17th Annual Alberta Biomedical Engineering Conference
Banff 2016

October 21-23, 2016
Banff Park Lodge
Banff, AB

PROGRAM COMMITTEE

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Brooklynn Knowles, Alison Muller, University of Alberta

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POSTER JUDGES

To be announced at the conference

PODIUM JUDGES

Dr. Tom Oxland, University of British Columbia
Dr. Art Kuo, University of Calgary
Dr. Hossein Rouhani, University of Alberta

TRAINEE VOLUNTEERS

University of Calgary	Amanda Chan		Student co-chair, student organizer, undergraduate funding, AV organization, volunteer recruitment, registration package assembly
	Andres Kroker, Colin Firminger		Student organizer, volunteer recruitment, social event planning, registration package assembly, registration table
	Geoff Michalak Lazaro Sanchez Rodriguez Austyn Matheson Susanne Schmid	Jacob George Tomasz Bugajski Colin Firminger Andres Kroker	Package assembly
	Guomin Ren Austyn Matheson Susanne Schmid Jacob George	Amanda Chan Colin Firminger Andres Kroker	Registration
	Andy Michalski Geoff Michalak Scott Sibole Lazaro Sanchez Rodriguez Eng Kuan Moo Amin Komeili Najratun Nayem Pinky	Amanda Chan Colin Firminger Andres Kroker Mana Novin Danielle Whittier	Session Chairs
	Mana Novin Najratun Nayem Pinky Danielle Whittier		Sponsorship Volunteers
University of Alberta	Brooklynn Knowles, Alison Muller		Student organizers

CONFERENCE EVENT COORDINATOR

University of Calgary **Elizabeth Mullaney**

A BIG THANK YOU TO ALL OF OUR VOLUNTEERS WHO HELPED WITH THE ORGANIZATION AND PLANNING OF OUR CONFERENCE THIS YEAR!

A SPECIAL THANK YOU TO
LISA MAYER FOR HER ONGOING SUPPORT
OF THE BME CONFERENCE

PROGRAM

Podium sessions are in the Summit Assiniboine room.
Poster sessions are in the Castle and Alpine Meadows rooms.
You must wear your name badge in order to access all meals and conference events (podium, poster sessions, coffee breaks).

FRIDAY

4:30 - 8:30 pm	**REGISTRATION and CHECK-IN – Banff Park Lodge Lobby**
7:30 pm	**Opening Reception – Glacier Salon**
	3 Minutes Thesis Competition

SATURDAY

7:00 – 8:00 am	**BREAKFAST – Glacier Chinook**
8:00 – 8:05 am	**Welcoming Remarks – Summit Assiniboine**
8:05 – 8:45 am	**Guest Speaker #1** **Karl Schroeder** Writer, Speaker, Teacher **Session Chairs:** Amanda Chan, Andy Michalski
8:45 – 9:55 am	**Student Podium Presentation Session #1** **Session Chairs**: Scott Sibole, Geoff Michalak

Colin Firminger	01	Minimalist footwear increases metatarsal strains during walking
Mohsen Janmaleki	02	Mechanical Properties of Endothelial Cytoskeleton and Weightlessness
Yan Liang	03	Co-culture of Human Meniscus Cells with Bone Marrow Mesenchymal Stromal Cells Promotes Meniscus-like Matrix Formation in a Polycaprolactone Scaffold
Andrew S. Michalski	04	Impact of Mesh Element Size on Finite Element Analysis of Hip Fracture in a Sideways Fall
Alvaro Espinosa	05	Novel multiaxial, MRI-compatible loading rig to simulate daily activities: a design overview
Andres Kroker	06	TED Talk - The effect of anterior cruciate ligament tears on human knee bone microarchitecture

9:55 - 11:10 am

Poster Session #1 (ODD NUMBERED POSTERS)

Judges: TBA

COFFEE/BEVERAGE BREAK
Castle and Alpine Meadows

Amanda Chan	01	Investigating the effect of different lubricants and incubation times on the coefficient of friction of Biofinity contact lenses
Max Hamilton	03	Grey matter atrophy measured in-vivo with 9.4T MRI in the experimental autoimmune encephalomyelitis mouse model of multiple sclerosis
Kristin Lorenzen	05	Kinematic Differences between Young Adults with a Previous Knee Injury and Matched Controls in the Single Leg Squat and Vertical Drop Jump
Erin Roberts	07	Factors affecting cell attachment to microcarriers in stirred suspension bioreactors compared to adherent static culture
Ryan Schroeder	09	Human Running Kinematics in Reduced Gravity: Why do we Bounce?
Maria Pino	11	Designing a mini planar- biaxial- tensile- testing device for use with a confocal microscope
Sophia Poscente	13	Muscle Adaptation with Acute Electrical Stimulation in a Rabbit Model
Bryce Besler	15	Investigating a method for simulating bone remodeling patterns in space flight
Farshid Momennasab	17	Deriving the equations governing the sound waves propagating in the fluid by first-order perturbation method for application in cell manipulation
Riley Booth	19	Sensing muscle vibrations using piezoelectric discs for gesture classification
Tomasz Bugajski	21	Dynamic Bracing of Pectus Carinatum: A Pilot Study
Alireza Noamani	23	A multi-segment analysis of spine kinetics during seated, directional trunk bending
Jolene A. Phelps	25	Immobilized Biomolecules on Microcarriers: Enhanced Attachment and Proliferation of Synovial Fluid Derived Mesenchymal Stem Cells in Suspension Bioreactors
James Reeves	27	Migration of cancer cells under mechanical and chemical stimuli in a 3D microfluidic chip
Jacob George	29	Can finite element strength at the tibia by HR-pQCT predict spine fractures?
Zohreh Salimi	31	Reliability of Illinois Agility Test for wheelchair users
Mark Frayne	33	Determining the tolerance for change in joint angle when measuring the joint space in rheumatoid arthritis
Melissa Jones	35	Image quality impact of randomized sampling in MRI: implications for compressed sensing
Timothy Gadzella	37	Design and evaluation of an offloading knee brace
Kristin Monnery	39	Oxygen Therapy Attenuates Hypoxia and Improves Motor Deficits in the EAE Mouse Model of Multiple Sclerosis
Jaqueline Rios	41	Effects of exercise and dietary fibre supplementation on the myosin heavy chain isoforms in rats with diet-induced obesity
Shuyue Liu	43	Force after active stretch beyond myofilament overlap: titin and/or cross bridges?
Guomin Ren	45	Cytokine Profiles as Potential Biomarkers for “Pre-Osteoarthritis”
Wesley Chau	47	THE EFFECT OF MACRO CRACKS ON THE LOAD BEARING CAPACITY OF ARTICUALAR CARTILAGE
Sagar Grewal	49	Exploration of Error Sources and Consequences for Clinical Use of Knee Injury Risk Video Assessments
Seyedmahdi Hosseinitabatabaei	51	Validating HR-pQCT-based Finite Element Predictions of Distal Radius Bone Strength
Niloofar Ghazavi Khorasgani	53	Estimating energy expenditure: A comparison between a consumer step counter and a research accelerometer/ heart rate device in kids enrolled in the summer step study

Christopher O'Neill	55	Variability of MR R2* and Quantitative Susceptibility Mapping
Dylan Brenneis	57	The HANDi Hand: The Development of an Inexpensive, Multi-Articulated, Sensate Hand for Machine Learning Research in Prostheses
Andres Kroker	59	The effect of anterior cruciate ligament tears on human knee bone microarchitecture 6
Yasaman Samanian	61	Bacteria Transport through Lung Endothelium on Chip
Asmaa A. Khater	63	Droplets Generation in Microfluidics using Flow-focusing Configuration
Adrienne Kline	65	EEG Localization of Brain Activity During Walking: A Case Study
Matthew Flynn	67	Will Proteoglycan 4 (PRG4)/Lubricin-Soaked Contact Lenses
Vahid Abdollah	69	Evaluation of the Effects of Extension Loading on the Disc Fluid and Fluid Displacement in Participants with Chronic Low Back Pain using T2-weighted MR Images

11:10 – 12:30 pm **<u>Student Podium Presentation Session #2</u>**

Session Chairs: Eng Kuan Moo, Lazaro Sanchez Rodriguez

Lindsey Loundagin	07	COMPRESSIVE FATIGUE OF BOVINE CORTICAL BONE: CORRELATION BETWEEN DAMAGE RATE AND FATIGUE LIFE
Kevin Lee	08	Convulsive Sublethal Dose of Soman Causes Increased Brain Oxygenation in Awake Rats
Matthew McDonald	09	New pQCT strength index predicted up to 90% of variance in bone failure load at distal radius
James Mather	10	Can exercise prevent osteoarthritis-like changes in the tibial plateau of rats exhibiting diet induced obesity?
Christina Jablonski	11	Prrx1 Positive MSCs do not Contribute to Articular Cartilage Repair After Injury
Thomas Lijnse	12	Using Micro-Electrode Arrays for Long Term Studies of Neural Activity
Dena Burnett	13	TED Talk - Osteoarthritis patients with higher nocturnal knee pain have higher cortical stress

12:30 – 1:45 pm **LUNCH – Glacier Chinook**

1:45 – 2:30 pm **<u>Industry Panel Speakers</u>:**

Aubrey Blair-Pattison, Ammonite Biomodels
Oleg Baranov, CleanSlate UV

2:30 – 2:35 pm **BREAK – Group Pictures**

2:35 - 3:50 pm **<u>Poster Session #2 (EVEN NUMBERED POSTERS)</u>**

COFFEE/BEVERAGE BREAK

Judges: TBA

Parisa Bazazi	2	Microfluidic-based Synthesis of Colloidal Silica Particles
Brennan Berryman	4	Predicting Cartilage and Meniscus Mechanical Properties using Quantitative

Calena Marchand	68	A Strategy for the Creation of a Metabolomic Assay System to Aid in Early Diagnosis of Colorectal Cancer

3:50 – 5:10 pm **<u>Student Podium Presentation Session #3</u>**

Session Chairs: Andres Kroker, Amin Komeili

Amy Bunyamin	14	Annual changes in clinically relevant cortical bone properties in children can be characterized using high resolution peripheral quantitative computed tomography
Nicole Bowal	15	Movement biomechanics in children with cerebral palsy
Ashley Dalrymple	16	A Locomotor Cat Model for Restoring Walking after Incomplete Spinal Cord Injury
Thomas Johnson	17	Assessing brain grey matter perfusion, oxygen extraction fraction, metabolism and atrophy in mouse models of neurodegenerative disease
Loretta Ko	18	Mechanical properties and collagen composition of the tail tendon in rats fed with a high fat and sucrose diet: Effects of exercise and dietary fibre supplement
Katie Cameron	19	Compliant response of a silicone mock aorta in an ex vivo heart perfusion model
Richard Beddoes	20	An Assessment of Uniaxial Tensile Properties in Ascending Aortic Aneurysm Tissue for Bicuspid and Tricuspid Valve Groups

6:00 – 7:00 pm **DINNER – Glacier Chinook**

7:00 pm **“THE GREAT CHALLENGE”**

8:00 pm **Social – Rose and Crown – see map**

SUNDAY

7:15 – 8:15 am		**BREAKFAST – Glacier Chinook**
8:15 – 8:45 am		**Checkout**
8:45 – 9:25 am		**Guest Speaker #2**
		Dr. Tom Oxland, University of British Columbia
		Session Chairs: Colin Firminger, Scott Sibole
9:25 – 10:20 am		**Student Podium Presentation Session #4**
		Session Chairs: Eng Kuan Moo, Geoff Michalak
Evan Meikleham	21	Quantitative Analysis of Sparse MR Techniques using Spline-based Phantoms
Anita Fung	22	CROSS-VALIDATION OF FE-PREDICTED METATARSAL STRAINS SUGGESTS AN INFLUENCE OF AGE AND vBMD ON DENSITY-ELASTICITY RELATIONSHIPS
Alex Sacher	23	CT-based anisotropy measurements of proximal tibial trabecular bone: in vivo precision and preliminary comparisons
Charles Moore	24	Influence of High Flow Nasal Cannula Design on Upper Airways Gas Clearance and Pressure
Sadman Sakib	25	Formation of porcine testicular organoids in microwell culture
10:20-10:40 am		**Poster Session #3 (FINALISTS ONLY)**
		COFFEE/BEVERAGE BREAK; Activity from BMEG
10:40 – 11:35 am		**Student Podium Presentation Session #5**
		Session Chairs: Andy Michalski, Amin Komeili
Mehran Akbarpour Ghazani	26	Simulation of tumor growth: Coupling angiogenesis and avascular tumor growth
Kristin A. Bell	27	Designing Next Generation Helmets Liner Materials: Linking Failure to Performance for a Novel Shear-thickening Foam
Douglas Kondro	28	Bioprinting High Cell Density and Vascularised Tissues
Najratun Nayem Pinky	29	Neuroimaging of Inflammation in Sport-Related Concussion
11:45 – 12:30 pm		**Final Award Presentations**
CLOSING REMARKS		**Amanda Chan, Colin Firminger, Andres Kroker**

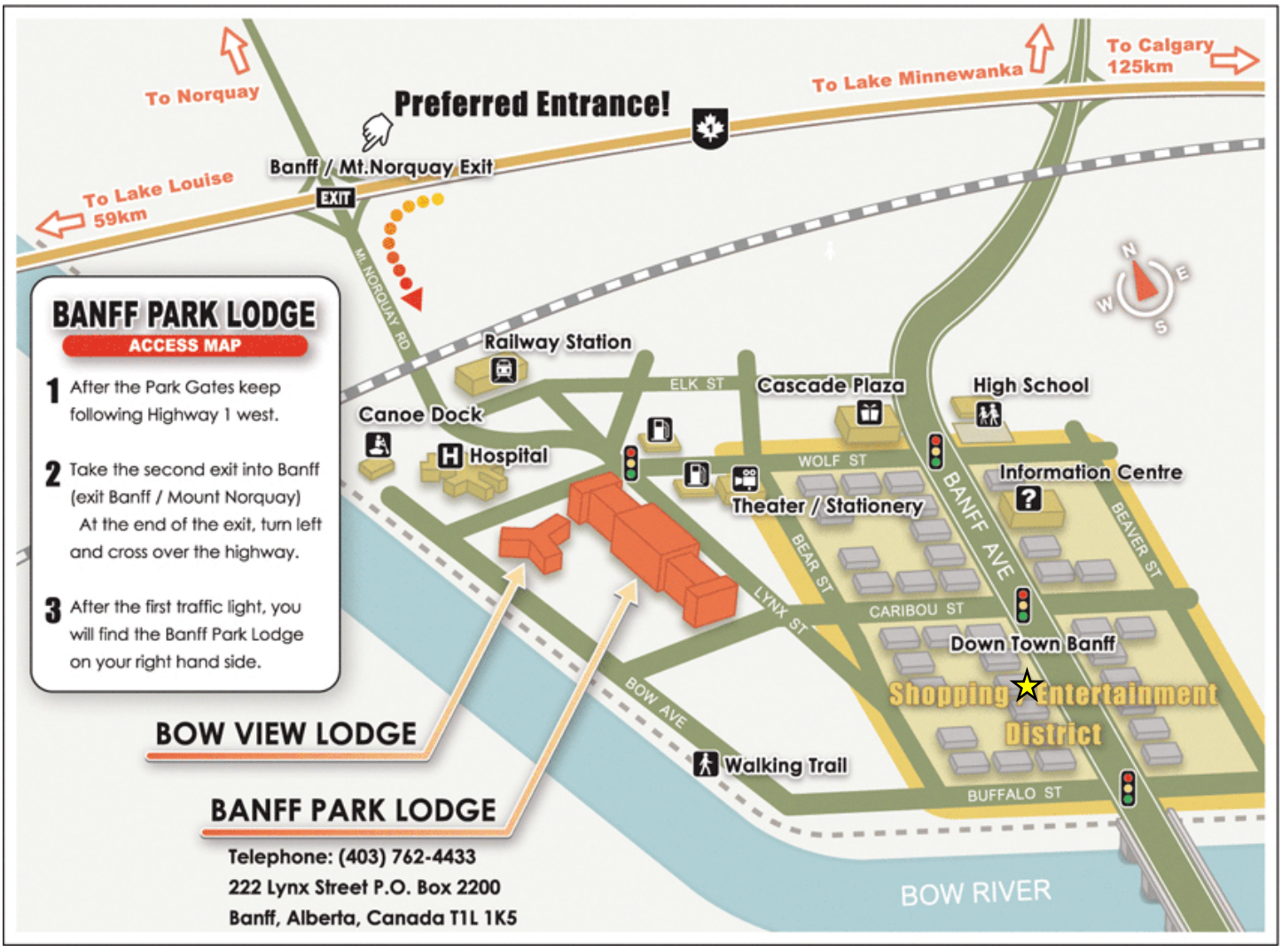
REMINDER

Please return all name tags and judges' clipboards at end of conference.

We thank you for your cooperation.

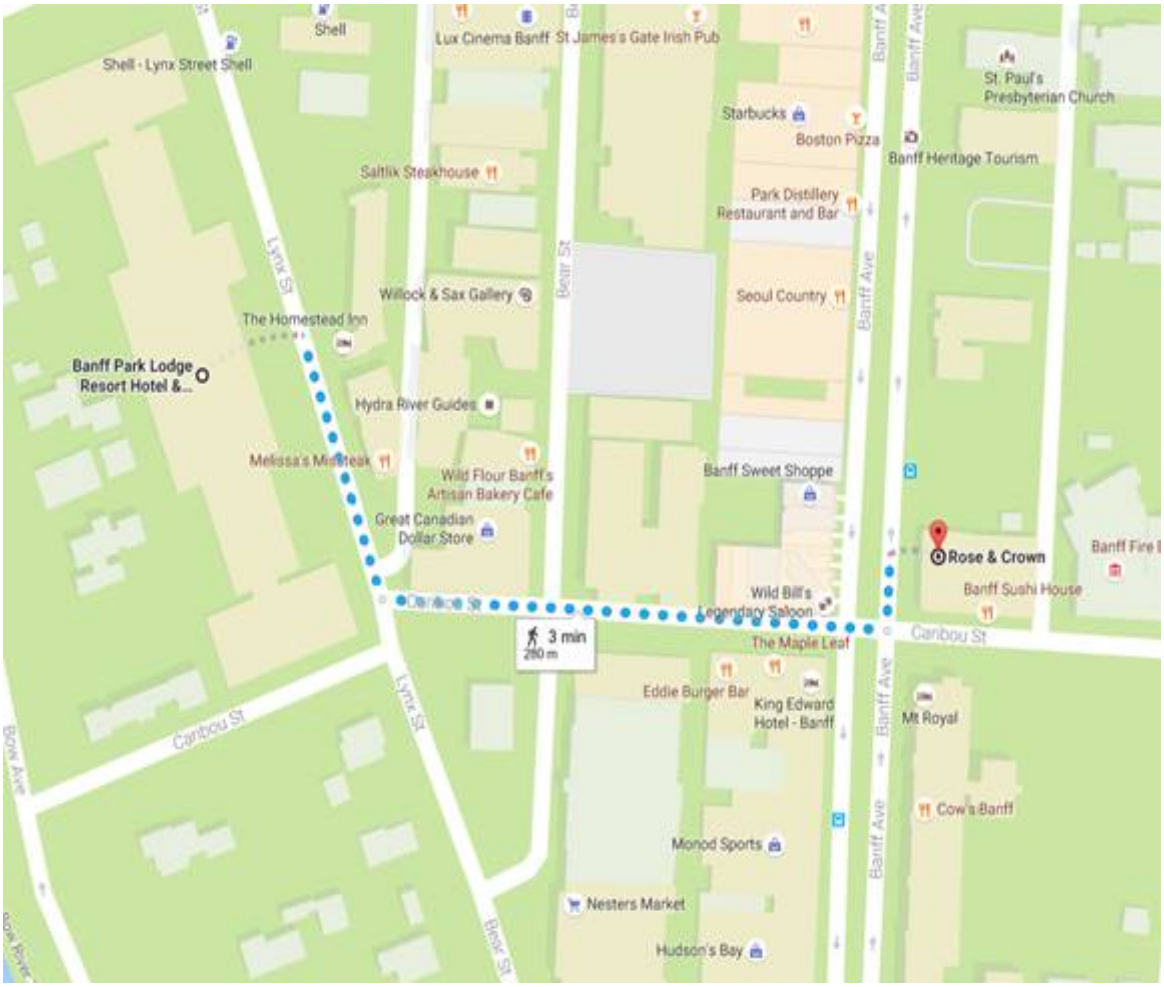
LOOKING FORWARD TO SEEING YOU NEXT YEAR!

Map and Meeting Location (star indicates Rose and Crown)



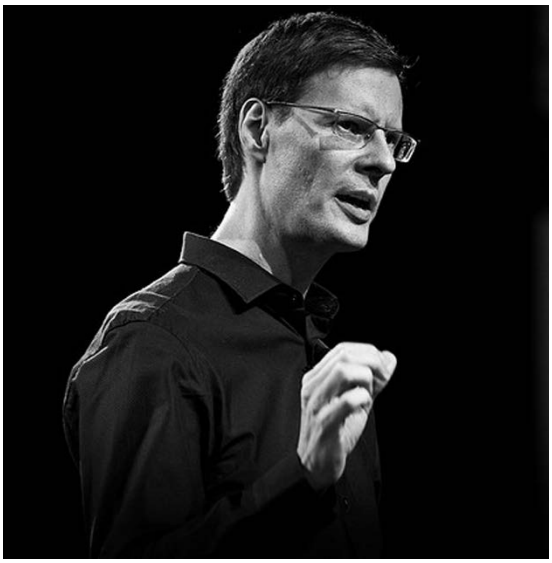
ROSE AND CROWN FOR SATURDAY NIGHT

To get to the Rose & Crown from the Banff Park Lodge, turn right out of the hotel and walk south on Lynx St, turn left and walk along Caribou St until Banff Ave. The Rose & Crown is located on the upper floor the two-story building directly across Banff Ave, on the northeast side of the intersection.



GUEST SPEAKER #1

Karl Schroeder,
Writer, Speaker, Teacher



Using a science fiction frame, author and futurist Karl Schroeder will present several project reviews of imaginary biotechnology projects from the near future. Sometimes serious, sometimes hilarious, these reviews of possible but currently unattainable devices, systems and products will highlight issues of multidisciplinary communication, innovation and foresight, and provide strategies for keeping up with what society and your peers are doing in a complex and rapidly-changing world.

GUEST SPEAKER #2

Dr. Thomas Oxland,
University of British Columbia

Dr. Thomas Oxland is a Professor of Orthopaedics and Mechanical Engineering at the University of British Columbia in Vancouver, Canada. He also serves as the Associate Head – Research in the Department of Orthopaedics at Vancouver General Hospital, and an Associate Director in the ICORD Research Centre. He is a biomedical engineer with research expertise in orthopaedic biomechanics. His specific areas of focus include the biomechanical aspects of the spine and spinal injury as well as orthopaedic implants. He has published over 160 peer-reviewed journal articles that have been cited over 6700 times. He is a Fellow of the Canadian Academy of Engineering and the American Society of Mechanical Engineers.

Abstract:
Biomechanical Aspects of Spinal Cord Injury
Thomas R. Oxland PhD PEng
Professor of Orthopaedics & Mechanical Engineering
University of British Columbia

Spinal cord injury (SCI) begins with mechanical insult to the cord (i.e. primary injury), followed by a myriad of biological events such as ischemia, inflammation, etc. that further damage the cord (i.e. secondary injury). The biomechanical aspects of the spinal column injury (i.e. vertebrae, disc, ligaments) and the subsequent insult to the spinal cord may inform the development of novel preventative and treatment strategies.

This presentation will highlight the research work being done at UBC and elsewhere to address the biomechanical aspects of SCI. Our unique SCI models have demonstrated that two of the most common injury types observed clinically – burst fracture and fracture-dislocation – produce different injury patterns to the spinal cord and result in contrasting functional deficits in these novel animal models. There remains much to discover regarding the behavior of the spinal column and spinal cord during the traumatic event and how this affects the pathophysiological degradation of the spinal cord.

INDUSTRY PANEL#1

AUBREY BLAIR-PATTISON, AMMONITE BIOMODELS

Biography:

Aubrey obtained her BSc in Mechanical Engineering at the University of New Mexico, and her MSc in BioMedical Engineering from the University of Calgary. Through her MSc she developed a novel material with similar properties to bone with the goal of providing better training options for orthopaedic surgeons. Aubrey co-founded Ammolite BioModels as Chief Technology Officer, and stepped into the role of CEO in January 2016.

Ammolite BioModels, Inc Profile:

Ammolite BIoModels was founded in April 2015 to pursue the commercialization of the bone models with the belief that improvements to training and education can be best done through commercial means. Ammolite BioModels has been awarded the NSERC I2C grant for the finalization of the models in preparation for commercialization, and more recently been awarded the TENET I2I for the commercialization of the models.

INDUSTRY PANEL #2

OLEG BARANOV, CLEANSLATE UV

Bio: Oleg is an entrepreneur and graduate of mechanical engineering. While at Queen's University studying mechanical design, Oleg was an active member of the student community. He worked on various concept design projects, founded a custom-apparel startup, and was the Head Manager of the Campus Outfitters. His leadership skills were honed in several different environments, as he spent his employment working as a deep-wilderness guide for Camp Temagami in northern Ontario. The skills Oleg gained from these pursuits, and the perspectives they helped develop, form the foundation of his passion for entrepreneurship and innovative design.

Elevator Pitch: CleanSlate UV is a solution for sanitizing mobile devices in healthcare, food processing and other infection-sensitive industries. It utilizes ultraviolet light to disinfect devices such as smartphones, tablets and non-critical medical devices in just 30 seconds without any harm to the devices. It also utilizes RFID tracking to power an automated compliance software suite so managers can track compliance among staff.

OUR SPONSORS:

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University of Saskatchewan

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McCaig Institute,

Silver Level Sponsor
Libin Cardiovascular Institute

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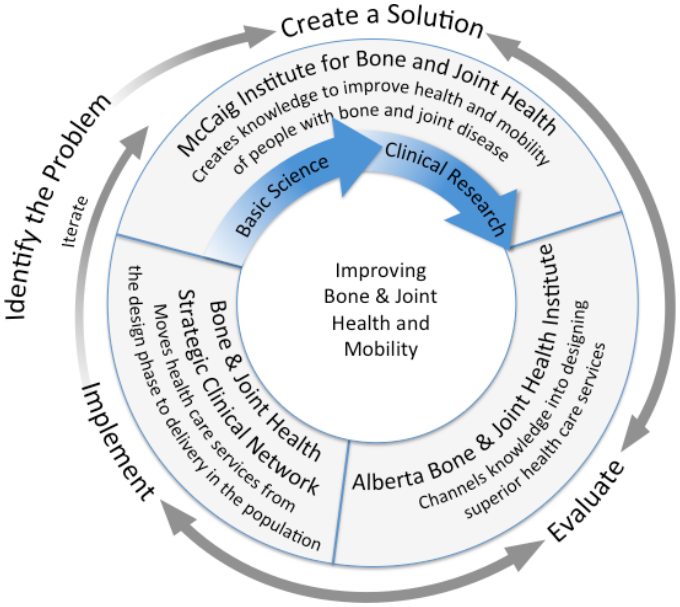
Canadian Society for Biomechanics, Bronze Level Sponsor

McCaig Institute for Bone and Joint Health, Gold Sponsor

The McCaig Institute for Bone and Joint Health is home to basic scientists, physicians, biomedical engineers, health system experts and researchers in training working together to improve the bone and joint health of Albertans. Through research excellence and regional partnerships with Alberta Health Services' Bone and Joint Health Strategic Clinical Network and the Alberta Bone and Joint Health Institute, the McCaig Institute has become a global leader in musculoskeletal research.

Research in the McCaig Institute focuses on **understanding** the causes of bone and joint conditions, **preventing** long-term damage, **diagnosing** disease earlier, **developing** new treatments and **transforming** research findings into real-world solutions.

Together, we are committed to a future of pain free *Mobility for Life.*



Libin Cardiovascular Institute of Alberta,
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The Libin Cardiovascular Institute of Alberta

The Libin Cardiovascular Institute of Alberta coordinates cardiovascular science research, education and patient care as an entity of both Alberta Health Services (Calgary) and the University of Calgary. It provides education and training of health-care professionals and offers world-class treatment using new technologies and access to cardiac services. There are more than 175 basic research, clinicians, and clinical research members who serve two million people in southern Alberta, Saskatchewan, and eastern British Columbia. The institute is committed to developing outstanding cardiovascular health promotion and disease prevention programs by translating innovative research into novel health-care solutions. For more information, visit LibinInstitute.org and @LibinInstitute on Twitter.

BIOMEDICAL ENGINEERING

Ready to make a difference

Located in the engineering capital of Canada, the University of Calgary's biomedical engineering program is advancing knowledge and solving problems in animal and human biology, medicine and health-care by educating the next generation of leaders.

READY TO CONTRIBUTE

Our undergraduate students have the strengths of a traditional engineering degree at the Schulich School of Engineering, advanced knowledge of biomedical engineering and valuable hands-on work experience.

MULTI-DISCIPLINARY TEAMWORK

Our graduate students participate in teams with researchers in engineering, kinesiology, medicine, nursing, science and veterinary medicine at an institution committed to investing significantly in biomedical research.

PARTNERS IN RESEARCH

Researchers work towards making an impact through scientific discoveries, innovative and market-driven technologies, and solutions to enhance the wellness and well-being of all throughout the lifespan. We look for opportunities to link with industry and international entities to provide market-ready graduates and R&D solutions.

Collaborative, skilled and experienced – the University of Calgary's biomedical engineers are ready to help your team make a difference today.

For inquiries email **bme@ucalgary.ca** | **ucalgary.ca/bme**

UNIVERSITY OF CALGARY

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