A True Story
All the facts you need to know about animals & medical research
Since 1900, the average human life span has increased from 45 to 80 years, largely because of biomedical advances that depended on animal studies.

Animal research is important not only to thousands of critically ill children but to millions of children who DO NOT get sick because they have been vaccinated against polio, measles, mumps, whooping cough, diphtheria and tetanus.

Many of us have survived strep throat, ear infections, bronchitis and pneumonia without permanent harm thanks to antibiotics, which were developed with the help of laboratory animals.
Most of us care deeply about animals. We treasure our pets, we visit the zoo, we enjoy television programs about wildlife and movies featuring animals. Many of us support efforts to save endangered species.

But we also care deeply about our health and that of our children, our parents, our friends and neighbours. We seek medical attention when we are ill. Most of us have our children vaccinated against childhood diseases.

We follow the news of medical breakthroughs: scientific findings about the cause and prevention of cancer and heart disease, new drugs to treat serious diseases, new surgical techniques to correct birth defects or to repair or replace vital organs such as the kidney, and new diagnostic tests and tools to pinpoint disease in its earliest, most treatable stages.

Virtually all medical knowledge and treatment – certainly every major medical breakthrough of the last century – has involved research with animals.

There is a compelling reason for using animals in biomedical research. As yet, we have no other realistic way to continue our fight to save human lives.

It isn’t always easy to reconcile our love of animals with the need for the responsible study of some animals in the medical laboratory. But it helps if we can learn the facts about biomedical research and the important role that laboratory animals continue to play in improving our daily lives.

**Why use animals?**

Nearly every major biomedical advance is based on original, critical studies with animals. In biomedical research, investigators strive:

**To understand how our bodies work**

Before you can fix an overheated car engine, you must know how it works. Only then can you discover what went wrong and how to correct the trouble. Doctors must understand how the body works before they can find what ails us. Their understanding of the body’s functions can be traced to scientific findings from animal research.

**To study disease**

Animals contract many of the same diseases that we do. They act as models for the study of these illnesses. Rabbits suffer from spina bifida and cleft palates, for example, and dogs can have bleeding disorders such as hemophilia, so they are part of this research. From animals, we learn how disease works within the body, how the immune system responds, who will be afflicted, and more.

**To test all potential forms of therapy**

From new drugs to innovative surgery, every medical treatment is tested in animals to ensure our safety. Diagnostic tools such as the x-ray, implanted devices such as heart pacemakers and artificial hips, improved nutrition – we know how safe and effective these advances are because of animal research.
Investigators seek a model of the human condition they study. Humans and animals share more than 250 common illnesses. Cats, for example, occasionally suffer from “wandering eye” or strabismus, so Nobel-Prize winning work on this optical problem was carried out in cats. Pigs, eels, pigeons, even insects have aided biomedical research. Here are a few animals on which scientists rely:

**Mice, Rats**

They are the most commonly used species in Canada. Their short lifespan makes mice and rats ideal for studies of aging. Rodents reproduce readily, so investigators use them to discover how drugs affect offspring. Vaccines for many diseases, including whooping cough, were developed and tested in mice. They contribute to research on muscular dystrophy, in vitro fertilization, Hodgkin’s disease... the list is endless.

Rodents also play an invaluable role in biomedical research because their physiology and genetic makeup closely resemble those of humans. Results from sequencing and analyzing more than 95% of the mouse genome in 2002 showed that 90% of genes associated with disease in mice are identical to those in humans. Studying how the genes work in mice is an effective way of discovering the role of a gene in human health and disease.

Scientists have also discovered how to breed mice with genetic alterations that mimic human diseases. Transgenic and knockout rodents help scientists observe what happens during the progression of disease, including cancer, cystic fibrosis, heart disease, muscular dystrophy, and spinal cord injuries. The animals also allow investigators to test potential forms of treatment.

**Fish**

Fish models play a significant role in assessing how chemicals affect the environment and the organisms living in it. Zebrafish are proving to be a valuable research model in the study of early vertebrate development and genetics. They are also used to assess how the environment and chemicals impact normal human development.
**Cats**

Leukemia is the most infamous disease shared by cats and humans. In cats, it is caused by an AIDS-like retrovirus. Recently developed vaccines that protect against feline leukemia may act as a model for an AIDS vaccine. Since 1898, cats have contributed to the study of emotion, deafness, spinal cord injury, cataract surgery, lupus, breast cancer and more. These diseases are common in cats, who stand to benefit greatly from biomedical research.

**Dogs**

A dog’s heart works much like a human’s. In the 1600s, William Harvey studied its heart movement and blood circulation. In 1665, Richard Tower first performed transfusions by using quills and silver tubes to transfer blood in dogs. A year later, Sir Christopher Wren injected medicine into a dog’s veins, showing the world that lifesaving drugs can be administered quickly and effectively.

Because dogs have a high incidence of kidney disease, they are a natural choice for this research.

The first successful kidney transplant occurred in dogs at Harvard University in the late 1950s. Dogs currently aid research to prevent the rejection of transplanted organs.

**Artificial hips and joints for the handicapped, injured and aged were designed and tested in dogs. The most common treatment for human cataracts, the intraocular lens, was developed in dogs. In the future, they will help us to find ways to treat diabetes, cancer, gallstones, emphysema, hemophilia, lupus, narcolepsy and more.**

**Monkeys**

Similarities between humans, apes and monkeys are an obvious advantage to biomedical research. Dr. Bruce Chown and his Manitoba research team pioneered the treatment of Rh factor disease in rhesus monkeys. From monkeys and apes, we have gained insights into human language and behaviour, Parkinson’s and Alzheimer’s diseases, respiratory distress syndrome, intrauterine surgery and more. Non-human primates are also used in the study of AIDS, malaria, periodontal disease, aging, and Parkinson’s disease.

**Where do laboratory animals come from?**

Over 60% of animals used in biomedical research are rats and mice that are specially bred by scientists or reputable suppliers. Scientists have learned how to breed mice with genetic alterations that mimic human diseases. These rodents, purpose-bred by scientists or obtained from reputable commercial suppliers, make up vast proportion of mice used in biomedical research today.

Some animals, abandoned by their owners and slated to die because adoptive homes cannot be found, come from public pounds and animal shelters. Pound animals are important to biomedical research because unlike purpose-bred animals they come from genetically diverse backgrounds, and represent a wide spectrum of ages. The majority of pound animals are used for teaching purposes in veterinary medicine and animal health technology and can be adopted out at the end of the school year.

The use of dogs for research purposes has decreased dramatically since 1975.

Non-human primates (monkeys) and specially bred cats and dogs come from scientific breeding centres.
Canada was first to create an Animal Care Committee in every research facility.

In 1968, scientists and animal welfare activists concerned about the care and use of experimental animals in Canada formed the Canadian Council on Animal Care (CCAC). This internationally recognized council works with universities, colleges, voluntary agencies, the federal government, the pharmaceutical industry and the Canadian Federation of Humane Societies to develop guidelines for animal research.

All Canadian research facilities, including industry-based operations and government departments that use animals voluntarily meet these standards, which are outlined in CCAC’s “Guide to the Care and Use of Experimental Animals”, and in CCAC Policy Statements.

Animal Care Committees

Animal was first to create an Animal Care Committee (ACC) in every research facility that uses animals for teaching or testing. The CCAC supervises the care and use of laboratory animals through ACCs, which are comprised of veterinarians, scientists and community representatives, most of whom have experience in animal welfare.

The CCAC supervises the care and use of laboratory animals.

Animal Care Committees evaluate all research involving animals. They:

- consider whether the use of animals is necessary
- evaluate the ethics of proposed studies
- approve any activities that use animals before projects begin
- set and oversee procedures that ensure animals do not experience unnecessary pain, and, when necessary, are killed humanely
- see that laboratory animals receive adequate, responsible veterinary care.

Procedures that may potentially cause pain are stringently scrutinized by Animal Care Committees. They have the power to stop any objectionable research immediately. They also see that investigators, graduate students and animal care
personnel are properly trained.

A training program for all personnel involved with the use of animals in research, teaching and testing has been mandatory since 2003. Research facilities require that animal health technicians have thorough training and usually provide their staff with the opportunity to take additional animal care courses.

**CCAC Assessment**

The CCAC conducts spontaneous, unannounced visits to animal care committees to evaluate their effectiveness and the support they receive from the research facility. Every three years, or less if warranted the CCAC also schedules visits to assess each research facility’s compliance with animal care and use guidelines. Institutions which have been in compliance with CCAC guidelines for two consecutive three-year visits may be moved to a five-year assessment program. These institutions remain subject to unannounced visits.

If a project or facility does not measure up to CCAC standards, it must implement changes within six months or risk the withdrawal or freezing of research funds by the Canadian Institutes of Health Research (CIHR) and/or Natural Sciences and Engineering Research Council (NSERC).

Cruelty to animals is a criminal offense in Canada. Animals that are transported to research facilities are protected by the federal Health of Animals Act. In Ontario and Alberta, special legislation governs experimental animals.

**MYTH vs FACT**

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<th>Myth</th>
<th>Fact</th>
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<tr>
<td>Laboratory animals suffer great pain and distress</td>
<td>Animals are not exposed to any pain in most research projects. In the minority of experiments where pain may be encountered, animals are protected by anesthetics, tranquillizers and pain-killing drugs. Only a few experiments, for example, the study of pain itself, must withhold these drugs because they obscure research results. These studies are strictly supervised by CCAC Animal Care Committees.</td>
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<td>Scientists really don’t care what happens to laboratory animals.</td>
<td>The welfare of laboratory animals is the concern of every responsible medical researcher for humane as well as scientific reasons. Ill-fed, poorly housed, badly treated or distressed animals make poor research subjects. They do not provide reliable scientific data. No scientist can expect accurate research results from animals kept under detrimental conditions. For this reason, the quality of a laboratory animal’s life is a prime concern of medical researchers.</td>
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<td>Most laboratory research with animals is unnecessary.</td>
<td>Apart from humane concerns, scientists face strong economic pressures against the unnecessary use of laboratory animals and other research resources. Only limited funds are available for the investigation of many human health problems. Funding agencies must restrict support to well-designed studies that will add new knowledge of the human body or find causes, cures and preventions of disease. The Canadian Institutes of Health Research (CIHR) and Natural Sciences and Engineering Research Council (NSERC), the two largest funding agencies in Canada, require all grant applications to include an extensive scientific bibliography to avoid the possibility that researchers may duplicate previous work.</td>
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<td>Other research methods can replace animals in biomedical research.</td>
<td>Scientists only use animals for biomedical research when necessary. Over the years, scientists have developed many valuable, non-animal tests which now supplement or, in some cases, replace work with live animals. Unfortunately, there are limitations to these procedures. Scientists use computer models to predict how new medications will affect our bodies. But a computer only works with information we already know. Only animal models can help us to explain the mysteries of our bodies. Perhaps one day, computers will mimic all complex body functions... but that time has not yet come.</td>
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<td>Animal cell and tissue cultures (in vitro tests) can help scientists to identify the potential toxic or beneficial effects of a new chemical compound. But independent cells often react differently than our whole body. Tissue cultures don’t have a nervous system; you can’t measure blood pressure in a test tube. New compounds must be tested on living, interacting organ systems before humans and animals can use them.</td>
<td>Like any new scientific discovery, research techniques to replace, reduce or refine studies on laboratory animals take time to develop, scientifically validated and accepted by regulatory authorities.</td>
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Before the turn of the century, many elixirs promised miraculous cures. Mrs. Winston’s syrup soothed with morphine. Shiloh’s Cure for Consumption controlled coughs with heroin. In 1937, an antibacterial sulpha drug was first marketed as a liquid in the USA. The untested formula was made with ethylene glycol (antifreeze) because sulpha drugs do not dissolve well in water. The compound killed 107 people, mostly children. This tragedy could have happened in Canada. At the time, manufacturers did not need to prove that new drugs were safe to use before they were sold.

Today, every new drug must pass a rigorous product testing routine set by the Therapeutic Products Directorate of Health Canada to ensure our safety. From the time a new product is invented to the moment it’s available for use may take 15 years. Only 1 in 3,000 new discoveries is successful.

During the lengthy testing process, drug manufacturers and government work together to discover if the new product is safe. The drug company begins three levels of drug trials (in vitro, in vivo and clinical trials). The government verifies that the new drug has passed each necessary step.

Are all levels of testing necessary?
Modern drug testing routines were not hastily constructed but have been developed and refined since the Patent Medicine Act of 1909. Our body is a complex organism that reacts unpredictably to new medicines, so according to law, all biomedical discoveries must be pre-tested to prevent human death or harm.

Investigators have learned that in vitro laboratory tests alone cannot provide enough valid information to satisfy our regulatory agencies (i.e. Health Canada) that a drug is safe to use. After all, single cells cultured in laboratory test tubes differ radically from complete, human organ...
systems. Because they cannot show complex interactions within the human body, in vitro tests cannot adequately forecast how we will react to a new drug.

Every chemical invented to help mankind is a potential killer. Whether it is used occasionally or repeatedly as a medication, food additive or industrial or farm product, all unknown chemicals must undergo tests to determine their harmful effects on humans. In the Poison Control Centre, doctors know how to identify an overdose or how to counteract an accidental poisoning because of acute toxicity tests in animals.

**Toxicity testing**

Toxicology tests determine how lethal a new chemical is and at what concentrations the chemical can be used safely in humans and animals. Toxicology tests are valuable guides for the control and prevention of acute poisoning, particularly since some fairly toxic chemicals are used daily in the industrial and farming sectors. Symptoms of poisoning in overexposed workers are better understood and treated, if physicians know how much exposure to a harmful chemical constitutes a potentially toxic dose. Toxicity tests are also conducted to determine if the chemical causes damage to the health of the organism (reversible/irreversible), and if exposure to the chemical induces cancer, genetic damage or mutation(s), or birth defects. These tests are required by law.

The specific tests conducted are primarily determined by the major route of exposure (i.e., by mouth, on the skin, in our eyes). These tests still involve the use of experimental animals, although scientists have made significant advances in reducing the total number of animals involved in the testing process. The development of new toxicity tests has dramatically reduced the number of animals required in traditional tests like the LD-50, while other tests have been refined to cause less pain or discomfort. Scientists have also developed non-animal methodologies that reduce, and in some instances replace the use of an animal. For example, non-animal pre-screens can determine if a new chemical is corrosive and if so, no further testing is conducted. Other pre-screens recently developed for ocular safety testing will likely reduce the use of live animals for eye safety testing by 10% or more.

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**The path of a new drug**

**New drug submission (1-4 years)**

The results of all the research (basic and clinical) conducted on a new drug are reviewed by the Health Products and Food Branch (HPFB). All drugs are reviewed by the HPFB to ensure that there is sufficient evidence to support the safety, efficacy and quality of the drug and to ensure that the requirements of the Food and Drugs Act and Regulations are met for approval. The HPFB assesses the risks and benefits of the drug. If it is judged that, for a specific patient population and specific conditions of use, the benefits of the drug outweigh the known risks, the HPFB will approve the drug by issuing a Notice of Compliance.

**Distribution**

The successful product is sold only at pharmacies, usually with a doctor’s prescription. After many years of safe and effective use, some highly beneficial drugs (i.e. common pain killers, antihistamines, anti-arthritic medication) may be licensed for sale without prescription (over the counter).
Advances in Veterinary Medicine

Over its lifetime, your pet’s health depends on the benefits of animal research. Today, more than 83 medicines developed for humans through animal research are routinely used by veterinarians to treat sick or injured pets, farm animals, and wildlife. Dogs benefit from anticonvulsive drugs and medication to treat arthritis, and cats can be treated for hypothyroidism and feline diabetes.

Breakthroughs such as vaccines for distemper, rabies, parvovirus, feline leukemia and infectious hepatitis are based on animal research. Our pets now have protection against parasites such as hookworm and heartworm. When ill, safe and effective antibiotics are available for their treatment. Tranquilizers, pain killers and anesthetics now remove the anxiety, pain and fear that was previously commonplace when our pets needed veterinary treatment. Every day, they eat healthy foods because of animal-based nutrition research. They can be treated for cancer, receive pacemakers, and undergo corneal and organ transplants.

Stem cell therapy, which holds great potential to treat human disease and prevent suffering to a host of debilitating diseases in the future, has already reaped enormous benefit in treating horses with tendon damage. The therapy is also being used with some promising results to treat arthritis as well as tendon and ligament injuries in dogs.

Pets accidentally involved in car accidents or afflicted with hip dysplasia or arthritis now benefit from advances in human orthopedic surgery. Many animals that once had to be destroyed are now able to live longer, healthy lives.

In the 1950s, monkeys were instrumental in the discovery of the oral polio vaccine. When Jane Goodall reported an outbreak of polio among East African chimpanzees, human polio vaccine was flown in to save the colony.

Animals who support research

According to the Canadian Council on Animal Care, investigators at Canadian university, government and commercial laboratories used 2,054,909 animals in 2007 for research, teaching and testing.
Treatable conditions
scarlet fever
gallstones
tooth and gum disease
anemia
hay fever
schizophrenia
Rh disease
PKU (phenylketonuria)
cataracts
corneal defects
ear infections
vitamin deficiency

Diseases with life-prolonging treatments
rheumatoid arthritis
diabetes
cystic fibrosis
hypertension
epilepsy
muscular dystrophy
emphysema
hemophilia
leukemia

Bone fractures
herpes
depression
pneumonia
bronchitis
acne
allergies
peptic ulcers
premature birth
chlamydia

Benefits of Animal Research

Major discoveries
DNA
virus and retrovirus
electron microscope
pump-oxygenator
electrocardiograph (ECG)
electroencephalograph (EEG)
angiogram
radiation therapy
kidney dialysis machines
iron lung
blood pressure measures
heart pacemaker
artificial hips and joints
x-rays

Surgery
blood transfusions
coronary bypass
kidney, heart, lung, liver transplants
blue baby syndrome
heart valve replacements
abdominal surgery
congenital heart defects
skin grafts (burn therapy)
spina bifida
microsurgery
breast cancer
brain tumours
birth defects
intrauterine surgery

Other
stroke rehabilitation
intravenous feeding and medication
artificial limbs
re-attachment of severed arms, legs, fingers
how lifestyle affects health
effects of smoking, alcohol, drugs
occupational/environmental hazards
improved nutrition
Every scientist who unravels the mysteries of man's afflictions adds to our knowledge of the human body. If we traced the impact of one scientist's discovery to another's work, what would we find? Like climbing an unexplored mountain, investigators slowly and carefully attain their goal: a glimpse of new paths to progress.

Two U.S. scientists, Comroe and Dripps, found at least 21 major biomedical advances over 300 years were necessary before one in four Canadians could benefit from coronary bypass surgery. Laboratory animals contributed to 18 of these steps. The dog, in particular, advanced the knowledge of our heart from ignorance to enlightenment.

To conquer polio...

1. The conquest of polio begins in 1909, when two scientists (Landsteiner and Popper) find that apes and monkeys can contract the disease from man. Working with laboratory mice, scientists begin to suspect that polio is a virus, but still cannot identify the organism that causes the disease.

2. Stanley discovers the existence of viruses in 1935 with an electron microscope, which enables scientists to study extremely minute forms of life.

3. In the early 1940s, scientists studying how viruses react in the gastrointestinal tract accidentally discover the poliovirus.

4. Preliminary research on the poliovirus shows that it travels by air or the touch of a contaminated hand.

5. lands and monkeys can contract the disease from man. Working with primates, scientists will later develop and test antipolio vaccines.

Before 1947, research on mice indicated the belief that polio is a neuronologic disease spread by unsanitary conditions.
In 1949, Jonas Salk confirms that 3 strains of virus cause polio.

In 1951, Salk publishes the results of a small U.S. clinical trial of a vaccine made from killed poliovirus. At the height of the polio epidemic, parents clamour for their children’s protection and demand access to the unproved vaccine.

In 1954, a large North American clinical trial proves that Salk’s vaccine is 99% effective against Type 2 and 3 polio strains, but outbreaks occur among those infected with Type 1 virus.

By 1955, Raymond Parker at the University of Toronto discovers a way to grow poliovirus in monkey kidney tissue culture, paving the way for the development and mass production of a new vaccine. Albert Sabin tests his new oral vaccine of live but weakened (attenuated) polio virus in the Soviet Union, which had its first polio outbreak the previous year.

The safe and effective Sabin oral polio vaccine is adopted worldwide. In 1982, the World Health Organization warned of disastrous effects if live polio vaccine was released without pretesting in monkeys. “Vaccines are given to healthy, young infants, often in mass campaigns before the dangers are recognized. Safety testing in animals is humanity’s only safeguard.”

Today, the global effort to eradicate polio has reduced the number of new cases that are diagnosed worldwide every year from hundreds of thousands to around one thousand, since the program was introduced in 1988.

At one time, the diagnosis of diabetes was a death sentence. If you were a child, you had less than a year to live...

In 1921, Frederick Banting and Charles Best first isolated a secretion, insulin, from the pancreas of dogs at the University of Toronto. Best later extracted insulin from cow pancreas, purified and filtered it, then tested it successfully on diabetic dogs.

On January 10, 1922, Banting and Best injected each other with insulin to test for “untoward effects”. The next day at Toronto General Hospital, 14-year-old Leonard Thomson became the first diabetic to receive insulin.

Insulin, which today is produced through genetic engineering, is not a cure, but simply a control. Investigators are still searching for ways to improve its treatment and to eradicate diabetes, the third leading cause of death in North America. And animals like the dog, rat and pig still contribute to our expanding knowledge of this disease. With their help, biomedical researchers hope to find a cure for juvenile diabetes within a decade.

The insulin story

“The insulin story is dramatic, wonderful evidence of how the use of animals in medical research can play an indispensable role in lifesaving medical advances.”

Michael Bliss
author of The Discover of Insulin
ongoing research.

Without the aid of animals, biomedical research of the following conditions would suffer an incurable setback:

AIDS
Alzheimer’s disease
Parkinson’s disease
arthritis
cystic fibrosis
leukemia
lung cancer
breast cancer
skin cancer
birth defects
multiple sclerosis
muscular dystrophy
in vitro fertilization
chlamydia
heart and lung transplants
heart and kidney transplants
diabetes
genetic disorders
hearing loss
aging
depression

behavioural problems
headache
spina bifida
hemophilia
lupus
pneumonia
Tay-Sachs
respiratory distress
syndrome
slow viruses
herpes
conjunctivitis
influenza
spinal cord injury
cataract surgery
corneal transplants
mercury poisoning
asthma
rheumatism
cytomegalovirus
anemia
bone cancer
osteoforosis
bronchitis
artificial limbs and joints
glaucoma
hypertension
pain relief
Down’s syndrome
atherosclerosis

meningitis
hepatitis
Hodgkin’s disease
immunosuppressive
diseases
epilepsy
stomach cancer
bowel cancer
brain tumours deafness
cervical cancer
endometrial cancer
hydrocephalus
kidney stones
emphysema
cleft palate
growth disorders
heart attacks

stroke
bone loss
hypervitaminosis
cholera
anesthesia
fertility problems
contraception
fetal development
skin grafts
tooth implants
gum disease
environmental health
hazards
thyroid disorders
obesity
nutrition
orthopedic surgery
osteomyelitis
syndactyly
shock
dermatitis...
Animals are an essential part of biomedical research. They protect us, help us and offer us the best hope for finding the cause, treatment and prevention of diseases that inflict pain, disability and death on humans and animals. Humane and responsible animal studies are our insurance of a healthy lifestyle and healthier future for both ourselves and our animal companions.

Biomedical research, product development and safety testing depend on the study of laboratory animals. While investigators are trying to limit animal use as much as possible, the study of human and animal diseases will continue to rely largely on animal research for the foreseeable future.

The continued advance of biomedical research depends on public support. If we decide to eliminate or severely restrict laboratory research with animals, we may sacrifice a healthier future.

Incurable diseases and disabilities still affect many people. Future advances in biomedical research could save your children, grandchildren and perhaps even you. But without the help of laboratory animals, our chances of progress against AIDS, Alzheimer’s, arthritis, muscular dystrophy, heart and kidney disease, Down’s syndrome, leukemia and other diseases would stop. Dead.

Canadians for Health Research asks you to consider the scientific facts and ethical concerns that surround this issue before you decide to form an opinion. We urge you to support the responsible needs of your biomedical research community as it works towards improving the health of your world.

You decide...
Canadians for Health Research (CHR) is a national, not-for-profit organization, dedicated to engaging Canadian youth and adults in understanding health research issues, scientific processes and their impact through education and advocacy.

CHR believes that the continued, responsible use of animals is essential to biomedical research if we are to cure disease, alleviate pain and suffering and enhance the quality of human and animal life.

CHR members are committed to the high standards advocated by the CACC and are prepared to ensure that these standards are maintained in Canada.

CHR encourages the development and use of reliable, non-animal testing methods but does not believe that it is morally wrong to use laboratory animals if no viable alternative exists.