INFECTIONS, INFLAMMATION AND CHRONIC DISEASES

UNIVERSITY OF CALGARY

How will we solve the world's greatest health challenges?

Together.

Through cutting-edge research programs and one-of-a-kind facilities led by top scientists, we will drive global initiatives in infections, inflammation and chronic diseases (IICD), tackling some of the most important global challenges to our health and the economy.

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 change our campus community, our city and beyond, to unleash the power of the University of Calgary to cure infections, inflammation and chronic diseases. And this power can only be unleashed together.

Decoding the causes of infections, inflammation and chronic diseases

The World Health Organization ranks chronic diseases as the greatest challenge to human health, accounting for 68 per cent of deaths worldwide.

Unabated, the impact will continue to increase with the aging population. As a leader in discovery and the translation of health and biological research, we are sparking breakthroughs in worldwide efforts to address infections, inflammation and chronic diseases.

Led by the Cumming School of Medicine's Calvin, Phoebe and Joan Snyder Institute for Chronic Diseases, the University of Calgary's IICD research strategy unites more than 200 experts from the faculties of science, kinesiology, nursing and veterinary medicine, as well as the Shulich School of Engineering. Together, we are dedicated to improving the quality of life for millions of people of all ages affected by conditions such as cystic fibrosis, asthma, inflammatory bowel disease and diabetes.

At the heart of our study is precision medicine, in which we treat individuals and conditions based on their unique characteristics. Through research, data and technology, we will predict, prevent and diagnose disease, and care for patients with the right treatment at the right time. Precision medicine will shape the future of infections, inflammation and chronic disease research.

Your support will translate our studies from basic research in the lab into results in the clinic for the effective prevention, diagnosis and treatment of evolving diseases. We will create the future of health in three key areas:

- **Human health**
- **Animal health**
- **The environment**

Human health

> “WE HAVE THE RIGHT RESEARCHERS, THE RIGHT COMBINATIONS OF RESEARCH TEAMS AND THE RIGHT FACILITIES TO MAKE DISCOVERIES THAT WILL IMPROVE THE QUALITY OF LIFE FOR MILLIONS OF PEOPLE AFFECTED BY INFECTIONS, INFLAMMATION AND CHRONIC DISEASES.”
>
> PAUL KUBES, DIRECTOR, CALVIN, PHOEBE AND JOAN SNYDER INSTITUTE FOR CHRONIC DISEASES

Translating discoveries into better health outcomes

Our researchers are leading the country in chronic inflammatory disease discoveries, translating them into improved human health through precision immunotherapy and study of the microbiome: a community of trillions of bacteria, parasites, viruses and fungi that live in and around humans, animals and our environment.

The work of investigators in six faculties is leading to a spectacular decrease in illness and pain across the disease spectrum, delivering major improvements in quality of life through our advanced understanding and ability to manipulate the immune system’s reactions.

The Western Canadian Microbiome Centre will provide some of the most vital discoveries for the improvement of health around the world.

We will study the microbiome in revolutionary ways with live imaging in a germ-free environment to learn more about the balance of bacteria in our bodies, which is critical to personalized treatments and, ultimately, prevention of debilitating chronic diseases.

With your support, we will lessen the burden on our health and economy created by infections, inflammation and chronic diseases.

Together, we will learn to balance our bacteria.

Harnessing the power of our microbiome

Comprised of 300 trillion bacteria, fungi, parasites and viruses within and on our bodies, the microbiome has a powerful influence on our health. Regarded as a new and distinct organ, the microbiome affects not only infection and disease, but also mood, behaviour, weight and allergies. We know the use of antibiotics in premature infants results in the alteration of their microbiomes, putting them at risk of developing chronic conditions such as asthma and inflammatory bowel disease.

Cumming School of Medicine researchers Laura Sycuro and Marie-Claire Arrieta are examining the microbiomes of 1,000 babies born in Alberta. The purpose of this work is to watch how they change from the womb and through the first five years of life, based on the unique experiences of each. The insight gained will lead to the identification of causes and methods for prevention and treatment of conditions like necrotizing entercolitis in premature infants.

Cumming School of Medicine researcher Marie-Claire Arrieta is studying the microbiomes of 1,000 babies born in Alberta to learn how the bacteria in our bodies changes with experience and how we can harness it for prevention and treatment of disease.

Together, we will get to the root of the problem.

> “DR. LEIGH AND HIS TEAM HAVE ABSOLUTELY CHANGED MY LIFE. I WENT FROM SIMPLY EXISTING TO LIVING AGAIN. I DON’T THINK THERE IS ANYTHING BETTER THAN CLEAR LUNGS. BREATHING IS SOMETHING PEOPLE TAKE FOR GRANTED.”
>
> ELAINE PEASE, PATIENT

Breathing new life into those losing hope

When her grandson was just a toddler, Elaine Pease couldn’t pick him up; asthma had taken over her life and her lungs were in a deteriorated state. Standard treatments like inhalers didn’t work and there was a concern the disorder could ultimately end her life. By studying every detail involved in her asthma attacks, from the genes involved, the environment and the type of inflammation present, to her lifestyle and even the microscopic organisms living inside of her, Richard Leigh of the Cumming School of Medicine’s Department of Medicine was able to give Elaine her life back. Leigh was able to confirm her exact type of asthma and the best way to treat it. A drug that precisely targets her inflammation has transformed Pease’s life. This application of precision medicine offers hope to those suffering from many other chronic inflammatory diseases as well. Diagnostic technologies that can detect the right molecule to target are being tested in the Snyder Institute.

Together, we will pioneer new treatments.

Turning deadly diseases into curable conditions

Thanks to research in our laboratories that leads to clinical trials in humans, successful new therapies are being pioneered to cure chronic diseases. Our Calgary Liver Unit helped reduce Hepatitis C from the most common chronic disease requiring liver transplantation in Canada, to an easily curable condition in almost everyone. First identified in 1989, Hepatitis C affects nearly one in 100 Canadians, causing liver damage and scarring that slowly progresses to cirrhosis, liver failure and death. Because of significant investment in research and the involvement of world-leading facilities in developing new therapy targets in labs and testing them through clinical trials, taking only one pill a day for as little as eight weeks can cure most cases of Hep C. This amazing accomplishment was achieved in less than 20 years because of research, the most powerful cure to disease.

Preventing health issues from every angle

The interconnectedness of animal and human health is undeniable. Up to 75 per cent of new infectious diseases in humans originate in animals, which can also affect our ecosystem's waterways and vegetation.

It is important that we consider each of these elements for prevention and treatment protocols. This is the premise of the University of Calgary's One Health initiative — an integrated and inclusive way of looking at health issues.

One Health involves having experts from different disciplines share their knowledge and work together with community members to predict, prevent and solve health problems. We see the whole picture of infection — from transfer to humans via livestock, and what its effects may be on the environment — and unite medical researchers, clinicians, veterinarians and engineers to achieve the most positive results possible.

Our researchers are focused on the future. To secure safe and healthy water and food sources to serve a population predicted to reach nine billion by 2050, we are working to reduce infectious diseases in livestock. We are studying the use of antibiotics in animals, and how that translates into dangerous resistance in humans.

Through our integrated multi-disciplinary approach, we will lead the way in uncovering new ways to tackle these problems for a sustainable and healthy future.

Together, we will reduce drug resistance.

Slowing the birth of infections with no cure

If the spread of antibiotic-resistant infections continues at its current pace, medicine may return to the dark ages. In another 20 years, a simple cut on the hand may have the potential to be life-threatening. Considered by the Centers for Disease Control as one of the largest threats to global public health, the issue is not limited to the overuse of antibiotics to treat human illnesses. The use of antibiotics in the animals we eat and how this translates to antimicrobial resistance in people is of particular interest to researchers from the Cumming School of Medicine and the Faculty of Veterinary Medicine. Infection cannot be passed to humans through consumption of cooked or pasteurized animal products. It can, however, be transmitted through direct contact and waste that regularly gets into the lakes and rivers that supply our drinking water. We are studying ways of reducing use of antimicrobials in animals without jeopardizing their productivity as a food source. This will lead to less antimicrobial resistance in the bacteria that threatens both animal and human health, preventing potentially deadly outbreaks.

> “WHEN WE TREAT ANIMALS WITH ANTIBIOTICS, WE AREN’T JUST TREATING THE BACTERIA IN THOSE ANIMALS. WE ARE TREATING THE BACTERIA, ALGAE AND FUNGI IN THE RIVERS, THE FISH AND OTHER AQUATIC LIFE IN THOSE RIVERS, THE OTHER ANIMALS THAT DRINK FROM THOSE RIVERS, AND THE HUMANS THAT GET THEIR DRINKING WATER FROM THOSE RIVERS.”
>
> HERMAN BARKEMA, PROFESSOR OF PRODUCTION AND ANIMAL HEALTH, FACULTY OF VETERINARY MEDICINE

Together, we will evict unwelcome guests.

John Gilleard is part of a multi-faculty team of researchers that takes the study of parasites in animals and applies it to better understand and prevent the spread of parasites in humans in developing countries.

Safely controlling dangerous parasites

More than one billion people — one in six on the planet — are infected with parasitic worms. Based on their studies of parasites in livestock to keep critical food sources healthy, a team of eight researchers from the faculties of veterinary medicine and science, as well as the Cumming School of Medicine, is applying new knowledge in order to better understand and prevent the spread of parasites in humans in the developing world. This must happen without allowing the parasites to become drug resistant. The team's research uses precision medicine and One Health approaches to identify why parasites become resistant to drugs and what proteins are essential to the parasite and not the host. This will ultimately lead to the creation of new diagnostic tests and drugs to improve the control of these parasites and reduce their global health impact in both animals and humans.

Environment

Advancing along with the ever-changing earth

Disease has traditionally evolved much faster than medicine, especially over the past century. We are helping the human race catch up in a health landscape heavily influenced by the environment. Exposure to air and water pollution is a risk factor for diseases such as asthma — a serious threat in Alberta following the Fort McMurray wildfires in 2016. Airborne particles are also associated with lung cancer and cardiovascular disease. The warming climate has the potential to impact all populations, from heat-related illness to the broadening reach of infectious diseases.

We are developing a better understanding of how diseases function in the changing environment, leading to better ideas for prevention, easier diagnosis and targeted therapy. We're studying how we can treat the root of the problem to keep both animals and humans healthy. In addition, we are studying how we can use the environment to our advantage, seeking new micro-organisms in places like the Alberta oil sands with the knowledge that we may find the answers to complex health issues right in our own backyard.

Together, we will boldly seek new resources.

> “WE ARE EXPLORING NEW MICRO-ORGANISMS FROM UNIQUE ENVIRONMENTS, TURNING BUGS INTO DRUGS THAT CAN TREAT DISEASE ACROSS THE SPECTRUM.”
>
> JOE HARRISON

Exploring the oil sands for the key to developing new bug-killing drugs

Recent reports suggest antibiotic-resistant bacteria could kill 10 million people per year by 2050 if left unchecked, and run a cost of $100 trillion to the world’s economy. Assistant professor Joe Harrison and his colleagues in the Faculty of Science and Cumming School of Medicine believe the unique ecosystem of Alberta’s oil sands may hold the key to solving the growing problem.

The deep biosphere of the oil sands contains molecules that can break up bacterial biofilms — groups of harmful micro-organisms surrounded by a layer of slime that cause infection. Harrison and his fellow researchers use chemistry to identify promising compounds that may lead to clinical trials to combat infection in humans.

The discovery of new antibiotics from this untapped resource may save the lives of those suffering from deadly bacterial infections resistant to known antibiotics. It may also hold clues to cures for other diseases, and has the potential to stimulate the natural biological cleanup of things like oil spills in our oceans.

> GLOBALLY, WE NEED TO UNDERSTAND CLIMATE CHANGE AND HOW IT AFFECTS DISEASE IN PEOPLE AND ANIMALS, FROM LIVESTOCK, TO PETS AND WILDLIFE. WE ARE STUDYING IT WHERE IT IS OCCURRING MOST RAPIDLY IN ORDER TO PREDICT, PREVENT AND TREAT DISEASES IN OUR ANIMAL AND HUMAN POPULATIONS.
>
> SUSAN KUTZ

Together, we will learn from change.

Protecting the needs of Indigenous people in a warming world

For Arctic residents who depend on wildlife as a staple for food, culture and tradition, climate change is a serious threat to their lives. The warming arctic temperatures are affecting the health of animals like muskoxen and caribou by making them more susceptible to pathogens and allowing parasites to expand their range. The risk of transfer of disease to humans is also rising. Susan Kutz, a professor in the Faculty of Veterinary Medicine, is working directly with Inuit and Dene community members to assess the progress and determine possible solutions that will preserve both human and animal health, as well as critical safe food sources in this rapidly changing environment.

People
$25
million

Platforms
$25
million

Research
$25
million

$75 million

Take your place among the leading philanthropists of your time.

Join us to support research investigating the complexities of infections, inflammation and chronic diseases. Your support will help ignite the minds of tomorrow's medical leaders; enable transformative research; strengthen community partnership; and build a vibrant research program that allows for innovative ideas and solutions.

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

Together, we will help people live longer, healthier lives.

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:

People — $25 million

Better outcomes for people living with chronic disease depends on leaders who will bring discoveries to the community.

- 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 infections, inflammation and chronic diseases.
- Funding for highly skilled technicians, research nurses and health researchers will deliver innovative research programs.

Research — $25 million

Philanthropic support of research will lead to new discoveries in prevention, treatment and care.

- Highly integrated, multidisciplinary teams will focus on the continuum of research.
- Clinical trials will advance studies in prevention, detection and treatment.

Platforms — $25 million

Tools and research platforms are necessary to support the common goal of eradicating the burden of infections, inflammation and chronic diseases.

- The launch of the Western Canadian Microbiome Centre will allow researchers to better the prevention, detection and effective treatment of diseases influenced by our bacterial balance.
- Adding to existing imaging technologies with cutting-edge tools will create the most enlightening picture of disease in action.
- Advanced and specialized equipment will facilitate precise and personalized therapies.

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 solve the world's greatest health challenges.

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