

Meeting Proceedings - 2017

Meeting Date: September 26-27, 2017

Location: Novotel Toronto North York, 3 Park Home Avenue, Toronto, ON, M2N 6L3

Attendees

Brian Amsden (Human Mobility Research Centre)
Adam Baxter-Jones (UoS Bone and Joint Imaging Group)
Trevor Birmingham (Western Bone & Joint Institute)
Steven Boyd (McCaig Institute for Bone and Joint Health)
Goldi Gill (Arthritis Alliance of Canada)
David Hart (McCaig Institute for Bone and Joint Health)
David Holdsworth (Western Bone & Joint Institute)
Saija Kontulainen (University of Saskatchewan)
Anne Lyddiatt (Patient Partners in Arthritis)
Joy MacDermid (Canadian MSK Rehab Network)
Jason McDougall (Arthritis Alliance of Canada)
Geraldine Merle (McGill Health Centre Research Institute)
Pierre Moffatt (Network for Oral and Bone Health)
Samantha Mundy (Facilitator)
Dawn Richards (The Arthritis Society)
Jann Paquette-Warren (Facilitator)
Michael Underhill (UBC Biomedical Research Centre)
Cari Whyne (Holland MSK Sunnybrook Research Institute)
Bettina Willie (Shriners Hospitals Canada Research Centre)
David Wilson (Centre for Hip Health and Mobility)
Sara Whynot (Dalhousie Research for Ortho)
Shannon Woodhouse (Facilitator)
Albert Yee (Holland MSK Sunnybrook Research Institute)
Elizabeth Zimmermann (Shriners Hospitals Canada Research Centre)

Regrets

Tim Bryant	Pierre Guy	Karim Khan
David Cooper	Ed Harvey	Deborah Marshall
Mike Dunbar	Kariym Joachim	David Wilson
Lee Durbon	Rita Kandel	

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DAY 1 – September 26, 2017

Introductions

David Holdsworth began the meeting by welcoming everyone and outlining the meeting objectives and planning grant deliverables. After a roundtable introduction activity, participants quickly moved into the next session to increase everyone's knowledge of the participating groups.

Meeting Objectives:

- foster collaborative interaction among MSK groups to build or expand partnerships
- review activities previously or currently being implemented by individual groups
- explore expectations of success to establish common goals and priorities for the consortium
- identify and explore current and future funding opportunities
- develop an action plan that will increase the profile of MSK research in Canada
- establish a consortium that is more prepared to respond to calls by funding agencies that are looking for national studies or scale up of interventions by defining roles and responsibilities in the preparation of grant applications

Planning Grant Deliverables:

- a national consortium of academic, consumer, funder and decision-maker representatives that are prepared to work together collaboratively
- a summary of cross-jurisdictional research strengths and alignment with consumer, decision-maker, and funding priorities to guide the selection of opportunities
- a list of opportunities that are well aligned with the goal of obtaining support for national MSK research projects
- an outline of a mechanism to identify specific roles and responsibilities with itemized timeline and tasks for the completion of funding applications

Overview of Academic Groups

In this session, representatives of the consortium's academic groups briefly described their group's main vision/objectives, size/membership, and top 2-3 strengths, expertise, or resources. They highlighted a few things that are critical to their group's success and a recurrent challenge(s) faced by their organization. Finally, each representative explained their understanding and expectations of the consortium in the coming year. Please see Appendix A for a full summary of each group's overview. Below is a summary of the combined information.

Groups and Presenters

- Biomedical Research Centre (BRC) at University of British Columbia (T. Michael Underhill)

- Bone and Joint Imaging Group (BIG) at University of Saskatchewan - UoS (Adam Baxter-Jones)
- Centre for Hip Health and Mobility (CHHM) at University of British Columbia (David Wilson)
- Injury Repair Recovery Program (IRRP) at Research Institute McGill University Health Center (Géraldine Merle)
- Human Mobility Research Centre at Queens University (Brian Amsden)
- McCaig Institute for Bone and Joint Health at University of Calgary (Steve Boyd)
- The Bone and Joint Institute (BJI) at Western University (David Holdsworth)
- Network for Oral and Bone Health Research (RSBO) in Quebec (Pierre Moffatt)
- Orthopaedic Research at Dalhousie University and the Nova Scotia Health Authority (NSHA) (Sara Whynot)
- The Research Centre at Shriners Hospitals for Children - Canada (Bettina Willie)

Overview

- The groups ranged from of 20 to 100 investigators with variability in level of engagement (full members, associate or affiliated members), some included a description of research staff and trainees
- The location of the groups varied from single units within universities or hospital based, to multiple sites in the region and mobile research units. Some function virtually using existing facilities within affiliated organizations.
- Most described themselves as interdisciplinary, with members in one or more Faculties, and some spoke of a strong connection to healthcare
- Many described themselves as hubs of multiple site within their region
- Funding sources included:
 - Agencies, foundations, donations
 - Competitive funding and renewal processes
- Overall visions, missions, goals were related to one of more of the following:
 - enhancing MSK health, bone and joint health, active living, active aging, mobility and movement across the lifespan, and oral health
 - reducing the burden of chronic bone and joint disorders on individuals, the healthcare system and the economy
 - accelerating research via interdisciplinary collaborations - mobilizing researchers and developing / formalizing collaborative relationships with industry, government and clinical care sites
 - creating and nurturing partnerships to have a positive impact in communities
 - promoting strategic initiatives and supporting common use of resources
 - providing high quality MSK education and training

- building careers and fostering leadership (interdisciplinary training and mentoring for private, clinical and academic sector)
- recruiting and growing world class scientists and clinician scientists (outcomes, clinical systems, engineering and basic science) to MSK research
- improving knowledge transfer –
 - creating, sharing, and implementing solutions
 - disseminating new knowledge
 - selecting champions to promote research innovation across programs
 - translating discoveries, conducting human testing, leading multicentre RCTs
 - identifying and promoting practice and health policy change
 - commercializing innovations
- operationalizing MSK groups/entities/organizations
 - developing business models for sustainability
 - identifying services that can be provided/profitable

Main Objectives

- Investigating and understanding causes, prevention, diagnosis and treatment of MSK conditions
- Discovering new knowledge that improves the quality of care and quality of life of children and families affected directly or indirectly by MSK conditions
- Advancing prevention strategies and early detection/diagnosis tools
- Optimizing treatments, “precision medicine” and surgical technologies - right intervention, right patient, right time
- Identifying risk factors such as bone architecture / strength to support early detection and prevention strategies
- Improving support systems and palliation
- Studying and improving access to care for vulnerable population
- Main objectives were often aligned with specific areas of expertise or diseases. Some of the expertise listed are included below. For more information see Appendix A or specific group websites.

- | | | |
|-----------------------------|--------------------------------|----------------------------------|
| - Animal models of diseases | - Biomedical | - Functional outcomes |
| - Basic biological | - Clinical and health services | - Genetics |
| - Best practices | - Clinical health outcomes | - Health behaviours |
| - Bioengineering | - Clinical trials | - Health promotion |
| - Biomarkers | - Engineering | - Imaging - advanced diagnostics |
| - Biomaterials | - Epidemiology | - Imaging - Synchrotron |
| - Biomechanics | - Ergonomics | - Mobility |

- Molecular & Cell Biology
 - Motion analysis
 - Nursing
 - Orthopaedic surgery
 - Pain - acute to chronic
 - Patient engagement in research
 - Physical sciences
 - Population and community health
 - Precision medicine
 - Prevention
 - Regenerative medicine
 - Rehabilitation
 - Skeletal Biology
 - Social Environments
 - Sport Medicine
 - Target identification - bone regeneration
 - Technology development
 - Tissue Engineering
- Some types of interventions/treatments were noted including:
 - Image-guided
 - Surgical
 - Traumatic fracture
 - Therapeutics
 - Minimally invasive therapies
 - Computer-assisted
 - Implants with biological/cell-based therapy
 - Assistive technology
 - Arthroplasty

Main Strengths

- The most common strength was identified by the groups as the complementary expertise and collaborative approach across the entire MSK system
- Other strengths listed included specific expertise such as regenerative medicine with novel animal models or core facilities like:
 - NGS, Flow, microscopy, etc.
 - RI-MUHC resources
 - Technology Platforms (Containment level 3, drug discovery, histopathology, immunophenotyping, molecular imaging, proteomics, molecular imaging, small animal imaging labs...)
 - Simulation Center, Center for Innovative Medicine
 - Innovation center: Medtech Innovation Hub (space dedicated to projects not people, professional services etc.)
 - Centre for research in image guided therapeutics (CeRIGT)
 - Imaging infrastructure
 - Technology transfer units
 - Administrative Data Sources: Institute for Clinical Evaluative Sciences (ICES)
 - Gait labs
 - Computer assisted surgery suite
- A few spoke of their emphasis on training as a strength (e.g. Collaborative Training Program in MSK Health Research)
- A few described unique programs that provide seed funding and also events that encourage collaboration (e.g. Seminars & Workshops, Conferences, Sponsored Events)
- Features identified as key to group success included:
 - Proven track record (grant/awards, trainees, publications)
 - Strong linkages between patient/community and research
 - Number and diversity of trainees, and their key role in collaborative research
 - Centralized support of equipment and operations
 - Adequate admin/technical support

Recurrent Challenges

- Sustainability, operating funds, source of funds, equipment funding to...
 - coordinate and support collaborative activities
 - generate interest into inter-dependent themes
 - explore high-risk projects
 - carry out studies of small to large scope
 - support MSK clinician scientists / clinician investigators
 - hire technical support for specialized equipment
 - retain staff with crucial competencies
 - obtain and maintain infrastructure and space requirements
- Recruitment
 - losing faculty/critical expertise in key areas over the next 5 years
 - few faculty positions available
 - no succession plan
 - shifting of expertise
 - best trainees deterred by cost of living and job prospects
 - senior-level (CRC tier 1) candidates are costly and hard to move
- Engagement / Partnerships
 - link to industry sources
 - link to provincial decision-makers
 - participation and involvement of faculty members
- MSK research does not enjoy the same priority as other areas on many levels
- Lack of public/media presence
- Intellectual property (IP): belongs with the University centres and not all relevant IP is funded
- Reporting - getting the right metrics and obtaining data from group members
- Research evidence is not always incorporated into clinical care in a timely way

Consortium Expectations

- Link research across Canada - foster novel multi-institutional collaborations for synergy in...
 - generating new knowledge
 - advancing products and processes that will impact the health of Canadians
 - improving treatments and cost effective management solutions
 - implementing/translating research findings into clinical care
 - applying for funding opportunities
- Increased integration (less silos) across nation to...
 - mentor, train, and share Canadian grown talent
 - capitalize on expertise/equipment/resources at each site

- launch multi-site studies with access to larger disease specific study populations
- develop a virtual drug development/ therapeutic pipeline
- Unified voice and approach to...
 - identify national MSK priorities - critical research areas for MSK health and how each group in Canada can lend its expertise in a collaborative way
 - increase the profile of MSK research in Canada
- Enhanced engagement with industry and government
- Launch a funding or pilot grant funding program

Overview of Key Stakeholder Groups

Representatives of the consortium's key stakeholder groups described their group's main vision/objectives, size/membership, and top 2-3 strengths, expertise, or resources. They highlighted a few things that are critical to their group's success and a recurrent challenge. Finally, each representative explained their understanding and expectations of the consortium in the coming year. (Note: AboutFace and CIHR representative sent regrets.)

Groups and Presenters

- Arthritis Alliance of Canada (AAC) (Jason McDougall)
- Patient Partners Program (Anne Lyddiatt)
- The Arthritis Society (Dawn Richards)
- Canadian Arthritis Patient Alliance (CAPA) (Dawn Richards)

Overview

- The groups have different organizational structure - some are virtual groups that are patient-driven and others have multiple sites with a broad national base
- Visions for these groups are aligned to many aspects of improved knowledge, awareness, prevention, care and management of Canadians living with MSK conditions
- They emphasised the promotion of collaboration through the engagement of people and organizations across sectors such as:
 - Health Care Professionals
 - Researchers
 - Funding agencies
 - Governments
 - Voluntary sector agencies
 - Industry
 - consumer organizations
- Many described have a role in leadership, research funding, and advocacy

Main Objectives

- The groups aim to encourage and support excellence in research initiatives that are driven by and recognized as patient priorities
- They develop frameworks and strategies to ensure that the research solutions reach all relevant audiences: individuals living with arthritis; researchers and clinicians; policymakers
- They participate in the training of healthcare professionals and trainees to support improved knowledge, awareness, prevention, care and management of Canadians living with MSK conditions (e.g. performing a full MSK exam)
- They develop materials to help people know more about dealing with their MSK condition, and how to speak to healthcare providers

Main Strengths and Key Features

The strengths and features varied based on the specific group's mandate. The cumulative summary of all groups included:

- Committees working on models of care and toolkits to establish and reinforce best practices
- Committees that support the implementation and cost consequence analysis of models and tools
- Committees that oversee research award programs (note: Arthritis Society is the largest non-governmental funder of arthritis research with a robust peer review process)
- Committees responsible for advocacy and awareness work
- Well respected and supported by committed volunteers
- Actively partner with other organizations (e.g. CIHR SPOR and Research Ambassadors)
- Actively involved in research to help identify gaps and opportunities

Recurrent Challenge

- Securing funding - need for support with preparing funding proposals
- Academic awareness and general knowledge translation of programs/model/tools developed so they can be used in training, studies and clinical practice
- Achieving full patient engagement in all aspects of academic research programs, including:
 - Priority setting
 - Training for new and currently-engaged patients
 - Collaborators on research teams
- Recruiting new volunteers

- Create opportunities to engage in new network / partnerships
- Being informed of new collaborative opportunities
- Support and encourage use or expansion of existing programs/groups
- Advocate for more investment in arthritis research, especially osteoarthritis

Breakout Session:

A rotating breakout session format was used to explore ways of identifying national collaborative opportunities and gaps. Meeting participants were divided into three groups that moved together from one topic to the other building on the work of the group before them. The topics were aligned to the CIHR Institute of Musculoskeletal Health and Arthritis strategic research priority areas: Chronic Pain and Fatigue; Inflammation and Tissue Repair; and Disability, Mobility and Health. The overall goal of the session was to promote and synergize research efforts among academic and clinician scientists with active collaborations with knowledge users (e.g. patients, decision makers, etc.).

In each session, the groups brainstormed ideas by working through this set of questions:

- What are the biggest problems according to the literature?
- How do these problems relate to important clinical or consumer reported challenges?
- Who has the expertise/resources to find solutions (leading centres)?
- Who could champion this work on a national scale?
- Who could fund the work (government/funding bodies, not-for-profit, industry)?

Group A (Facilitators: Jason McDougall and Jann Paquette-Warren)	Group B (Facilitators: David Holdsworth and Samantha Mundy)	Group C (Facilitators: Adam Baxter-Jones and Shannon Woodhouse)
Saija Kontulainen	David Hart	Brian Amsden
Joy MacDermid	Geraldine Merle	Trevor Birmingham
Dawn Richards (regrets)	Pierre Moffatt	Steven Boyd
Sara Whynot	Michael Underhill	Anne Lyddiatt
Dave Wilson	Albert Yee	Cari Whyne
	Elizabeth Zimmermann	Bettina Willie

Breakout Session Reports

All meeting participants were brought back into one group to review discussion points, key findings, and questions that resulted from the breakout sessions. This was an opportunity to learn about ideas that were formulated by individual groups and come to consensus on potential key national priorities for the consortium.

Session 1 - Chronic Pain & Fatigue

- **“Pain is the primary impediment of mobility and healthy aging”**
- Develop better self-reported **measurement tools** for pain and fatigue (intensity, quality, adaptation, impact on quality of life) – role of co-morbidities like mental health
- Develop quantitative **measurement tools** for pain and fatigue
- Study the **mechanism of joint pain** - explain lack of correlation between disease severity/mechanical structure and pain (biological/psychosocial influence)
- Study **opioids and cannabis** use, safety, drug interactions, dosages
- **Need greater capacity** – increase relationship with pain experts and mental health experts outside of the MSK realm that are willing to expand their research focus and explore how pain impacts mobility and mental health (e.g. there are instances where people who experience significant pain due to an MSK conditions commit suicide) – can this be accomplished through training of the next generation?
- Consider **stigma** related to pain – impact on job, perceived weakness, views about treatment and related stigma
- **Champion** – Jason MacDougall, need to identify groups that focus on both MSK and pain to play a role
- New funding opportunity – **licensed producers**
- Need to **change the conversation with industry** – “not just a deep unsolvable pit”, need to invest time, people and money to find solutions

See Appendix B for more detail from the session.

Session 2 - Inflammation & Tissue repair

- Need better **in vivo assays** to quantify inflammatory response in an objective way (does not interact with the system under study) - why does some inflammation resolve and others not? What are all the signaling processes involved? This would be critical to developing more specific treatments
- **“Scaling it up”** – not just about developing the next great solutions but also need the right facilities, manufacturing practices and laboratories with regulatory processes to implement on a large scale - what can the group do to help address deficiencies, how do we **capitalize on existing partnerships** and **avoid reinventing the wheel** by consulting with this consortium - improve coordination and save time?
- **Better biomarkers** for not just bones but soft tissues
- Allographs/transplants - **coordination of MSK tissue banks**
- Regulatory issues – GMP, Quality Management
 - Approach **Health Canada** for help as a consortium
- Potential **Champion** – Rita Kandel, UoS Dr. Chen, public figures (athletes, musicians, politicians, etc.)

- Funding bodies – the regular suspect but maybe as a group would have more chance with NIH, Sporting Goods Companies

See Appendix C for more detail from the session.

Session 3 - Disability, Mobility & Health

- **Fracture** Prevention/Risk Prediction (primary and secondary) & Intervention
- How do you prescribe **exercise interventions** (dosage and relevance)?
- “Patient Oriented Research” – need a better KT strategy for engagement of patients and clinicians, with a goal of **establishing guidelines, mobility tool kit** (think about timelines & documents), and apps for phones (how do we implement KT Science)
- **Wearables & Artificial Intelligence** as the next thing based on current popularity - Implications regarding training data and involving key partners (Vector Institute)
- How Wearables and AI can affect **Urban and Rural** (remote access, point of care, feedback, smart health systems)

See Appendix D for more detail from the session.

Potential Consortium Priorities:

- Find our Clara Hughes/Bell
- Build on success to nationalize/local wins
- Can we start multi-centered trials with specific clinical relevance?

Questions and Closing Remarks

General feedback on the progress of the day and format of sessions was positive. Day 2 sessions were previewed and there was agreement that the rotating breakout session format should be used again. An evening networking opportunity was planned and the meeting was adjourned for the day.

Day 2 – September 27, 2017

Meeting Objectives for Day 2

- develop an **action plan** to increase MSK profile
- identify and explore **funding opportunities**
- become more prepared to do **national studies and scale up of programs & interventions, etc.**
- outline of a mechanism to identify **roles and responsibilities** for consortium activities

Day 2 Theme

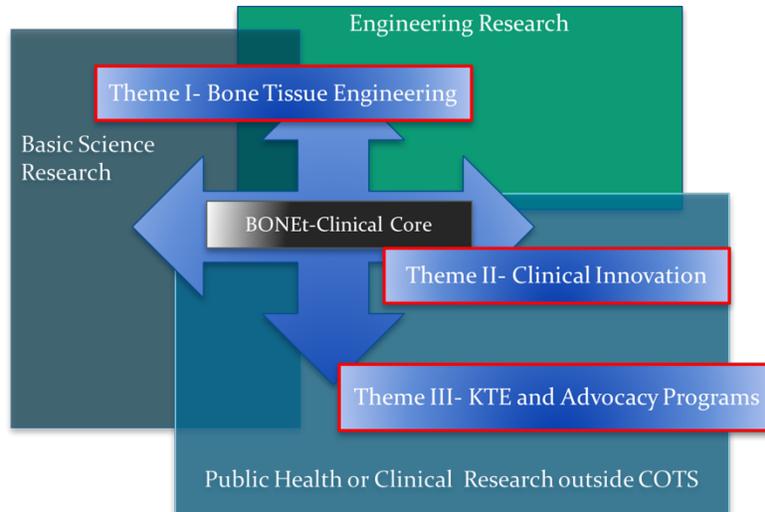
“How will we distribute the “National Priorities” among Consortium Members?”

After an overview of Day 1 discussion and before starting the breakout session portion of the meeting, the group discussed the upcoming NCE funding opportunity and a previous MSK-related application.

NCE Funding Opportunity

BoNET – Canadian Orthopaedic Trauma Network

- the application was Ranked 4th in the last NCE competition (first 3 were funded)
- BoNET was focused on MSK trauma including: Fracture healing, Clinical interventions, Translation of research, Industry and Public /Advocacy / Policy, Education (students, surgeons, corporate, public)
- It involved clinical research (COTS), engineering research, basic science research, public health research, advocacy programs and corporate partnerships
- The goal was to build a better model of MSK Research that would increase the capacity of COTS – Canadian Orthopaedic Trauma Society (on its own, COTS is insufficient to deal with the epidemic of Canadian MSK trauma)



BoNET Vision Overview

- Addresses a medical need
- Responsive to the socioeconomic burden of trauma
- Fulfills the Canadian government Science and Technology criteria for optimal programs
- Aligned with CIHR and IMHA consensus criteria for musculoskeletal research

Thematic Research Program

- **Theme I: Bone Tissue Engineering** (pre-clinical studies)
 - Expedite repair and monitor the healing environment
 - Improved implants, bone grafts, anabolic agents, cell-based therapies and micro-devices
- **Theme II Clinical Innovation:**
 - Clinical test-bed for trials using validated measurement tools
 - Critical mass of trauma patients
- **Theme III Knowledge Translation, Exchange & Outreach:**
 - Tracking of interventions and devices to ensure the safety of Canadians
 - Generation of a National trauma database used to improve study design
 - Advocacy team (Disseminate and exchange information with consumers, healthcare providers, policy makers, industry leaders and the public at large)

Further discussion of this previous application and current NCE opportunity was incorporated in the breakout session to follow.

Breakout Session:

A rotating breakout session format was used to explore ways to raise the profile of MSK Research in Canada; leverage local/provincial/regional/federal funding as well as industry-partnered funding opportunities; and engage key consortium players to take on major roles and responsibilities. Meeting participants were divided into three groups that moved together from one topic to the other building on the work of the group before them. The topics were identified during the planning grant writing process and refined during pre-meeting teleconference with consortium members. The overall goal of the session was to begin the development of an action plan for the consortium. Specific questions were formulated for each session to guide the brainstorming process.

Group A (Facilitator: Jann Paquette-Warren)	Group B (Facilitators: David Holdsworth and Samantha Mundy)	Group C (Facilitator: Shannon Woodhouse)
Saija Kontulainen	David Hart	Brian Amsden
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Dawn Richards	Geraldine Merle	Trevor Birmingham
Sara Whynt	Pierre Moffatt	Steven Boyd
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	Albert Yee	Bettina Willie
	Elizabeth Zimmermann	

Session 1 - Profile of MSK Research in Canada (facilitated by Jann Paquette-Warren)

Think of what Canadians believe are the biggest health problems to be addressed and MSK priorities we identified yesterday...

- MSK health is seen as something that contributes positively or negatively to “bigger” health problems (e.g. heart disease, stroke, cancer, diabetes, COPD, mental health)

How can we change messaging about MSK health...what can we say about our priorities? (e.g. 140 characters, 30 sec video, billboard)

- Active for life! Research for risk prevention and innovative solutions to keep people’s bone, joints and muscles healthy.
- Concerns that healthy aging, aches and pain would not resonate with all age groups
- Avoid duplication of public health messaging – but consider synergies independence and activity goals

Which mechanisms should we prioritize as a consortium?

- logos, branding, marketing, visuals, social media, presentations in community

- Is that the right role for this consortium of researchers?

Who can champion our message?

- Using community or other existing groups as a conduit for our message
- Establishing a working group of communication folks already embedded in our individual groups

Who is the audience the consortium should target?

- Who cares?
- --- messaging can't stop (needs to be constant and ongoing) or people forget until something happens to them --- we may need a behaviour changes expert on the communication working group
- Who should care?
- EVERYBODY But where can the consortium start? Public? Funders?

Who are the right people to help shape and support our message

- Experts in communication/KT
- Marketing and business folks
- ParticipACTION – how could we work with them?
- Other existing program by Pierre Lavoie and Heather McKay

Consortium Role in MSK profile

- Should this be a priority task for the consortium?

Session 2 - Responding to Funding Opportunities - David Holdsworth

This session aimed to build on the work from the Day 1 sessions and list funding opportunities, as well as discuss how to mobilize the consortium in advance of an RFP (e.g. identify specific groups to mobilize the consortium according to specific types of calls, types of problems, types of priorities). Also, the objective was to explore how to establish consortium administration/facilitation of funding applications.

List of Current Opportunities

- NCE (Nov 15 – trauma, rehab)
- CIHR Team Grants (Lobby for RFP)
- FRQ
- NSERC Strategic Partnerships (Net)
- NB: difficult – health focus
- ORF, CHRP
- PSP – Pharma, Ortho devices, Medex, Dairy, sports equip
- Canadian Military (?) Canadian Military Veterans Research (talk to Joy)

- Strategic innovation fund
- NSERC Create
- US Department of Defense (DOD)
- CSA (Canadian Space Agency)
- Bill & Melinda Gates
- Other private philanthropic organizations

Mobilizing Consortium before RFP

- Consortium members on IMHA advisory board but has the structure changed?
- Consider offering memberships to private sector partners (need to consider IP issues)
- Meet with IMHA director (Karim Khan, UBC who could not join us for these sessions)
- Invite PSP reps to annual meetings
- Unified narrative regarding the “unmet funding needs” (canned text, consistent messaging, research \$, morbidity/impact on people and systems)

Who will mobilize Consortium/When?

- Identify existing contacts of consortium members (e.g. private sector, government)
- Establish small executive (working group)
 - Director of McCaig
 - Director of BJI western
 - Director of hip health
 - David Hart
 - Jason McDougall
 - Pierre Guy
 - Director of PAC
 - Director of MSK network
 - Coordinate with Arthritis Society, Arthritis Alliance

Establishing consortium administration/facilitation for funding applications

- Secure new funding to support an administrator for the consortium (1 FTE)
- \$100K (1-year contract)
- Ask each University for support – need messaging about how our activities further their research mission
- Get national exposure before going to Philanthropy
- Start with a simple model (e.g. out sourced website) with limited content --- need to
- register domain name

Session 3 - Consortium Synergies - Shannon Woodhouse

Given that the consortium does not have an operating budget at this stage, this session was meant to explore ways to capitalize on existing resources and activities within the consortium member groups.

Canadian Bone and Joint Conference

- currently hosted by Western's Bone and Joint Institute this national conference allows cross talk, but it is costly to plan and host this event for any single group – could it become a consortium event?
- Partner with different groups each year (satellite symposium)
- MSK consortium workshops may be more sensitive to the time needed to attend and would raise the profile of the consortium in already established conferences
- Consortium members already meet often within their own region
 - McCaig – BME meeting (Oct.Nov for students)
 - Saskatchewan – annual internal bone meeting – Health Science Day
 - UoT - Research day and Spine Fest
 - Shriners – JMNI meetings
- How do we avoid silos?
- Arthritis Society may host a CAN like conference in the future
- Consortium success is based on internal participation in MSK more broadly
- We need to get exposure and enhance our diversity
- We would need a detailed revenue sharing plan (loss vs profit) with effective travel funding and sponsorships
- Alternatively, we could join other meetings like 2019 – PEI JD Imaging, 2019 – Banff Quant Im MSK, 2019 ICORS PQ, 2019 – world congress BioMech, ASBMR, COA, ORS, AAOS, ORSI, IOF, AAC, Till McCulloah (StemCell and Regenerative Med), CCTC
- It is less expensive to send trainees to local conferences, not sure we can afford another conference

Specific roles and responsibilities of consortium members?

- We need a base budget and set committee for 3 years to take care of sponsorship, continuity, scientific direction (5-6 reps across the country – chair, treasure, secretary, members-at-large)
- Nominees include Brian Amsden, Cari Whyne, Adam Baxter-Jones, Sara Whynot, Patients (2), Trainees
- Next annual meeting could be at the 2018 ASBMR (Sept 28-Oct 1) plus virtual meetings in between (talk to Angela Cheng about ASBMR)
- Can use the Canadian Biomaterials Society as a model

- Talk to Canadian Pain Society about a rep on consortium
- Talk to JR related to AI
- We should plan annual meeting with rotating locations

Trainee Exchange Program

- International vs national – focus nationally at first
- Need to identify sites and targeted coop placements
- Explore existing programs to join (use existing structures and processes) - Look into Stem Cell Network, RSBO, MITACS, TAS
- Should look at international opportunities and government support
- Length (2 weeks to 4-6 months max <10K)
- Unusual matches to build collaboration and learn about new area
- Use comp papers
- How do we sell it /convince people of the value? Needs clear outline of opportunity – contact info/equipment/benefits/conferences. Need Canadian Infrastructure database
- Uptake may be difficult - Need \$ to support and the logistics are tough
- Think about travelling fellow options for pre-selected group or Faculty instead visiting institutions (see COA model)
- Consider remote access to specialized equipment instead of a physical exchange to reduce program costs/travel & accommodations

Post-doc Matching System

- Not just post-docs but PHDs, Trainees, Faculty --- all hires, let's make Canada a destination for MSK
- Find a way to share our HQP and keep them in Canada
- How do we support traffic to our postings and highlight the Canadian Advantage?

Website – Public Outreach but keep it simple

- Annual fundraiser to be part of our Clara Hughes-like campaign
- Job postings
- Newsletter
- RSS feeds
- Partners with schools that have publication/comms/KT abilities/coops
- Do a branding competition
- Projects in a department?
- Need continuous movement to keep fresh – give to trainees to drive content?
- Need money for a content manager/webmaster
- Need a non-institutional look and feel

Breakout Session Reports

All meeting participants were brought back into one group to review discussion points, key findings, and questions that resulted from the breakout sessions. This was an opportunity to learn about ideas that were formulated by individual groups and come to consensus on key national priorities for the consortium.

Summary & Next Steps

Consortium Priorities

- Find our Clara Hughes/Bell
- Build on success to nationalize/local wins
- Can we start multi-centered trials with specific clinical relevance?
- Can the consortium simply focus on the research and draw their problems from existing advocacy groups?
- Consortium could serve as a mechanism to truly engage clinicians – it can be a challenge to get them involved
- Shriners has a great model for getting Philanthropy dollars – through public lectures – Consortium could launch nationwide campaign using this model
- We have state-of-the-art infrastructure across Canada but need to improve access for all and technical support/operational support – to unlock the potential in Canada is to invest in operating
- Need better translation (i.e. MacMaster – large clinical trials) and commercialization

Closing Remarks

Thank you to all participants. This was a great start and we are looking forward to more discussion over the networking lunch and virtually.

NETWORKING LUNCH

The Networking Lunch was used to get started on some action items and to better identify priorities for next steps. A name, slogan and mission statement was crafted.

Name

CaNMoR

- Canadian Network for Mobility Research

Slogan

- Active for life! Muscle, bone and joint health research to keep Canadians moving.

Mission

- Bringing researchers and partners together to generate solutions that will improve the health of Canadians, through prevention and management of musculoskeletal conditions.

Short Term Goals and Priorities

- **Website** - BJI to take the lead on securing a url and get started with the site – McCaig will link BJI with their communications person to help support
 - Logo
 - Register domain names
 - Website development
 - Intro
 - About us
 - People/partners
- **Communication hub** – need to secure funding to establish a communication hub for the consortium (1-FTE – split into multiple location, operations around communication)
- **NCE** – consortium to support an effort to submit an NCE focused on trauma and rehab (BJI, McGill to follow-up with Emil Schemitsch and Ed Harvey)
- **Events** – consider including consortium members in upcoming events (panel members, invited presentations)
- **IMHA** – David Hart will update IMHA about consortium progress
- **Consortium Summary** – BJI to draft a one-pager to support consortium members who apply for funding or attempt to engage key stakeholders
- **Consortium Governance** – Adam Baxter-Jones to circulate sample or draft terms of reference
 - Governance – EXECUTIVE COMMITTEE– eastern, central, western / research vs clinical / pillars (nominees Jason MacDougall, David Hart, Steven Boyd, Cari Whyne, David Holdsworth, Pierre Guy)

- Working group – communication
- Working group – funding
- Working group – training/faculty exchange program
- Working group – events... conference or workshops - BRIAN
- **French Translation** – materials for the consortium need to be available in both languages

Comment from Sara: Also seems the group would go forward in a “strategically academic” way to address Steve Boyd’s comment regarding pure research. Strategic priority: Perhaps consider MSK + Pain. You may not have Clara Hughes but you would have 2 VERY effective advocate patient groups to push and keep the agenda on the radar.

Action Items

- Finalize name and secure of domain
- Build a simple webpage
- Meet with IMHA
- Invite PDD to meeting and activities
- Draft and finalize a unified narrative of unmet needs
- Next annual meeting could be at the 2018 ASBMR (Sept 28-Oct 1) plus virtual meetings in between (talk to Angela Cheng about ASBMR)
- Talk to Canadian Pain Society about a rep on consortium
- Find our Clara Hughes/Bell

Appendix A – Group description summary table

Overview	Main Objectives	Main Strengths	Key Features	Recurrent Challenge	Consortium Expectation
Biomedical Research Centre (BRC) at University of British Columbia (T. Michael Underhill)					
<ul style="list-style-type: none"> – Interdisciplinary group of approx. 50 people – BRC is the hub for the group that has multiple site across Vancouver 	<ul style="list-style-type: none"> – Regenerative medicine: biology and therapeutics 	<ul style="list-style-type: none"> – Complementary expertise across the entire MSK system – Novel animal models to study regeneration of MSK constituents – Core facilities, NGS, Flow, microscopy, etc. 	<ul style="list-style-type: none"> – Highly collaborative group – Significant expertise across the pre-clinical space (med chem, biologics, targets, cell-based therapeutics, animal models) 	<ul style="list-style-type: none"> – Operating funds – Continual investment in leading edge technologies: source of funds – Industry engagement 	<ul style="list-style-type: none"> – Increased integration (less silos) across nation – One stop technology/expertise shopping – Funding or pilot grant funding – Increased engagement with industry and government – Virtual drug development/therapeutic pipeline
Bone and Joint Imaging Group (BIG) at University of Saskatchewan - UoS (Adam Baxter-Jones)					
<ul style="list-style-type: none"> – Interdisciplinary group of approx. 20 full members and 7 associate members funded by Saskatchewan Health Research Foundation 	<ul style="list-style-type: none"> – Examine wrist bone strength as a risk indicator for more debilitating fractures of the hip and spine in later life and explore related early detection and prevention 	<ul style="list-style-type: none"> – UoS has identified MSK as an area of research for CERC application – CRC Tier 2 in Bone & Joint Imaging (Dr. David Cooper) 	<ul style="list-style-type: none"> – Brought new collaborations together from major colleges on campus and within the province – Proven track record: Grant \$\$\$, 	<ul style="list-style-type: none"> – Funding for space that would consolidate all scanners in one suite and inquirate a physiological function laboratory 	<ul style="list-style-type: none"> – Multi-site grants – Sharing student training and support – Providing summer schools (e.g. longitudinal data analysis)

Overview	Main Objectives	Main Strengths	Key Features	Recurrent Challenge	Consortium Expectation
<ul style="list-style-type: none"> – Overall goal of increasing funding, developing and formalizing collaborative relationships, providing high quality training, and improving knowledge transfer 	<ul style="list-style-type: none"> strategies: discover intervention strategies to reduce fracture incidence throughout the lifespan – Study the association between physical activity and bone strength development during adolescence – Explore the relationship between bone architecture / strength at the forearm and indices of fall and fracture risk in women over 50 years – Assess bone architecture and strength using Synchrotron Imaging 	<ul style="list-style-type: none"> – Proven track record <ul style="list-style-type: none"> ○ \$1.5 million CFI, \$2.5 million operating grants, \$4.5 million training grants ○ 60 + peer review articles 	<ul style="list-style-type: none"> Trainees (Undergrad, Grads and PDF), Publications – Space identified in new Academic Health Science building 	<ul style="list-style-type: none"> – Operations and equipment funding – Technical support for scanners 	<ul style="list-style-type: none"> – Access to larger disease specific study populations – Sharing unique equipment such as Canadian Light Source
Centre for Hip Health and Mobility (CHHM) at University of British Columbia (David Wilson)					
<ul style="list-style-type: none"> – Vision: Health through mobility at every age – Mission: With our partners we create, share, and implement solutions that promote active aging and improve bone and joint health to enhance 	<ul style="list-style-type: none"> – Conduct and share world leading research that inspires action – Create and nurture partnerships to have positive 	<ul style="list-style-type: none"> – Bioengineering applied to bone and joint problems (biomechanics, biomaterials, surgical navigation, imaging) – Health promoting built and social 	<ul style="list-style-type: none"> – Close connection between patient/community and research (e.g. LTC homes, City of Vancouver, Orthopaedic Industry) – Number and diversity of our 	<ul style="list-style-type: none"> – MSK research does not enjoy the same priority as other areas at many levels – Attracting the best trainees (cost of living, job prospects) – Insecure Centre operating funding 	<ul style="list-style-type: none"> – identify one or more mechanisms for raising the profile of MSK research at the federal level – plan a large-scale funding application to increase operating

Overview	Main Objectives	Main Strengths	Key Features	Recurrent Challenge	Consortium Expectation
<p>mobility across the lifespan</p> <ul style="list-style-type: none"> – 34 core research members (faculty), 18 associate research members, 43 Research project staff, 74 trainees, 13 central research services staff – Vancouver General Hospital campus Size: ~40,000 sq. ft. (Exercise Prescription Suite; Innovation 2 implementation lab; CTMU - Cartilage Tendon Muscle Unit; Computer-Assisted Surgery Suite; Bioengineering Facility; Knowledge Mobilization Studio; Population Health Laboratories; Upright Open MRI; Bone Health and Falls Prevention; Medical Imaging Suite; Mobile Research Unit) 	<p>impact in communities</p> <ul style="list-style-type: none"> – Build careers and foster leadership through interdisciplinary training and mentoring 	<p>environments, health promoting behaviours</p> <ul style="list-style-type: none"> – Falls and injury prevention 	<p>trainees, and their key role in collaborative research</p> <ul style="list-style-type: none"> – Centralized support of equipment and operations 	<p>means it is difficult to:</p> <ul style="list-style-type: none"> ○ make the most of a “Centre” structure (e.g. retain staff with critical competencies, coordinate and support collaborative activities) ○ explore high-risk projects ○ carry out studies of large or small scope ○ provide an exceptional training experience 	<p>funds for MSK research</p>
<p>Injury Repair Recovery Program (IRRP) at Research Institute McGill University Health Center (Géraldine Merle)</p>					
<ul style="list-style-type: none"> – Vision: To achieve International Leadership in the prevention, care and 	<ul style="list-style-type: none"> – Recruit the best candidates in outcomes, clinical, engineering and basic science to 	<ul style="list-style-type: none"> – Cohort of dedicated scientists and surgeon-scientists working on bone repair 	<ul style="list-style-type: none"> – Link existing renowned expertise in molecular cell biology, bone tissue engineering, 	<ul style="list-style-type: none"> – Funding – Intellectual property (IP): belongs with the University centres 	<ul style="list-style-type: none"> – Opportunity to: <ul style="list-style-type: none"> ○ foster novel multi-institutional collaborations and

Overview	Main Objectives	Main Strengths	Key Features	Recurrent Challenge	Consortium Expectation
<p>management of injury</p> <ul style="list-style-type: none"> – 3 main locations at Montreal General Hospital, Glen site, and Shriners – more than 50 Principle Investigators (+ staff and trainees) 	<p>injury and trauma research</p> <ul style="list-style-type: none"> – Train individuals to “ready state” in identified private, clinical or academic sector – Facilitate links to industry, government and clinical practice by sponsorship of short term rotations (MITACS model) 	<ul style="list-style-type: none"> – Design large scale multi-faceted projects (e.g. Hip Fracture: <ul style="list-style-type: none"> ○ New implants with biological or cell based therapy ○ Development of a standardized approach to the surgical and post-surgical management of hip fractures ○ Include pre- and in-hospital care) – RI-MUHC resources <ul style="list-style-type: none"> ○ Technology Platforms (Containment level 3, drug discovery, histopathology, immunophenotyping, molecular imaging, proteomics, molecular imaging, small animal imaging labs...) ○ Simulation Center, Center for Innovative Medicine, CORE... – Innovation center: Medtech Innovation Hub (space dedicated to projects not people, professional services etc.) <p>jake.barralet@mcgill.ca</p>	<p>and pre-clinical validation with recognized world leaders in clinical interventions and outcomes</p> <ul style="list-style-type: none"> – To create an innovation ecosystem that generates new knowledge through education and develop, integrate and commercialize technology that transitions rapidly from discovery to the marketplace by involving multiple stakeholders 	<p>and not all relevant IP is funded</p> <ul style="list-style-type: none"> – Generate interests into inter-dependent themes 	<p>be synergistic for discovery</p> <ul style="list-style-type: none"> ○ generate new knowledge, advanced products and processes that will impact the health of Canadians by providing improved, cost effective solutions for the management of MSK trauma

Overview	Main Objectives	Main Strengths	Key Features	Recurrent Challenge	Consortium Expectation
Holland MSK Research Program at Sunnybrook Research Institute (SRI) at University of Toronto (Cari Whyne)					
<ul style="list-style-type: none"> – Sunnybrook Health Sciences Centre began as a hospital for Canadian veterans and became a fully affiliated teaching hospital of the University of Toronto. With 1.2 million patient-visits each year, the centre is established across three campuses making it Canada's largest trauma centre – Sunnybrook Research Institute (SRI) has over 1300 scientists, clinician scientists and research associates, more than 400 trainees, and approximately 500,000 sq. ft. of state of the art infrastructure at the University of Toronto – Vision: Accelerate research to create and translate knowledge and innovation that transforms clinical practice and 	<ul style="list-style-type: none"> – Grow our research strengths in: image guided interventions, translational research, technology development and population based analytics with primary foci in the areas of traumatic fracture treatment, the impact of arthritis management, and minimally invasive interventional strategies for spinal metastases – Fully utilize our rich clinical environment and effectively manage data to enable strong evidence based research to guide precision medicine – Recruit and grow world class scientists and clinician scientists leveraging Holland 	<ul style="list-style-type: none"> – Main Foci: MSK Trauma; Arthroplasty; Bone Metastases (spine); MSK Education – Research Areas: Image guided interventions; Translational research; Technology development and Population based analytics – Clinical Resources: Large volumes in arthroplasty and trauma; specialized bone metastases clinic – Research Resources: Centre for research in image guided therapeutics (CeRIGT) and imaging infrastructure; Technology transfer and Leveraged Industry Partnership Funding; Data Sources: Institute for Clinical Evaluative Sciences (ICES) 	<ul style="list-style-type: none"> – Clinician-scientist partnerships, including collaboration beyond our own program <ul style="list-style-type: none"> ○ U of T Spine Program ○ Toronto Western Arthritis Program ○ MSH (materials/tissue engineering) ○ U of T Sports Medicine Program ○ HSC (MSK developmental biology) ○ iHPME (outcomes) ○ IBBME – Access to resources throughout Toronto <ul style="list-style-type: none"> – equipment, data... – Translation commercialization focus and infrastructure at SRI 	<ul style="list-style-type: none"> – Support for MSK clinician scientists / clinician investigators <ul style="list-style-type: none"> – MSK not currently recognized as a strategic priority at Sunnybrook Health Sciences Centre – The tenuous state of today's research funding – Finding a new HMSK research director for the program 	<ul style="list-style-type: none"> – Link research across Canada – best collaborations to send research forward <ul style="list-style-type: none"> ○ Funding opportunities ○ Mentoring / Sharing Canadian grown talent ○ Fully capitalizing on equipment/resources at each site

Overview	Main Objectives	Main Strengths	Key Features	Recurrent Challenge	Consortium Expectation
<p>improves patient bone and joint health</p> <ul style="list-style-type: none"> – Longer term goal: To successfully translate our discovery research through first in human testing, leading multicentre RCTs, instituting changes in practice and health policy and commercialization of our innovations 	<p>and other chair resources</p> <ul style="list-style-type: none"> – Identify, support and mentor internal champions and trainees in order to promote research innovation across the program 				
Human Mobility Research Centre at Queens University (Brian Amsden)					
<ul style="list-style-type: none"> – Vision: Innovative surgical technologies that create value for the patient and health care system – Kingston General and Hotel Dieu Hospitals /48 members across 3 Faculties (Chem and Mech Eng, School of Computing, Orthopaedic Surgery, School of Rehab Therapy) 	<ul style="list-style-type: none"> – Research Themes: <ul style="list-style-type: none"> ○ Computer-assisted Therapies ○ Tissue Engineering/Regenerative Medicine ○ Biomechanical Design, Rehabilitation and Ergonomics ○ Assistive Technologies – 	<ul style="list-style-type: none"> – Direct interaction with clinicians in OR setting – Highly interdisciplinary – Infrastructure (gait lab in HDH; Computer assisted surgery suite) 	<ul style="list-style-type: none"> – Integrated research teams – Admin/technical support 	<ul style="list-style-type: none"> – Funding – Decreased engagement of Faculty: no succession plan – Infrastructure: labs in Kingston General Hospital 	<ul style="list-style-type: none"> – Research collaborations with other Centres – Funding opportunities
McCaig Institute for Bone and Joint Health at University of Calgary (Steve Boyd)					
<ul style="list-style-type: none"> – Vision: Leading the improvement of MSK health for patients across their 	<ul style="list-style-type: none"> – Interdisciplinary collaborations with focused research areas (biomarker 	<ul style="list-style-type: none"> – Research Expertise: <ul style="list-style-type: none"> ○ Biomarkers 	<ul style="list-style-type: none"> – Operationalizing the Centre for Mobility and Joint Health 	<ul style="list-style-type: none"> – Operational Funding – Few positions for faculty recruitment 	<ul style="list-style-type: none"> – Identify critical research areas for MSK health and how each group in Canada

Overview	Main Objectives	Main Strengths	Key Features	Recurrent Challenge	Consortium Expectation
<p>lifespan through research and education</p> <ul style="list-style-type: none"> – Mission: To enhance the MSK health of Albertans by focusing our efforts on a “precision medicine” approach to research: tailoring the right intervention for patients at the right time – 65 faculty, 70 staff, 100+ trainees – Facility: The Centre for Mobility and Joint Health (MoJo) incorporates cutting edge research of McCaig Institute, has a strong connection to healthcare, and is focused on improving treatments 	<p>analysis, motions analysis, imaging) supported by external funding and strategic partnerships to study and advance prevention, early diagnosis and novel treatments</p> <ul style="list-style-type: none"> – Direct research to patient action to lead the way in turning research evidence into healthcare solutions 	<ul style="list-style-type: none"> ○ Advanced diagnostic imaging ○ Biomechanics and motion analysis ○ Epidemiology <p>– Key Strengths:</p> <ul style="list-style-type: none"> ○ Research across all 4 pillars ○ Multi-disciplinary teams ○ Clinician-scientist collaborations ○ Province-wide partnerships 	<ul style="list-style-type: none"> ○ Develop a business model for sustainability ○ Identify services that we can provide (industry, clinicians, researchers) ○ Host clinical trials ○ Encourage multi-disciplinary, translational research partnerships <p>– Recruitment of New Faculty</p> <ul style="list-style-type: none"> ○ Losing critical expertise in key areas over the next 5 years ○ Shifting of expertise: basic science and engineering ○ Emphasis on precision medicine at the University of Calgary <p>– Partnership with</p> <ul style="list-style-type: none"> ○ Alberta Health Services (Bone and Joint Health Strategic Clinical 	<p>– Research funding</p>	<p>can lend its expertise in a collaborative way</p> <ul style="list-style-type: none"> – Identify opportunities to strengthen existing research programs with national collaborations – Identify funding opportunities for multi-centre projects

Overview	Main Objectives	Main Strengths	Key Features	Recurrent Challenge	Consortium Expectation
			<p>Network) that identifies clinical priorities</p> <ul style="list-style-type: none"> ○ Alberta Bone and Joint Health Institute that evaluates and implements solutions 		
The Bone and Joint Institute (BJI) at Western University (David Holdsworth)					
<ul style="list-style-type: none"> – Vision: Lifelong Mobility – Mandate: Research to enhance active living, mobility and movement, investigate causes, prevention, diagnosis and treatment, and improve support systems and palliation – 185 official members across 5 faculties (medicine/dentistry, health sciences, engineering, social science, science): Trainees (72) Staff (10), Faculty (93) – note: many additional research technicians and staff 	<ul style="list-style-type: none"> – Primary Objectives: <ul style="list-style-type: none"> ○ Understand bone and joint diseases ○ Innovate in diagnosis and evaluation ○ Develop and evaluate new therapies ○ Influence key knowledge users – Research Themes: <ul style="list-style-type: none"> ○ Basic biological and biomedical ○ Physical sciences and engineering ○ Clinical and health services 	<ul style="list-style-type: none"> – Core Strengths: <ul style="list-style-type: none"> ○ Transdisciplinary Research Collaborations ○ Collaborative Training Program in MSK Health Research (CMHR) ○ Catalyst Grants Program ○ Seminars & Workshops, Canadian Bone & Joint Conference, Sponsored Events – Main Research Strengths: <ul style="list-style-type: none"> ○ Biomechanics & Orthopaedic Surgery 	<ul style="list-style-type: none"> – Partnership with key local clinical and research facilities: <ul style="list-style-type: none"> ○ London Health Sciences Centre (3 hospitals) and Lawson Health Research Institute ○ Fowler Kennedy Sports Medicine Clinic ○ Rorabeck Bourne Joint Replacement Clinic ○ Roth McFarlane Hand and Upper Limb Centre ○ MSK Imaging Laboratories ○ Biomechanics Laboratories 	<ul style="list-style-type: none"> – Sustainability <ul style="list-style-type: none"> – Public/media presence – Link to provincial decision-makers – Senior-level (CRC tier 1) recruitment 	<ul style="list-style-type: none"> – Expanded national partnerships and research initiatives – Coordinated funding applications – Unified voice and approach to national MSK priorities – Increased profile of MSK research in Canada

Overview	Main Objectives	Main Strengths	Key Features	Recurrent Challenge	Consortium Expectation
	<ul style="list-style-type: none"> ○ Population and community health 	<ul style="list-style-type: none"> ○ Clinical Trials & Outcomes ○ Imaging ○ Mobility, Rehabilitation, & Sport Medicine ○ Skeletal Biology (Animal Models, Molecular & Cell Biology, Regenerative Medicine) 	<ul style="list-style-type: none"> ○ Skeletal Biology Labs ○ Ivey International Centre for Health Innovation 		
Network for Oral and Bone Health Research (RSBO) in Quebec (Pierre Moffatt)					
<ul style="list-style-type: none"> – Mission: To develop and disseminate new knowledge on oral and bone health – Funded by ‘Fonds de Recherche Québec – Santé’ – 4-year Competitive Renewal (0.5M\$) – Current Director is Dr. Arlette Kolta and Co-Directors Elect are Drs. Faleh Tamimi and Christophe Bedos – 75 Regular Members from Across Quebec (+11 Associate Members) 	<ul style="list-style-type: none"> – To mobilize researchers in Quebec – To promote strategic initiatives – To support common resources – To organize knowledge transfer activities – Current Foci: <ul style="list-style-type: none"> ○ Validation of a new strategy to repair jaw bone voids in the presence of antiresorptive-induced osteonecrosis ○ The transition from acute to chronic pain in chronic painful 	<ul style="list-style-type: none"> – Main Strengths <ul style="list-style-type: none"> ○ Funding Initiatives ○ Major Structuring Projects ○ Recruitment Aid ○ Support for conference organization ○ Support for major infrastructures ○ Student Conference Support ○ Student/Postdoctoral Salary Support – Expertise 	<ul style="list-style-type: none"> – Access to Resources / Platforms – Sense of Belonging – Collaborative studies 	<ul style="list-style-type: none"> – Members’ Participation / Involvement – Continuing Funding and External Partnerships – Getting metrics / News from Members 	–

Overview	Main Objectives	Main Strengths	Key Features	Recurrent Challenge	Consortium Expectation
	<ul style="list-style-type: none"> temporomandibular joint disorders ○ Rare diseases affecting the MSK system ○ Accessibility to oral care for vulnerable population ○ Diagnostic and therapeutic innovations for maxillo-facial pathologies caused by cancer and aging 	<ul style="list-style-type: none"> ○ Combined pan-Quebec Oral and Bone Experts 			
Orthopaedic Research at Dalhousie University and the Nova Scotia Health Authority (NSHA) (Sara Whynot)					
<ul style="list-style-type: none"> – Mission: To contribute to a healthier Nova Scotia through world-class research focused on innovative solutions to reduce the burden of chronic bone and joint disorders on individuals, the healthcare system and the economy – Located in Halifax, Nova Scotia at Dalhousie University with close affiliation with the Nova Scotia Health Authority (single health district) 	<ul style="list-style-type: none"> – To provide evidence: informed easily implementable solutions to reduce MSK disease prevalence and associated costs of bone and joint diseases – The focus is on an improved understanding of the osteoarthritis (OA) disease processes, prevention and early intervention strategies, and 	<ul style="list-style-type: none"> – Leverage solid relationships with quality teams at NSHA to enable translational research – Established team of researchers with 15 years of demonstrated success, for example: <ul style="list-style-type: none"> ○ IMPACT - Innovation in MSK Health and Physical Activity is a multidisciplinary, multi faculty (Medicine, Engineering and Health Professions) and multi institutional team (e.g. NSHA and 	<ul style="list-style-type: none"> – Secure Stable Funding – Translational research funding program (supports the translation of research into clinical care at NSHA and IWK health centre); increasing emphasis on health outcomes research and patient engagement in research – Our research is providing pathway-specific knowledge for early and surgical 	<ul style="list-style-type: none"> – Securing research funding, in particular matched funding - few local funding sources are available – Research evidence is not always incorporated into clinical care in a timely way 	<ul style="list-style-type: none"> – Positioned to implement research findings into clinical care with established relationships with clinical quality teams

Overview	Main Objectives	Main Strengths	Key Features	Recurrent Challenge	Consortium Expectation
<p>serving the entire Province)</p>	<p>optimizing orthopaedic surgical solutions</p>	<p>IWK health centre) of researchers who aim to improve MSK health and mobility</p> <ul style="list-style-type: none"> – Environment - nimble, collaborative, interprofessional group with a solid link between University and health system, good access to university students and trainees 	<p>treatment and management strategies, and will contribute to shaping the general public prevention strategies in Canada to promote and work toward a lifetime of MSK health</p>		
The Research Centre at Shriners Hospitals for Children - Canada (Bettina Willie)					
<ul style="list-style-type: none"> – Shriners Hospitals for Children has a mission (carried out without regard to race, color, creed, sex or sect, disability, national origin, or ability of a patient or family to pay) to: <ul style="list-style-type: none"> ○ Provide the highest quality care to children with neuro-MSK conditions, burn injuries and other special healthcare needs within a compassionate, family-centered and collaborative care environment 	<ul style="list-style-type: none"> – Genetics of metabolic bone disease - 7 experts (Rauch, Moffatt, Murshed, Glorieux, McKee, Majewski, Weiler) with 6 ongoing projects – Target identification for bone regeneration – 9 experts (Hamdy, Willie, St-Arnaud, Komarova, Haglund, Moreau, Tabrizian, Colmegna, Tran) with 12 ongoing projects – Functional Outcomes and nursing research – 8 	<ul style="list-style-type: none"> – Identification and characterization of disease-causing genes – Developing animal models of diseases – Established standard of care for many metabolic bone diseases – Developed surgical systems (Fassier-Duval rod) and procedures (Distraction Osteogenesis) – Example: <ul style="list-style-type: none"> ○ X-linked hypophosphatemia ○ vitamin D deficiency rickets type I 	<p>–</p>	<ul style="list-style-type: none"> – Research Funding (CIHR turmoil) – Student recruitment 	<ul style="list-style-type: none"> – Understand strengths of members – Initiation of collaborative projects

Overview	Main Objectives	Main Strengths	Key Features	Recurrent Challenge	Consortium Expectation
<ul style="list-style-type: none"> ○ Provide for the education of physicians and other healthcare professionals ○ Conduct research to discover new knowledge that improves the quality of care and quality of life of children and families – Our vision: Become the best at transforming children’s lives by providing exceptional healthcare through innovative research, in a patient and family-centered environment 	<p>experts (Hamdy, Rauch, Ouellet, Ferland, Dahan-Oliel, Veilleux, Glorieux, Tsimicalis) with 49 ongoing protocols</p>	<ul style="list-style-type: none"> ○ Osteogenesis Imperfecta: type I-V, type V, type VI, type VII ○ MDMHB (metaphyseal dysplasia with maxillary hypoplasia and brachydactyly) ○ Cole-Carpenter syndrome ○ Idiopathic Infantile Hypercalcemia 			

Appendix B - Breakout session summary for chronic pain & fatigue

“Pain is the primary impediment of mobility and healthy development & aging”

Biggest Problems

- Need to better understand the mechanism of joint pain to help us comprehend the associated symptoms and the lack of correlation between disease severity/structural changes and pain
- Need better subjective measurement tools to assess the experience of pain including intensity, quality, and adaptation mechanisms used by consumers to stay mobile/functional (note: good coping skills can mask pain and chronicity that can lead to normalizing pain, which makes subjective measures inaccurate in assessing pain level)
- Need better subjective measurement tools to assess the experience of fatigue including intensity, quality, and adaptation mechanisms used by consumers
- Need better ethically sound and economical techniques in the lab and clinic to measure pain objectively (metrics for markers/biomarkers of pain)
- Need to advocate for funding to support research on cannabis safety, drug interactions, dosages, etc. (note: opioids vs medical cannabis, long-term impact)
- Need to better understand the interplay between pain and mental health
- Need to better understand the interplay among pain and other chronic co-morbidities
- Need better phenotyping of pain and subtypes of pain
- Need better evaluation of non-pharmacological approaches to reduce pain and fatigue
- Need better assessment of the impact of sex/gender/age/culture on the experience of pain and fatigue
- Need better understanding of the factors that facilitate and impede return to work
- Need to consider the translatability of animal models

Important Clinical or Consumer Reported Challenges

- Pain stigma impacts people’s willingness to report pain and to access or adhere to treatment (note: ability to work/job security, perceived weakness, reliance on treatment, type of treatment opioids/cannabis)
- Ability to work
- Under-estimated cost burden of pain on people and the system

- Early OA diagnosis has implications for access to care (e.g. can impact eligibility for total joint replacement for example)
- No clinical guidelines for certain types or subtypes of pain
- Inconsistent and inexplicable outcomes for certain treatments (e.g. pain sometimes persists post total joint replacement)
- Timelines and freedom of access to meds
- Need better diagnostics for pain and fatigue

Expertise/Resources - Leading Centres

- Difficult to identify MSK specific pain centres in Canada – could potentially model UK (Nottingham)
- Need more funding in this area to support a greater number of researcher who specialize in pain specific to MSK
- Need to increase collaborations among MSK researchers/consortium and other pain experts/groups
- Consortium needs to partner strategically to increase pain expertise and greater capacity/experience/resources in this area:
 - Chronic Pain SPOR/IMHA
 - Dalhouse Pain Network
 - De Groot Centre (McMaster)
 - QC Pain Network/Alan Edwards Centre
 - Dwight Moulin – NP Pain
 - Pain Science Division of Physiotherapy Association
 - Calgary Chronic Pain Centre
 - Health Canada

National Champion

- Among the current members of the consortium, Jason MacDougall studies MSK specific pain
- Need to attract and identify additional researchers focused on MSK specific pain
- Groups who may have champions are included above in the leading centres, other might include:
 - Canadian Paediatric Society
 - Paediatric Rheumatologist
 - Children’s Developmental Rehabilitation Program
 - Canadian Spine Association

Possible Funding Sources

- CIHR attributes less than 1% of funding to pain – need to advocate for an increase in this priority area
- Licensed producers of cannabis may be good source of revenue once legalized
- Pharma are reluctant to invest in new pain drug development because of the limited successes to date and poor reputation lately. Need to change conversation with industry to support finding solutions - invest in time and people to improve our understanding of basic joint pain mechanisms for more effective targets for different patient subtypes

Appendix C - Breakout session summary for inflammation & tissue repair

Biggest Problems

- We are behind on understanding the biology (individual components/cell types involved) in terms of regulation mechanisms of the immune response and so we are not seeing efficacy in the current treatment or therapies
- Need better in-vivo assays to quantify inflammatory response in an objective way without interaction with the system under study (more specificity than the gross changes that accompany inflammatory response) and at the same time think about how it would be accessible enough to be used to guide clinical decisions
 - Challenge: Serum profiles are necessarily surrogates for joint inflammation (e.g. level of cytokines in serum vs synovial fluids can be very different)
 - Challenge: it is difficult to know which cytokines are at play at the right time in the right person – individual differences, gender differences, age factors
 - Challenge: how can we identify which responses lead to good or bad outcome - why does some inflammation resolve in some and others not
 - Challenge – Even if we identify pathways how do we change the mechanisms – pharma has stepped away from this because it is complicated (not a silver bullet scenario) so many adverse events – the problem is with balance/regulation can't be straight knockout of an inflammatory player, because a certain level is important for tissue regeneration and repair – e.g. many TNF-alpha blockers not as good as predicted because you need some level of TNF in your system
- Need a better understanding of the role of inflammation in the initiation and progression of osteoarthritis
- Need a better understanding of the role of inflammation in tissue repair (i.e. interaction with stem cell therapies)
- Need a better understanding of modulation of inflammation in repair (i.e. how much inflammation should we have for bone union - inflammation plays a vital role)
- Need a better understanding of the role of individual cell types and the interplay among them related to inflammation and tissue repair
- Need a better understanding of the impact of co-morbidities (e.g. diabetes, cardiovascular disease, cerebrovascular disease, asthma, metabolic syndrome/obesity) on MSK related inflammation
- Need to identify and establish better collaboration and partnerships (e.g. facilities with good manufacturing practices and regulatory processes) to scale up new methods and enhance translation
- Need to establish a tissue bank coordination centre for allografts and transplants of MSK tissues

- Need to work on the optimization of composition and architecture of biomaterials (biocompatible, biodegradable, smart materials)
- Need to work as a consortium with Health Canada to address regulatory issues and turnaround time – GMP, Quality Management System. How can the consortium work together to simplify the process or how can we get approval in specialized centres that is used by all so we don't have to get individual approvals?

Important Clinical or Consumer Reported Challenges

- Understand why some rheumatoid arthritis sufferers don't respond to current treatments
- Reduce side effects of current treatments, can we make them safer?
- Need to understand the difference between manifestation of the disease versus the intrinsic aspects of the disease
- Biomarkers and tools to measure response to therapy are needed. Tools to measure soft tissue damage and repair, especially for bone rather than soft tissues because they are a huge component to tissue repair mechanisms
- More rapid access - if we can identify early on who will be a positive responder then treat earlier with the biologic rather than failing other drugs first in order to qualify for the biologic - precision medicine) - Need for biomarkers that are indicative of positive response to therapy for improved cost-effectiveness
- Earlier interventions for joint preservation
- Earlier identification of anatomical risk factors; predictors of joint disease (e.g. gait, joint function, hormones, lifestyle intervention) – perhaps some people shouldn't do certain types of activities – could be as simple as quad to hamstring balance, consider the gender differences (e.g. hormone impact on joint laxicity)
- Lack of quantitative 3D images, need better integration of imaging info to support clinical decision-making
- Need to better prevent and treat peri-implant infections
- Metrics to measure inflammatory response and interplay of therapies (e.g. drugs/exercise)
- Fibrosis (dupuytren's contracture – hand deformity that develops over years)

Expertise/Resources - Leading Centres

- Tissue repair:
 - McGill
 - UBC (super cluster???)
 - Western
 - Queens
 - Toronto (CFREF)

- Calgary (RA)
- Inflammation
 - Western
 - McGill

National Champion

- Advocates
 - High profile athletes, NHL, musicians/actor etc. need clinicians/surgeons to weigh in
 - Visible personalities
 - Spokespeople to increase profile
 - Olympic athletes
 - Tissue engineering group (Daniel Chen, University of Saskatchewan) looking at rebuilding cartilage
 - Opinion Leaders
 - Ask orthopedic surgeons for suggestions
 - Rita Kandel
 - Industrial partners – impact of disability

Possible Funding Sources

- NIH (US) – partner with US investigators
- Industrial partners (sporting goods, pharma, sports, apparel, if you wear the right apparel you reduce the risk of injury)
- Insurers
- Employers (mining, oil, auto)
- Auto, buildings (designers and architects). Designing for greater mobility
- NCE
- NSERC
- Department of Defense (US)
- International partnerships (Canada? Europe?)
- Philanthropy
- Veterinary

Appendix D - Breakout session summary for disability, mobility & health

Biggest Problems

- Better identification of high risk individuals/activities to target prevention strategies
- Training and clinical uptake of new equipment identified/utilized in research (ie. fancy imaging equipment)
- Appropriate use of clinical resources, being selective with interventions (health economics)
- Need to better understand primary and secondary fracture or soft tissue/joint injury prevention/risk prediction and intervention
- Better use of interventions for better outcomes and health care cost savings
- Need to address the challenges of scalability of successful interventions (bringing together groups around specific areas, conducting clinical trials)
- Need more knowledge of how best to prescribe exercise interventions (dosage and relevance)
- Need to make better use (more appropriate) of imaging to support clinical decision-making (improve diagnostics and treatment planning or just is it just an added cost when x-ray is sufficient – when to use or not to use)
- Need to make better use of existing low cost screening tools in the community
- Need to evaluate wearables & artificial intelligence as a component of interventions to better understand their value (e.g. impact on access rural/urban, point of care, feedback/tracking/monitoring, smart health systems)
- Need to establish guidelines and a mobility tool kit / apps for phones (e.g. more patient-oriented research and implementation science studies to engage patients and clinicians)
- Need better understanding of the value and interaction of allopathic and complimentary interventions
- Need to more effectively use population health data and use administrative databases to better assess costs and privacy issues... machine learning approach – consolidating our information to make better use of what we have
- Need to consider how to incorporate best practices and guidelines in training program
- Need to involve key partners like the Vector Institute for artificial intelligence
- Need to focus on the research and engage society for KT
- Need to identify trials required that would provide trainees with relevant projects (e.g. physical activity vs sedentary behaviour)

Important Clinical or Consumer Reported Challenges

- Focus on specifics of MSK disorders to address quality of life issues

- Increasing awareness to consumers of new interventions/initiatives. Demonstrate the value of consortium
- Fatigue needs to be considered when discussing issues related to pain
- Standardizing diagnostics and interventions/care algorithms for better health outcomes across Canada
- Lack of clinical guidelines for patients, community resources (maintain independence) – knowledge translation of existing solutions
- Adapting guidelines for vulnerable populations and isolated communities

Expertise/Resources - Leading Centres

Aside from all those already involved in this consortium we might include the following.

- CAMOS
- Catch a Break
- Bone & Joint Canada
- Leap
- McMaster Clinical Trials
- CAPRI
- IMHA
- Centre for Hip Health and Mobility - UBC
- DO WE NEED:
 - Recreation Specialist
 - Behavioural Change Specialist
- How do we include
 - Recreation Specialist
 - Behavioural Change Specialist
- Using our resources and engaging the right people – how do we get buy-in?
- We need to consider pulling together Big Data Users

National Champion

- Media/High Profile Ambassadors like sport stars, actors, etc...
- Bill Lesly (Manitoba – Osteoporosis...)
- Lori Tucker (Big Data)
- Pierre Guy (Big Data)

- Heather McKay (Mobility)
- Canadian MSK Rehab Network

Possible Funding Sources

- CIHR, SSHRC, NSERC
- Insurance companies (focused on prevention over intervention)
- Sport Canada
- Parks & Rec, Participation
- Workers Comp/Unions/Insurers
- Industry
- CFI Infrastructure
- Provincial & Municipal levels
- Space Agency
- Department of Defense (DOD)
- Northern Communities (Remote) (Suggestion from Geraldine)
- Donors/Philanthropy