be held in collaboration with the Endocrine Society of Australia (ESA) and the Society for Reproductive Biology (SRB). We are very excited to announce that this meeting will have **both a face-to-face and a virtual component**, bringing researchers and clinicians together after a year of virtual meetings and collaborations!

Date: 21-24 November 2021

Venue: Melbourne Convention & Exhibition Centre

Abstract Submission Deadline: Friday 13 August 2021

Early bird Registration Deadline: Friday 17 September 2021

Abstracts can be submitted under the categories of 'Basic Science', 'Clinical Science' or 'Clinical Case Study'.

The ANZBMS program themes will include cellular mechanisms of bone disease, advanced therapeutics in bone and transgender health.

For further information, please visit the official conference website.

ANZBMS Annual Meeting Grants & Awards

Awards for papers presented at the 2021 ANZBMS Scientific Meeting

ANZBMS Highest Rated Student Abstract Award

Roger Melick Young Investigator Award

Christopher & Margie Nordin Young Investigator Poster Award

Amgen-ANZBMS Outstanding Abstract Award

Other awards to be announced at the 2021 ANZBMS Scientific Meeting

ANZBMS Kaye Ibbertson Award for Bone and Mineral Medicine

Sol Polsen Research Award

The ANZBMS Career Achievement Award

Grants

ANZBMS Travel Grant

Applications close 13 August 2021

ANZBMS/BHF Award Recipients

ANZBMS/Bone Health Foundation (BHF) Inaugural Grant in Aid

ANZBMS and the Bone Health Foundation (BHF) is pleased to announce the recipients of the first ANZBMS/BHF Grant-in-Aid. Further information about BHF can be found on pg. 5.

These $25,000 grants were targeted to mid-career researchers (5-15 years postdoctoral) who were unsuccessful in a recent National Grant Round to provide funds to help make their work more competitive in a future grant round. We received many very high quality applications, which were scored by a panel of 7 experts. All applicants received feedback on their applications, which we hope will help them in preparing their future grant applications.

This year's awardees were:

Dr Frances Milat, Monash University, Melbourne

'Effectiveness of a fracture liaison service targeting individuals at high fracture risk following Ischaemic Stroke'

Associate Professor Frances Milat is a clinician-researcher trained in clinical endocrinology and metabolic bone disorders. She is the Deputy Head of Endocrinology and Head of Metabolic Bone Services at Monash Health as well as Head of Metabolic Bone Research Group at the Hudson Institute.

'I am incredibly grateful for the ANZBMS and BHF 2021 Grant-in-aid. This grant has been critical in providing support for an important project in fracture prevention following stroke' says Milat.

Osteoporosis and fractures in individuals with neurological disability is a neglected area of healthcare and research not only in Australia, but worldwide. Many Common neurological conditions including stroke, MS and Parkinson's disease are associated with a 3-7 fold increase in fracture risk.

The grant-in-aid funding will assist this project, which is the first of its kind to address osteoporosis optimisation and fracture prevention following stroke. We plan to implement and assess the first osteoporosis screening program to identify individuals at high risk of fracture following stroke.

Dr Michelle McDonald, Garvan Institute, Sydney

'Prevention of rebound bone loss and fracture induced by Denosumab withdrawal'

Dr Michelle McDonald is the Group Leader of the Bone Microenvironment Group at the Garvan Institute of Medical Research. Dr McDonald's research career spans over 18 years, attaining her PhD in 2008. Her current research aims to develop new strategies to target cells of the bone environment to prevent tumour growth in bone as well as prevent tumour spread from bone to other more lethal tissue sites.

The Grant-in-aid funding will allow Dr McDonald and her team to explore how targeting the process of osteoclast fission may help overcome a clinical issue. 'When patients are withdrawn from therapy with Denosumab, they experience a rebound loss in bone mass and a high risk of fracture' Says McDonald 'We plan to explore new ways to prevent this using models in the lab, with the aim to use this data to gain further funding to support clinical studies'

In addition to her interest in research, Dr McDonald is passionate about mentoring her students and staff and contributes in multiple ways to influence the growth and success of women in STEM careers, often taking the time to speak to school aged girls about her career path.

Bone Health Foundation

The Bone Health foundation is a not-for-profit organisation that raises money for education and research into bone health and musculoskeletal conditions that affect Australians of all ages.

Established in Adelaide in 1991, The Foundation has raised and invested in excess of $2.5 Million into Australian based research and education projects to improve the health and wellbeing of those affected by poor bone health.

Our aim is 'Healthy Bones for Every Body' and as such we run awareness programs highlighting the benefits of Calcium, Vitamin D and Exercise for strong and healthy bones.

Funding from the Bone Health Foundation has assisted with the discovery of an increased incidence of the late diagnosis of Hip Dysplasia in young children. Due to this discovery, a clinic has been set up in the Women's and Children's Hospital, Adelaide by Associate Professor Nicole Williams, to screen and treat patients with Hip Dysplasia. Our ongoing support has also assisted with the roll out of a community nurse training program and direct referral system to assist with the early detection and treatment of Hip Dysplasia.

In 2020 our focus returned to funding early career researchers in South Australia, and despite the difficulties associated with Covid 19, The Bone Health Foundation awarded $125,000 worth of seed grants.

Our commitment to research remains strong in 2021 with the announcement that we will again fund up to 5 x $25,000 Early Career Researcher Grants, this is in addition to our Grants in Aid partnership with the ANZBMS.

To find out more about The Bone Health Foundation and what we do, visit www.bonehealth.org.au

ANZBMS Committee Updates

Early Career Investigator Committee

The ANZBMS ECIC are often approached for recommendations of eligible early career researchers for a number of valuable opportunities. These include, but are not limited to: (1) invited national and international platform presentations; (2) peer reviewing roles; (3) awards.

With this in mind, the ANZBMS ECIC is establishing a database of ECI member profiles that allows us to better understand the skill sets, expertise, and research interests of our membership. *This database will provide a means for us to proactively identify and engage ECI members that are eligible for these research and professional service roles that will ultimately improve their track record.*

The ECI database will also help us design and implement future initiatives that are aimed at boosting track records, and encouraging collaboration within our society. These include an ANZBMS Fellowship and Grant Coaching Program and a Skills and Resources Matching Initiative. ***This is a great opportunity and all ECI members are encouraged to participate in this initiative by filling out the following questionnaire:*** https://forms.gle/4BDXyP5Wriwfk6qH7

Bone Densitometry Committee

In a world-first, the ANZBMS densitometry course was delivered through an online format in February with over 80 registrants, in response to COVID-19 and the challenges this has posed.

The course went smoothly and was well received, including lectures via Zoom as well as the use of virtual DXA workstations imitating the real life DXA controls, allowing simulated scans and analyses of multiple scans in our library.

The next course, also online will be on the 18th and 19th September.

We hope to return to some face to face courses in 2022.

ANZBMS Affiliate society : ASMR

The Australian Society for Medical Research (ASMR) is the peak professional body representing the Australian health and medical research (HMR) sector. In addition to a large number of individual members, the ASMR also represents a range of Affiliate Members, including the ANZBMS.

The ASMR's mission is to empower research for a healthy and equitable Australia. To achieve this, the activities of the Society rest on the three pillars of political, public and scientific advocacy. This article outlines some of the current priority activities of ASMR and discusses ways in which the ANZBMS and its members can contribute to the ASMR's mission.

Authored by Dr Dan Johnstone

ASMR Executive Director and Past President (2017)

Public, Political, Scientific Advocacy

www.asmr.org.au

@TheASMR1

Immediate priorities

The immediate priorities of the ASMR are slanted heavily towards ensuring a fertile and sustainable research ecosystem through enhanced investment into HMR. Specifically, we advocate for:

(1) ***An urgent injection of investment into the NHMRC Medical Research Endowment Account (MREA) to support world-class Australian research and researchers and drive health, economic and social returns.***

Various ASMR commissioned reports have revealed NHMRC-funded research returns $3.20 for every dollar invested (see https://asmr.org.au/factsheet-and-reports/). Despite these exceptional returns, investment into the NHMRC MREA has been static for the past 10 years. Ahead of the next federal election, the ASMR is calling on politicians to commit to an**immediate doubling of annual investment into the NHMRC and sustainable MREA investment into the future**. This is aimed at rescuing current grant funding rates (in some cases <10%) and placing us on a track to achieving the ASMR's long-term goal of benchmarking HMR investment to 3% of total health expenditure (currently 0.7% across MREA and Medical Research Future Fund (MRFF) disbursements).

(2) ***Protecting the integrity of peer review, to ensure that funding decisions are based on merit rather than political influence or lobbying.***

Many of our members (and the research community at large) have raised concerns around the lack of transparency in some MRFF processes. Since the MRFF was announced in the 2014 Federal Budget, the ASMR has strongly advocated for peer review to be central to all MRFF funding decisions. While we have seen improvements in recent years, there is still more that can be done. The Australian National Audit Office (ANAO) is currently calling for submissions to their audit of the MRFF, which we expect will highlight any deficiencies to drive further improvements. Additionally, ASMR members have expressed concern with changes to NHMRC peer review processes (e.g. lack of qualitative feedback, absence of review panels for some schemes, etc.). The ASMR have conveyed these concerns to the NHMRC and made suggestions for improvement, some of which have been adopted for current grant rounds.

(3) Support of all career stages and all parts of the research pipeline, to ensure continuity of the workforce and translatable research discoveries into the future. For some years it has been recognised that there is a pinch point at the mid-career level when it comes to opportunities for grant funding (either through fellowships or Investigator grants). As a result, many amazing researchers within the EMCR bracket take their talent overseas, to other industries or are forced out of the sector. This loss of intellectual capital, representing the future leadership of the sector, has the potential to paralyse Australian HMR in the near future. While the ASMR has always strongly advocated for greater career potential for EMCRs, we intend to make this a particular priority in the immediate term. In addition, with the full capitalisation of the MRFF and its focus on supporting the clinical/translational/commercial end of the research pipeline, there is concern that basic discovery, preventative health and health services research is being neglected as a consequence. The ASMR is continually advocating for adequate and sustainable support of all areas of HMR across all stages of the research pipeline.

Mechanisms for addressing these and other priorities

The ASMR uses a number of mechanisms in order to achieve our goals and support our membership. In terms of political advocacy, we regularly meet with politicians to inform and educate them on the state of the sector and the exceptional returns associated with investing in HMR. Early in 2021, we launched a Parliamentary Friends of Health and Medical Research group, which will be used as a vehicle to communicate these messages directly to politicians *en masse*. In addition, the ASMR Medical Research Week®, held in June each year, involves a suite of events geared towards public, political and scientific advocacy, such as public outreach events, scientific meetings and gala events that centre around the ASMR Medallist. Finally, the ASMR run a number of initiatives aimed at supporting the career advancement of its members, including professional development programs, scientific conferences and research awards.

How can ANZBMS and its members be involved?

The ASMR would greatly value the contribution of ANZBMS and its members in helping us achieve our goals and mission. One of the main ways individuals can help is to become a member of the ASMR – the more members we have, the stronger our voice in advocating. Better still, become an active member by nominating to join one of our state or regional committees. You can also help by following the ASMR through social media channels and sharing content that resonates with you, or participate in surveys or information-gathering exercises sent to members periodically (such as our current submission to the ANAO audit of the MRFF). We would also love to see you at ASMR events (either as part of ASMR Medical Research Week® in June or the ASMR National Scientific Conference in November, to be held this year in Canberra) so that we can engage you directly in the ASMR network.

For further information on these and other ASMR initiatives, visit www.asmr.org.au

asmr Australian Society for Medical Research

Public, Political, Scientific Advocacy

Meet our newest ANZBMS members

Professor Jean-Pierre Lévesque, PhD, Professorial Research Fellow

Affiliation: Mater Research Institute – The University of Queensland

Research category: Basic/Translational

Research interests: My major interest is to understand how the microenvironment of the bone marrow regulates haematopoiesis and how the haematopoietic tissue interacts with the surrounding bone tissue. My second interest is to understand the pathogenesis of trauma-induced heterotopic ossifications particularly subsequent to major traumas of the central nervous system.

What you hope to gain from joining ANZBMS? I am moving more and more to bone research through my work on the pathogenesis neurogenic heterotopic ossifications. Joining the ANZBMS offers me the opportunity to connect with scientists and clinicians interested in musculo-skeletal biology and disorders.

Laura Trainor, PhD candidate

Affiliation: The University of Adelaide and South Australian Health and Medical Research Institute (SAHMRI)

Research category: Translational

Research interests: My research interests are the bone marrow microenvironment and multiple myeloma, the second most common blood cancer. My project aims to identify and characterise the cellular and microenvironmental changes in the progression of multiple myeloma from its pre-malignant stage, monoclonal gammopathy of undetermined significance.

What you hope to gain from joining ANZBMS? I hope to meet and communicate with ANZBMS members so I can build my network with other bone researchers.

@_LauraTrainor

West Australian Bone Research Collaboration

We are excited to announce the launch of the webpage for the Western Australian Bone Research Collaboration.

WABRC was officially formed in 2016 however, their webpage which has up to date information on the team, and their research programs events and publications was launched earlier this year: **https://wabrc.com/**

HubLE relaunch

To mark the second anniversary of HubLE, we are excited to announce the relaunch of HubLE, the IFMRS's Online Learning Environment for young investigators in the musculoskeletal (MSK) field.

So, what's new?

We've made a few changes to ultimately improve how people share their ideas and learn from others, these include:

- **Refining the core HubLE features**, making it easier for folks to find the ideas, research and knowledge that will be most useful for their work and learning.
- **Simplifying the process for submitting content** and streamlining the publication schedule.
- **Updating the website** to make it easier to navigate and improve the overall experience.

Our mission remains the same

Although we've made a few changes, our mission remains the same, and HubLE will continue to support the next generation of scientists to shape the future of MSK research, from basic to clinical. How? By not only giving a platform to early investigators to share, network, and engage in discussion and dialogue with other researchers and professionals from across the world, but also by providing high-quality, accessible knowledge about MSK research, with an emphasis on innovation.

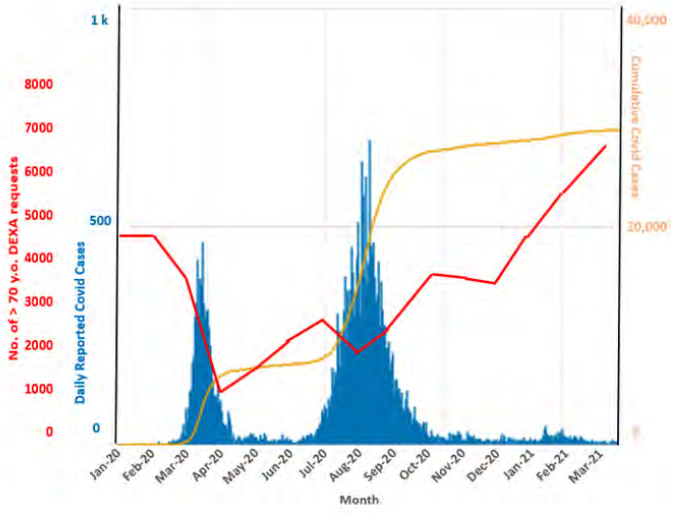
Join the HubLE community today!

To share your ideas and learn from our international community, visit:

www.huble.org

COVID19 and DXA scans

Recovery of Bone Density Requests in > 70 year old subjects in Victoria in relation to National Covid-19 Cases



Source: Medicare Australia, Department of Health Report 4/5/2021

Covid-19 has disrupted healthcare delivery in many sectors, particularly in our elderly population. Victoria in particular entered a 112 day lockdown, with a sudden drop in bone density requests for subjects greater than 70 years of age. The downstream effect of this is unknown, however the rise in request volume suggests recovery and confidence of this population to attend to their bone health.

Member publications

Chan ASM, McGregor NE, Poulton IJ, Hardee JP, Cho EH, Martin TJ, Gregorevic P, Sims NA, Lynch GS. Bone Geometry Is Altered by Follistatin-Induced Muscle Growth in Young Adult Male Mice. JBMR Plus. 2021; 5(4):e10477.

What is the background of the study?

This study has focussed on understanding how muscle size influences bone structure in adulthood.

Bone adapts dynamically to physiological stimuli, particularly in response to the mechanical forces from muscle contraction. Changes in muscle function can drive subsequent changes in bone shape, a phenomenon most studied in the context of exercise. However, as physical activity influences both tissues, muscle and bone, it is difficult to discern how the surrounding musculature influences bone structure directly. Myostatin (MSTN) is a potent inhibitor of muscle growth, and in*MSTN*-null mice, muscle growth throughout development alters bone shape and structure. However, whether muscle growth initiated later in adulthood could similarly alter bone structure, was unknown.

What did you find and what message do you want readers to take away?

To examine what effect increasing muscle size had on bone shape, we successfully induced muscle hypertrophy in the lower hindlimb muscles of adult, male mice through a single intramuscular injection of an adeno-associated viral (AAV) vector encoding follistatin, a potent inhibitor of MSTN. Four weeks after injection and in response to significant muscle growth, we identified that the tibial ridge, a bony structure that sits adjacent to the tibialis anterior muscle, was significantly lengthened. We also identified that the cortical shaft was actively narrowed by events of cortical bone drift, specifically in regions directly opposing muscle growth.

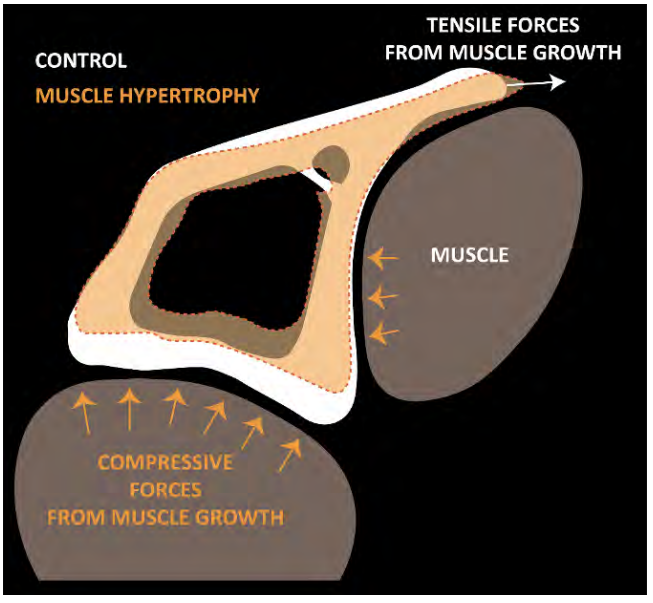
Together, these observations strongly indicate that the adult tibia is capable of rapid, structural modifications in order to accommodate the growing, surrounding musculature.

What is an application of your finding?

Loss of muscle and bone health during ageing is a major health problem for Australia and most developed nations which have increasing populations of older adults. Preserving muscle and bone health is essential for healthy ageing, living independently and for maintaining quality of life. Understanding how both tissues interact and influence each other is important for developing effective interventions that preserve muscle and bone health. Our findings reveal how the surrounding musculature can influence bone structure, and how this might be affected through all stages of life. Further studies need to resolve whether bone adaptations to dynamic changes in muscle size are transient or preserved. This knowledge provides an important foundation for developing novel muscle-bone therapeutics.

Did you face any challenges during the study?

A considerable challenge was designing and using custom analytical tools to measure region-specific changes in bone structure that were otherwise inaccurately represented in standard workflows. This included using the Otsu method (described in Walker et al., 2020) to quantify the changes in bone volume at different density thresholds, and radially measuring cortical thickness to identify regions of localised cortical thinning.



Muscle hypertrophy drives adaptations to tibial bone structure. Representative cross-sectional images at 25% distal to the top of the tibia (control group = white, muscle hypertrophy group = orange, outlined). Compressive forces drive cortical bone drift, and tensile forces drive the extension of the tibial crest.

Member publications

McDonald MM, Khoo WH, Ng PY, Xiao Y, Zamerli J, Thatcher P,Kyaw W, Pathmanandavel K, Grootveld AK, Moran I, Butt D, Nguyen A, Corr A, Warren S, Biro M, Butterfield NC, Guilfoyle SE, Komla-Ebri D, Dack MRG, Dewhurst HF, Logan JG, Li Y, Mohanty ST, Byrne N, Terry RL, Simic MK, Chai R, Quinn JMW, Youlten SE, Pettitt JA, Abi-Hanna D, Jain R, Weninger W, Lundberg M, Sun S, Ebetino FH, Timpson P, Lee WM, Baldock PA, Rogers MJ, Brink R, Williams GR, Bassett JHD, Kemp JP,Pavlos NJ, Croucher PI and Phan TG. Osteoclasts recycle via osteomorphs during RANKL-stimulated bone resorption. Cell. 2021; 184(5):1330-1347.e13.

What is the background of the study?

Denosumab (Dmab) is an effective agent for the treatment of osteoporosis and is the most commonly GP prescribed osteoporosis medication. Whilst highly effective at preventing further bone loss and fractures, cessation of Dmab treatment is problematic with a rapid rebound effect, resulting in accelerated bone loss and increased risk of vertebral fractures. We understand this bone loss is driven by increased osteoclast activity, but the mechanism driving this is unclear.

Our current understanding of osteoclast biology has been determined through static in vivo data and in vitro investigations, each approach lacking complexities of in vivo cell dynamics and interactions. Emerging new in vivo imaging approaches provide the capacity to examine osteoclasts in real time within the complex bone microenvironment, providing a better understand therapeutic responses such as Dmab treatment withdrawal.

What did you find and what message do you want readers to take away?

Using a novel intravital imaging technique to image osteoclast son the endocortical surface of mature bone we discovered that osteoclasts undergo cycles of cell fission and fusion, recycling their cellular constituents. This provided evidence that apoptosis is not the only fate for osteoclasts, indeed they undergo recycling. This aligns with new findings that the osteoclast lifecycle is up to 6 months (can provide reference for this). Importantly we defined these recycling osteoclasts as a distinct cell population, with a unique transcript signature from osteoclast pre-cursors and mature osteoclasts.

Of importance to the clinical situation of Dmab therapy cessation, we provide evidence that osteomorphs and osteoclast pre-cursors accumulate during Dmab therapy, and then rapidly re-fuse to form osteoclasts following withdrawal.

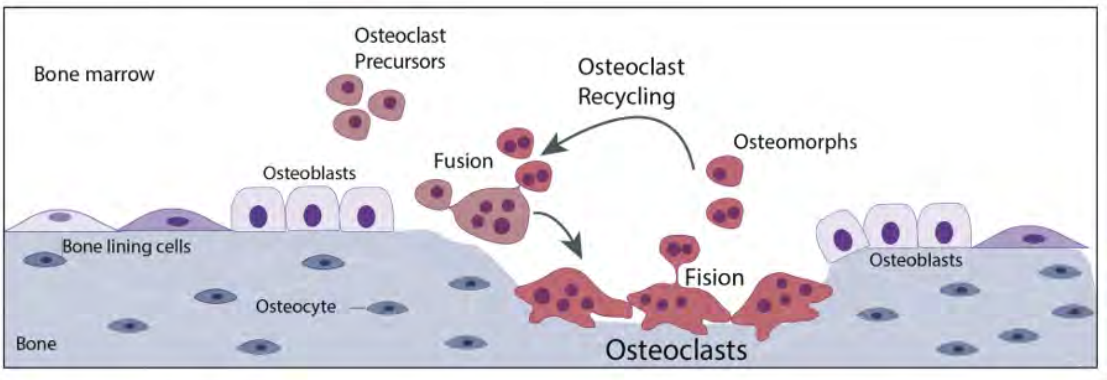
What is an application of your finding?

Our discovery of the osteomorph and its unique transcript signature provide an exciting opportunity for the field as it could provide new avenues for therapeutic targets and improved understanding of bone pathologies.

Evidence that osteoclast recycling underlies the rapid formation of osteoclast following denosumab withdrawal provides improved understanding of the mechanism behind this clinical conundrum and with this, new opportunities to intervene and prevent it.

Did you face any challenges during the study?

Yes of course. This work commenced over 6 years ago. As is often the way, many experiments failed in this time, but with the thought we had made an exciting discovery, we persevered and it paid off. The biggest challenge we overcame was that we wanted to lineage trace osteoclasts, but the field did not have a clean genetic reporter for these cells. To overcome this, we used a mixed bone marrow chimera system and relied on the fact we knew osteoclasts formed via fusion, meaning red and green only donor osteoclast precursors produced osteoclasts that were both red and green following fusion. It was then possible to track fission products using this system also. Sometimes you need to turn to simple ideas to overcome complex challenges.



Member publications

Matthews BG, Novak S, Sbrana FV, Funnell JL, Cao Y, Buckels EJ, Grcevic D, Kalajzic I.
Heterogeneity of murine periosteum progenitors involved in fracture healing. Elife. 2021.10:e58534.

What is the background of the study?

I started this study during my postdoc in the US. I had been working on fracture healing, and it was clear from the fracture literature, and from looking at histology of mouse fractures, that the periosteum was really the key site of cells involved in bone healing. At that time, almost all the stem cell related studies completely ignored the periosteum and focused on the bone marrow compartment. Many also focused exclusively on neonatal or juvenile mice. This has since changed, there have been a number of key papers published in the last few years looking at periosteal stem and progenitor populations. We started with a lineage tracing model that we knew identified osteoprogenitors during fracture healing in vivo in at least some settings and attempted to better define the cells involved in bone and fibrocartilage formation during the healing process.

What did you find and what message do you want readers to take away?

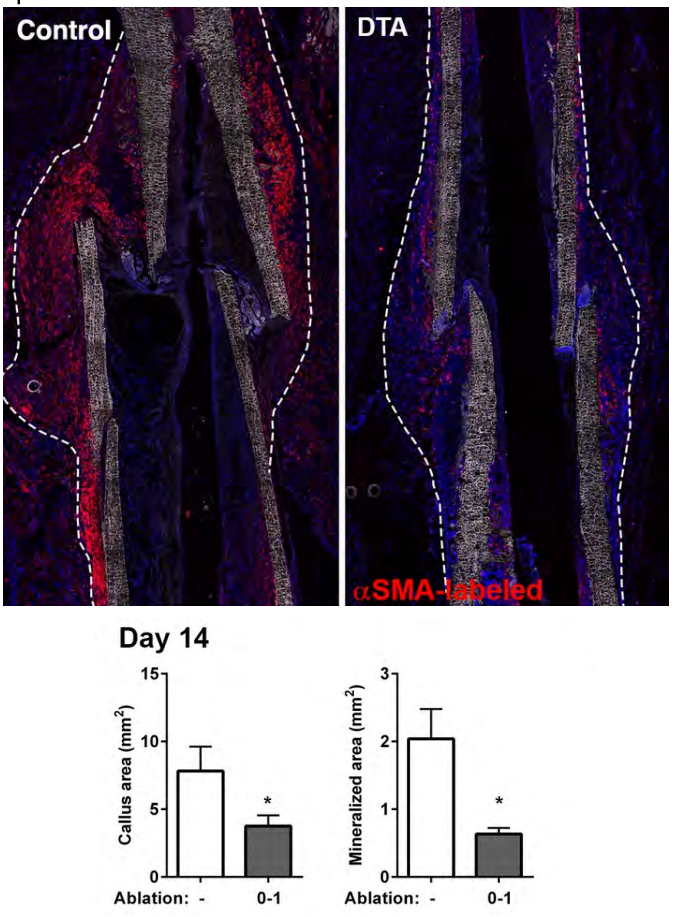
We found that the periosteum is highly enriched for skeletal stem and progenitor cells compared to the bone marrow compartment. Our results also suggest that callus formation during healing is probably not driven by a single pool of stem cells, but involves multiple populations, including more mature lineage-restricted populations. αSMA is expressed in many of these cells, especially those that become osteoblasts, at some point in their lineage, but in some cases this is probably due to activation in the early stages of injury.

What is an application of your finding?

We would ultimately like to understand the cellular and molecular processes that drive fracture healing as it is a great example of successful tissue regeneration. Ultimately it would be great to be able to identify patients that will not heal earlier, and have better interventions to treat this, but we're not there yet!

Did you face any challenges during the study?

I moved back to New Zealand and started my (semi)independent research career before I finished this project. Sanja Novak and Ivo Kalajzic in Connecticut did a fantastic job finishing up experiments since I didn't have any of the transgenic animals in my new lab, and my new team, Ye and Emma, were able to complete some parts here. I visited Connecticut a couple of times, but since we submitted it in mid 2020, getting revisions done was very challenging with border and lab closures and authors spread across four different countries. Flow cytometry is also challenging on digested tissues like the periosteum, it was difficult to get consistent results, some of the figures have very large n since we did some analyses many times. It's taken a while, but I'm delighted to finally have it published.



Ablation of aSMA cells impairs fracture healing. Taken from Matthews et al. 2020 eLife

Member publications

Thompson M, Aitken D, Balogun S, Cicuttini F, Jones G. Population vitamin D stores are increasing in Tasmania and this is associated with less BMD loss over 10 years. Journal of Clinical Endocrinology & Metabolism. 2021(30). DOI:10.1210/clinem/dgab197

What is the background of the study?

Vitamin D deficiency is a modifiable determinant of poor musculoskeletal health. In Australia incidental sun exposure alone was assumed to be adequate to achieve vitamin D sufficiency until the late 1990s. Subsequent research demonstrated widespread vitamin D deficiency in southern Australia. This resulted in a range of changes to public health guidance and clinical practice. There are few data globally, and none in Australia, that assess long term longitudinal change in 25-hydroxyvitamin D (25(OH)D) or the impact of longitudinal vitamin D sufficiency on skeletal health outcomes such as bone mineral density (BMD). Existing international studies have suggested that cohort vitamin D status is unlikely to improve without a population wide intervention such as food fortification.

What did you find and what message do you want readers to take away? What is an application of your finding?

We conducted a prospective cohort analysis of community dwelling older adults living in southern Tasmania. Over 10 years participants experienced a substantial (11.3 nmol/L average) increase in longitudinal 25(OH)D concentration. Summer sun exposure and vitamin D supplement use increased. Individuals who were vitamin D deficient at baseline experienced greater increases in 25(OH)D and were more likely to commence a vitamin D supplement, suggesting targeted intervention. Maintaining vitamin D sufficiency was associated with less BMD loss over 10 years. Participants who achieved vitamin D sufficiency had similar BMD outcomes compared to participants who were always sufficient, suggesting that the excess BMD loss associated with vitamin D deficiency may be reversible when deficiency is corrected.

What is an application of your finding? Our results suggest that targeted interventions can improve vitamin D status in community-dwelling older adults and that this may decelerate age-associated BMD loss. These data fill an important gap in the literature linking "long term" (10 years) vitamin D status with improved skeletal health (BMD) outcomes. Overall, our results support interventions aimed at achieving or maintaining population vitamin D sufficiency as an approach that may ameliorate age-associated BMD loss.

Laslett L L, Scheepers L E, Antony B S, Wluka A E, Hill C L, March L, Keen H I, Otahal P, Cicuttini F M, Jones G. Efficacy of krill oil in the treatment of knee osteoarthritis: a 24-week multicentre randomised double-blind controlled trial. Osteoarthritis and Cartilage. 29(S1): S10 -S11

What is the background of the study?

Knee osteoarthritis is extremely common, and an important cause of pain and disability, but there are very few effective treatments. Therapies that slow down the rate at which the disease progresses and also alleviate pain are sorely needed. One of the common pathological findings in people with knee osteoarthritis is localised inflammation inside the knee (effusion-synovitis). This is important in OA pathogenesis as it predicts changes to other structures within the knee and predicts knee replacements. It is also associated with knee pain. Krill oil is an attractive candidate therapy for treating knee pain and knee osteoarthritis, because it has anti-inflammatory effects. Two small clinical trials in people with knee pain and / or arthritis suggested that krill oil may be beneficial in alleviating knee pain and reducing inflammation. Therefore, we conducted a randomised controlled trial of krill oil (2g / day) in people with at least moderate knee pain, knee osteoarthritis and localised knee inflammation over 24 weeks.

What did you find and what message do you want readers to take away? What is an application of your finding?

Krill oil (2g / day) for 24 weeks was not effective in reducing pain in 262 people with moderate to severe knee pain, knee osteoarthritis and localised inflammation, compared to placebo. We did not see any effects on any other outcomes assessed. We are yet to assess changes on MRI scans. Krill oil was safe, with no differences in adverse events between people who received krill oil vs placebo.

Member publications

What is an application of your finding? Our results show that at the 2g / day dose, that krill oil is not an effective treatment for knee pain in people with knee osteoarthritis. Our results do not support people using this as a treatment for painful knee osteoarthritis.

Did you face any challenges during the study? Clinical trials are always challenging. They are expensive, they take a long time, and they are the work of a large number of people. This trial represents 5 years of work for the KARAOKE study team. However, this was a fairly standard investigator initiated clinical trial. Our largest challenge has been trying to find a way to automate reading of the MRI scans.

Photo Credits: Aker Biomarine AS

Other member publications:

References: (alphabetical order by first author)

1. Abshirini M, Coad J, Wolber FM, von Hurst P, Miller MR, Tian HS, Kruger MC. Green-lipped (greenshell) mussel (Perna canaliculus) extract supplementation in treatment of osteoarthritis: a systematic review. Inflammopharmacology. 2021.

2. Al Saedi A, Duque G, Stupka N. Targeting intramuscular adipose tissue expansion to preserve contractile function in volumetric muscle loss: A potentially novel therapy? Curr Opin Pharmacol. 2021;58:21-6.

3. Arnold A, Dennison E, Kovacs CS, Mannstadt M, Rizzoli R, Brandi ML, Clarke B, Thakker RV. Hormonal regulation of biomineralization. Nat Rev Endocrinol. 2021;17(5):261-75.

4. Atlas G, Yap M, Lim A, Vidmar S, Smith N, King L, Jones A, Hong J, Ranganathan S, Simm PJ. The clinical features that contribute to poor bone health in young Australians living with cystic fibrosis: A recommendation for BMD screening. Pediatr Pulmonol. 2021.

5. Balogun SA, Aitken D, Wu F, Scott D, Jones G, Winzenberg T. Linear and non-linear associations between physical activity, body composition and multimorbidity over 10 years among community-dwelling older adults. J Gerontol A Biol Sci Med Sci. 2021.

6. Beck B, Drysdale L. Risk Factors, Diagnosis and Management of Bone Stress Injuries in Adolescent Athletes: A Narrative Review. Sports (Basel). 2021;9(4).

7. Bellinge JW, Francis RJ, Lee SC, Vickery A, Macdonald W, Gan SK, Chew GT, Phillips M, Lewis JR, Watts GF, Schultz CJ. The effect of Vitamin-K1 and Colchicine on Vascular Calcification Activity in subjects with Diabetes Mellitus (ViKCoVaC): A double-blind 2x2 factorial randomized controlled trial. J Nucl Cardiol. 2021.

8. Boerckel JD, Plotkin LI, Sims NA. Editorial Peer Reviewers as Shepherds, Rather Than Gatekeepers. J Bone Miner Res. 2021.

9. Daly RM, Dalla Via J, Fyfe JJ, Nikander R, Kukuljan S. Effects of exercise frequency and training volume on bone changes following a multi-component exercise intervention in middle aged and older men: Secondary analysis of an 18-month randomized controlled trial. Bone. 2021;148:115944.

10. Debaud C, Tseng HW, Chedik M, Kulina I, Genet F, Ruitenberg M, Levesque JP. Local and systemic factors drive ectopic osteogenesis in regenerating muscles of spinal cord-injured mice in a lesion level-dependent manner. J Neurotrauma. 2021.

11. Dolci F, Kilding AE, Spiteri T, Chivers P, Piggott B, Maiorana A, Hart NH. Modulators of Change-of-Direction Economy After Repeated Sprints in Elite Soccer Players. Int J Sports Physiol Perform. 2021:1-7.

12. Drevinge C, Scheffler JM, Koro-Arvidsson C, Sundh D, Carlsten H, Gjertsson I, Lindholm C, Lorentzon M, Rudin A, Ekwall AH, Islander U. Intermediate monocytes correlate with CXCR3+ Th17 cells but not with bone characteristics in untreated early rheumatoid arthritis. PLoS One. 2021;16(3):e0249205.

13. Duckham RL, Hawley NL, Rodda C, Rantalainen T, Hesketh KD. The skeletal maturity of Australian children aged 10-13 years in 2016. Ann Hum Biol. 2021:1-3.

14. Duncan EL. Gene Testing in Everyday Clinical Use: Lessons from the Bone Clinic. J Endocr Soc. 2021;5(4):bvaa200.

15. Edwards CM, Johnson RW. Targeting Histone Modifications in Bone and Lung Metastatic Cancers. Curr Osteoporos Rep. 2021.

16. Enriquez RF, Lee NJ, Herzog H. AgRP signalling negatively regulates bone mass. J Neuroendocrinol. 2021:e12978.

17. Fuggle NR, Westbury LD, Bevilacqua G, Titcombe P, M OB, Harvey NC, Dennison EM, Cooper C, Ward KA. Level and change in bone microarchitectural parameters and their relationship with previous fracture and established bone mineral density loci. Bone. 2021;147:115937.

18. Gojanovic M, Holloway-Kew KL, Hyde NK, Mohebbi M, Shivappa N, Hebert JR, O'Neil A, Pasco JA. The Dietary Inflammatory Index Is Associated with Low Muscle Mass and Low Muscle Function in Older Australians. Nutrients. 2021;13(4).

19. Grace TM, O'Rourke D, Robertson T, Perilli E, Callary S, Taylor M, Atkins GJ, Solomon LB, Thewlis D. A semiautomated method to quantitatively assess osteolytic lesion volume and bone mineral density within acetabular regions of interest from CT. J Orthop Res. 2021.

20. Gray A, Marsh D, Mitchell P. The Fragility Fracture Pandemic - has the 'Call to Action' made a difference? Injury. 2021;52(4):645-6.

21. Harvey NC, Orwoll E, Kwok T, Karlsson MK, Rosengren BE, Ribom E, Cauley JA, Cawthon PM, Ensrud K, Liu E, Cruz-Jentoft AJ, Fielding RA, Cooper C, Kanis JA, Lorentzon M, Ohlsson C, Mellstrom D, Johansson H, McCloskey E. Sarcopenia Definitions as Predictors of Fracture Risk Independent of FRAX((R)) , Falls, and BMD in the Osteoporotic Fractures in Men (MrOS) Study: A Meta-Analysis. J Bone Miner Res. 2021.

22. Heilmeier U, Joseph GB, Pasco C, Dinh N, Torabi S, Darakananda K, Youm J, Carballido-Gamio J, Burghardt AJ, Link TM, Kazakia GJ. Longitudinal Evolution of Bone Microarchitecture and Bone Strength in Type 2 Diabetic Postmenopausal Women With and Without History of Fragility Fractures-A 5-Year Follow-Up Study Using High Resolution Peripheral Quantitative Computed Tomography. Front Endocrinol (Lausanne). 2021;12:599316.

23. Inoue M, Matsumoto C, Nakajima K, Kuroshima S, Sawase T. Alendronate/dexamethasone combination therapy worsens soft and hard tissue wound healing around implants in rat maxillae. Bone. 2021;148:115942.

24. Kamble S, Valtchev P, Dao A, Pelras T, Rogers MJ, Savage PB, Dehghani F, Schindeler A. Synthesis and Characterization of Bone Binding Antibiotic-1 (BBA-1), a Novel Antimicrobial for Orthopedic Applications. Molecules. 2021;26(6).

25. Kanis JA, Johansson H, Harvey NC, Lorentzon M, Liu E, Vandenput L, McCloskey EV. An assessment of intervention thresholds for very high fracture risk applied to the NOGG guidelines : A report for the National Osteoporosis Guideline Group (NOGG). Osteoporos Int. 2021.

26. Kendler DL, Body JJ, Brandi ML, Broady R, Cannata-Andia J, Cannata-Ortiz MJ, El Maghraoui A, Guglielmi G, Hadji P, Pierroz DD, de Villiers TJ, Ebeling PR, Rizzoli R. Osteoporosis management in hematologic stem cell transplant recipients: Executive summary. Journal of Bone Oncology. 2021;28:100361.

27. King LK, Epstein J, Cross M, Buzzi M, Buttel T, Cembalo SM, Spitz E, Adams CL, Adebajo A, Bennell K, Blanco B, Courage U, Decary S, Gill M, Gill TK, Hajji R, Hinman RS, Jones A, Li LC, Mather K, Mani R, Nasef SI, Oo WM, Osteras N, Otobo TM, Ramiro S, Sharma S, April KT, Touma Z, Whittaker JL, Wluka AE, Grosskleg S, Hunter DJ, Shea B, Hawker GA, Callahan LF, March L, Guillemin F. Endorsement of the domains of knee and hip osteoarthritis (OA) flare: A report from the OMERACT 2020 inaugural virtual consensus vote from the flares in OA working group. Semin Arthritis Rheum. 2021.

28. Kumar SM, Simm PJ, De Silva LM, Gorelik A, Freeman JL, Mackay MT, Ahmad BS, Petty SJ, Wark JD. Risk of Fractures and Other Injuries in Children Treated with Antiseizure Medications for Epilepsy. Calcif Tissue Int. 2021.

29. Kuroshima S, Nakajima K, Sasaki M, Hayano H, Inoue M, Kozutsumi R, Sawase T. Gene expression analysis of fresh extraction wounds prior to onset of bisphosphonate-related osteonecrosis of the jaw-like lesions in mice: A preliminary animal study. J Prosthodont Res. 2021.

30. Le Couteur DG, Handelsman DJ, Stanaway F, Waite LM, Blyth FM, Naganathan V, Cumming RG, Hirani V. Sarcopenic obesity and amino acids: Concord Health and Ageing in Men Project. J Gerontol A Biol Sci Med Sci. 2021.

31. Lee YR, Findlay DM, Muratovic D, Kuliwaba JS. Greater heterogeneity of the bone mineralisation density distribution and low bone matrix mineralisation characterise tibial subchondral bone marrow lesions in knee osteoarthritis patients. Bone. 2021;149:115979.

32. Levinger I, Duque G. Sarcopenia: Innovation and Challenges. J Am Med Dir Assoc. 2021;22(4):728-30.

33. Liu TY, Bartnikowski M, Wu AC, Veitch M, Sokolowski KA, Millard SM, Pettit AR, Glatt V, Evans CH, Wells JW. Healing of sub-critical femoral osteotomies in mice is unaffected by tacrolimus and deletion of recombination activating gene 1. Eur Cell Mater. 2021;41:345-54.

34. Mirkhalaf M, Dao A, Schindeler A, Little DG, Dunstan CR, Zreiqat H. Personalized Baghdadite scaffolds: stereolithography, mechanics and in vivo testing. Acta Biomater. 2021.

35. Nguyen HG, Lieu KB, Ho-Le TP, Ho-Pham LT, Nguyen TV. Discordance between quantitative ultrasound and dual-energy X-ray absorptiometry in bone mineral density: The Vietnam Osteoporosis Study. Osteoporos Sarcopenia. 2021;7(1):6-10.

36. Nielsen SM, Boers M, de Wit M, Shea B, van der Windt DA, Reeves BC, Beaton D, Alten R, Toupin April K, Boonen A, Escorpizo R, Flurey C, Furst DE, Guillemin F, Leong A, Pohl C, Rasmussen MU, Singh JA, Smolen JS, Strand V, Verstappen SMM, Voshaar M, Woodworth TG, Ellingsen T, March L, Wells GA, Tugwell P, Christensen R. OMERACT consensus-based operational definition of contextual factors in rheumatology clinical trials: A mixed methods study. Semin Arthritis Rheum. 2021.

37. Nossent JC, Raymond WD, Keen HI, Inderjeeth CA. Septic Arthritis in Children: A Longitudinal Population-Based Study in Western Australia. Rheumatol Ther. 2021.

38. Pan F, Tian J, Cicuttini F, Jones G. Sleep disturbance and bone mineral density, risk of falls and fracture: Results from a 10.7-year prospective cohort study. Bone. 2021;147:115938.

39. Pan TT, Pan F, Gao W, Hu SS, Wang D. Involvement of Macrophages and Spinal Microglia in Osteoarthritis Pain. Curr Rheumatol Rep. 2021;23(5):29.

40. Papapoulos S, Bone H, Cosman F, Dempster DW, McClung MR, Nakamura T, Restrepo JFM, Bouxsein ML, Cohn D, de Papp A, Massaad R, Santora A. Incidence of Hip and Subtrochanteric/Femoral Shaft Fractures in Postmenopausal Women With Osteoporosis in the Phase 3 Long-Term Odanacatib Fracture Trial. J Bone Miner Res. 2021.

41. Pasco JA, Sui SX, West EC, Holloway-Kew KL, Hyde NK, Stuart AL, Gaston J, Williams LJ. Operational definitions of sarcopenia should consider depressive symptoms. JCSM Clinical Reports. 2021;6(2):62-8.

42. Patel H, Woods L, Teesdale-Spittle P, Dennison E. A cross-sectional study of the relationship between recreational sporting activity and calcaneal bone density in adolescents and young adults. Phys Sportsmed. 2021:1-9.

43. Pimentel A, Bover J, Elder G, Cohen-Solal M, Urena-Torres PA. The Use of Imaging Techniques in Chronic Kidney Disease-Mineral and Bone Disorders (CKD-MBD)-A Systematic Review. Diagnostics (Basel). 2021;11(5).

44. Rathnayake MSB, Farrugia BL, Kulakova K, Ter Voert CEM, van Osch G, Stok KS. Macromolecular Interactions in Cartilage Extracellular Matrix Vary According to the Cartilage Type and Location. Cartilage. 2021:19476035211000811.

45. Reid IR, Horne AM, Mihov B, Stewart A, Bastin S, Gamble GD. Effect of Zoledronate on Lower Respiratory Infections in Older Women: Secondary Analysis of a Randomized Controlled Trial. Calcif Tissue Int. 2021.

46. Rettedal EA, Ilesanmi-Oyelere BL, Roy NC, Coad J, Kruger MC. The Gut Microbiome Is Altered in Postmenopausal Women With Osteoporosis and Osteopenia. JBMR Plus. 2021;5(3):e10452.

47. Ribet ABP, Ng PY, Pavlos NJ. Membrane Transport Proteins in Osteoclasts: The Ins and Outs. Front Cell Dev Biol. 2021;9:644986.

48. Ryan ST, Hosseini-Beheshti E, Afrose D, Ding X, Xia B, Grau GE, Little CB, McClements L, Li JJ. Extracellular Vesicles from Mesenchymal Stromal Cells for the Treatment of Inflammation-Related Conditions. Int J Mol Sci. 2021;22(6).

49. Samad N, Nguyen HH, Ebeling PR, Milat F. Musculoskeletal Health in Premature Ovarian Insufficiency. Part Two: Bone. Semin Reprod Med. 2020;38(4-05):289-301.

50. Schousboe JT, Langsetmo L, Szulc P, Lewis JR, Taylor BC, Kats AM, Vo TN, Ensrud KE. Joint Associations of Prevalent Radiographic Vertebral Fracture and Abdominal Aortic Calcification With Incident Hip, Major Osteoporotic, and Clinical Vertebral Fractures. J Bone Miner Res. 2021.

51. Sempos CT, Durazo-Arvizu RA, Fischer PR, Munns CF, Pettifor JM, Thacher TD. Serum 25-hydroxyvitamin D requirements to prevent nutritional rickets in Nigerian children on a low-calcium diet-a multivariable reanalysis. Am J Clin Nutr. 2021.

52. Si L, Eisman JA, Winzenberg T, Sanders KM, Center JR, Nguyen TV, Tran T, Palmer AJ. Development and validation of the risk engine for an Australian Health Economics Model of Osteoporosis. Osteoporos Int. 2021.

53. Sim M, Blekkenhorst LC, Bondonno NP, Radavelli-Bagatini S, Peeling P, Bondonno CP, Magliano DJ, Shaw JE, Woodman R, Murray K, Lewis JR, Daly RM, Hodgson JM. Dietary Nitrate Intake Is Positively Associated with Muscle Function in Men and Women Independent of Physical Activity Levels. J Nutr. 2021.

54. Singh A, Kotlo A, Wang Z, Dissanayaka T, Das S, Antony B. Efficacy and safety of hydroxychloroquine in osteoarthritis: a systematic review and meta-analysis of randomized controlled trials. Korean J Intern Med. 2021.

55. Smith C, Lin X, Scott D, Brennan-Speranza TC, Al Saedi A, Moreno-Asso A, Woessner M, Bani Hassan E, Eynon N, Duque G, Levinger I. Uncovering the Bone-Muscle Interaction and Its Implications for the Health and Function of Older Adults (the Wellderly Project): Protocol for a Randomized Controlled Crossover Trial. JMIR Res Protoc. 2021;10(4):e18777.

56. Sui SX, Williams LJ, Holloway-Kew KL, Hyde NK, Leach S, Pasco JA. Associations Between Muscle Quality and Cognitive Function in Older Men: Cross-Sectional Data From the Geelong Osteoporosis Study. J Clin Densitom. 2021.

57. Takehara S, Hirani V, Wright FAC, Naganathan V, Blyth FM, Le Couteur DG, Waite LM, Seibel MJ, Handelsman DJ, Cumming RG. Appetite, oral health and weight loss in community-dwelling older men: an observational study from the Concord Health and Ageing in Men Project (CHAMP). BMC Geriatr. 2021;21(1):255.

58. Toupin-April K, Decary S, de Wit M, Meara A, Barton JL, Fraenkel L, Li LC, Brooks P, Shea B, Stacey D, Legare F, Lydiatt A, Hofstetter C, Proulx L, Christensen R, Voshaar M, Suarez-Almazor ME, Boonen A, Meade T, March L, Jull JE, Campbell W, Alten R, Morgan EM, Kelly A, Kaufman J, Hill S, Maxwell LJ, Guillemin F, Beaton D, El-Miedany Y, Mittoo S, Westrich Robertson T, Bartlett SJ, Singh JA, Mannion M, Nasef SI, de Souza S, Boel A, Adebajo A, Arnaud L, Gill TK, Moholt E, Burt J, Jayatilleke A, Hmamouchi I, Carrott D, Blanco FJ, Mather K, Maharaj A, Sharma S, Caso F, Fong C, Fernandez AP, Mackie S, Nikiphorou E, Jones A, Greer-Smith R, Sloan VS, Akpabio A, Strand V, Umaefulam V, Monti S, Melburn C, Abaza N, Schultz K, Stones S, Kiwalkar S, Srinivasalu H, Constien D, King LK, Tugwell P. Endorsement of the OMERACT core domain set for shared decision making interventions in rheumatology trials: Results from a multi-stepped consensus-building approach. Semin Arthritis Rheum. 2021.

59. Vaught DB, Merkel AR, Lynch CC, Edwards J, Tantawy MN, Hilliard T, Wang S, Peterson T, Johnson RW, Sterling JA, Brantley-Sieders D. EphA2 Is a Clinically Relevant Target for Breast Cancer Bone Metastatic Disease. JBMR Plus. 2021;5(4):e10465.

60. Via JD, Owen PJ, Daly RM, Mundell NL, Livingston PM, Rantalainen T, Foulkes SJ, Millar JL, Murphy DG, Fraser SF. Musculoskeletal Responses to Exercise plus Nutrition in Men with Prostate Cancer on Androgen Deprivation: A 12-month RCT. Med Sci Sports Exerc. 2021.

61. Wang Y, Jones G, Hill C, Wluka AE, Forbes AB, Tonkin A, Hussain SM, Ding C, Cicuttini FM. Effect of atorvastatin on knee cartilage volume in patients with symptomatic knee osteoarthritis: results from a randomised placebo-controlled trial. Arthritis Rheumatol. 2021.

62. Xue M, Lin H, Liang HPH, McKelvey K, Zhao R, March L, Jackson C. Deficiency of protease-activated receptor (PAR) 1 and PAR2 exacerbates collagen-induced arthritis in mice via differing mechanisms. Rheumatology (Oxford). 2020.

63. Yokoyama A, Hasegawa T, Hiraga T, Yamada T, Yimin, Hongo H, Yamamoto T, Abe M, Yoshida T, Imanishi Y, Kuroshima S, Sasaki M, de Fraitas PHL, Li M, Amizuka N, Yamazaki Y. Altered immunolocalization of FGF23 in murine femora metastasized with human breast carcinoma MDA-MB-231 cells. J Bone Miner Metab. 2021.

64. Zendeli A, Bui M, Fischer L, Ghasem-Zadeh A, Schima W, Seeman E. High Cortico-Trabecular Transitional Zone Porosity and Reduced Trabecular Density in Men and Women with Stress Fractures. J Clin Med. 2021;10(5).

65. Zhao T, Winzenberg T, Aitken D, de Graaff B, Ahmad H, Jones G, Palmer AJ. The impact of comorbidities on health-related quality of life of people with osteoarthritis over ten years. Rheumatology (Oxford). 2021.

66. Zhu S, Liu M, Bennett S, Wang Z, Pfleger KDG, Xu J. The molecular structure and role of CCL2 (MCP-1) and C-C chemokine receptor CCR2 in skeletal biology and diseases. J Cell Physiol. 2021.

Calendar of Events and Webinars

AUSTRALIAN

ANZBMS Virtual Clinical Densitometry Course
17 - 19 September (Virtual)
More information here

Australian and New Zealand Orthopaedic Research Society
6 - 8 October 2021 (Virtual)
More information here

ESA- SRB- ANZBMS Annual Scientfic Meeting
21 - 24 November 2021
Melbourne
More information here

Australasian Paediatric Endocrine Group - Annual Scientific Meeting
21 - 24 November 2021
Mornington Peninsula
More information here

INTERNATIONAL

Osteoporosis Essentials Course - Taiwanese Osteoporosis Association
15 -16 May & 10 - 11 July 2021
More information here

ASBMR Webinar Series
Monthly webinars
More information here

Bone Research Society Annual Meeting
28 - 30 June 2021
More information here

WCO IOF-ESCEO World Congress on Osteoporosis, Osteoarthritis and Musculoskeletal Diseases
26 - 29 August, Virtual
Abstract submission closes 26 May 2021
More information here

ASBMR Annual Meeting
1 - 4 October 2021
Abstract submission closes 12 May 2021
More information here
Details on topics and registration available here

ECTS Webinar Series
More information here

ECTS Digital Masterclass for PhD Students, Trainees and Young Investigators
24 - 27 August 2021
More information here

ECTS Clinical Training Course in Metabolic Bone Disease
2- 3 September 2021 (Virtual)
More information here

IO - ASBMR Rare Bone Disease TeleECHO
Delivered virtually the first Thursday of each month 1500 EST
More information here

OI Foundation Osteogenesis Imperfecta TeleECHO clinic series
Delivered virtually the second Wednesday of each month 1500 hours EST
More information here