



# INSTITUTE OF INFECTION AND IMMUNITY

## ANNUAL REPORT 2004/2005



CIHR IRSC

Institut des maladies  
infectieuses et immunitaires  
Institute of Infection and Immunity

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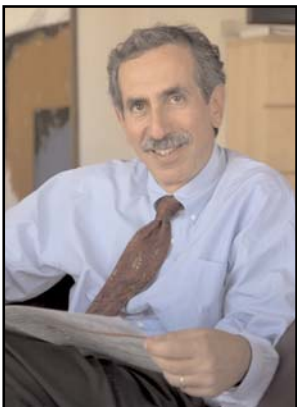
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**Dr. Alan Bernstein**  
*President, CIHR*

## Message from the President of CIHR

Infectious diseases know no boundaries and we frequently find ourselves at the mercy of new or re-emerging pathogens against which we have little or no natural resistance. The SARS outbreak in Toronto gave Canadians a realistic perspective on the far-reaching effects of new viruses and reinforced the health, social, psychological and economic costs associated with such diseases. We were fortunate in Canada that our public health system and the many outstanding health care professionals involved in containing the infection on the front lines ultimately were successful. Research across all areas of health - basic, clinical, health services, and population health - is the key to overcoming the threat of infectious diseases.

The Institute of Infection and Immunity (III) is an excellent example of the leadership shown by the Canadian Institutes of Health Research CIHR in identifying and responding to health challenges through partnerships that unite diverse groups with a common interest. The rapid research response to the SARS crisis, led by III, is just one illustration of this leadership. III has created many partnerships that have 'made a difference', such as the Canadian Research Coalition for Safe Food and Water and the Canadian SARS Research Consortium. III also manages the research program of the Federal Initiative to Address HIV/AIDS in Canada with the support of the CIHR HIV/AIDS Research Advisory Committee (CHARAC), a sub-committee of the III Institute Advisory Board.

In 2004/2005, III was quick to respond to the *Clostridium difficile* (*C. difficile*) crisis that erupted in Quebec and, to a lesser extent, in Alberta. The severe form of antibiotic-associated diarrhea that is the hallmark of *C. difficile* infections caused many deaths and became a major cause for concern in hospitals experiencing outbreaks. III co-hosted a research symposium with the University of Manitoba, launched a research initiative to address the issue of inadequate infection control practices in our health care institutions (a major factor in the spread of *C. difficile*), and entered a partnership agreement with the *Fonds de la recherche en santé du Québec*

for which CIHR Governing Council funds were accessed to mount a multidisciplinary research response. One of the root causes of *C. difficile* infections is the overuse of certain classes of antibiotics, which draws attention to the global problem of antibiotic resistance. III is addressing this issue through a planned research initiative involving many partner organizations. The first step was the highly successful Novel Alternatives to Antibiotics Workshop, held in Vancouver in March 2005.

Despite the attention commanded by infectious disease outbreaks, research on host immune responses is the key to the long term success of the Institute. To address immune responses in respiratory infections, the Institute is launching a research initiative addressing host mucosal immune responses in the lung and respiratory tract. The Institute is also planning a major initiative in collaboration with many partners, including the *National Institutes of Health* in the US, on autoimmune diseases.

Of course, we recognize that these strategic initiatives are built on the strengths and capacity of Canada's internationally recognized immunology and infectious disease communities. In 2004/2005, CIHR invested almost \$140 million in these two key areas of health research.

These achievements would not have been possible without the strong leadership of Dr. Bhagirath Singh and the support and commitment of a dedicated staff and an outstanding Institute Advisory Board, chaired by Dr. Lorne Babiuk. I would like to recognize all of these talented individuals for their contributions in supporting the CIHR mission through III.



Alan Bernstein, O.C., FRSC  
President  
Canadian Institutes of Health Research

CIHR headquarters in Ottawa  
*Place Bell Building*





**Dr. Bhagirath Singh**  
*Scientific Director,  
CIHR Institute of Infection  
and Immunity*

## Message from the Scientific Director

Compared to the frenetic activity generated in previous years by a series of emerging infectious diseases such as Severe Acute Respiratory Syndrome (SARS), West Nile virus and bovine spongiform encephalopathy (BSE), more commonly referred to as mad cow disease, 2004/2005 has been a year of consolidation for the Institute of Infection and Immunity (III).

The Institute continues to work with its research community and relevant partners to champion and support health research, build capacity and engage stakeholders. Following the challenges of SARS, West Nile virus and BSE in a single year, III has redefined the role of CIHR in national agenda setting for infectious diseases research. The Institute played a major role, not only in funding excellent research in emerging infectious diseases, but in helping to bring together public and private sectors, professional health research stakeholders and policy makers. We are delighted to have the new Public Health Agency of Canada (PHAC) as a valuable partner for the Institute in the area of emerging infectious diseases and vaccine research.

The increase in funding from the federal government to deal with the ongoing challenges of HIV/AIDS offers new opportunities for our research community. Together with PHAC and Health Canada our goal is to support new and innovative research in the global effort to control and eradicate the disease. Funding research in social behavioural issues posed by HIV/AIDS and hepatitis C and supporting new and innovative biomedical and clinical research in HIV/AIDS remains a major priority for CIHR. We continue to define strategic goals that will fill the needs and gaps identified by our researcher community.

The challenge of antimicrobial resistance clearly requires a new research focus. To this end Drs. Brett Finlay and Judy Bray recently organized a research priority-setting workshop to move the research agenda forward on this topic. Along with autoimmune diseases, this will form the focus of the III research effort in the coming year.

III continues to interact with the research community in all areas of the Institute mandate, attending meetings, conferences and workshops and participating in direction-setting exercises across the country. The infection and immunity research community continues to grow. Our database has close to 4,000 contacts for the Institute. I am pleased that our stakeholders are helping the Institute evolve by providing valuable feedback and advice through electronic links.

The Institute operates with a small, dedicated staff located both in London and at CIHR headquarters in Ottawa. During 2004/2005 there were several staff changes at both the Ottawa and London offices. In the spring of 2004, Project and Communications Officer Patrick Haag left the Ottawa-based Institute team to join the Web Services division at CIHR headquarters. In September 2004, the Institute welcomed Erik Blache, who joined the Ottawa-based team, from the Canada Science and Technology Museum as Project Manager and Analyst for the Institute. In early 2004/2005, Jennifer Gunning, from CIHR headquarters officially joined the Institute team as Team Lead for the HIV/AIDS Research Program, but was replaced in December 2004 for the duration of her maternity leave by Paula Kirton, also based in Ottawa. In London, Communications Officer Tess Laidlaw left the Institute to take up an exciting new opportunity at the Vaccine and Infectious Disease Organization (VIDO) in Saskatoon and Bethany Heinrichs joined the Institute as Administrative Officer. The University of Western Ontario, home of the Institute in London, Ontario, has provided necessary services and support to the Institute.

Each year several members retire from the Institute Advisory Board and are replaced by new members in a process of continuous renewal. Leaving the Board in 2004/2005 were Drs. Michel Bergeron, Abdallah Daar and Kevin Glasgow and Ms. Helaine Shiff; joining were Drs. Chris Power, James Lavery, Joaquin Madrenas, Allison McGeer and Ms. Mary Catharine McDonnell.

I would like to take this opportunity to thank the members of the Institute Advisory Board for their advice and support. I am particularly thankful to our Chair, Dr. Lorne Babiuk for guiding the Institute in these times of opportunity and challenge. I also sincerely thank our past and present staff for their dedication and commitment to the mission of the Institute. I am grateful to CIHR President Dr. Alan Bernstein for his support of the Institute and his vision and leadership during the ongoing challenges that CIHR faces. I thank Carol Richardson for her dedication and help in completing reports on the meetings sponsored by the Institute: *Integrating Discovery Platforms in Autoimmune Diseases* and *Meeting the Challenge of Prion Diseases*. Finally, it is my pleasure to thank Dr. Judy Bray for diligently writing this Annual Report, which truly reflects the achievements of the Institute in 2004/2005.

*Bhagirath Singh*

Dr. Bhagirath Singh  
Scientific Director  
Institute of Infection and Immunity



**Meeting of the III Advisory Board**  
*May 26th, 2004 in Halifax, Nova Scotia*

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## Profile of the Institute

As one of the 13 Institutes of the Canadian Institutes of Health Research (CIHR), the Institute of Infection and Immunity (III) upholds the principles outlined in the CIHR Blueprint document, through the support and encouragement of researchers from all areas of health research, including biomedical and clinical researchers, social scientists and scholars in the humanities, physical scientists, engineers and mathematicians. The III mandate covers the entire fields of infection and immunity but focuses primarily on the strategic research priorities previously identified and reaffirmed by the Institute Advisory Board (IAB), in consultation with the infection and immunity research communities.

### Institute of Infection and Immunity - Strategic Priorities

#### Infectious Diseases

- Antimicrobial Resistance
- Emerging Infectious Diseases
- HIV/AIDS and Hepatitis C
- Novel Vaccine Development
- Microbiologically Safe Food and Water

#### Host Immune Response

- Asthma and Allergy
- Autoimmune Diseases
- Innate Immunity
- Organ Transplantation and Regeneration

III is located in the Siebens-Drake Research Institute at the University of Western Ontario, research home of the Institute's Scientific Director, Dr. Bhagirath Singh. The Institute was particularly proud this year of the induction of Dr. Singh as a fellow of the Royal Society of Canada in recognition of his important scientific contributions.

The Institute is supported by an excellent staff located in both London and Ottawa and a strong IAB that represents researchers, stakeholders and the lay public. The IAB plays an important role in the identification of priority research areas, leading the development of strategic research initiatives and liaising with researchers and stakeholder groups in the fields of infection and immunity. In 2004/2005, meetings were held in Halifax, Edmonton and Toronto and each time the Board took the opportunity to review the purpose and progress of the strategic priorities and to meet with the local research community and representatives of stakeholder groups.



**From Left to Right:** *Dr. Lorne Babiuk, Minister Dr. Carolyn Bennett, Dr. Bhagirath Singh and Dr. Frank Plummer*

III was fortunate to have Minister Dr. Carolyn Bennett's participation in all three IAB meetings in 2004/2005, either by teleconference or in person. This provided a valuable opportunity for the mutual exchange of ideas and information, particularly with respect to population and public health issues and the potential links between III and the new Public Health Agency of Canada (PHAC).

In 2004/2005, III finalized and released a number of reports and publications, including "Meeting the Challenge of Prion Disease: Conference Proceedings and International Research Planning Workshop Report", which provided valuable input to discussions leading to federal funding for a Network Centre of Excellence focused on prion and prion-related research issues. Additional reports released in 2004/2005 included, "Research Symposium on Integrating Discovery Platforms in Autoimmune Diseases", "Canadian SARS Research Consortium Report 2003-2005: A Framework for a Canadian Rapid Research Response" and "Evaluation of the Canadian SARS Research Consortium". These and other documents, such as the III newsletters, annual reports and additional workshop reports, can be found on the III website at [www.cihr-irsc.gc.ca/iii.html](http://www.cihr-irsc.gc.ca/iii.html).



III maintains a high profile within the infection and immunity research communities through regular participation in and attendance at national and international meetings relating to all aspects of the Institute mandate. These meetings and symposia are important vehicles for knowledge exchange and often lead to the generation of new research initiatives or partnerships. III also participates in international initiatives such as the 16th International Congress of Immunology in Montreal, the Wilton Park Conference on Health as a Global Security Challenge in the UK, the Canadian Biological Sciences Colloquium in Russia, and the European and Developing Countries Clinical Trials Partnership on HIV/AIDS in Italy.

## Outstanding Research

This year saw the funding of several initiatives launched by III in 2003/2004 which were described in detail in the 2003/2004 annual report. The outstanding research funded by III as a result of these Requests for Applications (RFAs) is described below.

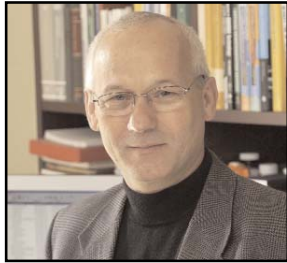
### Novel Technology Applications in Health Research

The “Novel Technology Applications in Health Research” RFA was designed to stimulate both the development of new techniques and methodologies of value in biomedical research and clinical practice and also the application, in health research, of technologies that already exist in science-based research disciplines not traditionally associated with the life sciences. Recent technology advances in fields such as chemistry, physics, engineering, mathematics, computational science, nanotechnology and communications have produced new methodologies that could potentially benefit many areas of health research. In 2003/2004, III identified a need to support the development of new tools, techniques and methods capable of providing



**Table 1 - Projects funded under the Novel Technology Applications in Health Research RFA**

Principal Investigator	Host Institution	Project Title
Dubowski, Jan	University of Sherbrooke	Quantum dot template for fast and simultaneous detection of different infectious agents
Labuda, Damian	Sainte-Justine Hospital (Montreal)	Developing diagnostic tools through <i>in vitro</i> molecular evolution
Pennefather, Peter	University of Toronto	Development of simplified and portable serology technology for monitoring progression of infectious disease with microliter blood samples
Rutenberg, Andrew	Dalhousie University	Micromanipulation of bacterial division
Santamaria, Pere	University of Calgary	New tools to characterize, manipulate and analyze the phenotypic contribution of extended regions of mammalian genomes, beginning with the human MHC
Ward, Brian	The Research Institute of the McGill University Health Centre	SELDI-ToF MS in blood-borne protozoan infections: novel diagnostic approach and new insights into host-parasite interactions



**Dr. Jan Dubowski**  
*University of Sherbrooke*

non-invasive evaluation of infectious and immune processes in vivo. The RFA provided an opportunity for small multidisciplinary teams to integrate expertise from the natural sciences into biomedical research in order to address questions such as immune status determination or immune reaction monitoring, localization of infectious foci or dissemination of infectious organisms, and rapid identification of organisms. III committed almost \$700,000 to support the six successful projects listed in Table 1 (page 9).



**Dr. Brian Ward**  
*The Research Institute  
of the McGill University  
Health Centre*

The funded research includes innovative new methods for the rapid detection and diagnosis of pathogens, new ways to monitor pathogenesis using minute blood samples, experiments that will improve our understanding of how individual bacterial cells work naturally and in disease, and studies using advanced molecular techniques to determine the gene(s) causing type 1 diabetes. For example, Dr. Dubowski's team will develop a novel quantum dot biochemical sensing device for the fast and simultaneous detection of nanoquantities of many different pathogens in humans, beginning with studies on the influenza virus. Dr. Labuda hopes to develop a human papilloma virus diagnostic kit that will have the capability of discriminating between benign strains and those that cause cervical cancer. Dr. Pennefather and his team will combine cutting-edge nanotechnology, communication, computational and photonics technologies to analyze microscopic blood samples to obtain a detailed profile of the malaria protozoan and Dr. Ward will study host-parasite interactions using advanced proteomics techniques.

*III retains its commitment to training the next generation of health researchers and provides funding to a total of 14 strategic training programs within the mandate of infection and immunity.*



## Emerging Infectious Disease Priority Announcement

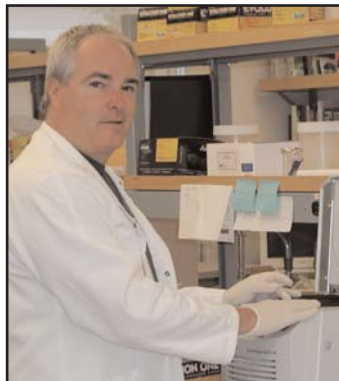
In response to the recent wave of new pathogens, such as SARS, West Nile virus and avian influenza, IIR issued a Priority Announcement in December 2003 for emerging infectious diseases. Institute priority announcements are designed to stimulate research in priority areas by encouraging researchers to submit applications on specific topics to the regular suite of CIHR funding programs. IIR provided additional strategic funds to support highly ranked three-year operating grant applications submitted to the March 2004 operating grants competition that focused on novel vaccine development, host immune responses and clinical sequelae to SARS and West Nile virus, and innovative proposals relating to other new emerging pathogens. This priority announcement attracted new applications focused on specific topics that have previously received little, if any, CIHR funding. The six funded projects are listed in Table 2. IIR has invested more than \$1.5 million in the support of these projects.



**Table 2 - Projects Funded under the Emerging Infectious Diseases Priority Announcement**

Principal Investigator	Host Institution	Project Title
Boivin, Guy	Laval University	Role of hemagglutinin changes on antigenic properties, virulence and drug resistance of influenza A viruses
Hobman, Tom	University of Alberta	Role of the West Nile virus core protein in virus replication and host cell death
Jia, William	University of British Columbia	Application of peptide array for SARS diagnosis and treatment
Kronstad, James	University of British Columbia	Morphogenesis of fungal pathogens
Loeb, Mark	McMaster University	Long term impacts of severe West Nile virus infection: A cohort study
Lowenberger, Carl	Simon Fraser University	Characterization of the innate immune response of mosquitoes to parasites and pathogens

The topics addressed in the funded projects cover several emerging pathogens including influenza, West Nile virus, SARS coronavirus, opportunistic fungal pathogens in immunocompromised individuals and a variety of parasites transmitted by insects. For example, Dr. Boivin's studies may lead to a more judicious selection of the viral strains included in prepared influenza vaccines and to the development of new antivirals with different mechanisms of action. Research will focus on viral changes and the molecular mechanisms of drug resistance using novel mutant strains of virus. Studies on West Nile Virus by



**Dr. Carl Lowenberger**  
*Simon Fraser University*

Dr. Hobman and Dr. Loeb's team will provide information on the molecular basis of West Nile virus pathogenesis and the clinical course of West Nile virus-associated disease respectively. Dr. Loeb also received a grant of \$13 million from the National Institutes of Health in the United States for follow-up studies on patients with West Nile virus infections in Canada. On a related topic, Dr. Lowenberger will study the novel peptides produced by insect vectors in response to parasites and pathogens such as malaria and West Nile virus. It is anticipated that a greater understanding of the mechanism of action of these peptides might suggest ways to prevent pathogen development in insect vectors and lead to production of novel drugs for treating infected individuals.

## Social and Behavioural Research Issues in HIV/AIDS and Hepatitis C

Diseases caused by HIV/AIDS and the hepatitis C virus (HCV) remain global health problems that place an enormous burden on public health systems and social services. Infections caused by both these agents are now chronic and highly prevalent and, although the patterns of transmission differ somewhat, there are underlying similarities, particularly with respect to behavioural issues. HIV/AIDS infection most often results from unprotected sexual intercourse, the use of contaminated injection equipment and vertical transmission. HCV infections were originally associated with contaminated blood products, but are now increasingly caused by injection drug use. The major at-risk groups for both diseases are vulnerable and marginalized populations, such as sex workers, drug addicts, the inmates of correctional institutions, aboriginal populations and the socio-economically disadvantaged.



The key to success in the prevention and control of both HIV/AIDS and HCV lies in behavioural interventions that both reduce the risk of infection and encourage infected individuals to adhere to treatment protocols. The social and behavioural issues surrounding both diseases are highly complex and solutions are most likely to be generated through interaction and collaboration among researchers from a variety of disciplines including social sciences, clinical epidemiology, health economics, health services and population health.



In consultation with researchers and other stakeholder groups, III identified the social and behavioural aspects of HIV/AIDS and HCV infections as an important research priority and, in June 2003, launched an RFA entitled 'Social and Behavioural Research Issues in HIV/AIDS and Hepatitis C'. To address the need for multidisciplinary research, the RFA used the Interdisciplinary Capacity Enhancement (ICE) Team Grants program. ICE grants provide support for new or existing groups that wish to build capacity, add expertise to their core capabilities and develop strategies for knowledge translation to ensure the rapid uptake of research results into practice. Funding for this RFA was provided by III and the CIHR/Health Canada/PHAC HIV/AIDS Research Program with the support of the Health Canada/PHAC/CIHR Research Initiative on Hepatitis C. The four funded projects are listed in Table 3.

<b>Table 3 - Projects funded under the Social and Behavioural Research Issues in HIV/AIDS and Hepatitis C</b>		
<b>Principal Investigator</b>	<b>Host Institution</b>	<b>Project Title</b>
Balfour, Louise	Ottawa Health Research Institute	Improving health care knowledge, treatment preparedness, treatment adherence, and quality of life among HIV and hepatitis C patients
Fischer, Benedikt	The Centre for Addiction and Mental Health (Toronto)	Investigating socio-behavioural risk, prevention and treatment factors for HCV in special populations
Godin, Gaston	Laval University	Prevention of HIV/AIDS and Hepatitis C: Social and behavioural research
Kirkland, Susan	Dalhousie University	Atlantic Interdisciplinary Research Network: Social and behavioural issues in hepatitis C and HIV/AIDS



**Dr. Louise Balfour**  
*Ottawa Health Research  
Institute*

The outstanding research funded as a result of this RFA covers social and behavioural issues related to both HIV/AIDS and HCV infections. The RFA successfully inspired the creation of new interdisciplinary teams, in some cases with as many as nine members, and provided the opportunity for expansion of existing groups. For example, Dr. Balfour and her team will build on existing research programs studying psycho-educational interventions in HIV/AIDS and HCV patients and correlate the effectiveness of this therapy with depressive symptoms. Dr. Fischer's team will focus on the primary causes of HCV infections in intravenous drug users, the role of stigma and the willingness of infected individuals to adhere to treatment plans, and the feasibility of behavioural interventions in the context of correctional institutions.



**Dr. Susan Kirkland**  
*Dalhousie University*

A new team of nine researchers led by Dr. Godin will pool its experience and expertise to gain an improved understanding of the social and behavioural issues surrounding HIV/AIDS and hepatitis C and will explore novel strategies for various levels of prevention. Dr. Kirkland's team will work with government and community-based groups to establish an Atlantic network to improve the identification, treatment and prevention of hepatitis C - and HIV/AIDS - infected individuals in Atlantic Canada.

## **Federal Initiative to Address HIV/AIDS in Canada (formerly the Canadian Strategy on HIV/AIDS - CSHA)**

The CSHA, founded by the federal government in 1988, was created to address a comprehensive range of HIV/AIDS-related issues, including research. The CSHA engaged community organizations, aboriginal groups, the private sector, academia, health and social service providers, governments and infected individuals in the fight against HIV/AIDS. CIHR, as a partner on the CSHA, had the administrative responsibility for the biomedical, clinical, health services and population health research programs and the Canadian HIV Trials Network, which provides infrastructure support to the network of clinical trial sites across Canada.



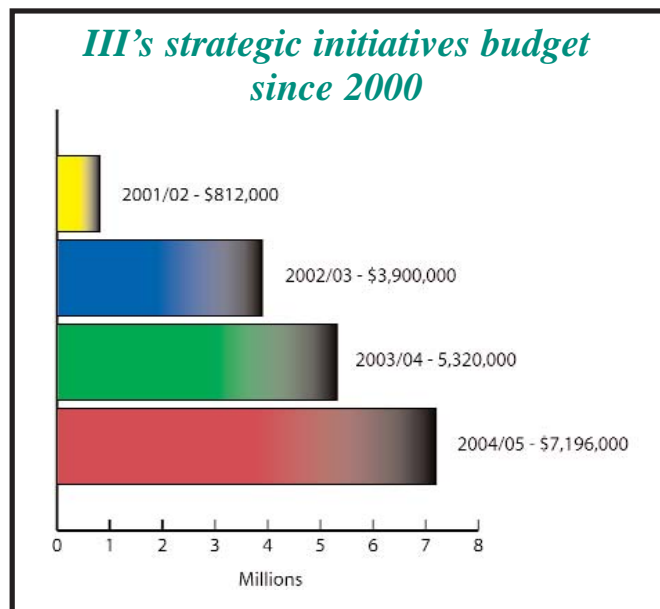


In January 2005, the Government of Canada reaffirmed its commitment to HIV/AIDS by announcing the Federal Initiative to Address HIV/AIDS in Canada (FI-HIV/AIDS) and by a commitment to double its funding to \$84.4 million by 2008/2009. The FI-HIV/AIDS, led by PHAC, reinforces the importance of community involvement and a strong government response. CIHR retains responsibility for the identification of research priorities and the administration of extramural research programs. In 2004/2005, outstanding research was funded in all areas of HIV/AIDS through the regular suite of CIHR programs. Funding in the amount of \$13 million was disbursed to support 145 grants and awards, with CIHR contributing an additional \$9 million. The identification of strategic priorities within the HIV/AIDS portfolio and the development of research initiatives are the responsibility of the CIHR HIV/AIDS Research Advisory Committee (CHARAC), a subcommittee of the IAB chaired by Dr. Chris Power. With the advice of this group, the HIV/AIDS Community-Based Research Program was launched in November 2004. This program was transferred from Health Canada to CIHR in 2004 and is managed by III in partnership with the CIHR Institute of Aboriginal Peoples' Health.



### Summary

The examples above serve as a testament to the outstanding research funded in infection and immunity as a result of RFAs launched by the Institute in 2003/2004. However, the identification of new strategic research priorities and the development of corresponding RFAs is an ongoing process at III. In 2004/2005, the Institute committed funds to support the launch of two new Institute-led research initiatives and many more RFAs led by other Institutes and external organizations, which will be described in the section, “Partnership and Public Engagement”.



## New RFAs Launched by III in 2004/2005

### Models to Investigate the Link between the Mucosal Immune Response in the Lung and Respiratory Tract and Disease Outcomes

As the recent outbreak of SARS clearly demonstrated, the lung and respiratory tract play a major role in the body's defence against infection. Immune reactions occurring in the lung are generally able to overcome invasion by a bacterial or viral pathogen but sometimes these immune responses do more harm than good and an overactive immune response may cause adverse reactions in the host.

Despite the importance of mucosal immune responses in the lung, most research focuses on systemic infections and infections at non-mucosal sites. In consultation with IAB members, infection and immunity researchers and partner organizations, III identified a need for additional research on immune/inflammatory responses in the lung and upper respiratory tract in response to both infectious agents and environmental irritants and allergens.



The RFA 'Operating Grants - Models to Investigate the Link Between the Mucosal Immune Response in the Lung and Respiratory Tract and Disease Outcomes' was launched in partnership with the new Network of Centres of Excellence, AllerGen, the Canadian Cystic Fibrosis Foundation, and the CIHR Institute of Circulatory and Respiratory Health. Applicants were encouraged to apply advanced technologies to studies designed to elucidate the relationship between immune/inflammatory responses and lung function in both humans and novel model systems. Successful projects will be funded in 2005/2006.

### Infection Control

2004/2005 saw the release of the first comprehensive report on patient safety in Canada. The report, produced by Drs. Ross Baker and Peter Norton in response to an RFP issued by the CIHR Institute of Health Services and Policy Research and the Canadian Institute of Health Information, provided evidence to suggest that as many as 7.5% of patients entering hospitals and other health care institutions experience an adverse event, either as a result of medical or surgical error or as a consequence of a hospital-acquired (nosocomial) infection.

This alarming statistic caught the attention of government and media alike and, combined with mounting concerns about antibiotic resistance and the emergence of new 'superbugs', drew attention to the problem of inadequate infection control practices in many Canadian hospitals. The SARS outbreak and a series of *Clostridium difficile* (*C. difficile*) outbreaks in Canadian hospitals further highlighted the importance of effective infection control in limiting the transmission of infectious diseases. In a proactive move, the IAB identified both infection control and antibiotic resistance as urgent priority research areas requiring prompt action on the part of the research community.



Serendipitously, in 2004, CIHR acquired from the Canadian Health Services Research Foundation, a health services research program, renamed Partnerships for Health System Improvement (PHSI). This program is specifically designed to support teams of researchers and decision-makers interested in conducting applied health research useful to health system managers and/or policy makers and has a strong emphasis on both partnership and knowledge translation. Applicants are required to include a decision/policy maker as part of the investigative team to ensure strong commitment on the part of the health care administration to the implementation of the results of the research. Applicants are also required to obtain matching cash or in-kind funding from a range of potential partners.

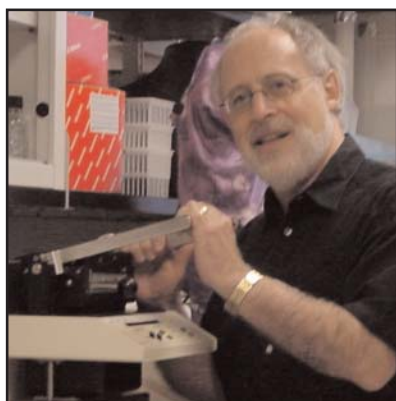


Of particular interest to III was the potential for applying research findings directly to changing policies or procedures in order to reduce infection rates. This funding opportunity offers an ideal opportunity for partnership between infection control practitioners, epidemiologists, and administrators or policy makers in hospitals and long-term or continuing care facilities. PHSI was launched for the first time by CIHR in September 2004 and included a focus on infection control as one of the eligible areas of research. The results of this competition will be announced in July 2005.

## Outstanding Researchers in Innovative Environments



**CIHR funded researcher,**  
*Dr. Gerard Wright of McMaster University studies antibiotic resistant mechanisms*



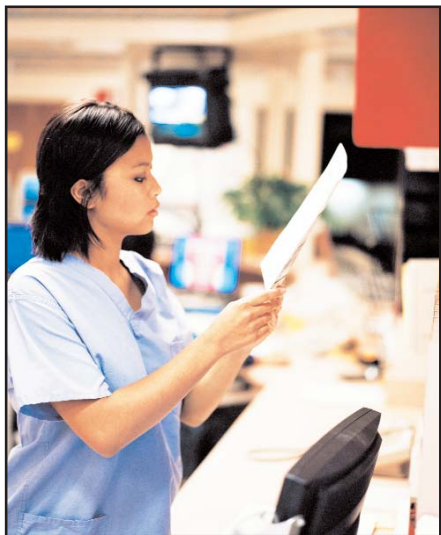
**CIHR funded researcher,**  
*Dr. Terry Delovitch of The Robarts Research Institute at the University of Western Ontario, studies type 1 diabetes in mice*

Canadian researchers in infection and immunity are highly regarded both in Canada and abroad. Many are involved in international collaborations or are recipients of international awards. In 2004/2005 CIHR invested almost \$140 million to support outstanding research in the areas of infection and immunity and more than 1100 research projects identified III as either their primary or secondary Institute, roughly 14% of all CIHR funded projects in that year. Examples of outstanding infection and immunity researchers funded by CIHR are highlighted throughout this section. CIHR is committed to training the next generation of outstanding researchers and through the two rounds of the Strategic Training Programs Grants competition, III is affiliated with 14 training programs related to its mandate. In 2004/2005, III invested more than \$1.3 million to the continued support of these training programs.

As a result of stiff competition and fluctuations in available funds, excellent researchers sometimes fail to receive funding, even for outstanding, highly ranked projects. To support these researchers, III provided six-month 'bridging' grants in 2004/2005 to enable investigators working in the infection and immunity fields to retain their staff and laboratories and re-apply for CIHR funding in the next open competition. III allocated close to \$400,000 for this purpose in 2004/2005.

## Workshops and Symposia

Workshops and symposia are an excellent way to bring together outstanding researchers and provide an ideal forum for the exchange of ideas and information, the creation of new networks and the development of strategic research initiatives. In 2004/2005 III provided financial support to 22 events, ranging from workshops on topics such as HIV/AIDS, *C. difficile*, autoimmunity and reproductive immunology, to annual meetings of associations such as the Canadian Society of Microbiology and the Canadian Society for Immunology. III is involved in the organization of some meetings and at others may have a staff member in attendance to interact with attendees and promote Institute activities.



### National Symposium on Key Research Issues in *Clostridium difficile*

On November 23, 2004 III co-hosted the symposium "Key Research Issues in *Clostridium difficile*" with the University of Manitoba. This symposium brought together researchers, health professionals and hospital administrators and provided a forum for learning and discussion about *C. difficile* and its impact on the health of Canadians. A workshop was held immediately following the morning symposium to identify key research issues and explore potential research funding opportunities. Working groups focused on four areas - diagnosis and surveillance, infection control, antibiotic stewardship and clinical issues. Recommendations were summarized in a report that will be considered by III and partners as they develop new research initiatives in the areas of emerging pathogens, infection control and antibiotic resistance.

### Novel Alternatives to Antibiotics Workshop

In March 2005, III hosted an invitational workshop in Vancouver entitled “Novel Alternatives to Antibiotics”. This workshop was the first step in the development of a research initiative to address the escalating problem of antibiotic resistance. For more than 50 years, antibiotics have cured infections caused by bacteria and have had a major impact on public health and the control of infectious diseases caused by bacterial pathogens. The widespread use of antibiotics in health care and agriculture, however, has produced resistant bacteria that are no longer killed by many antibiotics. We are now facing a crisis where the antibiotics that we have relied on for half a century are becoming less effective and the large pharmaceutical companies that produced our current arsenal of antibiotics have drastically reduced their research into new antibiotics, turning their attention instead to more lucrative markets such as drugs for chronic diseases.



**Michael Smith Laboratories (MSL), Vancouver, British Columbia** - *The “Novel Alternatives to Antibiotics Workshop” was held at MSL in March 2005.*

To address the problem, an IAB steering committee led by Dr. Brett Finlay brought together a group of researchers chosen not only on the basis of their successful research careers but also for their capacity to think beyond their traditional disciplines and areas of research to discuss far-reaching questions about antibiotic therapeutics. The workshop was highly interactive, with a focus on brainstorming and discussion. Representatives from nine potential partner organizations attended the workshop and engaged in the planning process from the very beginning (Table 4).

<b>Table 4 - Organizations Represented at the “Novel Alternatives to Antibiotics Workshop”</b>
Alberta Heritage Foundation for Medical Research
Association of Medical Microbiology and Infectious Disease Canada
Canadian Committee on Antibiotic Resistance
Canadian Foundation for Infectious Diseases
Canadian Patient Safety Institute
Community and Hospital Infection Control Association
Fonds de la recherche en santé du Québec
National Research Council Canada
Public Health Agency of Canada

Of the many alternatives to antibiotics that were suggested and discussed during the workshop several emerged consistently among the working groups, including immune modulation, microbial ecology (e.g. probiotics), phage therapy and physical systems. A report summarizing the proceedings and full workshop recommendations is posted on the III website at: [www.cihr-irsc.gc.ca/iii.html](http://www.cihr-irsc.gc.ca/iii.html). The workshop recommendations will be considered by III and partners in the preparation of an RFA.



## Partnerships and Public Engagement

Partnership is central to the III philosophy and the Institute has a strong history of capitalizing on partnership opportunities in order to identify and address research priorities from a national perspective. Examples include the Canadian Research Coalition for Safe Food and Water, the Canadian SARS Research Consortium (CSRC) and the Canadian Rapid Research Response Team (C3RT) as well as smaller partnerships with government departments, other research funding agencies and voluntary health organizations. Partnerships work at many levels and are not solely related to the leveraging of funds, although there is no doubt that the pooling of resources to address common issues is a definite asset. However, many of the most significant benefits of partnerships, particularly in the areas of infection and immunity, come from the creation of innovative collaborations between researchers working in different environments. One of the strengths of the seven projects funded under the Safe Food and Water Initiative in 2003/2004, for instance,



is proving to be the ability to rapidly advance science through the collaboration between government and university researchers, not just because of complementary areas of expertise but also because of the availability of vital resources that can be shared between laboratories. One of the great strengths of the CIHR Institutes is their ability to act as catalysts in bringing diverse groups together and establishing relationships that strengthen health research in Canada.

III explores potential avenues for partnership on all research initiatives and RFA launches, led by the Institute and is generally successful in obtaining commitments for collaboration and, often, shared funding of successful projects. These partnerships have been documented in earlier sections of this report and in previous annual reports. Examples of new III partnerships for 2004/2005 are outlined below.

## Partnerships with other CIHR Institutes and Portfolios

As part of the CIHR response to the SARS outbreak, six Institutes (including III), the CIHR Ethics office and the Canadian Lung Association partnered for the launch of a second SARS RFA entitled, "Public Health and Health Care System Preparedness and Response to SARS: Evaluation and Lessons Learned". The ten approved applications were announced in 2004/2005 and included topics such as the legal foundations for a Canadian disease control



and surveillance agency, optimizations of clinical and public health management of influenza-like illnesses, mechanisms of disease transmission, and psychological, occupational and economic impacts of SARS on patients and their families. As well, III, in partnership with CSRC member organizations, provided funds for Dr. Mark Loeb to develop a SARS sample bank and registry which will be stored at the National Microbiology Laboratory in Winnipeg. The process and procedures developed for collection of SARS samples and data will be available for use during future disease outbreaks. In another initiative related to SARS, III partnered with the CIHR Rx&D Research Program and GlaxoSmithKline Inc. for the launch of an RFA entitled, "SARS Small Molecule Pilot Project Grants Initiative" that focused on the biology of SARS and the identification of small molecule targets as antiviral agents. Five projects were approved for funding, beginning in the 2005/2006 fiscal year.

III joined the Institute of Gender and Health (IGH) on the launch of the RFA entitled, "Interdisciplinary Capacity Enhancement Grants - Reducing Health Disparities and Promoting Equity for Vulnerable Populations". The results of this RFA will be known in March 2006. III committed funds in 2004/2005 towards the support of a successful New Emerging Team application submitted to an RFA launched by the CIHR Rural and Northern Health Research Initiative. III is also a partner with the Institute of Population and Public Health and the Institute of Human Development, Child and Youth Health on a Priority Announcement for operating grants and fellowships focused on global health research.



## Partnerships with External Organizations

III serves as the CIHR representative on a Canadian HIV/AIDS vaccine initiative, a public-private partnership that will bring together academic, public and private sectors in Canada and makes connections to related global initiatives. III is also involved in the development of a Canadian vaccine research initiative, a consortium of public, academic and private sector organizations working together to develop a national vaccine research agenda. In October 2004, representatives from approximately 20 key organizations discussed plans to collaborate across organizational and jurisdictional boundaries to optimize the process of vaccine development and delivery. In another vaccine-related initiative, III is working with PHAC and the Ontario Ministry of Health and Long Term Care on an Influenza Immunization Program Evaluation Task Group. In 2004/2005, a Request for Proposals was issued to fund a one-year project designed to compare universal influenza immunization programs with programs that target only populations at high risk of complications and to capture data from the 2004/2005 flu season. The Institute worked with the task group to develop an RFA to be launched in 2005/2006 that will fund more extensive research in the same area.



III and the Canadian Society of Transplantation are partners on an initiative led by the Kidney Foundation of Canada to provide support for clinical fellowships. The objective of the program is to promote and enhance the development of clinician scientists involved in basic and clinical kidney transplantation research. In 2004, one award was approved for a Masters Fellowship held by Dr. Sang Kim at the Johns Hopkins Bloomberg School of Public Health in Baltimore. Dr. Kim's studies will focus on an evaluation of the advantages and disadvantages of using kidneys from 'marginal' donors, such as older individuals, in transplantation both in Canada and the United States.

In 2003, III and the Institute of Circulatory and Respiratory Health joined a partnership led by the Canadian Cystic Fibrosis Foundation to fund research groups working on cystic fibrosis - the BREATHE initiative. The purpose of the RFA was to hasten the translation of knowledge acquired from the discovery of the gene responsible for cystic fibrosis and to develop novel therapeutic approaches for altering the course of the disease. In 2004/2005, two projects were approved for funding. One team, led by Dr. John Hanrahan at McGill University, will conduct proteomics studies on defective proteins involved in cystic fibrosis and will search for new drug targets. The second team, led by Dr. Christine Bear at Toronto's Hospital for Sick Children, will also focus on defective protein folding and will study new ways to prevent bacteria from adhering to affected lung cells.

Funding also began in 2004/2005 on a partnership led by the Canadian Water Network (CWN), one of the Networks of Centres of Excellence. CWN is a member of the Canadian Research Coalition for Safe Food and Water and shares the III commitment towards research to protect the safety of Canadian drinking water. A major challenge with disinfection processes is to inactivate pathogens while minimizing by-product formation. The funded project, led by Dr. Ron Hoffman at the University of Toronto, focuses on optimal multiple disinfection strategies using UV technologies in combination with secondary residual disinfectants. The project is also supported by Trojan Technologies Inc. and CRESTech (an Ontario Centre of Excellence).

On the theme of emerging infectious diseases, III joined a partnership led by the Fonds de la recherche en santé du Québec (FRSQ) to support a large group of researchers recruited by FRSQ and capable of mounting a multidisciplinary research response to the *C. difficile* crisis. The group, which includes clinicians and research scientists from a number of Quebec hospitals and health care institutions, has submitted a proposal that is currently under review. CIHR Governing Council will commit \$100,000 per year for two years to support this project. Funding will begin in 2005/2006.

## The Path Forward

In 2005/2006, III looks forward to funding the RFAs launched in 2004/2005 on mucosal immune responses in the lung and infection control and to the full integration of the HIV/AIDS portfolio under the Institute's management. The next annual report will contain a more detailed account of the programs funded under the FI-HIV/AIDS strategy. III anticipates launching new research initiatives on novel alternatives to antibiotics and autoimmunity in 2005/2006 and is actively involved in partnership discussions with other CIHR Institutes and a number of external organizations. The III New Investigator Forum planned for April 2005 promises to be an exciting event that will facilitate networking among new investigators and provide an opportunity for interaction with renowned senior scientists from the infection and immunity research communities. Finally, III plans to continue playing an active role in national and international agenda setting exercises such as the Canadian Vaccine Research Initiative, HIV/AIDS Vaccine Enterprise, and the Clinical, Global Health and Regenerative Medicine multi-Institute Research Initiatives at CIHR.



**The Kingsbridge Centre, King City, Ontario** - Location of the upcoming New Investigator forum in April 2005.











# APPENDICES



## Appendix 1

Institute Advisory Board of the Institute of Infection and Immunity		
	Dr. Lorne Babiuk (Chair)	Director, Vaccine and Infectious Disease Organization (VIDO); Professor, Department of Veterinary Microbiology, University of Saskatchewan Canada Research Chair in Vaccinology
	Dr. Chris Bleackley	Professor, Department of Biochemistry, University of Alberta
	Dr. Joseph Cox	Assistant Professor, Family Medicine, McGill University; Public Health Specialty, Montreal Regional Public Health Department
	Dr. B. Brett Finlay	Professor, Biotechnology Laboratory, University of British Columbia
	Dr. Warren Hill	Executive Director, Canadian Viral Hepatitis Network; Senior Research Analyst, B.C. Centre for Disease Control
	Dr. James Lavery	Assistant Professor, Research Scientist, Centre for Research in Inner City Health and Centre for Global Health Research, St. Michael's Hospital, Department of Public Health, University of Toronto
	Dr. Mark Loeb	Associate Professor, Pathology and Molecular Medicine, McMaster University
	Dr. Joaquín Madrenas	Professor, and Canada Research Chair in Transplantation and Immunobiology, University of Western Ontario Head of Immunology, Robarts Research Institute

## Appendix 1 (cont'd...)

Institute Advisory Board of the Institute of Infection and Immunity		
	Ms. Mary Catharine McDonnell	Past President, Kidney Foundation of Canada
	Dr. Allison McGeer	Professor, Laboratory Medicine and Pathobiology, University of Toronto
	Dr. Marc Ouellette	Canada Research Chair in Antimicrobial Resistance; Professor, Microbiology, Laval University
	Dr. William E. Paul	Chief, Laboratory of Immunology, National Institute of Allergy and Infectious Diseases, National Institutes of Health, USA
	Dr. Kevork Peltekian	Medical Director, Atlantic Liver Transplantation Program; Assistant Professor, Medicine (Gastroenterology), Dalhousie University
	Dr. Francis Plummer	Scientific Director, National Microbiology Laboratory; Canadian Science Centre for Human and Animal Health
	Dr. Christopher Power	Professor, Department of Medicine, University of Alberta
	Dr. Tania Watts	Professor, Department of Immunology, University of Toronto

## Appendix 2

### Institute Support Grant - For the year ending March 31, 2005

<b>Available Funds</b>		<b>\$1,379,388</b>
<b>Expenses</b>		
Institute Development		
Conference, Symposia and Workshops	\$92,239	
Institute Advisory Board	88,349	
Professional Services	10,016	
Travel Expenditures	2,577	
Other Costs	83,164	
		\$276,345
Institute Operations		
Salaries and Benefits	\$410,604	
Office Accommodations	11,540	
Telephone and Communication Services	9,644	
Supplies, Material and Other Services	18,576	
Office Furniture and Fixtures	2,470	
Computer Equipment and IT Support	8,325	
Travel Expenditures	101,667	
Other Expenditures	75	
		\$562,901
<b>Total Expenses</b>		<b>\$839,246</b>
<b>Unspent Balance*</b>		<b>\$540,142</b>

\*Note: The unspent balance as at March 31, 2005 is carried forward to the subsequent fiscal year

## Appendix 3

### Institute Investments in Strategic Initiatives - For the year ending March 31, 2005

#### Contributions through Grants and Awards

Strategic Initiatives	Number	2004/05	2005/06	2006/07	2007 & beyond	Total
Safe Food and Water	5	1,041,671	985,686	472,592	-	2,499,949
New Frontiers Program	1	5,000	-	-	-	5,000
Interdisciplinary Capacity Enhancement Teams	1	30,000	30,000	30,000	22,500	112,500
Host Susceptibility and Resistance to Pathogens	2	587,000	587,000	587,000	587,000	2,348,000
Anti-microbial Resistance, Health System Implications and Health Outcomes	2	390,719	469,787	461,557	411,120	1,733,183
Operating Grants to Open Competition	12	557,045	391,999	391,999	195,998	1,537,041
Health Research Programs of Excellence	2	751,480	751,480	563,610	-	2,066,570
New Emerging Team Grants	3	197,504	191,379	193,981	57,345	640,209
Rural Health	1	100,000	50,000	50,000	-	200,000
IAPH Strategic Initiative	2	58,272	25,000	-	-	83,272
CIHR Training Program Grants	9	1,203,137	1,469,253	1,679,759	1,810,945	6,163,094
Pilot Project for New Investigators	2	146,400	-	-	-	146,400
SARS-Evaluation and Lessons Learned	3	100,001	-	-	-	100,001
Social and Behavioural Research Issues on HIV/AIDS and Hepatitis C	2	206,750	414,223	411,353	126,714	1,159,040
Novel Technology Applications	6	684,166	902,759	306,938	-	1,893,863
Canadian Water Network	1	50,000	50,000	-	-	100,000
Clinical Fellowships in Transplantation	1	42,500	42,500	42,500	-	127,500
BREATHE	2	150,000	-	-	-	150,000
<b>Total</b>	<b>57</b>	<b>\$6,301,645</b>	<b>\$6,361,066</b>	<b>\$5,191,289</b>	<b>\$3,211,622</b>	<b>\$21,065,622</b>

Note : Grants and awards in respect to these programs are approved for 1 to 6 years. Figures displayed represent CIHR financial commitments for these programs in 2004-05 and subsequent years. Availability of these funds in future years are subject to funding appropriations by Parliament. For some initiatives, partners also contributed to the funding of the grants and awards.