

Pandemic Preparedness Strategic Research Initiative

Priorities

The mandate of the Canadian Institutes of Health Research (CIHR) is to excel, according to internationally accepted standards of scientific excellence, in the creation of new knowledge and its translation into improved health for Canadians, more effective health services and products and strengthened Canadian health care system. The CIHR Institute of Infection and Immunity (CIHR-III) leads CIHR in addressing this broad mandate in the area of influenza pandemic preparedness.

Influenza is an infectious disease that causes fever, sore throat, muscle pain, headache and fatigue. Infections can be severe and cause several thousand deaths worldwide each year. In the past, new strains of the influenza virus have emerged and caused influenza pandemics that claimed several million lives. Most experts agree that the next pandemic is overdue. The recent emergence of a highly pathogenic strain of avian influenza (H5N1) capable of transmission from birds to humans has heightened concerns that a pandemic could be close at hand. An influenza pandemic could have severe health, economic and social consequences. Worldwide, between 2 million and 7.4 million people could die, including 11,000 to 58,000 Canadians. In total, an estimated 4.5 to 10.6 million Canadians could become ill.

Research will play a key role in helping prevent or lessen the impact of an influenza pandemic. To ensure that Canada has a coordinated and focused research effort, the CIHR-III has established the Pandemic Preparedness Strategic Research Initiative (PPSRI). The PPSRI is supported by the Canadian federal government which announced in May 2006 that it will provide \$21.5 million over five years to support pandemic influenza research. The mission of the PPSRI is to identify strategic research priorities and support pandemic preparedness research. The PPSRI is guided by a Task Group, consisting of representatives who carry out relevant research and members who will use the new research knowledge to guide the activities of the PPSRI.

PPSRI Task Group

Mark Loeb (Chair)	CIHR-III Advisory Board and Professor, McMaster University
Earl Brown	Professor, University of Ottawa
Robert Brunham	Director, Centre for Disease Control, University of British Columbia
Theresa Tam	Director, Public Health Agency of Canada Centre for Infectious Disease Prevention and Control
Ross Upshur	Director, Joint Centre for Bioethics; Associate Professor, Departments of Family and Community Medicine and Public Health Sciences, University of Toronto
Bhagirath Singh	(Ex Officio) CIHR-III, Scientific Director



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The PPSRI Task Group, in consultation with stakeholders (see sidebar), has developed strategic research areas first identified during the Influenza Research Priorities Workshop held by CIHR-III and the Public Health Agency of Canada in September 2005. The PPSRI will address these priorities through strategic initiatives such as targeted requests for applications. The priorities are not intended to lessen the importance of other areas of influenza research, which will remain eligible for funding through regular CIHR open competitions.

Vaccines and immunization programs

Vaccination is an excellent method of preventing and controlling the spread of infectious disease. However, developing effective influenza vaccines is a complex challenge. The efficacy of current vaccines varies and can be low in vulnerable populations such as the elderly. A greater understanding of how the immune system responds to influenza would enable researchers to develop better vaccines. Current vaccine preparation methods are generally slow and require a lot of viral antigen. We need new influenza vaccines and technologies to speed the availability of vaccines during a pandemic. It is difficult to know in advance the exact composition of a new pandemic strain and prepare an effective vaccine. To solve this problem, vaccines that offer cross-protection against many influenza strains would be ideal.

Key areas of research

- ◆ Identify immune responses to influenza infection and vaccination and the indicators of protection
- ◆ Optimize existing influenza vaccines and immunization programs
- ◆ Develop new vaccines and technologies, including cross-protective vaccines
- ◆ Assess the safety and potential benefits of current and new influenza vaccines

The virus: biology and rapid diagnostics

Not enough is known about the influenza virus – how it evolves, the molecular basis of its transmission or the mechanisms involved in its pathogenesis. In addition, reliable and rapid diagnostic tests for influenza are not currently available. Through improved diagnosis, health care professionals will be able to assess the effectiveness of vaccination programs more effectively.

Stakeholders Consulted

Canadian Institutes of Health Research
 Institute of Aboriginal Peoples' Health
 Institute of Health Services and Policy Research
 Institute of Infection and Immunity
 Institute of Population and Public Health
 Ethics Office
 Knowledge Translation Portfolio
 American Red Cross
 Association of Medical Microbiology and Infectious Disease Canada
 BioteCanada
 Canadian Food Inspection Agency
 Canadian Foundation for Infectious Diseases
 Canadian International Development Agency
 Council of Chief Medical Officers of Health
 Emerging Infectious Disease Research Network
 Health Canada
 Industry Canada
 INRS-Institut Armand-Frappier
 International Development Research Centre
 Mathematics of Information Technology and Complex Systems (MITACS) Network of Centres of Excellence
 Michael Smith Foundation for Health Research
 National Institute of Allergy and Infectious Diseases NIH
 Public Health Agency of Canada
 Rx&D (Canada's Research Based Pharmaceutical Companies)
 U.S. Center for Disease Control and Prevention
 University of Ottawa
 World Health Organization

Key areas of research

- ◆ Determine the molecular basis of transmission of influenza, including the human/animal interface
- ◆ Understand human and animal responses to influenza infection
- ◆ Understand the genetics of influenza, including viral evolution and the determinants of host range and virulence
- ◆ Develop and evaluate rapid diagnostic tests for influenza

Prevention and treatment

In the event of a pandemic, knowledge of how to prevent the spread of the virus and treat infected individuals will be critical. Researchers and health officials do not know enough about how the influenza virus spreads in humans or the best ways to prevent transmission between individuals. Anti-viral drugs will be an important therapeutic tool during the early stages of a pandemic before vaccines are available, so it will be essential to optimally use the limited supplies of these drugs. New anti-virals are needed in light of the limited number that are currently available, but developing a new anti-viral drug is a long-term project best suited to industry.

Key areas of research

- ◆ Determine molecular basis for transmission of influenza viruses between humans
- ◆ Establish methods to prevent transmission at the individual, institutional and community level
- ◆ Determine risk factors for infection, including identification of susceptible populations
- ◆ Develop methods for the rapid containment of infection and optimization of existing anti-viral drugs

Ethics, legal and social contract

There is an urgent need for researchers and public health officials to determine how to prevent and respond to a pandemic. We need to develop communication strategies that will effectively educate health care providers in the application of care guidelines and maintain trust between public health authorities and the public. It is vital that we prepare guidelines that address global, hospital and bedside requirements for the ethical allocation of scarce resources and quarantine procedures during a pandemic. It is also essential to understand the legal, social, economic and cultural impact of such measures and examine the needs of vulnerable populations, including children.

Key areas of research

- ◆ Develop and optimize knowledge translation and communication strategies
- ◆ Identify and address ethical, legal and social issues of surge capacity in pandemics, including resource allocation
- ◆ Understand the perceptions among health care providers and the public on the scope and extent of obligations and duty to care during a pandemic

CIHR-III is working with partners to support research in the priority areas. Results from the PPSRI and the continued activities of the Initiative will help Canada and the rest of the world prepare for influenza outbreaks and a future pandemic.