

LIBIN CARDIOVASCULAR INSTITUTE OF ALBERTA



understand THE CHALLENGES
build ON OUR STRENGTHS
partner WITH COMMUNITY
enable SUCCESS

STRATEGIC PLAN 2017-2022

THE LIBIN CARDIOVASCULAR INSTITUTE AIMS TO BE A MODEL OF INTEGRATED CARDIOVASCULAR HEALTHCARE, RESEARCH AND TEACHING.

The Libin Cardiovascular Institute of Alberta (LCI) is an entity of the University of Calgary and Alberta Health Services. Our dedicated core team of over 175 physicians and researchers work over a wide research spectrum with a goal to improve disease prevention, diagnosis and treatment. We have created an enriched training environment for future health care and research professionals, as well as our community.

The LCI is responsible for the delivery and coordination of all cardiovascular research, education and care across the City of Calgary with a referral base of Southern Alberta and parts of Eastern British Columbia and Western Saskatchewan.

Our 2017-2022 strategic plan addresses goals and strategies for research and research training/mentoring. This strategy complements the strategic themes of all our partners. We recognize the importance of community engagement and strong community partnerships.

OUR VALUES

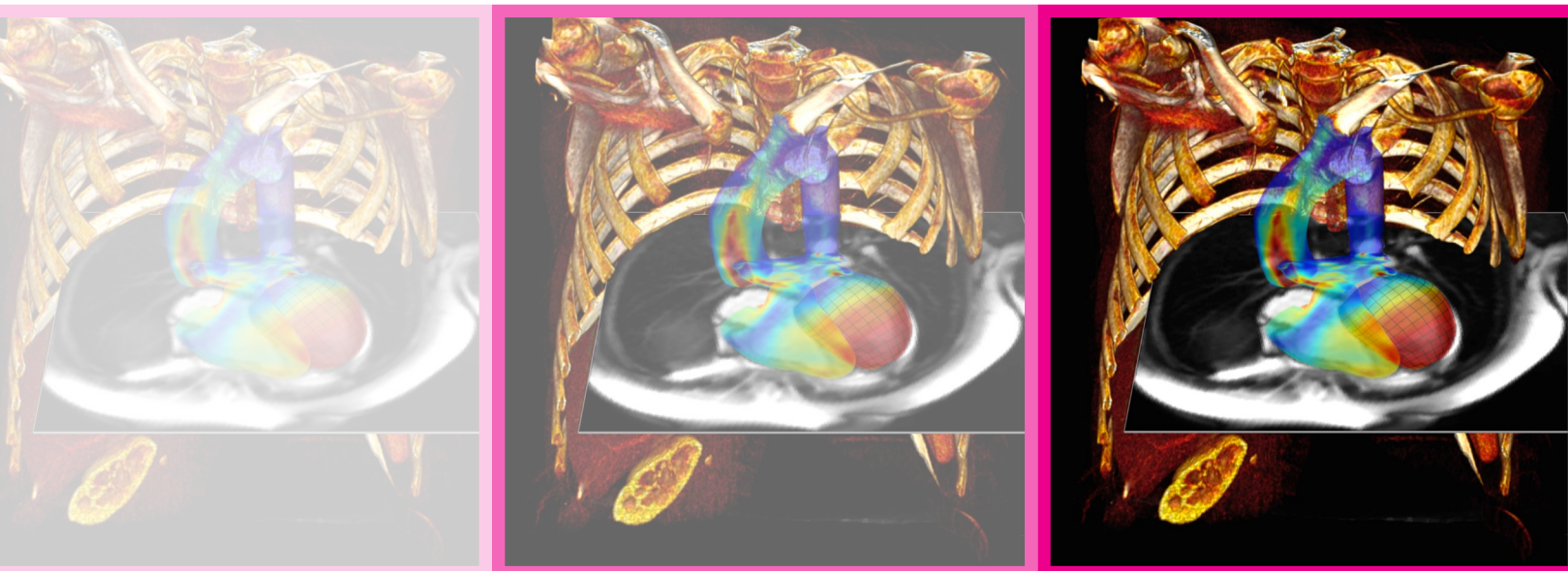
EXCELLENCE – recruiting, retaining and enabling outstanding researchers, clinicians and trainees

INNOVATION – exploring novel ideas and research approaches

MULTIDISCIPLINARY COLLABORATION – advancing research through local, national and international partnerships

PATIENT-CENTERED – prioritizing the patient is the core within our long term goal of a healthier future for our citizens

INTEGRITY AND RESPECT – promoting a culture that values patient experiences and outcomes



OUR GRAND CHALLENGE

The greatest challenge to our field is to identify modifiable risk markers and more precise individual prevention/intervention strategies for reduction in the burden of cardiovascular disease and premature death.

- Despite tremendous advances, cardiovascular disease has become the leading cause of death worldwide. Because of this, for the first time in a century, life expectancy has decreased.

- Sedentary activity and obesity give rise to hypertension and diabetes leading to kidney and vascular disease.

- Sudden cardiac death is the leading cause of premature death in Canada and worldwide. It is predicted to exceed deaths due to lung cancer, breast cancer, prostate cancer and colorectal cancer combined.

OUR BOLD RESEARCH VISION

To reduce the burden of suffering and premature death due to cardiovascular disease through transformative research

RESEARCH AND RESEARCH EDUCATION

Our researchers and trainees come from a variety of academic backgrounds and clinical disciplines, including the faculties of nursing, kinesiology, arts, veterinary medicine, the Schulich School of Engineering and Cumming School of Medicine. Our research strength comes from this diverse, multi-disciplinary approach, and multi-centre partnerships.

We have been internationally recognized. Our members are widely published in high impact journals on an annual basis. Our successes have advanced changes in clinical care paradigms and health service delivery models. We have impacted clinical care worldwide through leadership on multiple national and international guidelines and consensus documents. Our scientists have made important discoveries on the mechanism(s) of vascular disease and heart rhythm disorders leading to the development of promising new therapies and diagnostic tools.

Key research infrastructure platforms, including the Stephenson Cardiac Imaging Centre, the Mozell Family Analysis Core Lab, a variety of basic science core facilities, and the APPROACH database support our research and research training, while developing their own reputations for excellence.

We will focus our efforts over the next five years on two foundational priorities where we have the strength to be world leaders:

- 1) **VASCULAR HEALTH AND DISEASE** – reducing the risk factors that cause kidney disease, heart attacks, stroke, and diseases of the aorta
- 2) **ARRHYTHMIAS AND AUTONOMIC DYSFUNCTION** – reducing sudden cardiac death, common heart arrhythmias and fainting.

A patient-centered, precision medicine approach will be utilized. Research training and faculty renewal will be key to our success.

OVERARCHING RESEARCH AND RESEARCH TRAINING GOALS

Undertake additional transformative research exploiting innovative approaches and collaborative partnerships for:

- **DISCOVERY** of disease mechanisms, disease progression and novel therapies;
- **DETECTION** of modifiable risk markers and disease progression;
- **DELIVERY** of patient-centered and individualized, precision therapy;
- **DEVELOPMENT** of tools to more actively engage patients and their caregivers;
- **DEMONSTRATION** of value to our partners and to the community.

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Inspire and train the next generation of leaders in cardiovascular research, doubling our investment in research trainees over the next five years to:

- **FOSTER** new talent and develop skills in novel areas;
- **ENCOURAGE** creative thinking and cross-disciplinary exchange of ideas;
- **ENRICH** the training experience through travel to scientific meetings;
- **INVEST** in the future by supporting trainees with competitive scholarships;
- **MENTOR** trainees and young emerging investigators;
- **ATTRACT** trainees from around the world;
- **DEVELOP** new approaches to graduate level education.



LIBIN CARDIOVASCULAR INSTITUTE OF ALBERTA

REDUCING THE BURDEN OF SUFFERING AND PREMATURE CV DEATH

CIHR RESEARCH
THEMES

BIOMEDICAL

CLINICAL

HEALTH SERVICES

POPULATION

VASCULAR HEALTH

P2 CARDIOVASCULAR
HEALTH

CHRONIC KIDNEY
DISEASE

DIABETES

AORTA/BIOMEDICAL
ENGINEERING

ATHEROSCLEROSIS
VASCULAR BIOLOGY
& CORONARY ARTERY
DISEASE

CUMMING SCHOOL OF MEDICINE : PRECISION MEDICINE

UNIVERSITY OF CALGARY : CHRONIC DISEASES &
BIOMEDICAL ENGINEERING

ENABLING PLATFORMS

ALBERTA PROVINCIAL
PROJECT FOR OUTCOME
ASSESSMENT IN
CORONARY HEART
DISEASE (APPROACH)

CLINICAL TRIALS CORE

BASIC SCIENCES CORE

BIG DATA

STEPHENSON CARDIAC
IMAGING CENTRE

ELECTROPHYSIOLOGY & AUTONOMIC DYSFUNCTION

ARRHYTHMIA & HEART
FAILURE

EP CLINICAL TRIALS

SYNCOPE/ POSTURAL
ORTHOSTATIC
TACHYCARDIA
SYNDROME (POTS)

GENETICS

DISCOVERY CARDIAC
ELECTROPHYSIOLOGY

VASCULAR HEALTH AND DISEASE

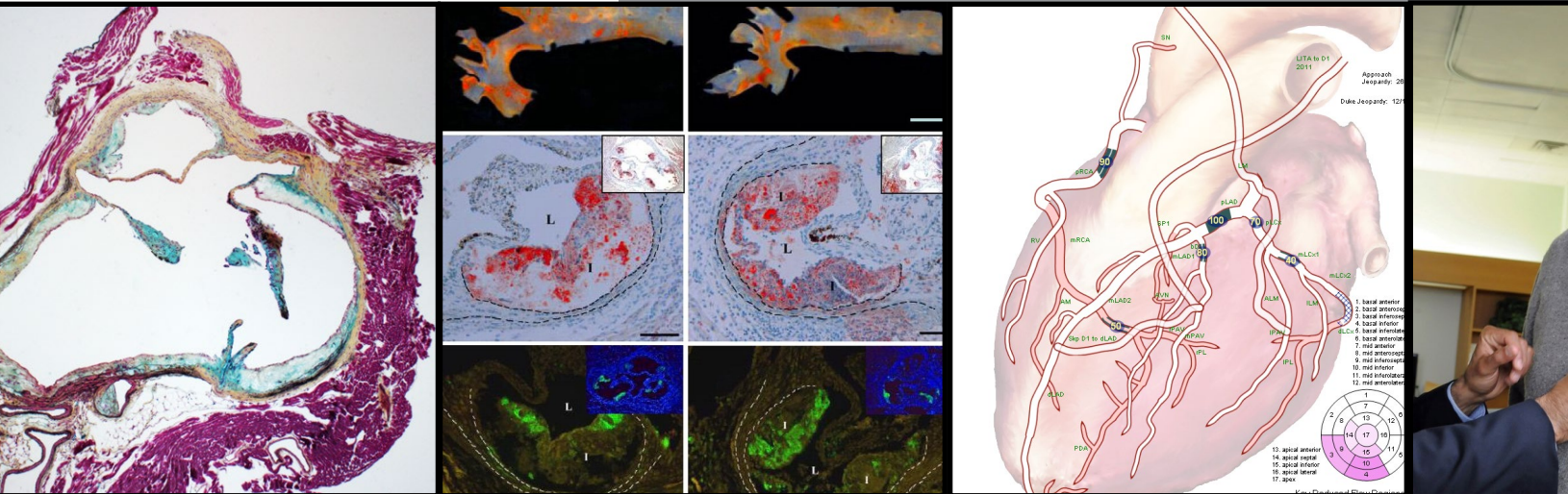
- Atherosclerosis at key sites, including the aorta, is the most common cause of cardiovascular disease.
- 90 per cent of Canadians will develop at least one atherosclerosis risk factor
- The incidence of diabetes has doubled in the past decade
- Kidney disease affects 1 in 10 Canadians.
- The majority of patients with diabetes and kidney disease die from vascular atherosclerosis.

I am inspired by the commitment of Libin Cardiovascular Institute of Alberta to integrate research, education, and clinical care through collaborative, multidisciplinary approaches. I am very excited and honored to join an excellent research team and carry out translational cardiovascular research in collaborations with clinicians and basic scientists at Libin Cardiovascular Institute of Alberta.

- Vascular biology discovery scientist **Vaibhav Patel PhD**

The LCI has assembled a world class team of scientists who are poised to advance the delivery of individualized precision therapy for prevention and treatment of vascular disease. We have particular strength in kidney disease through the Interdisciplinary Chronic Disease Collaboration (ICDC) and the Alberta Kidney Disease Network (AKDN).

We will build on our strengths in disease surveillance and monitoring health outcomes to achieve target goals for atherosclerosis risk factors in the population. We will expand our discovery science programs to advance mechanistic insights, develop new diagnostic tools, and find new therapeutic targets.



SUPPORTING OUR VASCULAR SCIENTISTS AND ENHANCING RESEARCH CAPACITY

STRATEGIC OBJECTIVES:

To discover molecular mechanisms, we are:

- Studying the role of inflammation and biomarkers
- Studying factors that modify development of vascular dysfunction, aneurysm formation, atherosclerosis and their progression
- Developing models to assess the impact of maternal factors on risk to their offspring

To discover interventions for prevention, we are:

- Developing novel targets for prevention and treatment.

To detect premature vascular disease, we are:

- Leveraging our strengths in cardiac imaging, bioreactors, biomarkers and computational modeling to detect those at risk
- Forming the collaborative entity P2 (People to Population Cardiovascular Health) to enhance surveillance and monitor outcomes

To deliver integrated, individualized precision therapies, we will:

- Apply our discoveries to guide therapy tailored for each person.

To develop enhanced patient engagement with shared decision making tools, we will:

- Study the efficacy and cost of using real time data and decision support tools to more actively engage patients, their families and care givers.



DATA

- Administrative Data
- EHR/EMR (CIS)
- Lab, Drug
- Rehabilitation
- APPROACH
- Survey

ANALYTICS

- Data mining machine learning
- Data quality assessment
- Statistical modelling

APPLICATIONS

- Surveillance
- Intervention
- Decision tools
- Patient centered care
- Policy

ARRHYTHMIAS AND AUTONOMIC DYSFUNCTION

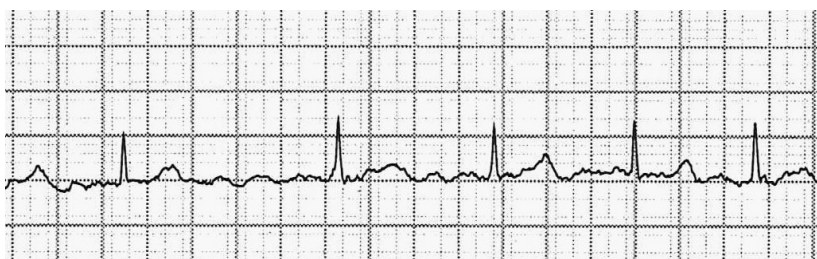
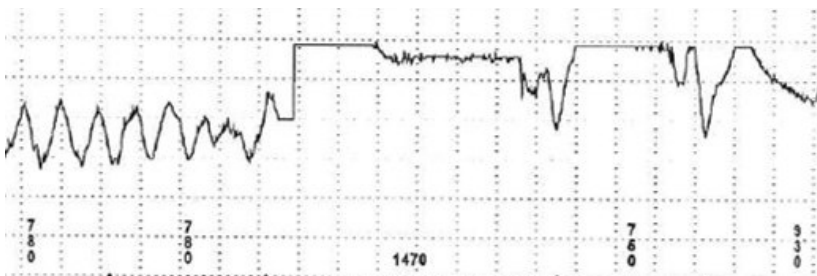
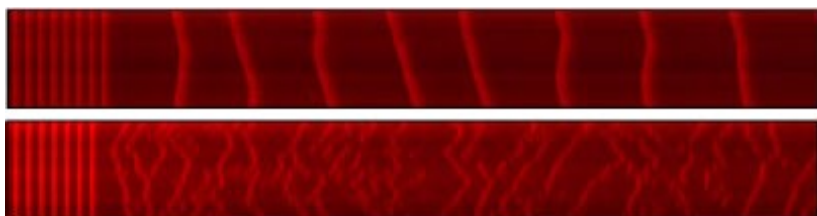
- Sudden cardiac death (SCD) is the leading cause of premature deaths (age <65) in North America.
- Ventricular arrhythmia SCD causes half of cardiac deaths.
- Atrial fibrillation (AF), the most common sustained heart rhythm disorder, is associated with significant morbidity, particularly stroke, and significant impairment in quality of life.
- Cardiac conduction disease resulting in symptomatic bradycardia is the most common indication for a pacemaker.
- Syncope (fainting) due to abnormal nervous system regulation of blood pressure and/or heart rate occurs at least once in the lifetime of half of Canadians.

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The LCI has assembled a world class team of scientists who are significantly impacting the burden of syncope, sudden death and atrial fibrillation. Their research has established novel care pathways for the management and follow-up of such patients. Their contributions are recognized through leadership in multiple national and international guidelines and consensus documents.

There are many examples of current heart disease treatments that have come into widespread clinical use that are based on studies that were first carried out in basic research laboratories. Basic research ensures that the outcomes of clinical research, whether expected or unexpected, can be interpreted and understood so that they may be refined and improved upon over time.

- Electrophysiology discovery scientist **Robert Rose PhD**



SUPPORTING OUR ARRHYTHMIA SCIENTISTS AND ENHANCING RESEARCH CAPACITY

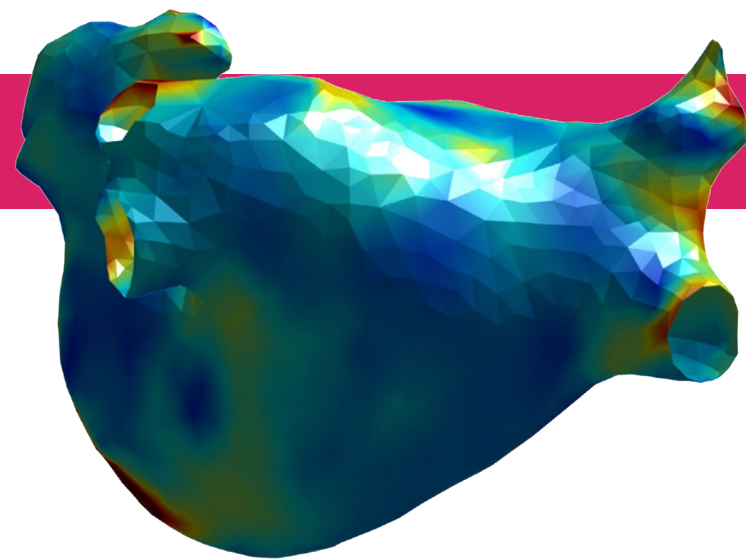
OUR STRATEGIC OBJECTIVES:

To discover mechanisms of arrhythmias and syncope, we are:

- Developing novel genetically engineered animal models.
- Developing clinically relevant animal models of AF and sinoatrial node disease.
- Using state-of-the-art cardiac imaging and monitoring tools to advance our research.
- Using human tissue to study mechanisms of AF.

To discover new therapies for arrhythmias and syncope, we are:

- Developing novel pharmacologic and non-pharmacologic therapies and interventions for prevention and treatment of SCD, AF, and syncope.
- Repurposing pharmacologic therapies in novel ways to treat orthostatic hypotension and postural tachycardia syndrome



To detect risk markers for premature sudden cardiac death and atrial fibrillation development, progression, and response to therapy, we are:

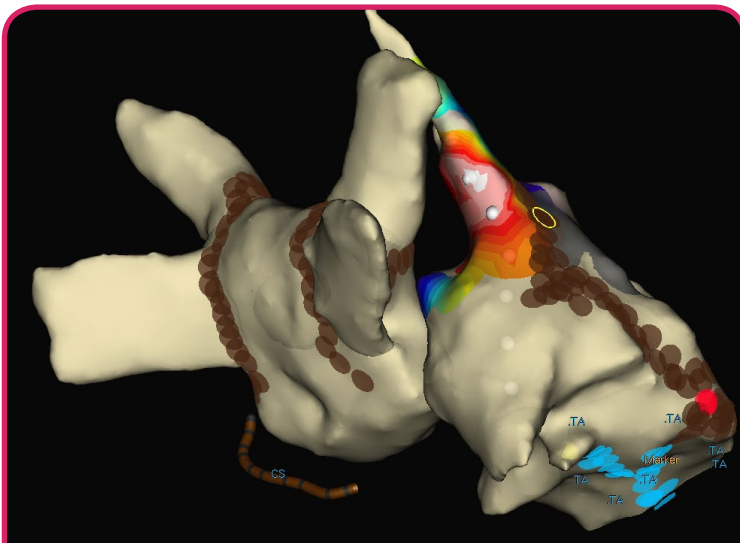
- Leveraging our strengths in ECG signal processing, cardiac imaging, biomarkers, genomics and computational modeling.

To deliver individualized, precision-guided therapies for prevention of sudden cardiac death, atrial fibrillation and syncope, we are:

- Using our strengths in translational, clinical and population health sciences to study therapy tailored to individualized risk profiles.

To develop enhanced patient engagement and shared decision making tools, we are:

- Researching the efficacy and cost of using real time data and decision support tools while actively engaging patients, their families and care givers.



OUR ENABLING PLATFORMS

Our infrastructure platforms are crucial to our research success. Some are unique to the LCI. Others build on existing strengths and facilities within the Cumming School of Medicine (CSM), including genomics. In collaboration with other members of CSM, we will prioritize financial support to the platforms that support members of the LCI.

Discovery Science Core Facilities

- ☐ Microscopic cardiac imaging
- ☐ Small animal echocardiographic imaging
- ☐ Small animal cardiac telemetry monitoring
- ☐ Cell regeneration
- ☐ Histopathology
- ☐ Bioengineering/computational modeling

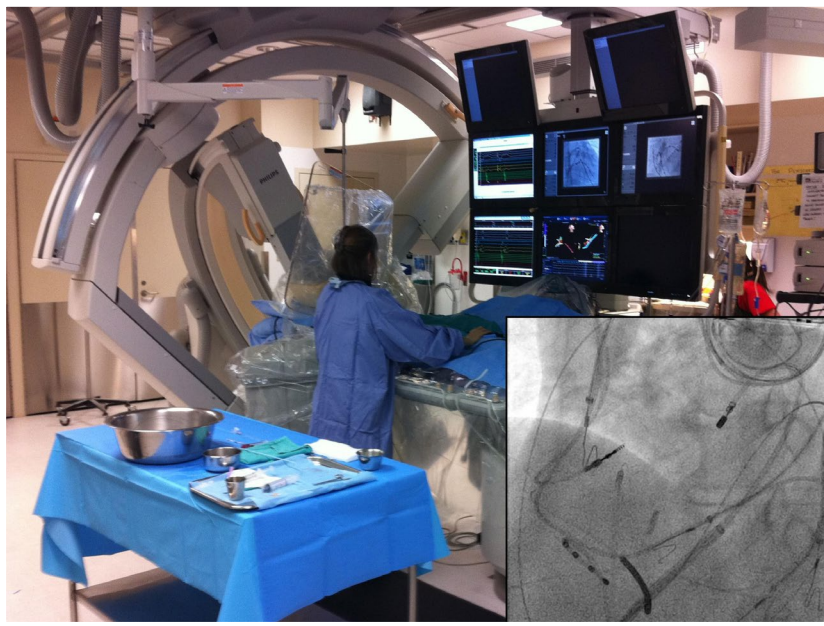
Mozell Family Analysis Core Laboratory – Two biostatisticians are employed to provide statistical and methodological support for Libin members. More than 50 projects per year are facilitated by the laboratory.

Stephenson Cardiac Imaging Centre – Stephenson is a world class cardiovascular magnetic resonance imaging centre with two 3T magnets dedicated to cardiac work. The clinical volume (>3500 procedures/y) is the largest in Canada. The centre has more than 20 research members and facilitates collaborative research in animal models and across human disease states. The centre will soon be enriched with the hiring of a PhD imaging scientist to enhance research amongst the clinical research users.

Clinical Trials Core – Numerous clinical research groups thrive within the LCI. A clinical research coordinator is available to facilitate clinical research projects for new investigators and our clinical trainees.

APPROACH (Alberta Provincial Project for Outcome Assessment in Coronary Heart disease) – APPROACH has been in existence for more than 20 years. It is one of the largest cardiac databases in the world. APPROACH is the backbone for important epidemiology and population health studies. The group has published more than 200 manuscripts and continues to pioneer new approaches to data acquisition and linkage.





Our key strategic challenge for the next few years is to pivot from reporting on past outcomes to improving them in real time, by implementing and testing tools that deliver important information to patients, care providers, and policy makers where and when they need it.

- APPROACH research directors
Dr. Matthew James & Dr. Stephen Wilton

CLINICAL/HEALTH SERVICE DELIVERY RESEARCH

While the budget responsibility for clinical care delivery resides with AHS, Libin leadership is responsible for delivering clinical care in a collaborative fashion with AHS leadership. The Institute Director is also the Department Head of Cardiac Sciences allowing seamless harmonization of the academic clinical agenda. Linkage to clinical care is essential for all patient-based research. In addition, part of our research is focused on the benefits, utility and economics of timely patient-centered delivery of health care.

OVERARCHING CLINICAL RESEARCH GOALS

- Improve cardiovascular health through research, innovation and education on health care delivery.
- Align clinical care delivery research with our academic priorities – Vascular Health and Disease; Arrhythmia and Autonomic Dysfunction.
- Develop emerging areas of research focus – heart failure care pathways and advanced therapies, transition of congenital heart disease patients to adulthood; expand specialized clinics and non-physician healthcare delivery where our research shows it is efficacious and cost-effective.

OBJECTIVES

- Re-engineer care pathways to maximize access and minimize wait times and measure their efficacy and cost.
- Use quality assurance and improvement methodology research to optimize outcomes.
- Engage patients in our health care delivery research.

EDUCATION

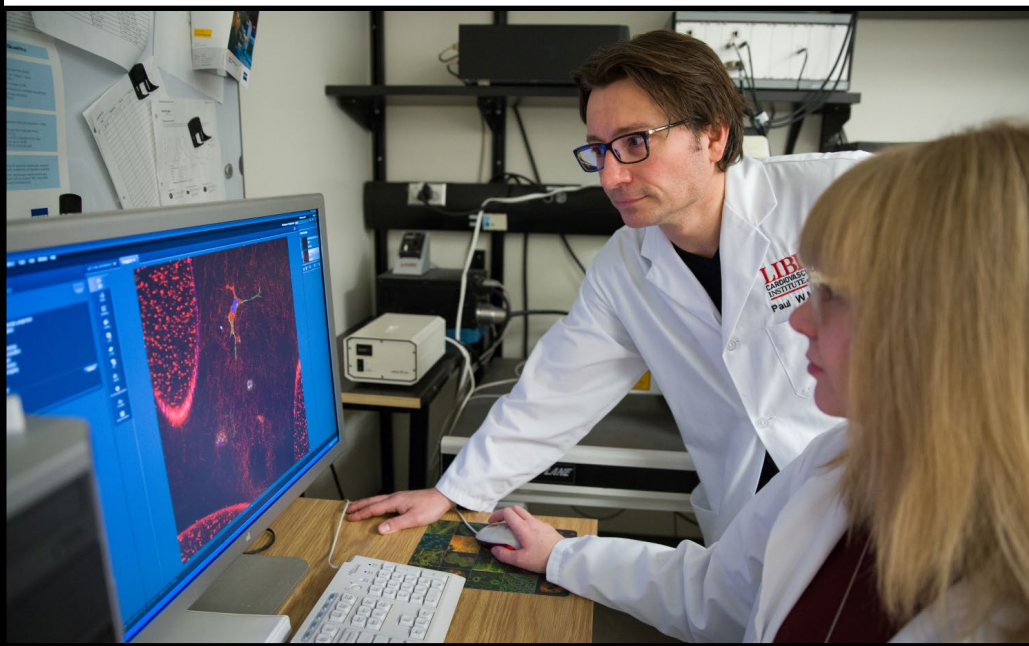
The transmission of knowledge is a core principle of virtually all LCI activities. LCI is involved in delivery of cardiovascular learning at all levels. In this document the focus is research training and renewal of our research workforce. MSc and PhD training and provision of postdoctoral fellowships in a variety of cardiovascular related areas is a key part of this effort. Introduction to research is provided in our Core Cardiology and Cardiac Surgery training programs. In addition, LCI also offers a wide variety of clinical research training platforms in our highly reputed clinical sub-specialties. This research training effort is accomplished in conjunction with the Graduate Science Education and Postgraduate Medical Educations platforms of the university.

Our areas of strength for graduate research education were presented earlier in the research section. Clinical research training is supported through:

- Access to core platforms
- Providing venues for research education including the annual research day, seminar series, grand rounds
- Providing scholarships for research through the Division of Cardiology research competition
- Postgraduate training scholarships via Arthur Childs Foundation awards
- Biostatistical support
- Creation of modular graduate science courses to enhance knowledge for clinical trainees

The three years that I spent here did more than just transform me into a cardiologist. During this time, I met exceptional mentors, clinicians, researchers and colleagues who were not only inspiring, but more importantly, were friends who cared enough to help a young cardiologist in very concrete ways.

- Oxford Centre for Clinical MR
Research Deputy Clinical
Director **Dr. Vanessa Ferreira**



Today's LCI trainees are tomorrow's leading cardiovascular researchers.

- LCI Director of Research Education and Mentorship
Dr. Sofia Ahmed

The LCI is committed to training and mentoring the next generation of cardiovascular researchers and supports an outstanding research training experience for all stages of their education.

We have recently created new competitive academic awards for our trainees, reflecting the

commitment of the LCI to graduate and post-graduate education in cardiovascular research. The LCI aims to promote excellence in cardiovascular research by recruiting outstanding trainees from around the world to our innovative research training programs through the offer of competitive funding opportunities. Through cardiovascular journal club, weekly research update seminar series and a dynamic external speakers' series where internationally recognized experts present cutting edge research, LCI trainees are exposed to a variety of novel ideas resulting in enhancement of their own research studies. LCI travel awards encourage trainees to present their work at national and international scientific meetings to share in the creation of new knowledge and collaboration of innovative scientific approaches to cardiovascular disease at a global level. Excellence in trainee research is recognized through publication prizes, fostering further exchange of scientific knowledge with the cardiovascular research community.

Finally, the LCI hosts the annual Tine Haworth Cardiovascular Research Day, a day-long symposium showcasing trainee research within the LCI which concludes with the presentation of trainee research prizes and an invited keynote address from an internationally-renowned cardiovascular scientist. This highly successful event underscores the LCI commitment to excellence in trainee research.

Our strategic education objective is to train and mentor the next generation of cardiovascular researchers, providing an outstanding research training experience at all levels



COMMUNITY ENGAGEMENT

We have recognized for a number of years that excellence can only be achieved by being relevant and connected to the community. We have invested in a community engagement coordinator within the LCI to increase our capacity for communication and educational event planning. The community engagement mechanism is an extensive series of events under the moniker **Libin 101**. This lecture series creates opportunity for two way feedback between Libin researchers and the broad community including students, the public and donors. We recognize and are responding to the need to have patients more involved at the planning of our research projects and for more research on delivery of health care in a way that utilizes tools of the modern tele-connected world.

OVERARCHING GOALS

Through partnerships and direct initiatives, improve awareness of cardiovascular disease, institute research and disease prevention strategies throughout the community and engage patients in our research activities.

OBJECTIVES

Develop research programs that evaluate new paradigms of cardiovascular health care delivery within the community, particularly homecare of chronic diseases like heart failure and atrial fibrillation.

Develop and engage patients in the planning of health care delivery research.

Implement health care delivery outside the acute care setting that meaningfully impacts those with illness in our core research strengths, is deemed preferable to patients, and is cost-effective.

STRATEGIC ALIGNMENT

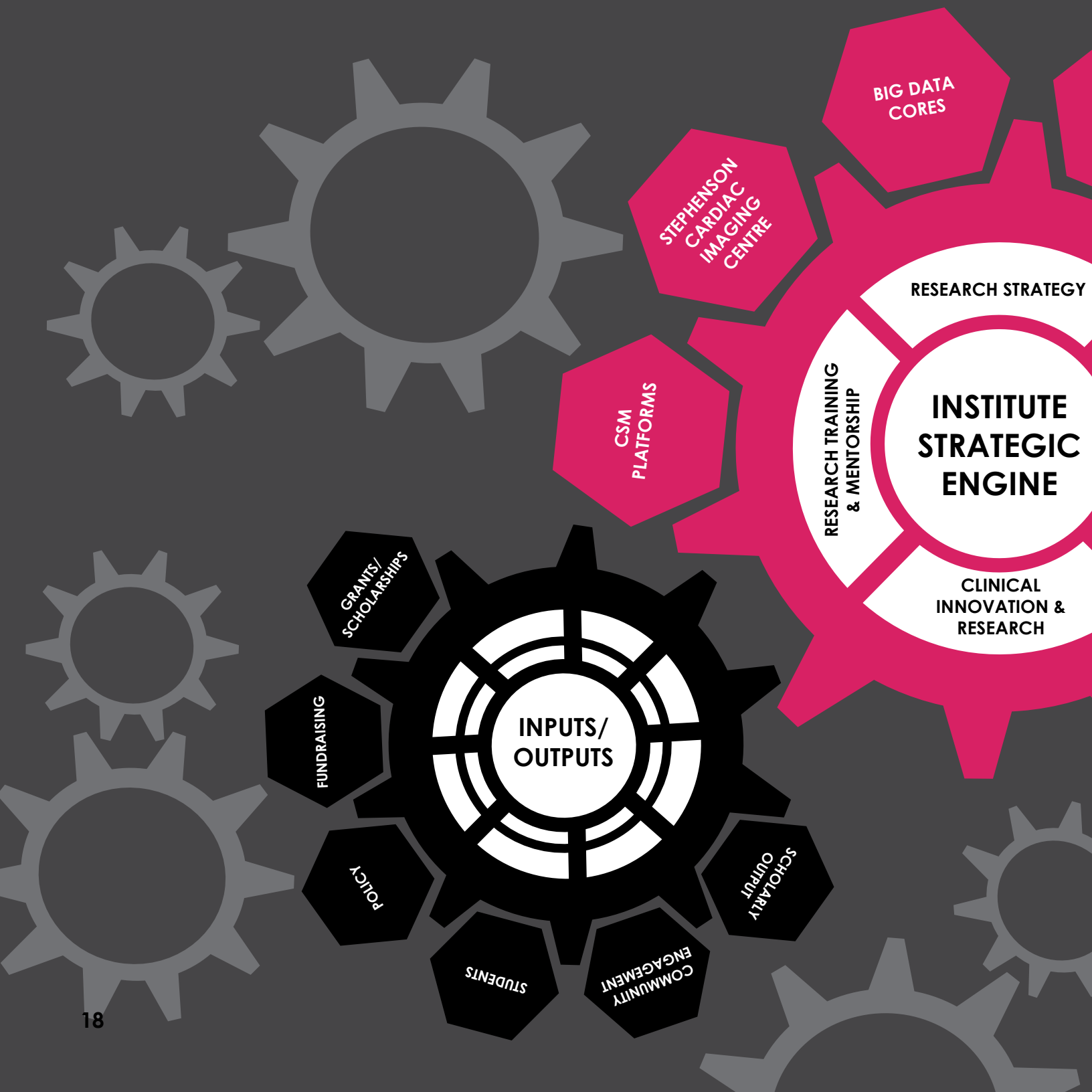
Our strategic clinical, research and community engagement goals are closely linked to the strategic goals of the CSM, the University of Calgary, and AHS. We are also aligned closely with the Heart and Stroke Foundation as partners for research funding and advocacy.

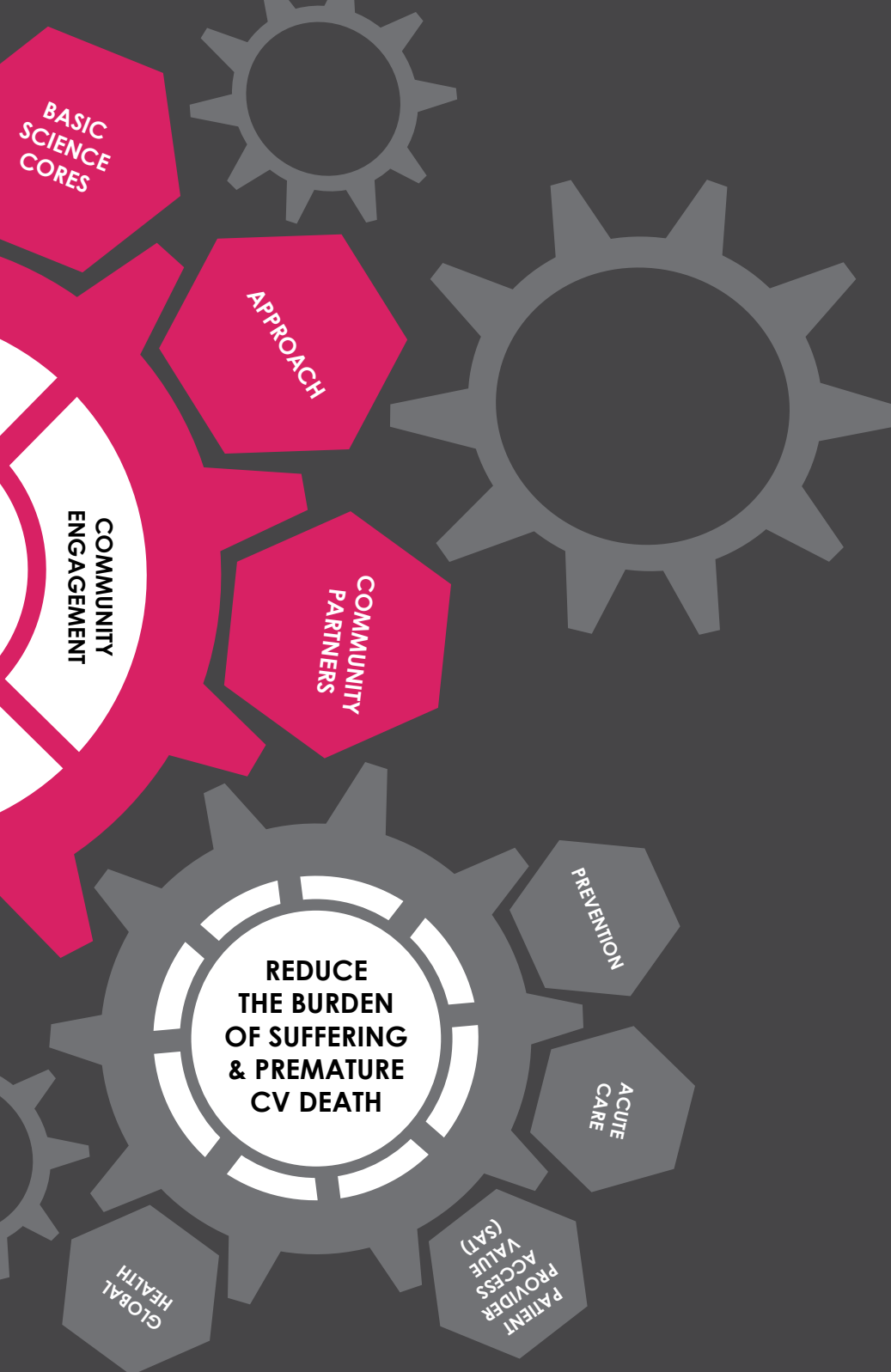
Our innovations in research and clinical care will have an individualized, precision medicine focus, a mandate of the CSM and an area that is gaining traction within the cardiovascular sciences. Chronic disease is another priority of the University of Calgary, and chronic kidney disease, hypertension, congestive heart failure and atrial fibrillation are very large components of chronic disease in our community. The majority of our members work in these domains. Bioengineering is a strategic priority of the university and is a key part of much of our research, particularly in SCD research and aortic vascular disease.

We are committed to a culture of excellence and innovation in health care delivery, research and the training of our future scientists and clinicians.

Our infrastructure platforms promote excellence in health care delivery, health outcomes, and research to build on the strengths of **our people** and **enabling platforms** within the CSM.

We are committed to Taking Excellence to Heart. 





I remember Dr. Mitchell sitting with me, my mom and dad and drawing diagrams, showing us exactly what he was going to do and outlining and putting it in layman's terms. He was really confident and that made me feel really good. Looking back, it has been such a crazy ride to go through all that and to be able to go to the Olympics and get a medal. I feel extremely lucky. The Libin Institute has been amazing.

- Olympic medalist
Justin Warsylewicz



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