



**MCCAIG** INSTITUTE  
FOR BONE AND JOINT HEALTH

Spring 2018

# RESEARCH IN MOTION



25<sup>TH</sup> ANNIVERSARY SPECIAL EDITION

**WE ARE THE MCCAIG INSTITUTE**



UNIVERSITY OF  
CALGARY

*Mobility for Life.*

## MESSAGE FROM THE DIRECTOR STEVEN BOYD



Steve Boyd, 2004

Reading through the stories in this newsletter, I've never been more proud of what the McCaig Institute has become.

This year, we celebrate the 25<sup>th</sup> (well, actually 26<sup>th</sup>) anniversary of the McCaig Centre, and also the 10<sup>th</sup> anniversary of the McCaig Institute for Bone and Joint Health. As you'll learn in this issue, the past quarter century has seen a remarkable trajectory of progress.

What struck me while sifting through our history, is how truly unique we've been from the very beginning as a multidisciplinary research group. We have always been proud to say we are a multidisciplinary research institute, but when you read about our evolution, it's very evident how infused it is in our culture and what a profound impact it has had on our research and training environment.

What is also clear in these pages is that the McCaig Institute is unique because of its people. The names of research groups and physical facilities have changed numerous times throughout the years — these are all a matter of record. But what is most important is the narrative, the story of the people who have made us who we are today. From Gary Hughes and Mike Ward chatting on a beach, to Cy Frank and Nigel Shrive leading the way for engineers and physician scientists to work together, to all the basic scientists who have collaborated with clinicians to come up with real world solutions. The list of dedicated and passionate people goes on and on, building and expanding on each other's expertise to this very day. Every scientist, clinician, trainee, lab technician, and staff member — we are the McCaig Institute.

Our task now is to look to the future while building on the strong multidisciplinary foundation that has been laid. With this in mind, we are excited to introduce a new initiative: The Mobility for Life project. As you'll read later in this newsletter, our group will be expanding once again. We'll be asking Albertans to join our research team as we embark on one of the biggest projects we've ever undertaken.

[Read on for more details!](#)



**MCCAIG INSTITUTE**  
FOR BONE AND JOINT HEALTH

### CONTACT US

For more information about bone and joint health research or to join our mailing list, contact us at:

**MCCAIG INSTITUTE FOR BONE AND JOINT HEALTH**

**T:** (403) 210-6774

**E:** [mccaig@ucalgary.ca](mailto:mccaig@ucalgary.ca)

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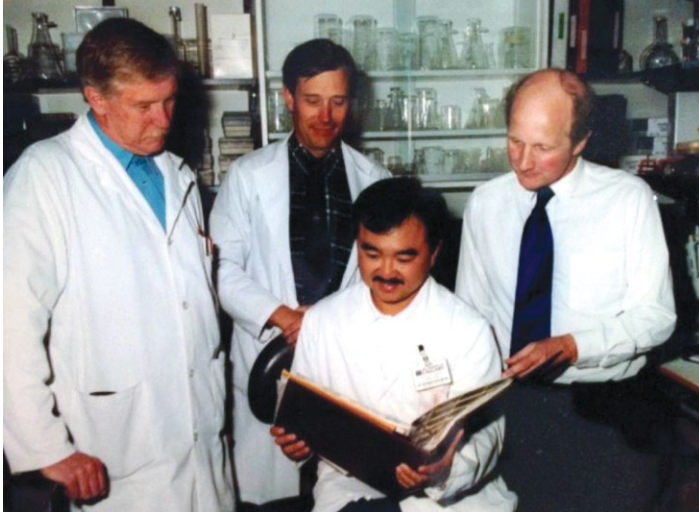


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## THE McCAIG INSTITUTE FOR BONE AND JOINT HEALTH:

# Celebrating more than 25 years of multidisciplinary research



Dave Hart, Cy Frank, Nigel Shrive with trainee Nori Nakamura

## It all began on a beach in Windermere, British Columbia in 1978.

Gary Hughes, Chief of Orthopedic Surgery at the Calgary Foothills Hospital, and Mike Ward, professor in civil engineering at the University of Calgary (U of C), had been buddies since their student days and were vacationing with their families in Windermere. As the two sat on the beach chatting, their conversation may have gone something like this:

**Hughes:** *“Hey, I have a really enthusiastic resident named Cy Frank who wants to test some ligaments for his resident research project. He needs to build a device to do this, but he doesn’t know how to go about it. Mike, you’re an engineer — do you know someone who could help him out?”*

**Ward:** *“I know just the guy. We have a bright, new faculty member — a civil engineer named Nigel Shrive. I’m sure he’d have some ideas.”*

This conversation between two friends launched decades of multidisciplinary research collaboration that is the cornerstone of what is now the McCaig Institute for Bone and Joint Health.

## THE EARLY YEARS

Shrive and Frank were introduced in late 1978 and began working together in borrowed lab space at the U of C. Together, at a cost of \$443, they built a device to test ligament strength. Their work won Frank “Best Resident Research Project” both locally and nationally, making it clear to the two they were on to something good.

Frank went on to fellowships in San Diego and Toronto and upon his return to Calgary he and Shrive started working on new ways to improve ligament healing. “It wasn’t long before we realized that if we wanted to grow our research, we needed to know more about what the cells were doing,” says Shrive. They started working with cellular biologist Dave Hart, an expert in inflammation. “We ended up with a little triumvirate of me looking at the function of the tissue, Cy being able to tell you what it was made of and how it was structured, and Dave being able to tell you what the cells were doing,” says Shrive. “We were able to do a lot of really innovative work because the three of us had these three different types of expertise and we put them all together in a way that nobody had before.” Frank, Shrive and Hart began to bring in more scientists and clinicians with different skills and the team became the Musculoskeletal (MSK) Research Group.

“It was a really exciting time,” says Judy Crawford, administrative support for the team. “We were a small group of trainees, other support staff, technicians and faculty, but everyone really wanted the group to grow and succeed.”

In 1988, the group brought in the expertise of more rheumatologists and became the Joint Injury and Arthritis Research Group (JIARG). It was during this time that JIARG member Marvin Fritzler, a rheumatologist and renowned expert in developing diagnostic tests for rheumatic autoimmune disease, was involved in the care of a patient named J.R. (Bud) McCaig.

## BUD McCAIG: A PATIENT WITH A VISION

Businessman and philanthropist Bud McCaig loved to golf, so when swinging a club became too painful for his hands, he knew it was time to seek help. In 1986 he saw Fritzler, who diagnosed him with a variant of rheumatoid arthritis and saw that some of McCaig's joints were so badly damaged he would require surgery.

Cy Frank performed arthroscopic surgery on both of McCaig's knees and later, orthopedic surgeon Bob McMurtry operated on his wrists and hands. Inspired by his own experience, McCaig felt more could be done to prevent arthritis and wanted to contribute to making that happen.

## THE McCAIG CENTRE FOR JOINT INJURY AND ARTHRITIS RESEARCH

By this time, JIARG's small research space in the Health Sciences Centre was bursting at the seams. "The vision of an integrated multidisciplinary research program in a bigger, newer space was a gleam in our eye," says Fritzler. "Bud McCaig believed in the dream and we hatched a plan to make it a reality."

With the strong support of then dean of medicine Mo Watanabe, Fritzler, Frank, McCaig and the JIARG team launched a fundraising campaign to construct a state-of-the-art MSK research centre at the U of C. This centre, they envisioned, would connect basic laboratory research with patient care, with a particular focus on the diagnosis, treatment and prevention of arthritis.

In 1989 McCaig and fellow community leader Dick Haskayne created the Western Orthopaedic and Arthritis Research Foundation to raise money for the development of a 10,000-square-foot research facility. The MSK research centre would be housed on the fourth floor of the recently built Heritage Medical Research Building.





*Staff, faculty and donors gather in the empty fourth floor of the Heritage Medical Research Building to kick-off the construction of the McCaig Centre for Joint Injury and Arthritis Research. 1989*



*Members of the Joint Injury and Arthritis Research Group (JIARG), circa 1994*

The campaign was a tremendous success, raising over \$4.5 million. Construction began on the space and in the spring of 1992 the McCaig Centre for Joint Injury and Arthritis Research officially opened.

### LEADING CANADA IN MULTIDISCIPLINARY RESEARCH

With the new facility open, there was room to grow. New faculty were hired and the number of trainees increased, with all involved working towards improving the diagnosis and treatment of MSK conditions. “We were a real team, with everyone contributing in different ways,” says Dave Hart. The team began to realize just how unique they were. “We put together this grant with investigators from engineering, kinesiology, medicine, science and nursing,” says Hart. “We really focused on multidisciplinary collaboration being more important than working alone and the feedback we got was that they loved our novel approach. We laughed about that, because we’d been doing it for years. It was the rest of the country that was 20 years behind.”

“

**This is a world-class facility. When I became an arthritis patient six or seven years ago with deteriorated hands, wrists and knees, I began to appreciate the great competence of these people. They have a strong clinical program to go along with the bench research. I sincerely believe it will make a difference in unlocking the causes of arthritis and improving treatments. They have the capability to mobilize and improve the quality of life for thousands of people, and I’m a living example of this.**

**J.R. (BUD) McCAIG**

*at the opening of the McCaig Centre for Joint Injury and Arthritis, March 1992*

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Behind the scenes, this collaborative environment was powering science. It was a prolific time, with the team publishing high-impact papers and bringing in a record amount of research funding. Researchers, trainees, clinicians and staff became like a big family, all working towards a common goal. “Everyone was willing to help each other,” says Shrive. “We all knew we were trying to build something beyond ourselves. You went to a meeting and people volunteered to get things done. Being in such a multidisciplinary group where you had this idea of doing something that no one else could do, it was really a great time.”

## SUCCESS STORY

*In 1980, Marv Fritzier discovers the first biomarker for drug-induced lupus.*

*In 1984, his lab discovers anti-centromere antibodies, a diagnostic biomarker for limited scleroderma. These findings lead to the establishment of Mitogen Advanced Diagnostics, which to this day provides state-of-the-art diagnostic autoantibody testing for early and accurate diagnosis of autoimmune diseases such as lupus and scleroderma.*



## THE START OF BIOMEDICAL ENGINEERING PROGRAMS AT THE UNIVERSITIES OF CALGARY AND ALBERTA

It was a real win for the McCaig Centre when renowned kinesiologist Ron Zernicke was recruited from the University of California, Los Angeles, in 1990. “The multidisciplinary approach to MSK health was something that set the McCaig Institute apart,” says Zernicke. “I knew they had strengths in orthopedics, kinesiology, and engineering. Those were the three elements in my area of biomechanics that I was really looking for and it was all in one location.”

Wanting to ensure the future of multidisciplinary research in the McCaig Centre, a team, with Zernicke as point, secured a Whitaker Foundation establishment grant (the first ever awarded to a Canadian university) to launch a pan-Alberta biomedical engineering (BME) training program at the University of Alberta (U of A) and the U of C. With the help of Nigel Shrive and U of A biomedical engineer Peter Allen, the first class was delivered via video conference in the fall of 1997.

“We were able to offer the program to about 35 PhD students between the two universities, and then we started holding annual BME conferences in Banff,” says Zernicke. “This set the stage for the development of BME graduate programs at each university. It really fostered a collaborative relationship that continues today.”

## THE POWER OF PARTNERS

In 1997, the fundraising campaign Partners in Health raised \$4.5 million for labs, equipment and personnel for the centre, with major donations coming from Bud and Ann McCaig, John and Christena Wood, TD Bank and Ernst & Young. With this money, the McCaig Centre established the Wood and McCaig Professorships, enabling the recruitment of new faculty, staff and trainees and establishing a fund for lecturers and new, innovative programs. The McCaig Centre was starting to garner national and international attention, and external partnerships became increasingly important. With the enthusiastic support of the Arthritis Society of Canada, the McCaig Centre was named a Centre of Excellence within a national initiative called the Canadian Arthritis Network.

In 1998, then director Robert Bray stated, “JIARG would like to consolidate and integrate its research activities through stronger partnerships with patients, providers and other key stakeholders in the community, where arthritis has its greatest impact. This bedside-to-bench and back again approach is key to ensuring that the benefits of cutting-edge research end up squarely where they belong — in the improved diagnosis, care and prevention of bone and joint problems in patients.”

## SUCCESS STORY

*Tenet Medical Engineering, one of the greatest technology transfer stories originating in the McCaig Institute, is established in 1994 by Ken Moore, Nigel Shrive, Cy Frank, Bob Bray, Roger McPherson, Dennis Chimich and Eric Damson. The company produces leading-edge technology in surgical positioning devices for orthopedic surgeries. In 2011, Smith and Nephew acquire the company for \$43 million.*

## MULTIDISCIPLINARY APPROACH IMPACTS PATIENT CARE

In 2004, a fundraising campaign called Reach! was initiated to develop new lab space. Funds from the campaign allowed the McCaig Centre to more than double in size by expanding into the newly built Health Research and Innovation Centre. The vision to move science from the lab to the patient was mirrored in the centre's new layout. Basic research labs were located at one end of the facility, applied science labs in the middle, and the new wing housed the translational — or patient-based — research. "The concept was you work on molecules, then cells, then joints, then tissues, then people," says Nigel Shrive. "Then you reverse the order and go back again. Bench to bedside to bench again. We never wanted to lose focus on what was in the patient's best interest."

With rheumatologists and orthopedic surgeons as part of the McCaig Centre's multidisciplinary team, the focus on patient needs was central to much of the centre's research. Rheumatologists such as Liam Martin and Steve Edworthy were integral in developing patient treatment guidelines, while orthopedic surgeons Norm Schachar and Carol Hutchison pioneered new techniques to improve joint transplants. "It's nice to work with people who are in the basic science of what we do as clinicians," says Martin. "Everything is centred on patients, as it should be."

### MAKING AN IMPACT

*Cy Frank completes fellowships in San Diego and then Toronto, where he trained in arthroscopic surgery. When he returns to Calgary in **1984**, he brings his newly perfected skills and becomes the first surgeon in the city to do arthroscopy. He trains others in the technique, which provides Calgary patients with a less-invasive treatment for joint injuries.*

*In preparation for the 1988 Winter Olympics, the Human Performance Lab (HPL) opens in **1987** under the direction of Benno Nigg. The HPL concentrates on two areas — high sports performance and what is called "load." The lab is asked by the International Olympic Committee to conduct performance research during the Olympics. "I have everything I could want and more," says Nigg in a 1987 interview. "For biomechanics, this is the place to be. Nowhere else can even compare."*

*In **1992**, Walter Herzog and his team develop a unique system to measure up to four muscle forces simultaneously in a freely moving animal model. This breakthrough allow researchers to obtain muscle-force data in a more comprehensive way than ever before.*



*Norm Schachar*

*In **1993**, Norm Schachar and his team develop a model for cartilage transplantation. This model leads to new methods for the repair of isolated (focal) cartilage defects that occur in osteoarthritis. In 1995, the team develops a technique to determine the number of viable and non-viable cells following freezing/*

*thawing. These studies extend understanding of the tissue responses during freezing and thawing of tissues, which leads to the development of cartilage cryopreservation techniques, which provide recovery and function superior to cartilage preserved using conventional procedures.*

*In **1993**, Ron Zernicke and his team publish a study looking at the effects of exercise and diet on bone health. He finds that a diet rich in saturated fats decreases the amount of calcium absorbed from food and adversely affects bone quality. A later study predicts, for the first time ever in an animal model, the sites of new bone formation induced by an exercise program.*





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**I think it is virtually impossible to find sufficient words to characterize this exceptional man... or, as I saw that his daughter Melanie characterized him recently: a superhero for all of us. In any of his worlds, in business, in the community – certainly in our medical and academic worlds – or at home, Bud’s name was (and is) synonymous with the words honesty, integrity, dedication and leadership.**

**CY FRANK**

*speaking at Bud  
McCaig’s memorial*

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As the centre grew, Bud McCaig was ever-present in the background, working to ensure science-based discoveries made their way to patient care. He and Cy Frank both saw enormous value in creating an independent organization that could serve as a catalyst for bettering patient care by influencing clinical practice, public policy, research and the exchange of knowledge. So, in 2004, McCaig contributed \$10 million to create the Alberta Bone and Joint Health Institute (ABJHI). The McCaig Centre and ABJHI would work hand-in-hand, with the former conducting the research and the latter evaluating and facilitating changes to patient care. Today, the ABJHI is Canada’s only independent institute for channelling knowledge into better bone and joint health-care services.

## **THE McCAIG INSTITUTE FOR BONE AND JOINT HEALTH**

The McCaig Centre suffered a tremendous loss in 2005 with the passing of Bud McCaig. For three decades, his thousands of hours of volunteer work and numerous contributions to Alberta’s health-care system were remarkable. He was the McCaig Centre’s biggest cheerleader and his impact is timeless.

A generous gift from the estate of Bud McCaig was left to the University of Calgary to further research in bone and joint conditions, and from this the McCaig Institute for Bone and Joint Health was formed.



*Osteoarthritis Team co-leads Cy Frank, Linda Woodhouse and Walter Herzog*

*Photo courtesy of Alberta Innovates*

## THE OSTEOARTHRITIS TEAM

In 2008, the McCaig Institute, which had grown to include researchers and clinicians from the U of A, embarked on one of its biggest and most impactful projects.

With \$6 million in funding over seven years from Alberta Innovates (known at the time as the Alberta Heritage Foundation for Medical Research), bone and joint researchers and clinicians from across the province joined together to form the Osteoarthritis (OA) Team. Led by Cy Frank and Walter Herzog from the U of C, together with U of A's Linda Woodhouse, the multidisciplinary OA Team focused on prevention, detection, intervention, tissue repair and streamlining the health-care system. The team allowed researchers, clinicians, health-system administrators and health policymakers to work together to plan and implement health-care changes for arthritis patients. "The OA Team was one of the great projects of the McCaig Institute," says Dave Hart. "It was a great team-building exercise that taught us a lot."

By the time the funding was finished in 2015, the team had authored 663 peer-reviewed publications and had leveraged over \$74 million to support research in osteoarthritis. The team produced 10 invention disclosures, nine issued patents, four licence agreements and one commercial product.

## STRATEGIC CLINICAL NETWORKS

In 2012, Alberta Health Services developed Strategic Clinical Networks (SCNs) in an effort to improve the link between research, patient care and improved health-care delivery. The SCNs, which have made a tremendous impact since their inception, are comprised of people who are passionate and knowledgeable about specific areas of health, working together to find new and innovative ways of delivering care. With the OA Team already working on these issues, the Bone and Joint Health Strategic Clinical Network (BJH SCN) was one of the first to start making an impact. The BJH SCN soon became Alberta's primary vehicle for provincial bone and joint strategies. To no one's surprise, one of the key leaders behind the Strategic Clinical Networks was Cy Frank.

## SUCCESS STORY

*In 2009, Tannin Schmidt co-founds Singularis, a company based on using lubricin as a boundary lubricant of the ocular surface. In 2011, Singularis merges with Lubris and forms a partnership with Selexis.*

## MAKING AN IMPACT

**In 1996**, Nigel Shrive and Cy Frank provide evidence that surgical intervention for ligament injury doesn't impact patient outcomes. This shifts clinical practice from intervening surgically for injured MCLs to conservative treatment.

**In 1997**, Robert Bray's team successfully measure blood flow non-invasively in ligament and bone tissue using a laser-Doppler imaging device developed in their lab. This same device was later used to measure vasoregulatory physiology in human joints during surgery.



Robert Bray demonstrating his laser-Doppler imaging device

**In 1998**, Steve Edworthy and Marv Fritzler publish a controversial paper stating that silicone gel-filled implants do not induce or promote connective tissue disease.

**In 1999**, Janet Ronsky and her team successfully map joint contact through a range of knee flexion.

**In 2002**, Marv Fritzler and his team discover a novel cellular compartment called GW bodies. These structures are the focus for the microRNA pathway of gene regulation. This leads to the development of monoclonal antibodies that are marketed worldwide, and new diagnostic tests to identify different forms of rheumatic diseases.

**In 2003**, a group of McCaig researchers led by David Hart secures a five-year grant to study sex/gender influences on MSK health throughout the lifespan.

**In 2006**, the Joint Transplantation Program is started through an anonymous donation that is matched by the Calgary Health Trust. Using technology and knowledge pioneered by Norm Schachar, Eltoff Abdalla receives Alberta's first fresh biological joint transplant at Foothills Medical Centre in a surgery performed by Carol Hutchison.



Eltoff Abdalla, recipient of Alberta's first fresh biological joint transplant

**In 2007**, Dave Hart and his team show that specific injuries to the knee result in unique changes in the eye. Publications form the concept of a potential "knee-eye axis" linking mobility (the knee) with navigation (the eye) through the environment. This provides a possible explanation for why some joint diseases increase the risk of eye complications.



*McCaig Institute Director Steven Boyd speaks with research participant Patricia Salo at the opening of the Centre for Mobility and Joint Health (MoJo). 2016*

## THE CENTRE FOR MOBILITY AND JOINT HEALTH

With the development of the ABJHI and the Bone and Joint SCN, and the success of the OA Team, McCaig and Frank's vision of ensuring research impacted patient care was becoming a reality. All that was needed was a clinical research facility where patients and members of the public could participate in research studies. A team of researchers, led by engineer (and former McCaig trainee) Steven Boyd, devised a plan to build a new facility that would bring together researchers from fields as diverse as engineering and health to work on problems that impact patients. In 2010, the team secured a grant from the Canadian Foundation for Innovation (CFI) to build the new Centre for Mobility and Joint Health. The CFI grant was matched by the province and with additional community donations, the total amount raised was \$13.2 million.

Not long after receiving news that a clinical research facility would be built, Cy Frank, the unwavering champion of the McCaig Institute, passed away unexpectedly in 2015.



**Cy envisioned bone and joint research in Alberta reaching a world class level and steadfastly moved us a long way up that hill. He was a visionary and a community leader, designing and implementing inroads in health care, provincially and nationally. To McCaig Institute researchers he was a collaborator par excellence and a partner in innovation. To many of our trainees he was an inspirational mentor, enabler and a fountain of knowledge.**

**NIGEL SHRIVE**



In 2016 the Centre for Mobility and Joint Health (MoJo) officially opened. The new facility is the culmination of decades of work by countless scientists, engineers, clinicians, trainees and staff to link basic research with patient care. "The MoJo is unique because we bring so many diverse groups together, all working to develop personalized care options for the individual through research," says Steven Boyd, current director for the McCaig Institute. "We are a hub where physicians, basic scientists, biomedical engineers, patients and the Alberta health system collaborate to keep Albertans moving."

## MAKING AN IMPACT

*Work conducted by Cy Frank and the ABJHI as part of the OA Team reduces wait times for hip and knee replacements. This work attracts national attention and improves efficiencies in the health-care system that result in over \$10 million in annual savings between 2012 and 2014.*

*In 2012, Derrick Rancourt and Roman Krawetz perfect bioreactor technology that allows them to produce millions of stem cells more quickly than ever and make them safe for clinical applications.*



*Roman Krawetz and Derrick Rancourt*

*In 2016, Carolyn Emery and Deborah Marshall publish a study that finds injury prevention programs in youth soccer keep more kids active in the sport while reducing health-care costs.*

*In 2017, a multidisciplinary research team led by Cheryl Barnabe finds a new link between psoriasis and depression and the subsequent development of psoriatic arthritis. The authors recommend better health assessments would be beneficial for patients with these diagnoses.*



*McCaig Institute Director Steven Boyd, Jeff McCaig, Joann McCaig, Melanie McCaig, Maurice McCaig and University of Calgary President Elizabeth Cannon celebrate the establishment of the McCaig Institute Foundation. 2016.*

## THE MCCAIG LEGACY CONTINUES

The McCaig family continues to be a driving force behind improving bone and joint health for Albertans. In 2017, Jeff, Joann, Melanie and Maurice McCaig established the McCaig Institute Foundation in honour of their mother and sister-in-law, Anne Shorrocks McCaig. Income from this \$10-million gift is committed to supporting the operating costs of the institute in perpetuity.

Jeff and Marilyn McCaig’s support goes beyond financial contributions. For Jeff, it’s important to see his parents’ legacy carried on. “Both of my parents suffered from arthritis. And my dad was especially committed to the work of the McCaig Institute,” he says. “I want to ensure his vision continues into the future.”

Chair of the McCaig Institute’s advisory board, Marilyn’s motivation is simpler. “Life is movement,” she says. “That’s why the work of the McCaig Institute is so important.”

## MOVING FORWARD

“I think both Bud and Cy would be proud of how far we’ve come since 1978,” says Dave Hart. “I think it’s important to celebrate our history, but also to use what we’ve learned to move forward and build momentum.”

The future of the McCaig Institute looks bright. The MoJo is open and humming with activity. Clinical staff and trainees are busy co-ordinating multiple research studies and enthusiastic research participants arrive daily. “I see such an enthusiasm in residents and clinicians to work with researchers in the MoJo,” says Judy Crawford, who is now the education and research administrator for the Section of Orthopedic Surgery. “One of our clinicians said at our last meeting, ‘If you can think of it, it can be done in the McCaig Institute.’ Whatever you can come up with, there are researchers available here to help you formulate a plan and turn it into better patient outcomes.”

The MoJo also allows the McCaig Institute to fulfil a new research direction — precision medicine, a concept that begins and ends with the patient, with clinical problems driving research. In fact, a number of McCaig researchers are part of an international research network who recently received over \$18 million to study precision medicine in childhood arthritis. “This grant allows us to build a knowledge base and measure and quantify the outcomes, which will not only have an economic impact, but could save or improve the lives of children with arthritis,” says Deborah Marshall, health economic lead on the project.

## MOBILITY FOR LIFE

One of the main priorities for the McCaig Institute moving forward is research on both prevention and earlier diagnosis. “We not only want to focus on precision medicine,” says Boyd. “We also need to focus on precision health — keeping people healthy so they don’t require treatment.”

Marv Fritzler and Ron Zernicke agree. “If we’re going to make the health-care system more sustainable, the unmistakable imperative is to focus much more on early and accurate diagnosis, disease prevention and maintenance of health,” says Fritzler. “We need to help people maintain musculoskeletal health as they get older,” says Zernicke. “It’s about independence and maintaining mobility and quality of life.”

With an eye on keeping people healthy and independent, the McCaig Institute is about to embark on one of its most ambitious endeavours: The Mobility for Life Project.

The Mobility for Life project will follow a large cohort of people with and without bone and joint conditions over many years. “Bone and joint diseases are slow burn diseases,” says Boyd. “They develop across the lifespan, so we need to study them from many different angles, across many different disciplines, over at least 20 years.” Boyd hopes the project will get underway within the next year, depending on funding. “We’re excited to engage Albertans in finding a solution for bone and joint conditions. It’s a huge undertaking, but I think it really builds on our legacy and the McCaig Institute’s tradition of linking basic science with patients,” says Boyd. “Though we’re just in the preliminary planning stages, in many ways, the McCaig Institute has been working towards this for decades.”

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## DIRECTORS OF THE McCAIG INSTITUTE FOR BONE AND JOINT HEALTH

(AND PRECEDING RESEARCH GROUPS)

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**CY FRANK**  
1988-1993 and  
2004-2007



**DAVID HART**  
1993-1995 and  
2007-2008



**RON ZERNICKE**  
1996-1999



**ROBERT BRAY**  
1999-2002



**NIGEL SHRIVE**  
2002-2004 and  
2009-2014



**MARVIN FRITZLER**  
2015



**STEVEN BOYD**  
2016-present

# WHERE ARE THEY NOW?

Since its beginnings as the Musculoskeletal Research Group back in 1978, the McCaig Institute has produced hundreds of world-class scientists, industry leaders, clinicians and health delivery professionals. Former McCaig trainees are now surgeons, company presidents, academic scholars and health innovators. In the words of the late Cy Frank, "trainees are, perhaps, the McCaig Institute's greatest legacy."

**HERE ARE JUST A FEW FORMER McCAIG INSTITUTE  
TRAINEES WHO ARE MAKING AN IMPACT.**



## **Greg Wohl**

Greg Wohl started as a lab technician in Ron Zernicke's lab in 1992. He went on to complete his master's and PhD from 1994 to 2002, studying how frozen storage and cryoprotective techniques influenced the interaction between graft and host tissues.

After completing a post-doctoral fellowship at Washington University in St. Louis, he joined the Department of Mechanical Engineering at McMaster University in 2007, where he has been since. His current research focuses primarily on bone adaptation and how drugs and diet influence bone adaptation to mechanical loading. He has also collaborated with orthopaedic surgeons at McMaster on design and mechanics of implants, and on developing surgical training tools.

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### **WHAT DID YOUR TIME AT THE McCAIG INSTITUTE MEAN TO YOU?**

*"The McCaig Institute is truly a special environment that provided incredible opportunities for collaboration and cross-pollination of ideas between researchers and across disciplines. Very few places have such a mix of basic researchers in the sciences and engineering interacting with clinicians to address problems in musculoskeletal health. Studying at the McCaig Institute helped me to develop an appreciation for collaboration, and I continue to try to build bridges across disciplines to create that multidisciplinary approach."*

**- Greg Wohl**

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## Kristen Barton

Kristen Barton was a trainee with Nigel Shrive and David Hart between 2011 and 2016. Her master's research focused on studying the impact of knee joint injury on joint lubrication, while her PhD research was on the biological and biomechanical alterations after partial knee joint injury.

As part of the Leaders in Medicine Program, she is currently in her third year of medical training, and plans to pursue a residency in orthopaedic surgery when she graduates in 2019.

Even though Kristen is a medical student and a new mother, she still finds time for research. She is the research lead for a wearable technology company called Vivametrica, and is also working on a project that compares two different exercise programs in knee osteoarthritis patients. Kristen won the prestigious 2017 "Leaders of Tomorrow" ASTech Award for her work.



### WHAT DID YOUR TIME AT THE McCaIG INSTITUTE MEAN TO YOU?

*"Working at the McCaig Institute exposed me to multidisciplinary research. I had the opportunity to work with clinicians, engineers, and biologists, thus exposing me to a great deal of diversity within bone and joint health. Having the opportunity to pursue graduate training at the McCaig Institute allowed me to network both within the Cumming School of Medicine, as well as with many partners/programs affiliated with the McCaig Institute. The McCaig Institute provided an exceptional graduate training environment."*

- Kristen Barton

## Brad Day

Brad Day was a PhD student in Derrick Rancourt's lab from 2010 to 2016. His main project looked at the mechanism behind pluripotency maintenance of embryonic stem cells in stirred suspension bioreactors.

In 2016, Brad started as an intern with the Government of Alberta as a Policy Analyst with Alberta Health. He worked in Communicable Diseases as part of the Health and Wellness Promotion Branch, researching and creating a policy around compensation for individuals quarantined under the Public Health Act. He also had the opportunity to work with the Office of the Chief Medical Officer of Health reviewing the Rabies Guidelines and Communicable Disease Regulations. Currently, he is working for the Public Service Commission in the Strategic Policy Integration Unit, where he does research and drafts public policy.

### WHAT DID YOUR TIME AT THE McCAIG INSTITUTE MEAN TO YOU?

*"I really enjoyed my time with McCaig. I felt the research I worked on as well as the research that others were working on would have a broad impact. I also had the privilege of working with some absolutely brilliant and hard-working individuals. Throughout my time at the institute, I was able to build a strong base of research and analytics skills, which have helped me succeed as part of the Alberta Public Service."*

- Brad Day



## Corrie Gallant-Behm

As a PhD student in David Hart's lab from 1999 to 2006, Corrie studied the molecular biology and genetics of skin wound healing and scarring, to define some of the cellular and molecular mechanisms underlying fibrosis in the skin.

After graduating in 2006, Corrie completed a post-doctoral fellowship and a Masters of Quality Assurance and Regulatory Sciences at Northwestern University, and a second post-doctoral fellowship at the University of Colorado. Since 2013, Corrie has been a Research Scientist at miRagen Therapeutics, Inc., a pharmaceutical company based in Boulder, Colorado, which focuses on the discovery and development of innovative RNA-based therapeutics, with a specific focus on microRNAs. She leads the efforts to develop new therapeutics in cutaneous fibrosis, wound healing, ophthalmology and other indications.

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### WHAT DID YOUR TIME AT THE McCAIG INSTITUTE MEAN TO YOU?

*"The McCaig Institute was fundamental to my development and growth as a scientist. Working with molecular biologists, cell biologists, engineers, kinesiologists, clinicians and others taught me about the value in collaborative and cross-disciplinary studies. I continue to use the lessons I learned at the McCaig Institute to aid me in development of new therapeutics to treat a variety of diseases, including those that affect connective tissues and the musculoskeletal system."*

- Corrie Gallant-Behm

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## Marie-Pierre Hellio Le Graverand-Gastineau

Marie-Pierre studied medicine in Lyon, France before coming to Calgary to join Mark Adams' lab in 1996 to start a PhD. In 2000 she completed her research in David Hart's laboratory where she characterized animal models of osteoarthritis using molecular and cell biology.

After a fellowship at McGill University, Marie-Pierre joined the Department of Early Clinical Development in Pfizer Worldwide Research & Development in Groton, CT, in 2001. She has been working at Pfizer Inc. since, taking on different roles that have taken her to various places around the world. She is currently the Chief Scientific and Development Officer for Pfizer Japan in Tokyo.

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### WHAT DID YOUR TIME AT THE McCAIG INSTITUTE MEAN TO YOU?

*"My time at the McCaig Institute shaped me as a researcher. It was a total culture change! Everything was so different from my French background. It was refreshing and stimulating and it opened my mind. In particular, I loved..."*

- *The incredibly rich diversity of thoughts;*
- *The large student population with lots of energy, motivation and passion for advancing their projects;*
- *The freedom to explore, come up with new ideas, innovate, the ability to work with students from other departments, and the opportunities for collaboration and cross-pollination between researchers and across disciplines;*
- *Together anything seemed possible."*

- Marie-Pierre Hellio Le Graverand-Gastineau

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# McCaig Faces *of the Future*

One of the most important things the McCaig Institute does is train the next generation of scientists, clinicians and industry leaders.

The institute's multidisciplinary learning environment provides trainees with access to experts and resources across many faculties and institutes. Here is just a small sample of the trainees who are bringing energy and enthusiasm to current research programs, while preparing to launch their careers as health leaders locally, nationally and internationally.



## **Lindsay Gorrell**

Lindsay Gorrell is an Australian chiropractor and PhD candidate in Walter Herzog's biomechanics lab. She is conducting research on the biomechanics of neck manipulation using human cadaveric specimens to investigate the relationship between the amounts of strain (stretch) experienced by the vertebral artery, the 3D movements of the head and neck and the forces applied by chiropractors during neck manipulation. Her research aims to inform the teaching of neck manipulation at manual therapy schools, in addition to providing both patients and clinicians with reliable evidence regarding the safety of the procedure. Ultimately, Lindsay wants to continue practicing as a chiropractic clinician while also positioning herself as an international expert in the biomechanics of spinal manipulation.

## Suman Nath

Suman Nath is a postdoctoral fellow in Derrick Rancourt's lab. His research focuses on applying human stem cells for curing degenerative diseases. He is developing bioprocesses for reprogramming human skin cells to induced pluripotent stem cells (iPSCs) in a bioreactor for treating degenerative diseases. He plans to derive bone and cartilage tissue from these cells to develop treatments for skeletal diseases such as arthritis and osteoporosis. He hopes to pursue an academic research career in the future.



## Jolene Phelps

Jolene Phelps is a PhD candidate in Arindom Sen's Pharmaceutical Production Research Facility. Research is pointing to stem cells being beneficial via active molecules that they secrete inside the body. Jolene's research looks at exploiting this fact and developing bioprocesses that can collect and tailor these active molecules to for use as a pharmaceutical in specific applications such as repair of bone and cartilage defects within joints. Jolene hopes to pursue a research career in either academia or industry.

## Mariya Shtil

Mariya Shtil is an engineer and trainee in Steven Boyd's Bone Lab. She is studying navicular bone stress fractures in the foot using advanced medical imaging techniques with the goal of understanding the underlying mechanics of bone healing. Mariya is interested in pursuing a career in the biomedical technology industry, particularly in the field of medical device design. Given the trend towards wearable devices and constant health monitoring among individuals and the advent of big data and artificial intelligence, she hopes to use these technologies to develop preventative care strategies that aid clinicians in making diagnoses.





The Arthritis Society congratulates the McCaig Institute for Bone and Joint Health on its 25<sup>th</sup> anniversary. Since its inception, the McCaig Institute's commitment to providing help and hope for those who suffer from the more than one hundred forms of arthritis and related conditions, including osteoarthritis, rheumatoid and juvenile rheumatoid arthritis, lupus, fibromyalgia, gout, and ankylosing spondylitis, has only grown stronger.

Arthritis, in its various forms, is a major national health problem, affecting more than 4.6 million Canadians aged 15 years and older. By 2036 it is estimated that arthritis prevalence increase to 7.5 million, or one in five, Canadian adults. That's not counting the 24,000 Canadian infants, children, and teens also living with a form of arthritis.

If that is not enough, the economic impact of arthritis is significant. Since 2010, the cumulative economic burden in Canada from the impact of arthritis on presenteeism, absenteeism, and leaving the workforce is over \$150 billion.

Over the last 25 years, the McCaig Institute's research to find the cure for the prevention of arthritis and improve the quality of life for those affected by this disease has resulted in major treatment advances for most types of arthritis. Further, the Institute has increased public awareness and has helped provide guidance for combating arthritis through its annual Wood Forum.

As Canada's largest charitable source of investments in cutting-edge arthritis research, proactive advocacy and innovative solutions that will deliver better health outcomes for people affected by arthritis, the Arthritis Society has proudly supported the McCaig Institute during those 25 years to foster the next generation of scientists who will bring a cure within a realistic reach. The Society toasts the Institute on this silver milestone and wishes it continued success in the future.

## SAVE THE DATE

### CY FRANK LEGACY LECTURE 2018 CY FRANK LEGACY LECTURER



**Professor Dame  
Sally Davies**

Chief Medical Officer  
for England and  
Chief Medical Advisor  
to the UK Government

*"Integrating Big Data Into Clinical Practices"*

**September 11, 2018 in Toronto**

**September 12, 2018 in Calgary**

*(with webcast to University of Alberta)*

**September 14, 2018 in Vancouver**

*The Cy Frank Legacy Lectureship honours and commemorates the late Dr. Cy Frank, an internationally acclaimed visionary who championed the application of research to create solutions for patients. The lectureship showcases individuals who reflect the passion of Dr. Frank.*

**FOR MORE INFORMATION, VISIT**  
[mccaig.ucalgary.ca](http://mccaig.ucalgary.ca)

### WOOD FORUM 2018 INSIGHTS INTO FOOT AND ANKLE HEALTH

**10am to noon**

**Saturday, October 27, 2018**

The Red and White Club

McMahon Stadium, 1833 Crowchild Trail NW

FREE PARKING

*A FREE public forum on the latest research  
advances in foot and ankle conditions*

**FOR MORE INFORMATION, VISIT**  
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As the McCaig Institute reflects on 25 years of growth and development, ABJHI, McCaig's sister institute, has cause to pause for reflection on the 14 years that have passed since its formation.



ABJHI chose a contentious area of medical care to launch itself in 2004. Hip and knee replacements were then the poster child for all that was wrong with public health care in Canada: long, painful waits, variable practices and protocols, inconsistent quality.

ABJHI decided this area could and should be fixed. Working with orthopaedic surgeons and the Alberta Orthopaedic Society, ABJHI designed an innovative care path that set out evidence-based practices and protocols across the continuum. In a ground-breaking coordinated effort, ABJHI, orthopaedic surgeons and the former health regions in Edmonton, Calgary and Red Deer teamed up to pilot the new care path setting up multidisciplinary hip and knee clinics in the three cities with funding from Alberta Health.

Alberta's Health minister called the pilot a "staggering success story". Compared to a control group, patients in the new care path had less pain and greater ability to perform daily activities. They were home from hospital sooner. They were more satisfied with their care. The pilot also showed wait times could be cut dramatically.

The pilot — and ABJHIr — captured national attention and changed the way care is provided to Albertans who undergo hip or knee replacement. Today, the care path is standard practice and ABJHI is working with AHS's Bone and Joint Health Strategic Clinical Network (BJH SCN) to ensure care remains on a path of continuous improvement. Gains have been impressive. Compared to a decade ago, Alberta is doing 45% more surgeries with 9% fewer hospital beds. More than 51,000 bed-days have been saved since 2010 — a value of \$52 million. Hospital readmissions for post-surgery complications have dropped 20%. Since 2012, blood transfusions have declined more than two-thirds increasing. And teams are in place at hospitals across Alberta to strive for more gains.

ABJHI is also working with the BJH SCN to improve treatment and prevention in other areas — hip fracture, osteoporosis and rheumatoid arthritis. Similarly, we are looking to expand our focus to shoulder, spine, and foot and ankle.

These improvements result from solid relationships with health care professionals, researchers, administrators, policy makers and academics.

ABJHI and the McCaig Institute have had a significant impact on health care. But we cannot speak about their impact without speaking about the impact of Dr. Cy Frank on both institutes. It was Cy who, with the strategic and financial support of J.R. (Bud) McCaig, established the vision for the McCaig Institute and ABJHI, noting the complementary roles the institutes would play in making bone and joint health care better.

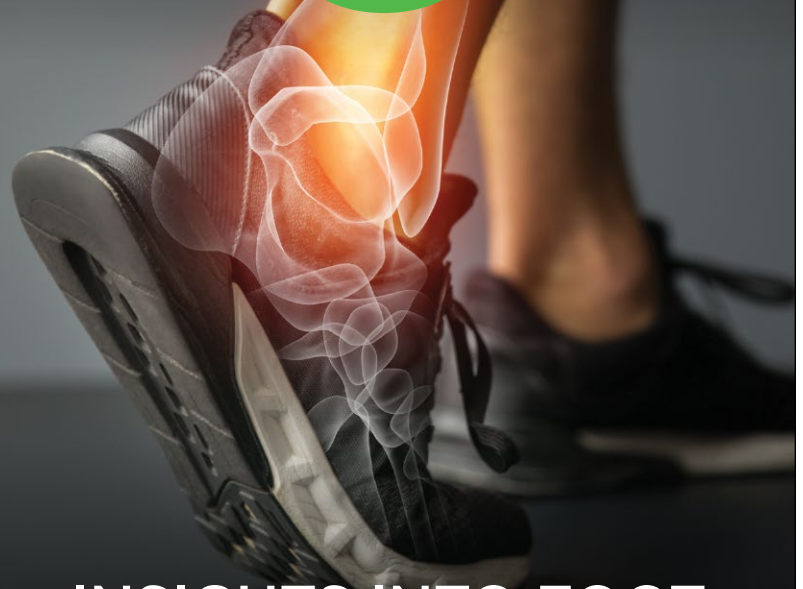
*“Today, the BJH SCN continues to build on the success that has been achieved by collaborating with ABJHI and the McCaig Institute, completing the cycle of discovery, evaluation, conceptualization and implementation.”*

Today, the BJH SCN continues to build on the success that has been achieved by collaborating with ABJHI and the McCaig Institute, completing the cycle of discovery, evaluation, conceptualization and implementation. More precisely, McCaig’s researchers create knowledge to improve health and mobility. ABJHI evaluates the knowledge and channels it into concepts for improving services. The BJH SCN moves the concepts into everyday practice.

This cycle of continuous improvement and delivery of world class health care to Albertans was the vision of Dr. Frank. He is gone, having passed away suddenly in 2015. Our organizations are the legacy he left. Together with AHS, the BJH SCN and like-minded colleagues, we are working to keep his legacy alive and healthy for the benefit of patients.

THE McCAIG INSTITUTE FOR BONE  
AND JOINT HEALTH PRESENTS

## WOOD FORUM 2018



# INSIGHTS INTO FOOT AND ANKLE HEALTH

A FREE PUBLIC FORUM  
on the latest research advances in  
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**SATURDAY, OCTOBER 27, 2018**

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**McCAIG INSTITUTE**  
FOR BONE AND JOINT HEALTH



**UNIVERSITY OF  
CALGARY**



## Cy Frank was a surgeon, researcher, innovator and visionary.

“

**His numerous contributions to medicine as a surgeon, teacher, researcher and advocate have had a profound impact on the people of Alberta.**

”

The McCaig Institute for Bone and Joint Health grew out of a vision Cy and a group of colleagues had to improve patient care by influencing clinical practice, public policy, research and the exchange of knowledge.

A much-loved teacher and mentor to medical students, orthopaedic residents, and MSc and PhD candidates, Cy had an abiding belief that medical knowledge must be shared unreservedly for the benefit of patients. He was noted for bringing the latest evidence-based research to the bedside and was passionate about engaging patients in research.

His numerous contributions to medicine as a surgeon, teacher, researcher and advocate have had a profound impact on the people of Alberta.

He is deeply missed and well-remembered by all who knew him.



**MCCAIG**INSTITUTE  
FOR BONE AND JOINT HEALTH

***Mobility for Life.***