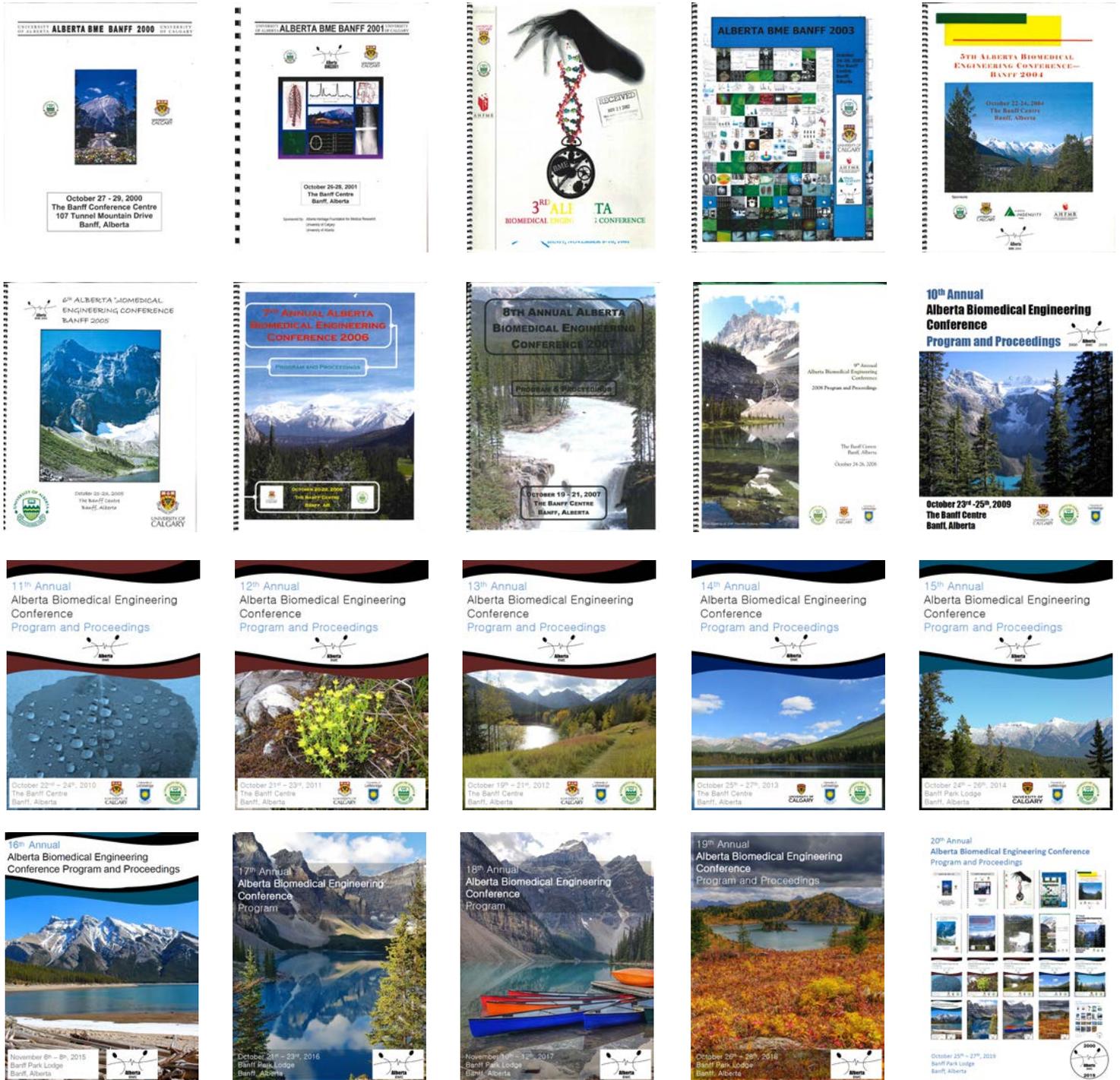


20th Annual Alberta Biomedical Engineering Conference Program and Proceedings



October 25th – 27th, 2019
Banff Park Lodge
Banff, Alberta



We gratefully acknowledge the support of our sponsors
for making this conference a success



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Biomedical Engineering Graduate Program

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Canadian Society for Biomechanics/
Société Canadienne de Biomécanique

20th Annual Alberta Biomedical Engineering Conference Banff 2019



October 25-27, 2019
Banff Park Lodge
Banff, AB

PROGRAM COMMITTEE

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Lindsey Westover

GUEST SPEAKERS / PODIUM JUDGES

Dr. Chiara Bellini	Northeastern University
Dr. Richard Wise	University of Cardiff, University of Chieti-Pescara
Dr. Ronald Zernicke	University of Michigan

SPECIAL ANNIVERSARY GUEST SPEAKER

Dr. Andre Buret	Vice-President, Research, University of Calgary
------------------------	--

INDUSTRY PANEL MEMBERS

Dr. John Wilson	INNOVATE CALGARY
Travis Stevens	Orpyx Medical Technologies
Kip Kyfe	4iiii Innovations
Dr. Lisa Stirling	Garmin International
Robert Forget	AWARE 360
Dr. John Remmers	Zephyr Sleep Technologies
Dr. Jochen Fahr	Brauerei Fahr
Industry panel chairs	Dr. Michael Kallos, Dr. Reed Ferber, Dr. Marc Poulin

TRAINEE STUDENT VOLUNTEERS

University of Calgary	Thomas Lijnse, Tannis Danielle Kemp	BMEG VP Conference Student Leaders
	Thomas Lijnse, Ryan Plett, Phil Spanswick, Tannis Kemp, Michael Kuczynski, Destiny Francis	Package assembly, registration packages
		Registration – Banff Park Lodge
	Thomas Lijnse, Michael Kuczynski, Katrin Smith, James Colter, Tannis Kemp, Destiny Francis, Kapilan Panchendrabose	Session Chairs - Presentations
	Michael T. Kuczynski	Photographer
University of Alberta	Milad Nazarahari, Alireza Noamani	Session chairs

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 OUR ANNUAL ALBERTA 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 gain access all meals and conference events
 (podium, poster sessions, coffee breaks).**

FRIDAY

11:00 am - 8:30 pm		REGISTRATION and CHECK-IN Banff Park Lodge Lobby
1:00 pm – 1:40 pm		<u>Opening Industry Speaker</u> Chair: Michael Kallos, University of Calgary Location: Summit Assiniboine
1:00 – 1:10 pm		Opening remarks
1:10 – 1:30 pm		Dr. John Wilson , President and CEO, INNOVATE CALGARY
1:30 – 1:40 pm		Discussion and questions
1:40 pm – 3:00 pm		<u>Industry Panel #1 – We-TRAC CREATE</u> Chair: Reed Ferber, University of Calgary
1:40 – 2:00 pm		Travis Stevens , VP Engineering, Orpyx Medical Technologies
2:00 – 2:20 pm		Kip Fyfe , CEO, 4iiii Innovations
2:20 – 2:40 pm		Dr. Lisa Stirling , Software Engineering Team Leader, Garmin International
2:40 – 3:00 pm		Discussion and questions
3:00 pm – 3:20 pm		COFFEE/BEVERAGE BREAK
3:20 pm – 4:15 pm		<u>Industry Panel #2 – BRAIN CREATE</u> Chair: Marc Poulin, University of Calgary
3:20 pm – 3:40 pm		Robert Forget , CTO, Aware 360
3:40 pm – 4:00 pm		Dr. John Remmers , CMO and co-founder, Zephyr Sleep Technologies
4:00 pm – 4:15 pm		Discussion and questions
4:15 pm – 4:55 pm		<u>Closing Industry Speaker</u> Chair: Michael Kallos, University of Calgary

4:15 pm – 4:20 pm		Introduction of Jochen Fahr; discussion of non-traditional career choices for BME highly qualified personnel
4:20 pm – 4:40 pm		Dr. Jochen Fahr , Owner, Brauerei Fahr
4:40 pm – 4:55 pm		Discussion and questions
4:55 pm – 5:00 pm		Remarks
7:30 pm		<u>Opening Reception</u> – Dr. Kallos/Dr. Krawetz Location: Glacier Salon
SATURDAY		
7:00 – 7.50 am		BREAKFAST – Glacier Chinook
7:50 – 7:55 am		Welcoming Remarks – Dr. Kallos/Dr. Krawetz Location: Summit Assiniboine
7:55 – 8:00 am		Dr. Andre Buret, Vice-President Research, University of Calgary
8:00 – 8:05 am		Elisa Park Kim, Hunter Hub for Entrepreneurial Thinking, University of Calgary
8:05 – 8:45 am		<u>GUEST SPEAKER #1:</u> Dr. Ron Zernicke, Director, Exercise & Sport Science Initiative Professor, Orthopaedic Surgery Professor, Kinesiology Professor, Biomedical Engineering, University of Michigan “Biomedical Engineering—Catalyzing Collaborations in Human Performance” Session chairs: Katrin Smith; Milad Nazarahari
8:45 – 10.00 am		<u>Student Podium Presentation Session #1</u> Session Chairs: James Colter; Tannis Kemp
Gupta, Vinay	01	Hypermetabolic Cerebellar-Pontaine Network in Alzheimer's Disease
Rahemtulla, Kahir	02	An alternative prophylaxis for deep vein thrombosis using intermittent electrical stimulation
Michalski, Andrew	03	Gotta Catch ‘Em All – Can opportunistic CT screening distinguish individuals with a known major osteoporotic fracture?
Yeung, Natalie	04	The Effect of Temporal Constraints on Upper-limb Movements

Nazarahari, Milad	05	An Inertial Measurement Unit-based Wearable Technology for Motion Monitoring of Patients with Walking Disorders During Therapeutic Training
Kuczynski, Michael	06	A Semi-Automated Processing Pipeline to Quantify Trapeziometacarpal Joint Biomechanics using Dynamic Computed Tomography
10:00 am – 11:10 am		<u>Poster Session #1 (ODD NUMBERED POSTERS)</u> COFFEE/BEVERAGE BREAK Castle and Alpine Meadows Judges: University of Alberta: Drs. Adesida, Aoki, Sharp, Laouar, Doschak, Hill, Rabey, Tanaka; University of Calgary: Drs. Dalton, Gavrilova; University of Saskatchewan, Dr. Sarty
Roszko, David	01	Design and Fabrication of a Flexible, Intraspinal Multielectrode
Hampshire, Sydney	03	Developing the specifications for monitoring the biomechanics of a racing wheelchair in virtual reality
Colter, James	05	Omics-Driven Computational Models for Optimization of iPSC Bioprocesses
Li, David	07	Quantitative analysis of regional specific pelvic symmetry
Bohidar, Pallavi	09	The Effects of Coupled B ¹ Fields in B ¹ Encoding MRI - A Simulation Study
Wong, Murray	11	Syndesmosis Position Varies with Ankle Range of Motion
Phelps, Jolene	13	Adipose Stem Cell-Derived Extracellular Vesicles Enhance Islet Function and Survival
Beddoes, Richard	15	Medical Imaging Based Markers as Indicators of Strength in Aortic Aneurysms
Luqman, Saad	17	3D Printed Microfluidic Device for High-Throughput and Accurate Liquid Delivery in Drug Testing Assay
Sharifi, Fatemeh	19	Patient Reported Outcome Analysis with Machine Learning Provides Predictive Information for EPIC-26 Values in Prostate Cancer
Hassanpour Tamrin, Sara	21	A New Microfluidic Device to Isolate Exosomes from Mammalian Cells
Hashlamoun, Kotaybah	23	Fluorescence Recovery After Photo-bleaching: Direct Measure of Diffusion Anisotropy
Shah, Sophia	25	The regenerative potential of endogenous epidural fat stem cells following injury
Plett, Ryan	27	Enhancing Longitudinal Analysis of Bone Strength Estimated by 3D Bone Imaging and the Finite Element Method
Dong, Rachael	29	Evaluation of the permeation kinetics of formamide in porcine articular cartilage
Poscente, Sophia	31	Rapid Muscle Feedback Responses Scale with Movement Speed
Roberts, Kieran	33	Development of a Variable Stiffness Carrying Pole for Testing Human Load Carrying Strategies

Ilg, Jeffrey	35	Characterization of Subchondral Bone Morphology in a Rat Model of Metabolic Osteoarthritis
Singh, Anupriya	37	UV-Mediated Single-step surface modification of microfluidic organ-on-chips
Nazeer, Sadhiq	39	Contribution of Active and Passive Components to Force After Damage in Skinned Muscle Fibers
Erkut, Esra	41	Genipin as a crosslinker to enhance the mechanical properties of 3D-bioprinted human nasal cartilage
Maurus, Philipp	43	The nervous system uses different mechanisms to control the dominant and non-dominant arms in a posture task
He, Jenny	45	Effect of Vitrification on Mechanical Properties of Porcine Articular Cartilage
Martin, Ashton	47	Stability measurement of implants used for craniofacial reconstruction
Yong, Kar Wey	49	A Facile Approach for Development of a Functional <i>In Vitro</i> Human Intracranial Aneurysm Model
Yazdanpanah, Zahra	51	Development and evaluation of 3D printed hybrid bone scaffolds
Vonow, Andrew	53	Technological Innovation for Next Generation Tele-Rehabilitation: Increasing Access to Rehabilitation Services in Remote Communities
Francis, Destiny	55	Characterizing Bone Microarchitecture Changes in the Dunkin-Hartley Guinea Pig Knee Osteoarthritis Model
Dang, Tiffany	57	Overcoming Bottlenecks in the Expansion of Human Induced Pluripotent Stem Cells Using Single-Use, Vertical-Wheel Bioreactors
Pearce, Sabrina	59	Objective Performance Assessment of a User-Friendly Pipeline in the Analysis of fNIRS Data
Queiroz, Leonardo	61	Video-Based Breathing Rate Measurement
11:10 – 12:30 pm		<u>Student Podium Presentation Session #2</u>
		Session Chairs: Michael Kuczynski; Thomas Lijnse
Lijnse, Thomas	07	Prevention of Electrode Degradation in ACET Micropumps for Biomedical Devices
Graf-Alexiou, Lucas	08	A biomechanical comparison of ACL graft preparation techniques
Borys, Breanna	09	Hydrodynamic Characterization and Protocol Development for Vertical-Wheel Bioreactors used to Expand Human-Induced Pluripotent Stem Cells to Clinical Quantities
Johnson, John Christy	10	Validation of Redliner Wheelchair Activity Monitor against SMART ^{Wheel}
Chan, Andrew	11	3D-Ultrasound Navigation for Pedicle Screw Insertion for Posterior Spine Fusion Surgery
Nasir, Muzammil	12	Differences in subchondral bone fat content of young and adult rats fed a high-fat high-sucrose diet
Oni, Ibukun	13	Investigations of neurovascular coupling within the visual cortex using simultaneously recorded fNIRS and EEG

12:30 – 1:45 pm		LUNCH – Glacier Chinook
1:45 – 2:25 pm		GUEST SPEAKER #2: Dr. Richard Wise, Professor, Cardiff University Brain Research Imaging Centre (UK) & Institute of Advanced Biomedical Technologies, University of Chieti-Pescara (Italy).
		Session chairs: Katrin Smith; Kapilan Panchendrabose
2:25 – 2:35 pm		BREAK – Group Pictures
2:35 pm – 3:50 pm		<u>Poster Session #2 (EVEN NUMBERED POSTERS)</u> COFFEE/BEVERAGE BREAK Castle and Alpine Meadows Judges: University of Alberta: Drs. Adesida, Aoki, Sharp, Laouar, Doschak, Hill, Rabey, Tanaka; University of Calgary: Drs. Dalton, Gavrilova; University of Saskatchewan, Dr. Sarty
Saleem, Fatima	2	Developing a Clinical Lameness Assessment Technology for Horses
Baclig, Maria Martine	4	A Deep Learning Based Multi-Player Tracker for Squash
Shakeri Jannati, Mohammad Ebrahim	6	Design and Implementation of Smart Toothbrush for Individuals with Dementia
Chin, Mathieu	8	A wearable technology approach to quantify exercises during a neuromuscular training warm-up program
Siddiqui, Maryam	10	MRI guided Focused Ultrasound induces hyperthermia in soft tissue sarcoma to facilitate drug delivery of thermosensitive liposomes
Kemp, Tannis	12	Image registration improves short-term reproducibility of bone density and microarchitectural measurements with HR-pQCT
Mustafa, Mohammed	14	Analysis of Aortic Porcine Tissue Properties derived from Uniaxial and Biaxial Testing
Besler, Bryce	16	Description and Reproducibility of Femur, Pelvis, and Spine Landmarks in Kidney Ureter Bladder (KUB) Computed Tomography – Reduce and Reuse Medical Image Data
Pouranbarani, Elnaz	18	Considering Membrane Resistance as an Objective in Cardiac Model Tuning Improves Accuracy of Tissue-Level Modeling
Mohammadi, Mehdi	20	Economic 3D-printing approach for high-throughput metabolomics study of complex microbial environments

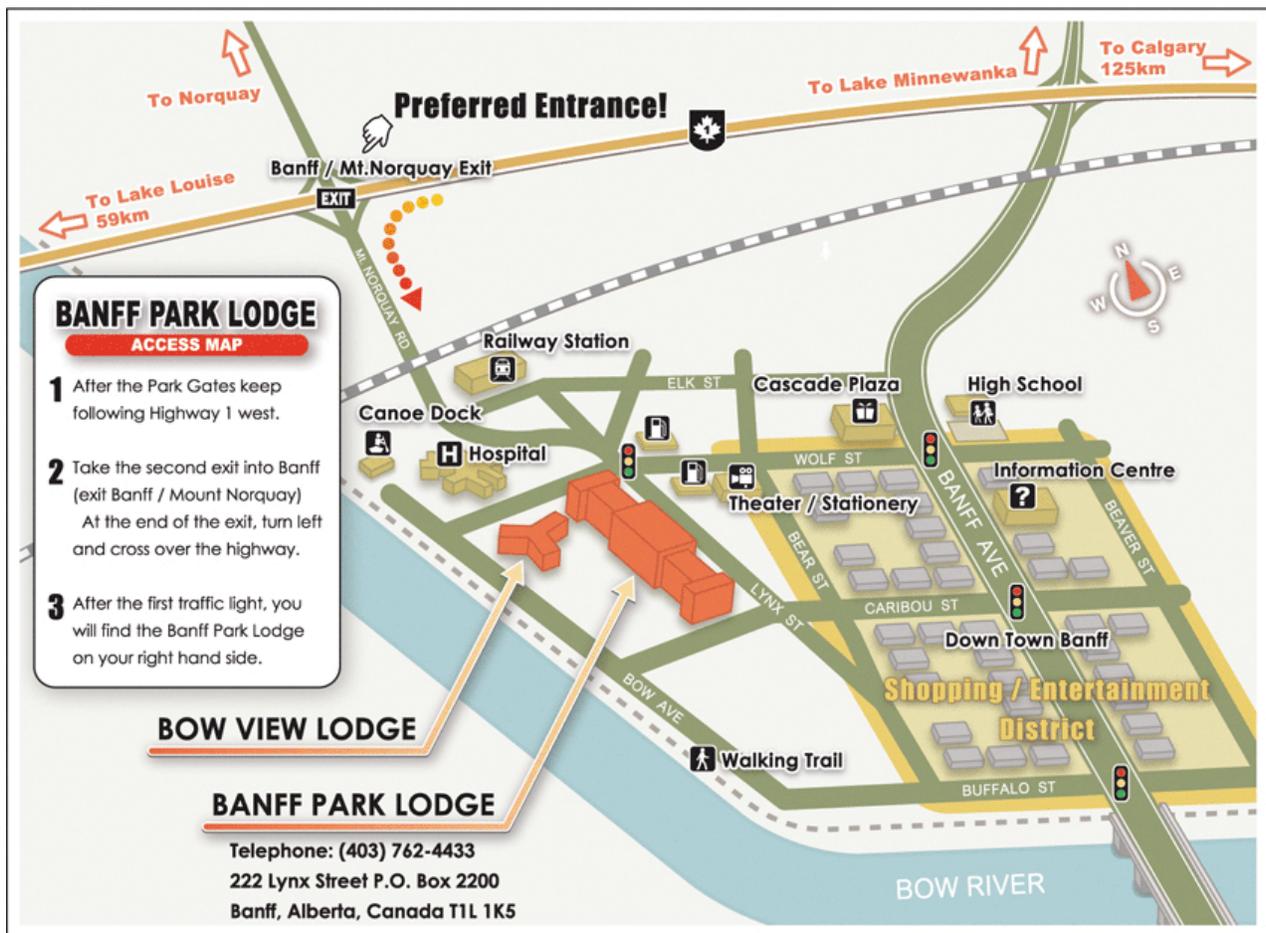
Szojka, Alexander	22	A Bioreactor for Combined Hypoxia and Dynamic Compression of Engineered Human Meniscus Tissues
Rahman, Samia	24	Oxygen Tension Modulated <i>In Vitro</i> Chondrogenesis and In Vivo Calcification of Infrapatellar Fat Pad-Derived Mesenchymal Stem Cells
French, Alexander	26	Semi-automated analysis of bone microarchitecture of osteoarthritic bone marrow lesions utilizing HR-pQCT and MRI
Zohourparvaz, Farnaz	28	Image Contrast in TRASE MRI
Remesz, Ross	30	Spatial Identification of Bone Growth at Cranial Suture Sites
Lan, Xiaoyi	32	Three-dimensional printing of engineered nasal cartilage by freeform reversible embedding of suspended collagen hydrogel
Corpuz, Kristian	34	A Novel Mouse Model of Intervertebral Disc Degeneration
Sun, Junran	36	Investigation of The Circumferential and Axial Mechanical Properties of Fresh, Frozen and Vitrified Porcine Menisci
Humadi, Ahmed	38	Validity of wearable inertial measurement units for evaluation of the risk of work-related injuries
Franco, Pablo	40	Development and Validation of a Fast Approach to Generate FE Models of the Knee
Afsar, M. Mehdi	42	A Context-aware Recommender System for Healthcare
Ovy, Enaiyat Ghani	44	A Natural Human Tooth Model by a Bond Graph Approach
Panchendrabose, Kapilan	46	<i>In Vitro</i> Assessment of VEGF Coated Stents and the Effects on Mesenchymal Stem Cells
Hamilton, Courteney	48	Bone Strength in Mice Induced with an Analog of Physical Inactivity
Pillay, Kineshta	50	Inhaled Nitric Oxide: <i>In vitro</i> analysis of dosing efficiency for continuous noninvasive delivery via nasal cannula
Masson, Anand O.	52	A Novel Non-Traumatic Chondrocyte Depletion Model Demonstrates that while Articular Cartilage Can Maintain Tissue Integrity Post-Insult, it is Incapable of Regeneration
Miller, Ryan	54	Modulation of the Nervous System in Unpredictable Environments
Crisol, Mary	56	Antioxidant Effects in Porcine Articular Cartilage During Exposure to Cryoprotective Agents
Volek, Kelsie	58	B-cell regulation of lung neutrophils during idiopathic pulmonary fibrosis
Chopra, Sanchit	60	Bioprocess Pilot for Large-Scale Expansion of Human Schwann Cells
Pawluk, Alexis	62	Protocol Optimization for Large Scale Production of Oncolytic Viruses in Stirred Suspension Bioreactors
3:50 – 5:10 pm		<u>Student Podium Presentation Session #3</u>
		Session Chairs: Destiny Francis; Kapilan Panchendrabose
Noamani, Alireza	14	Balance Evaluation of Elderly Fallers Using Wearable Inertial Sensors: A Clinical Study
Bouvier, Jack	15	Feedlot cattle who drag their hooves appear to develop white line separation

Nguyen, Quang	16	Dynamic soaring and elasticity in human split-belt adaptation
Duong, Kelvin	17	Feasibility of customized masks for delivering continuous positive airway pressure to healthy, adult subjects
Otoo, Baaba	18	Chondrocyte Volumetric Strain Measurements Across Cartilage Zones During Dynamic Loading
Ferrie, Leah	19	The role of exogenous and endogenous stem cells and biomaterials in bone fracture healing
Ead, Maha	20	Pelvic Fracture Reconstruction Using Symmetry
6:00 – 7:00 pm		DINNER – Glacier Chinook
7:30 pm		“THE GREAT CHALLENGE” – Lynx Salon
8:00 pm		SOCIAL – THE ROSE AND CROWN – SEE DIRECTIONS FOLLOWING PROGRAM

SUNDAY		
7:15 – 8:15 am		BREAKFAST – Glacier Chinook
8:15 – 8:40 am		Checkout
8:40 – 8:45 am		Welcome remarks
8:45 – 9:25 am		<u>GUEST SPEAKER #3:</u> Dr. Chiara Bellini, Assistant Professor, Bioengineering, Northeastern University, Boston, Massachusetts Session Chairs: Destiny Francis; Michael Kuczynski
9:25 – 10:20 am		<u>Student Podium Presentation Session #4</u> Session Chairs: Thomas Lijnse; Tannis Kemp
Panjavi, Sobhan	21	Porous Tubular Microvasculature with Reconstructed Endothelium for Tumor-On-Chip Applications
Fathian, Ramin	22	Countermovement jump phase detection using a single tri-axial accelerometer placed on the foot
Moore, Robert	23	Adaptations to Novel Visuomotor Rotations After Stroke
Cenaiko, Stirling	24	The Effect Protrusion of Electrodes has on AC Electrothermal Flow
Page, Becca	25	Effects of antiresorptive treatment on the fatigue-life of whole rabbit-tibiae

10:20-10:40 am		<u>Poster Session #3 (FINALISTS ONLY)</u> Judges: University of Alberta: Drs. Adesida, Aoki, Sharp, Laouar, Doschak; University of Calgary: Drs. Dalton, Gavrilova; University of Saskatchewan, Dr. Sarty COFFEE/BEVERAGE BREAK; Activity from BMEG
10:40 – 11:45 am		<u>Student Podium Presentation Session #5</u> Session chairs: Milad Nazarahari; Alireza Noamani
Pigott, Taylor	26	Investigating the Structural Implications of Obesity on Skeletal Muscle: How Can Obesity Contribute to Osteoarthritis?
Dasgupta, Ishani	27	Applying Fourier Shift Manipulation (FSM) to reduce artefacts in Tissue Sensing Adaptive Radar (TSAR)
Chan, Carly	28	A Rapid Metabolomics-based Approach to Urinary Tract Infection Diagnostics: Identification of Biomarkers
12:00 – 12:30 pm		Final Award Presentations - Closing remarks
REMINDER -		Please return all name tags and judges' clipboards at the end of the conference. We thank you for your cooperation. SEE YOU IN 2020!

Banff Park Lodge Map and Meeting Location



ROSE AND CROWN FOR SATURDAY NIGHT - 202 Banff Avenue

To get to the Rose & Crown from the Banff Park Lodge, turn right out of the hotel

- 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.

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GOLD	
	<p>University of Calgary</p> <p>Biomedical Engineering Graduate Program Schulich School of Engineering Centre for Bioengineering Research and Education Schulich Student Activities Fund</p>
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BRONZE	
	<p>Canadian Society for Biomechanics University of Saskatchewan, Division of Biomedical Engineering</p> <p>University of Calgary</p> <p>Hotchkiss Brain Institute Libin Cardiovascular Institute of Alberta</p>



UNIVERSITY OF CALGARY Biomedical Engineering Graduate Program

The Biomedical Engineering Graduate Program at the University of Calgary offers a unique opportunity to work with leading researchers across campus to advance knowledge and find solutions to improve human

animal health and wellness. Collaborate with world-leading researchers in Engineering, Kinesiology, Medicine, Nursing, Science and Veterinary Medicine to make new discoveries, to expand the field of biomedical engineering and make a difference in the lives of people around the globe.

The Biomedical Engineering Graduate Program is a key component of The University of Calgary's Eyes High vision and supports both the university's academic and research plans, particularly the strategic research theme

Engineering Solutions for Health: Biomedical Engineering. It is an established program supporting a diverse research community with a strong focus on student success.

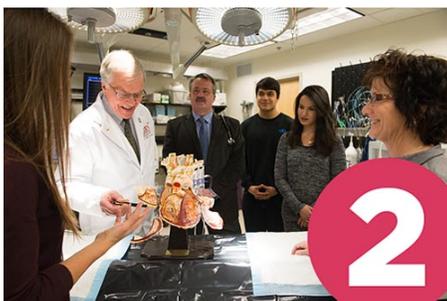
Priority Research Themes



Integrated approaches to enable prevention of injury and disease and support healthy aging

Goal: To invent and implement technologies that will keep people healthy and minimize complications from diseases, while also helping predict injury and illness.

Engineering methodologies can increase our fundamental understanding of human and animal health and disease across the lifespan. Based on this understanding, new integrated biomedical engineering technologies and solutions will be created for monitoring health and promoting prevention. Imagine a family member recovering from a heart attack – biomedical technologies will allow us to assess their disease type, limit disease progression and prevent loss of quality of life, while also identifying whether younger family members are at risk for heart disease.



Technologies for improved diagnostics

Goal: To develop more accurate imaging and diagnostics to detect disease earlier, provide biomarkers for evaluating new therapies, and enable personalized treatments optimized for the individual patient.

Early and accurate detection is crucial to precisely identify and treat the correct disease or dysfunction. Biomedical engineering offers ways to develop new instrumentation, data handling systems, and technologies that assess organ and body function, dysfunction, and disease at earlier stages, with higher sensitivity, and with more high quality information. Having an earlier and more accurate diagnosis greatly improves the chances of successful treatment leading to better outcomes following injury or disease.



Engineered novel therapeutics

Goal: To develop high-quality, long-lasting treatments for injury and disease, based on stem cells, targeted drugs and novel devices.

Developing novel therapeutic devices and molecular medicines and harnessing the power of stem cells to exploit the body's inherent repair mechanisms will be advanced by biomedical engineering technologies. With a focus on developing new personalized treatments to repair, regenerate or replace dysfunctional cells and tissues, these integrated therapies are designed to work with the body's natural healing processes. By using the body's own cells, the need for donors is eliminated, the chance of infection is reduced, and the overall outcome is a solution that functions more closely to the native cells or tissue.



Emerging theme: Optimized health care system performance

Goal: To deliver research built on our emerging strengths, using engineering tools and approaches to improve patient flow through the health care system.

Engineering tools and approaches are ideally suited to improving the flow of patients, data and resources through the healthcare system. Research within this theme will investigate new tools for evaluating healthcare system performance and technology assessment. Operational modelling technologies at the University of Calgary will ensure that all patients are able to access the care they need by optimizing the system for delivery of care – this will maximize the chances of a full recovery from a medical event.

FOR MORE INFORMATION about applying into our Biomedical Engineering Graduate Program, University of Calgary, please contact:

Biomedical Engineering Graduate Program Office, CCIT 012
Schulich School of Engineering Building, Main Campus
2500 University Drive NW, Calgary, Alberta, T2N 1N4
EMAIL: bmegrad@ucalgary.ca
TEL: 403-220-2721
<https://www.ucalgary.ca/bme/graduate>



Where people, talent and ideas collide

What is the Hunter Hub for Entrepreneurial Thinking?

The Hunter Hub is the University of Calgary's unique initiative to engage and immerse students, faculty, staff, alumni and the Canadian community in a culture of entrepreneurial thinking, challenging them with a new and bold approach to teaching, learning, discovery and knowledge-sharing.

The Hunter Hub for Entrepreneurial Thinking was created in 2017 with a generous gift from the Hunter Family Foundation, as an interdisciplinary nucleus for activities that will support entrepreneurial student experiences, enable faculty to lead in innovation, and expand a growing community of entrepreneurial and innovative thinkers.

Why is entrepreneurial thinking important to the University?

Global demand for those who can think entrepreneurially grows exponentially every year. This demand applies to students — whether they intend to work within an established organization, join the gig economy, or start a business of their own — entrepreneurial thinking is one of the most relevant skills for the 21st-century workforce.

Who can use the Hub's services?

It's for everyone! It's the gathering place and connection point for innovation, social enterprise and entrepreneurial communities including students, faculty, staff, alumni, entrepreneurs, supporters, industry and beyond.

Do you have entrepreneurial expertise to share?

We're always on the lookout for entrepreneurs to share their experiences and expertise with our students and growing entrepreneurial community. Want to join a panel, present a workshop, or share your entrepreneurial journey? We're also looking to host entrepreneurs-in-residence and mentors to help guide emerging entrepreneurs. If this is you, let us know!

How can the Hub help you?

The Hunter Hub is a safe place to try out your entrepreneurial ideas and to connect with people who have the knowledge to share. Do you want to learn what entrepreneurial thinking is? Do you have an idea for a business? We can connect you with information on all aspects of starting a business or side hustle.



(403) 220-4425

hunterhub@ucalgary.ca
UCalgary, MSC 171



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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.

ucalgary.ca/bme

graduate email bmegrad@ucalgary.ca

undergraduate email bioengineering@ucalgary.ca

research email bme@ucalgary.ca



UNIVERSITY OF
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Mobility for Life.



**UNIVERSITY OF
CALGARY**



MCCAIG INSTITUTE
FOR BONE AND JOINT HEALTH

GUEST SPEAKER #1

**Dr. Ron Zernicke, Director, Exercise & Sport Science Initiative
Professor, Orthopaedic Surgery Professor, Kinesiology Professor,
Biomedical Engineering, University of Michigan**



At UM, Ron Zernicke is Professor of Orthopaedic Surgery, with joint appointments in Kinesiology and Biomedical Engineering. He was Dean of the UM School of Kinesiology and is currently Director of UM Exercise & Sport Science Initiative (www.essi.umich.edu). He was Executive Director of the Alberta Provincial Bone and Joint Health Institute, and at the University of Calgary (UCalgary), he was Wood Professor in Joint Injury Research in Cumming School of Medicine; Professor/Dean of Kinesiology; and Professor, Schulich School of Engineering.

After matriculating at Concordia University Chicago (CUC; BA) and University of Wisconsin–Madison (MS/PhD), he joined UCLA and was Professor/Chair of Kinesiology. He received: UCLA Award for Distinguished Teaching, City of Calgary Community Achievement Award (Education), UCalgary Award for Outstanding Achievement in Graduate Supervision, and was Alumnus of the Year (CUC). He received an honorary DSc from University of Waterloo. He was President of Canadian (CSB), American (ASB), and International (ISB) Societies of Biomechanics, and Co-Chaired two ISB Congresses and 4th World Congress of Biomechanics. Research awards include: NASA (Cosmos Achievement Award), Society for Physical Regulation in Biology and Medicine (Yasuda Award for Outstanding Research Paper), ASB/ISB (Delsys Award), CSB (Career Award), CORS (Founder's Medal for Best Research), and CIHR (Partnership Award). He is a Fellow of ISB, CSB, ASB, American College of Sports Medicine, and National Academy of Kinesiology (president-elect).

His career research support (>\$45 million) includes: Arthritis Society of Canada, Adidas, Canadian Space Agency, NSERC, CFI, CIHR, NASA, NSF, and NIH, with his focus: (1) bone adaptation, (2) human movement dynamics and performance, and (3) joint injury and osteoarthritis.

GUEST SPEAKER #2

Dr. Richard Wise, Professor, Head of Magnetic Resonance Imaging, School of Psychology, Cardiff University Brain Research Imaging Centre



Richard is a physicist by Bachelor's degree who specialised in cardiovascular magnetic resonance imaging for his PhD at Cambridge University. He has always worked at the interface of physics and physiology and never in a department of physics, only ever in departments of medicine, neurology, psychology and clinical sciences.

In 2000 he changed from imaging the heart to the brain with a move to Oxford University as a post-doctoral research fellow. From 2006 he developed his research group at Cardiff University Brain Research Imaging Centre with a focus on understanding drug effects on human brain function and looking for ways to quantify brain function using functional MRI approaches, based on sensitivity to blood oxygenation in the human brain.

This has led recently to a new magnetic resonance imaging toolkit with the possibility to interrogate, in detail, the function of brain blood vessels and to measure the amount of oxygen fuel that the human brain is using in health and disease. He is now in the process of transitioning to University of Chieti-Pescara in Italy, where he aims to expand the clinical applications of his research.

GUEST SPEAKER #3

**Dr. Chiara Bellini, Assistant Professor, Bioengineering,
Northeastern University, Boston, Massachusetts**



Dr. Bellini received her PhD in Biomedical Engineering from the University of Calgary in 2012. While in Calgary, she worked with Prof. Elena di Martino to quantify changes in the mechanics of the left atrium following the onset of atrial fibrillation, using a combination of experimental and computational approaches.

Later, Dr. Bellini pursued her postdoctoral training in Prof Jay Humphrey's lab at Yale University, where she focused on the mechanical characterization of thoracic aortic aneurysms and dissections using genetically-modified and pharmacologically treated mouse models. In September 2016 Dr. Bellini joined the Department of Bioengineering faculty at Northeastern University as an Assistant Professor. Her research is focused on elucidating how pathophysiological processes of cell-mediated growth and remodeling affect the mechanical function of tissues and organs within the cardiovascular system.

She is the recipient of a NIH award to study the cardiovascular outcomes of electronic cigarette use, a NIH award to evaluate the role of arterial stiffening as an early biomarker for anthracycline-induced cardiotoxicity, and a DHS award to assess the effectiveness of PPE on reducing the cardiovascular risk in wildland firefighters. Dr. Bellini has authored 20 peer-reviewed publications and a book chapter.

During her talk she will present the mechanical characterization of the aorta in a mouse model of rescued thoracic aortic aneurysm, providing strong evidence for the mechanical interaction between the aorta and the spine. Furthermore, she will discuss the design of a pipeline for the nose-only delivery of aerosols to restrained mice, as currently used in her lab to reproduce chronic exposures to environmental toxins.

INDUSTRY PANEL MEMBER #1

Dr. John Wilson



Dr. John Wilson, President and CEO, INNOVATE CALGARY

As President and CEO, Innovate Calgary, Dr. John Wilson leads a team of professionals supporting the development and creation of economic and societal impact resulting from academic research helping to contribute to the innovation agenda for the University of Calgary.

John has an extensive background in knowledge transfer, commercialization and innovation-driven activities from his working experience as the Innovation Director at Brock University, and as the liaison between University of Oxford's technology transfer office and Yale University. He also managed a research and development team at Unilever, United Kingdom and Holland, and was also the CEO of a Unilever-based spin-out developing software and hardware for the computer games industry.

John holds a PhD in Chemistry from Bristol University and post-doctoral research experience at Bristol University, and Virginia Tech.

INDUSTRY PANEL MEMBER #2

Travis Stevens, VP Engineering, Orpyx Medical Technologies



Since joining Orpyx® Medical Technologies Inc. (“Orpyx”) in July 2013 as the Vice President of Engineering, Travis has overseen all aspects of development, from sensors to software, of Orpyx’s industry leading plantar pressure products, Orpyx® SI Sensory Insoles, Kinetyx™ software and SurroGait Rx® system.

Travis has a passion for great product design and helping people, both of which are supported by his diverse industry experience ranging from telecommunications to medical imaging. Travis is a proud alumni of the University of Calgary having received both his BSc. in Computer Engineering and MSc. in Electrical Engineering from the Schulich School of Engineering.

LinkedIn: <https://www.linkedin.com/in/travismstevens/>

INDUSTRY PANEL MEMBER #3

Kip Fyfe, CEO, 4iiii Innovations



Kip Fyfe
CEO

An innovator and visionary leader, Kip has devoted more than 30 years to the high tech electronics industry and currently serves as President and CEO of 4iiii.

In 1999, Kip co-founded Dynastream Innovations and championed the introduction of a number of disruptive technologies to the sports monitoring arena. This, in turn, opened a new era of innovation in wearable technology and piloted a new category of monitoring for runners.

This patented inertial technology first entered the market in 2000 under the Nike brand and has since been adopted by brands such as Polar, Suunto, Timex, Adidas and Garmin.

In 2002, under Kip's direction, Dynastream introduced ANT+, the ultra-low power wireless protocol. ANT+ redefined the sport monitoring industry, providing a platform for sport and wellness manufacturers to collaborate and provide interoperable solutions.

In December 2006, Kip and his team sold Dynastream to Garmin Ltd. With three of the four Dynastream founders, Kip launched 4iiii Innovations Inc. – a global sport electronics company – in September 2010. Optimizing their technical expertise, industry savvy, established partnerships and the fervent growth of today's wearable industry, Kip now leads another enviable team noted for market-leading product platforms.

INDUSTRY PANEL MEMBER #4

Lisa Stirling, Software Engineering Team Leader, Garmin International



Lisa is fascinated by the space where technology and humanity collide. She is a graduate of the Biomedical Engineering program at the University of Alberta, and completed a postdoctoral fellowship in the Human Performance Lab at the University of Calgary. Throughout her studies she explored the use of bioelectrical interfaces to stimulate and measure muscle activation for the purpose of spinal cord injury rehabilitation and sport performance enhancement.

With her experience as an engineer, researcher and athlete, Lisa understands how important it is that Garmin's wearable products are both innovative and invaluable to the user. Lisa's team of software developers, biomechanists and exercise scientists bridge the gap between engineers and end users, and in doing so, continue to transform the way Garmin products are developed.

INDUSTRY PANEL MEMBER #5

Robert Forget, CTO, Aware 360



Robert Forget currently serves as the CTO for Aware360. In this role, Mr. Forget is key in technology research and integration reviews including both devices and software. Robert also manages technology partners and strategic sales efforts for custom solutions leveraging the Aware360 platform.

Previously Mr. Forget worked for Vecima Networks Inc., in positions of increasing responsibility starting in business development and moving through the organization as Director of Sales, AVP of Product Management and finally as VP of Telematics.

Robert ran his own consulting firm from 2000-2004, specializing in electronics design and systems implementation. Robert has a Bachelor's degree in Engineering Physics from the University of Saskatchewan, an MBA and is a certified Professional Manager.

Mr. Forget currently serves on the board of directors for the Canadian Institute of Management, is the Vice Chair for CompTIA's IoT Advisory Council and has been active on the boards of many organizations from such diverse areas as technology associations, housing developments, politics, and not for profits.

INDUSTRY PANEL MEMBER #6

Dr. John Remmers, CMO and co-founder, Zephyr Sleep Technologies



Dr. John Remmers is a recognized physiologist, pioneer and innovator in sleep medicine. As a world renowned expert in the field of snoring and obstructive sleep apnea, he has published over one hundred peer reviewed articles in the area of respiratory physiology. Dr. Remmers served two terms as the Editor-in-Chief of the Journal of Applied Physiology and has presented honorary research lectures to the American Thoracic Society, the American Physiological Society and American College of Chest Physicians.

His research interests relate to the neurobiology of respiratory rhythmogenesis, chemoreception, and the pathophysiology of the control of breathing, being the first researcher to elucidate the pathogenesis of sleep apnea and to demonstrate that sleep apnea is caused by an anatomical narrowing of the pharynx. He has developed various technologies and medical devices to treat sleep apnea, ranging from portable diagnostic sleep monitors to auto-adjusting CPAP devices and remotely controlled mandibular positioners used in the prescription and characterization of oral appliance therapy.

As a pulmonologist and clinical professor of internal medicine at the University of Calgary, Dr. Remmers' passion for education is captured in his annual lectures at Spear, Tufts University and the Pankey Institute. His devotion to clinical care continues at the Southern Alberta Sleep Centre, where he maintains an active sleep practice. He is also the Chief Medical Officer of Zephyr Sleep Technologies, leading the research, design and development of innovative products used in the diagnosis and treatment of OSA. Over the past decade, Dr. Remmers has dedicated his research to patient selection for appropriate therapy.

INDUSTRY PANEL MEMBER #7
Jochen Fahr, Owner, Brauerei Fahr



Jochen landed in Calgary in 2008 to complete his Bachelors of Engineering in Biotechnology. In fact, this undergraduate degree was focused on industrial biotechnology with a goal of using microorganisms like yeast and bacteria for industrial processes, such as ethanol production. Shortly after graduation, he started his Masters of Science in Medical Sciences, but fast-tracked into a biomedical engineering PhD degree, which he finished in 2013.

Academics aside, Jochen worked in medical and industrial fields but fermented his passion for beer by brewing at home. He put his engineering skills to work, setting up an automated brewing system. Using this system, he won several medals in home brewing competitions.

Having rounded out his professional experience in business, science and engineering, Jochen took the leap in 2015 to make Brauerei Fahr Inc. a full-time endeavour. With a knack for entrepreneurship, a passion for great beer, a couple of award-winning home recipes and a very understanding wife, he is currently laying the groundwork to establish Brauerei Fahr in Turner Valley, AB.

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