



Infectious Diseases

The Canadian Institutes of Health Research (CIHR) is the Government of Canada's agency for health research. Through CIHR, the Government of Canada invested approximately \$201.4 million in 2006-07 across Canada in research on infections and immunity.

The Facts

- As of April 2007, there were more than 290 reported human cases of avian flu worldwide, resulting in more than 170 deaths. The infection has spread to locations in Europe and Africa. Most cases are the result of bird-to-human infection; however, human-to-human transmission has been suggested in at least one case. The virus's ability to turn into a pandemic is being closely monitored.
- A flu pandemic could make 15-35% of the Canadian population critically ill, causing up to 58,000 deaths, according to estimates by the Public Health Agency of Canada. Vaccines and antiviral medications would reduce both illness and deaths. The Government of Canada has invested more than \$1 billion in pandemic preparedness with \$21.5 million for research.
- Between 1995 and 2003, rates of multi-drug resistant *Staphylococcus aureus* (MRSA) in Canadian hospitals increased from about 0.5 cases per 1,000 admissions to 5 per 1,000 admissions. MRSA is making many antibiotics obsolete and is a threat to our ability to control bacterial infection.



About CIHR

The Canadian Institutes of Health Research (CIHR) is the Government of Canada's agency for health research. CIHR's mission is to create new scientific knowledge and to catalyze its translation into improved health, more effective health services and products, and a strengthened Canadian health-care system. Composed of 13 Institutes, CIHR provides leadership and support to more than 11,000 health researchers and trainees across Canada.

Finding Solutions

Attack of the superantigens

What do flesh-eating disease, food poisoning and toxic shock syndrome have in common? CIHR-funded researcher Dr. Joaquín Madrenas of the London, Ontario-based Robarts Research Institute found that these rapid-onset diseases are all caused by tiny amounts of bacterial "superantigens", toxins that are secreted by some bacteria and that trigger a massive activation of immune cells throughout the body. This systemic immune response then sets off its own chain of damaging biochemical events that can lead not only to fever and vomiting but to multiple organ failure and death. The finding will help develop new drug therapies for these devastating diseases.

Booster fuel for the immune system

CIHR-supported researcher Dr. Robert Hancock of the University of British Columbia – winner of CIHR's Canada's Health Researcher of the Year Award in 2006 – has identified and demonstrated the effectiveness of a new tool in the fight against antibiotic-resistant bacteria, which are becoming a major health risk. Using a newly discovered peptide called IDR-1, the research team was able to substantially boost the immune system. In tests in mice infected with antibiotic-resistant superbugs, the peptide significantly reduced the number of deaths caused by infection.

Outsmarting a deadly parasite

A new study led by Dr. Lakshmi Kotra of the Toronto General Research Institute has discovered a chemical that shuts down the malaria parasite. This synthetic compound blocks the activity of a key protein required for the parasite to reproduce and survive. By targeting and killing malaria parasites, including drug-resistant strains of the disease, researchers are closer than ever to the creation of a new anti-malarial drug. This project, funded in part by CIHR, could help protect people in the developing world from this too-common disease.

Heartburn medications may unleash deadly bacteria

A group of CIHR-funded researchers at McGill University led by Dr. Sandra Dial showed that widely-used drugs for suppressing excess stomach acid, such as heartburn medications, can increase a person's risk of *Clostridium difficile* infection. Researchers originally thought that *C. difficile* infections were most common in hospitalized patients receiving antibiotics. However, it appears that non-hospitalized individuals taking medications to reduce stomach acidity also face an increased risk of infection. The theory is that changing acid levels in the stomach encourages the growth of *C. difficile* bacteria. These findings may help physicians protect their patients against a potentially fatal bacterial infection.



The Researchers

Dr. Jim Lavery – Teaching scientists to communicate

When researchers and public health professionals fail to communicate effectively with the public, the results can be disastrous. For scientists trying to combat the spread of infectious diseases through communities, communication is particularly important.

For example, when the United Nations attempted to prevent malaria infection by giving pesticide-treated mosquito nets to communities in Africa, the residents refused to put the long white nets over their beds. The U.N. did not realize that the colour white is a powerful symbol of death to the people that they were trying to help.

Dr. Jim Lavery, a scientist at St. Michael's Hospital in Toronto, believes that we have to listen to the thoughts

and concerns of the people who will be affected by new technologies and health policies. "We have to be able to listen authentically and acknowledge that there may be some wisdom here that we need to incorporate," says Dr. Lavery.

Dr. Lavery and his colleagues are currently working on a project called "A Brokered Dialogue between the Rich and the Poor". The project involves separately filming health professionals and community members talking about issues like tobacco use, which they may not feel comfortable discussing in a face-to-face interview. These filmed sessions are then edited together into a simulated conversation that can help both groups gain a better understanding of the issue.

Dr. Lavery feels that we could use these brokered dialogues to prepare for an emergency situation, such as a widespread outbreak of avian flu, in which public health officials must act quickly. "It would be really useful if, in advance, people had some mechanisms of public discussion," he says.

