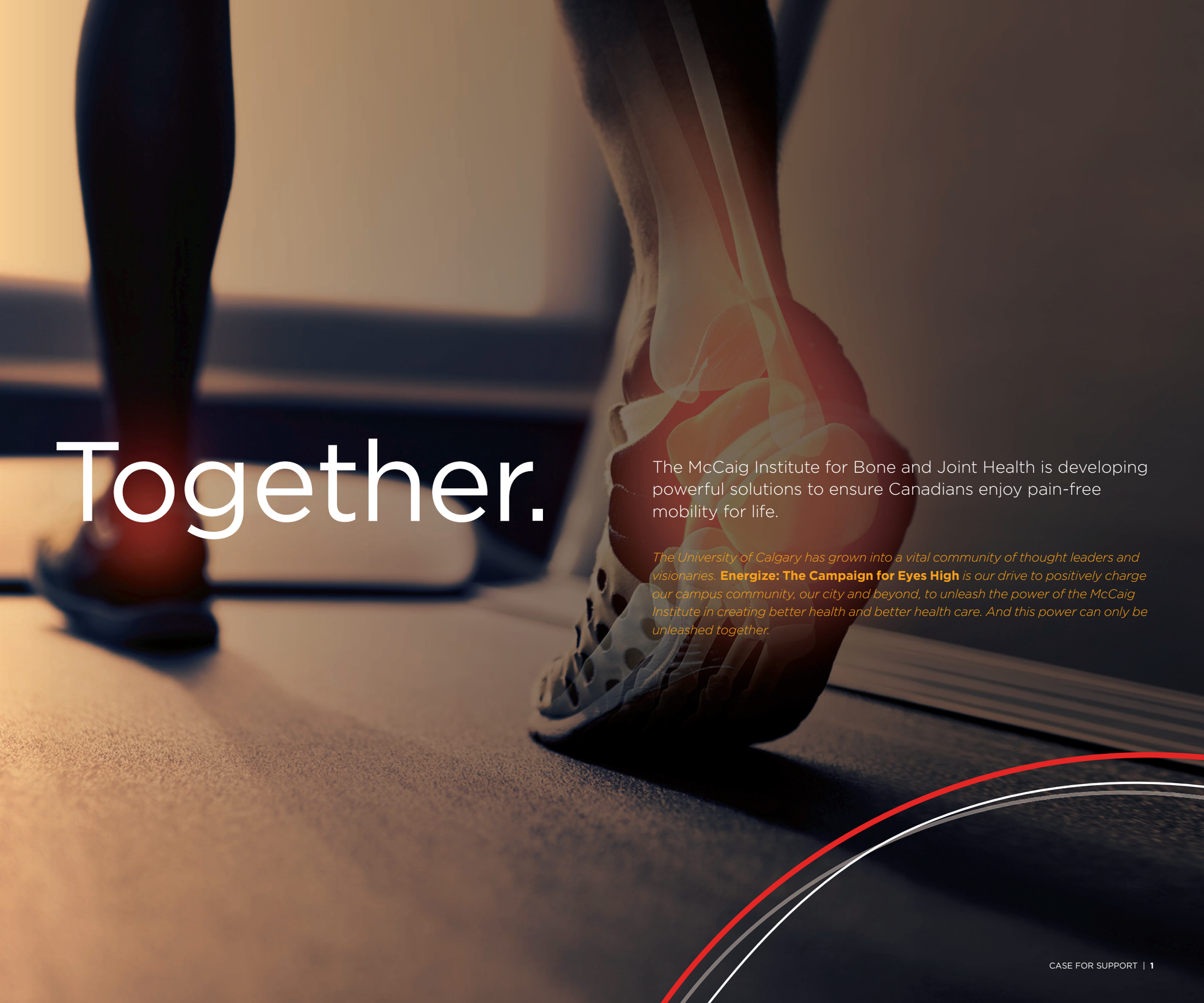
MCCAIG INSTITUTE FOR BONE AND JOINT HEALTH
CUMMING SCHOOL OF MEDICINE

UNIVERSITY OF CALGARY

How will we help people live active, pain-free lives?



Together.

The McCaig Institute for Bone and Joint Health is developing powerful solutions to ensure Canadians enjoy pain-free mobility for life.

The University of Calgary has grown into a vital community of thought leaders and visionaries. ***Energize: The Campaign for Eyes High*** *is our drive to positively charge our campus community, our city and beyond, to unleash the power of the McCaig Institute in creating better health and better health care. And this power can only be unleashed together.*

Advancing research to help those with bone and joint disorders

We often don't think about the risks of osteoporosis, the pain of rheumatoid arthritis or the reduced mobility resulting from osteoarthritis — until these conditions affect us or a loved one.

Yet bone and joint disorders are some of the most common chronic conditions affecting Canadians. By 2025, it's anticipated the number of Canadians with osteoarthritis will double, with 10 million Canadians suffering from the impacts of the disease. Bone and joint disorders are the leading cause of disability worldwide, costing the Canadian economy more than $35 billion annually.

The McCaig Institute for Bone and Joint Health at the Cumming School of Medicine is changing the future for Albertans, from children to seniors, by helping them stay active and pain-free for life. The McCaig Institute is home to a world-class team of researchers from across the University of Calgary, including the faculties of veterinary medicine and kinesiology, along with the Schulich School of Engineering. Our scientists, engineers and physicians are working together to create health solutions that are unique to the University of Calgary.

At the heart of our research is precision medicine, in which we treat individuals and conditions based upon their unique characteristics. Thanks to new technologies, scientists are able to diagnose and care for patients with the right treatment at the right time.

The future of bone and joint research and treatment is precision medicine. Vital investments in three key areas will allow us to:

- **Prevent** bone and joint disorders from happening, along with the lifelong damage they cause
- Better **detect and diagnose** bone and joint conditions to alter the long-term outcomes for Albertans
- **Develop new treatments** to improve the lives of people with bone and joint disorders

Prevention

> CONDITIONS LIKE OSTEOARTHRITIS CAN REDUCE YOUR MOBILITY, CAUSE CONSTANT PAIN, OR KEEP SOMEONE FROM THE ACTIVITIES THEY LOVE. STOPPING CONDITIONS FROM DEVELOPING IN THE FIRST PLACE – OR HAVING AN UNDERSTANDING OF WHO IS MORE AT RISK – WILL HELP US REDUCE THE BURDEN PEOPLE FACE.
>
> STEVEN BOYD, DIRECTOR, MCCAIG INSTITUTE FOR BONE AND JOINT HEALTH

Photo by Don Molyneaux Photography

Stopping bone and joint disorders before they start

The most effective way to tackle bone and joint problems is to increase our understanding of the causes of disease. Whether it is studying biomarkers that show signs of disease development, or developing recommendations to reduce injury that will contribute to arthritis later in life, prevention is a key aspect of research at the McCaig Institute for Bone and Joint Health.

An important part of prevention is identifying those most at risk for bone and joint disorders, such as youth who are prone to juvenile arthritis, or adults who are most likely to develop osteoarthritis. Education about bone and joint disorders is also critical to ensure families, health-care providers and those involved in sports have an understanding of how diseases can develop, and how to prevent them from happening.

The best way to fight disease is to prevent it from happening in the first place. Your support will enable us to learn more about how we can stop bone and joint disorders from impacting the lives of Albertans.

Together, we will stop injuries before they happen.

Carolyn Emery and Brent Edwards are using technology to better understand jumper's knee, and lessen the effects of the injury.

Photo by Adrian Shellard

Scoring a win for prevention

Jumper's knee is a common injury among athletes. For basketball enthusiasts, the constant jump shots and hard landings can result in injuries that sideline players.

Researchers at the University of Calgary are studying how to prevent jumper's knee before it happens. The injury is so common that the National Basketball Association is funding research into tendon-related injury. Two UCalgary researchers have received grants to study injuries of the knee and Achilles tendon.

Brent Edwards and Carolyn Emery, both members of the McCaig Institute and Faculty of Kinesiology academics, are using advanced imaging and biomechanical measurements to study playing surfaces, footwear and other risk factors in player injury. Their hope is to prevent jumper's knee, and better diagnose and treat the injuries when they happen.

Together, we will keep people active.

> MY MOM HAS OSTEOPOROSIS, AND SO DO A NUMBER OF OUR EXTENDED-FAMILY MEMBERS. WE'VE SEEN FIRST-HAND THE EFFECTS OF POOR BONE HEALTH, AND WE WANT TO DO WHAT WE CAN TO AVOID IT.
>
> HEATHER GIUFFRE

Photo by Don Molyneaux Photography

Improving imaging to prevent disease

Calgarians Heather and Michael Giuffre are participants in a research study at the McCaig Institute that is looking at the effects of calcium and vitamin D supplements on bone health. As tennis enthusiasts who also love to workout at the gym, the Giuffres are interested in learning about diet and lifestyle efforts that can help them avoid debilitating health conditions.

Using state-of-the-art MRI and CT imaging equipment in the McCaig Institute's Centre for Mobility and Joint Health (MoJo), researchers from several faculties are collaborating to develop innovative ways to scan patients to detect bone conditions earlier, so that treatment or preventative measures can be started before damage is irreversible.

Detection

Beating bone and joint disorders through faster detection

One of the most exciting advancements in health research is precision medicine. Rather than applying a one-size-fits-all approach to health, a person's genetics, lifestyle and diet are taken into account. This new approach helps us better identify those at risk of developing medical conditions, and better detect disease before damage occurs.

At the McCaig Institute, some of the brightest minds are using state-of-the-art imaging, motion assessment and diagnostic equipment to assess individuals. Earlier detection means earlier treatment, relieving pain, and the disabling effects of bone and joint conditions. All of this is possible through research, the most powerful way to cure disease.

Photo by Don Molyneaux Photography

Photo by Don Molyneaux Photography

Leading the world in bone and joint imaging

The McCaig Institute's new Centre for Mobility and Joint Health (MoJo) is one of the few places in the world that can take high-speed images of joints in motion. Janet Ronsky, a McCaig Institute researcher, develops tools and devices to evaluate human movement and joint health. Ronsky's team in the MoJo Clinical Movement Assessment Lab uses customized 3D imaging to analyze changes in a subject's mobility and muscular control over time. These motion patterns help researchers monitor changes in mobility, identifying risk factors early so that appropriate, patient-specific interventions can be developed before long-term damage occurs.

Together, we will better understand the body through technology.

Together, we will personalize treatment to target disease.

Predicting and diagnosing disease earlier

When Ava Morgan was seven, she began complaining about sore knees. A series of blood tests and a visit to pediatric rheumatologist Susanne Benseler at the Alberta Childrens Hospital confirmed she had psoriatic juvenile arthritis, a form of the disease that affects five per cent of people with juvenile arthritis. After trying a number of medications, Ava and her family found one that effectively treats the symptoms of her arthritis. Four years later, Ava loves hockey, ringette and playing with her siblings.

The hunt for the right treatment for patients such as Ava may now be shorter thanks to the McCaig Institute research team led by Marvin Fritzler. The team has developed a series of blood tests that provide a specific immune fingerprint of autoimmune and rheumatic diseases, allowing physicians to diagnose lupus, arthritis and other inflammatory diseases much earlier in their development. Once the specific disease is identified, targeted treatment can begin to prevent or slow progression.

> “THESE BLOOD TESTS WILL TAKE AWAY MUCH OF THE TRIAL-AND-ERROR APPROACH FOR PHYSICIANS, ALLOWING THEM TO MORE EASILY DETERMINE WHICH TREATMENT IS GOING TO BE MOST EFFECTIVE.”
>
> MARVIN FRITZLER, PROFESSOR, DEPARTMENT OF MEDICINE

Photo by Don Molyneaux Photography

Together, we will use technology to detect future disease.

Andras Kroker's research is increasing understanding about how knee injuries can predict disease in the future.

Photo by Don Molyneaux Photography

Tracking bone changes after injury

A torn anterior cruciate ligament — known as the ACL — is a painful injury that requires months of recovery time, and it can have long-lasting repercussions. Patients with ACL tears have a 50 per cent chance of developing osteoarthritis, often several decades after the initial injury. PhD candidate Andres Kroker uses state-of-the-art imaging technology in the McCaig Institute's MoJo facility to track people with recent ACL tears, looking at how their bone architecture changes over time. The earlier such changes can be detected, the sooner interventions can occur to stop or alter the course of osteoarthritis.

Treatment

After an accident injured Eltoff Abdalla's knee, her mobility and confidence were affected. In 2006 she received Alberta's first fresh biological joint transplant, and within a year was back to cycling, going to the gym and running.

Photo by Laughing Dog Photography

Improving treatment at the cellular and health-systems level

The more we know about how bone and joint disorders work, and how they influence each patient, the more precise and effective treatments can be. By understanding more about diseases and how the body responds to injury, we can develop new and better therapies. For the millions of Canadians affected by bone and joint disorders, precisely identifying which treatment will be most beneficial to them is crucial to relieving their pain. Treatment improvements happen both at the cellular level — learning how the body's cells can repair themselves — to the health-systems level — understanding who has access to treatment and who does not. Thanks to research that ranges from the laboratory to the community, we are developing new therapies that benefit everyone with bone and joint disorders.

Together, we will heal the body with its own cells.

Easing the pain of arthritis

Seung Kim has lived with the pain of osteoarthritis in his hands for decades. The anti-inflammatory medication he takes helps, but it doesn't control the pain completely.

"I was a welder when I was younger, so maybe that's what caused my hands to be the way they are," says Kim. "I wish there was a way to repair the damage."

Roman Krawetz and researchers within the McCaig Institute are developing new treatments for arthritis that use the patient's own stem cells to repair their damaged cartilage.

McCaig researchers are working to develop safe therapies for patients with arthritis, and determining which stem cells have the greatest potential to repair damage for people like Kim.

Researchers are learning more about how stem cells could repair damaged cartilage, and help patients like Seung Kim who experience pain from arthritis.

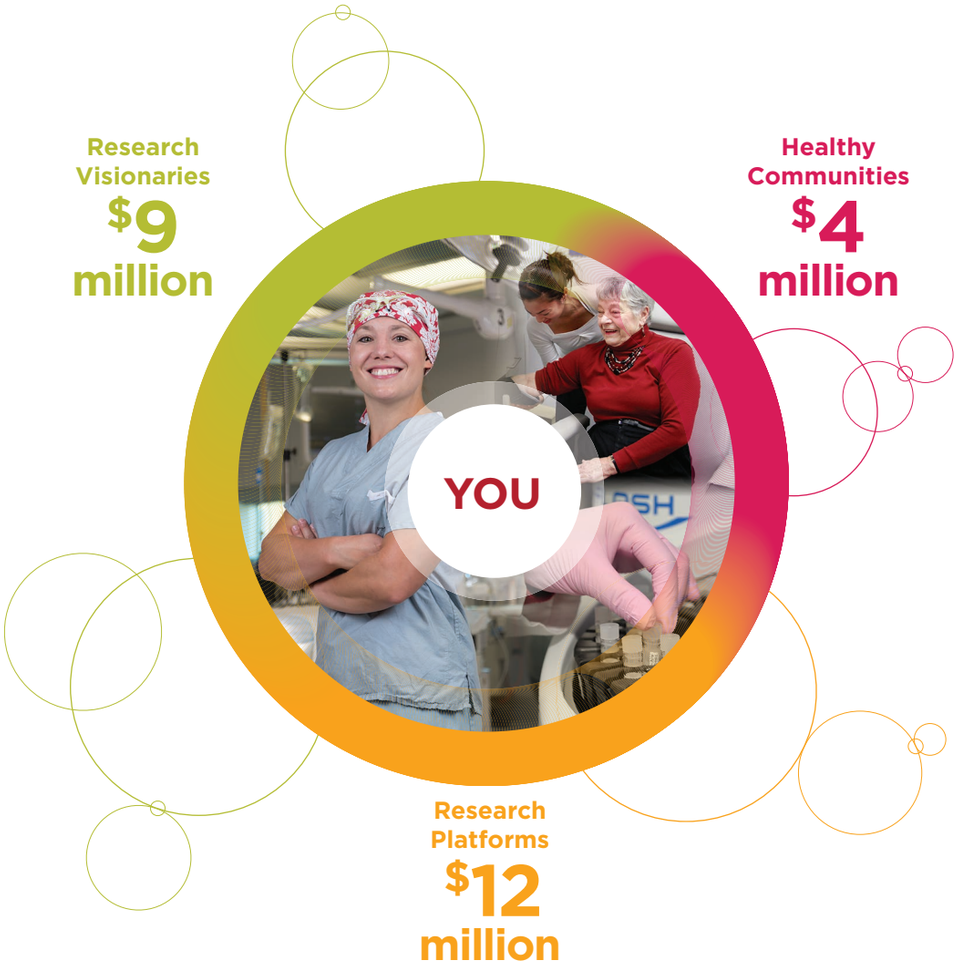
Photo by Don Molyneaux Photography

Photo by Don Molyneaux Photography

Together, we will make health accessible to all.

Improving the health system for all Albertans

Rheumatoid arthritis (RA) affects three times as many people in the Indigenous populations of Canada compared to non-Indigenous people. McCaig Institute researcher Cheryl Barnabe has spent her career studying the discrepancy in RA outcomes and where gaps in care arise for Indigenous patients. Through community partnerships and colleagues from many disciplines, Barnabe's research has focused on increasing the quality and frequency of care provided, and enhancing local resources to improve the continuity of care. Thanks to research like Barnabe's, we are understanding ways of improving the health system for communities across Alberta.



$25 million

Take your place among the leading philanthropists of your time.

Join us to support research of bone and joint disorders. Your support will bring the best and brightest to the McCaig Institute for Bone and Joint Health, provide the tools to unearth innovations, and help us partner with the community to create health solutions.

Together, we will spark discovery, creativity and innovation to define a better tomorrow.

Together, we will enable active, pain-free lives for Albertans.

Our research and community partnerships are enabling discoveries across the lifespan of disease and improving the health of our citizens. You can help us continue this important work through:

Research Visionaries — $9 million

Better outcomes for people living with bone and joint disorders depends on leaders who will bring discoveries to a community in need.

- Scholarships and bursaries will support the training of future leaders in research.
- Awards and recruitment packages will attract the next generation of researchers and clinicians who will find solutions to pressing questions in bone and joint disorders.
- Funding for highly skilled technicians, research nurses and health researchers will deliver innovative research programs.

Research Platforms — $12 million

Tools and research platforms will support our basic scientists, engineers, clinicians and health system researchers.

- Highly integrated teams will focus on the continuum of research.
- Clinical trials will advance studies in prevention, detection and treatment.
- Big-data and health-systems research will translate discovery into practice.

Healthy Communities — $4 million

Ensuring the best in health requires that we extend our reach by partnering with the community.

- Promote awareness and share knowledge of bone and joint disorders and our research advances, developing healthy communities through key stakeholders.
- Provide innovation funds that link research to the community.
- Create health solutions for disadvantaged populations, including Indigenous communities.

This is your opportunity to make a difference, spark meaningful change and create a legacy that will never fade. **JOIN US.**

Join us, and together we will help people live active, pain-free lives.

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