Research About – Infectious Diseases

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 nearly 12,000 health researchers and trainees across Canada.

Through CIHR, the Government of Canada invested approximately $222.2 million in 2007-08 in infectious diseases-related research across Canada.

The Facts

- While H5N1 avian influenza has broken out among bird populations in Asia, the Middle East, Africa and Europe, it rarely affects humans. As of April, 2008, avian influenza had killed 238 of the 376 people infected since 2003. Most were infected through contact with a sick bird. In a few rare cases, one person appears to have infected another.

- A 2008 report by the Public Health Agency of Canada indicates that for every 1,000 people admitted to hospital, eight are either infected with or carrying methicillin-resistant *Staphylococcus aureus* (MRSA). Left untreated, MRSA can develop into life-threatening infections of the blood, bones and lungs.

- Health Canada estimates that 250,000 people in the country are infected with the hepatitis C virus, which can cause chronic liver disease.

(Sources: Reuters, the Public Health Agency of Canada, Health Canada)

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Finding Solutions

Hand sanitizers no match for *C. difficile*

Researchers in a CIHR-funded project examining the use of hand disinfectants have found that the hospital superbug *Clostridium difficile* is not killed off by alcohol-based hand hygiene products. The research team, led by Dr. Michael Libman, Director of the Division of Infectious Diseases at the McGill University Health Centre in Montreal, is investigating the use of alcohol-based disinfection versus liquid soap and water for the removal of *C. difficile*. There have been an estimated 260 *C. difficile* deaths in seven Ontario hospitals over the past two years and up to 2,000 Quebecers have died since a 2003 outbreak of the bacterium. Soap and water is effective for removing the bacteria from hands. The team's findings have been submitted for publication.

Nasal spray shows promise in defeating dysentery

A University of Calgary research team led by Dr. Kris Chadee has developed a nasal-spray vaccine that can block a parasite responsible for 100,000 deaths each year. The *Entamoeba histolytica* parasite triggers amebiasis, a dysentery common in developing countries with poor sanitation. Dr. Chadee, a member of the CIHR's Grants Research Committee in Experimental Medicine, found a way to prevent the parasite from binding to intestinal cells of gerbils by giving them a nasal spray dose of the vaccine, followed by a booster shot. If studies involving larger animals go well, the vaccine will be tested on humans.

Searching for a sustainable flu vaccine

A CIHR project is taking up the challenge of finding a new generation of influenza vaccines that could provide longer protection than the current annual flu shots. The vaccines now used deploy antibodies to target the constantly changing proteins that trigger influenza. The CIHR project, led by Dr. Réjean Lapointe at the Centre Hospitalier de l'Université de Montréal, will look at developing a vaccine that will target proteins that change very little from strain to strain of influenza. The research will provide an ideal complement to current influenza vaccines and could increase our ability to combat pandemic threats.

The Researchers

Dr. Donald Weaver – A One-Two Punch to Infection

Dr. Donald Weaver is a neurologist, computational chemist and leader in the design of new Alzheimer's drugs. So what's he doing engineering new antibiotics?

"When I do my rounds on the neurology ward these days, infections are as an important health issue for my patients as are their neurological disorders," says the Dalhousie University chemistry professor.

Drug-resistant bacteria are a major and growing problem around the world. In hospitals, methicillin-resistant *Staphylococcus aureus* (MRSA) has become resistant to almost all antibiotics. The result is a steadily increasing mortality rate from antibiotic-resistant infections.

Dr. Weaver's CIHR-funded team – including biochemists Drs. David Byers and Christopher McMaster – is developing experimental drugs that target the bacteria's ability to build its cell membrane, the outer coating that's akin to the bacteria's skin.

"What we're doing is creating drugs that literally punch holes in the bacterial cell's membrane," says Dr. Weaver. "If we punch a few holes, we make the cell weak and the holes enable other conventional antibiotics to get in there and work much better. Our drug beats-up the cell, the other antibiotic delivers the death blow."

They're focused on developing small, patentable molecules that will pack a punch both chemically and commercially.

"We already have a number of compounds that increase the efficiency of the antibiotic erythromycin 200-fold," he says. To date all of these tests are *in vitro*, or with bacteria in lab glassware, rather than in animals or patients.

Dr. Weaver is confident his team has an approach that can lead to effective "pro-antibiotics". They've formed the spin-off company DeNovaMed to help take the next step of getting promising new antibiotics from the lab to the patients who need them.

For more information, go to www.impact.cihr-irsc.gc.ca

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