Annual Report Year 2005

Title of the Collaborating Centre:
WHO/PAHO Collaborating Center for Population Health Risk Assessment

Institution Name: Institute of Population Health/University of Ottawa

Exact name of the Centre which acts as the WHO Collaborating Centre:
R. Samuel McLaughlin Centre for Population Health Risk Assessment

City and Country of Location:
Ottawa, Ontario, CANADA

Terms of Reference:

I. Air Pollution and Population Health
II. Radiation Health Risks
III. Chemical Risk Assessments
IV. Risk Perception
V. Building Research Capacity and Training
VI. Risk Management
VII. Prion Diseases
I. Air Pollution and Population Health

A. NERAM: The Network for Environmental Risk Assessment and Management (NERAM), developed in 1988, integrates the scientific knowledge and expertise that exists across many diverse disciplines in Canada to provide a comprehensive approach to environmental risk assessment and risk management that supports more effective and efficient environmental protection practices and decision-making. NERAM contributes to both industry and government by addressing issues such as the need for more effective and efficient environmental protection practices and decision-making, the need for consistency/agreement on risk assessment methodologies and the need for more consistent and credible message in communicating about environmental risk. The Network's principal objectives are to develop risk-based methodologies, standards and tools based on scientific models of environmental risk assessment, focusing on methodologies that are practical and evidence-based, and to establish an integrated scientific framework for theoretical and practical principles of integrated environmental risk assessment and management, based on actual risk management decisions. NERAM is based at the University of Waterloo, Institute for Risk Assessment, with several “Nodes” including the University of Ottawa-McLaughlin Centre, Institute of Population Health. Daniel Krewski serves as Director of the Ottawa Node of NERAM while Dr. William Leiss, a McLaughlin scientist, serves as Director of the Risk Communication Node.

1.1 Work performed in relation to the terms of reference:
1) NERAM IV - an international Colloquium “International Perspectives on Air Quality: Risk Management Principles for Policy Development” was held in Cuernavaca, Mexico January 31-February 1, 2005. It was organized by the Network of Environmental Risk Assessment and Management (NERAM) and the AIRNET European Network on Air Pollution and Health. Air quality scientists, policymakers, industry representatives and non-governmental organizations from America, South America, Europe, Asia, India and Africa convened to establish principles for air quality management based on the identification of international best practice in air quality policy development and implementation. The NERAM IV Colloquium Statement is available at: http://www.irr-neram.ca/pdf_files/Mexico_Statement.pdf. The entire proceedings of the NERAM IV Colloquium is currently ‘in press’ in the Journal of Toxicology and Environmental Health: Craig L, Krewski D, and Shortreed J. (Eds.) 2006. Strategies for clean air and health. J Toxicol Env Health A: in press.

1.2 Recommendations, where applicable, for further implementation of the activity:
1) Preparation for NERAM V “Strategic Policy Directions for Air Quality Risk Management”, to be held in Vancouver, Canada, in 2006.

2. Collaboration between the centre and WHO/PAHO:
1) Dr. Michal Krzyzanowski, WHO Regional Office for Europe, member of NERAM IV conference planning committee and program.
2) Dr. Jacobo Finkelman, PAHO, member of NERAM IV conference planning committee and program.
3) Exposures in South America were evaluated in NERAM IV. Results are available in the conference proceedings.
**B: APHENA**

**Principal Investigator(s):** Daniel Krewski, Arden Pope, Richard. Burnett  
**Funding:** HEI, $543,000 2001-2003; 2002-2005  
**Description of Project:** There is increasing scientific and medical evidence that exposure to fine and ultra fine particulate matter could have relatively more significant health implications than exposure to larger particles or to other airborne pollutants. At present there is, however, not enough information available on the exposure-response relationship for fine and ultra fine particulate matter to consider appropriate guidelines, which would protect the whole population or at least the most susceptible groups. Particle characterization for epidemiological studies can be costly, because extended time-series are needed for these studies including parameters that are not routinely monitored. Inclusion of these parameters in a study program could add to the costs and complexity of the program. Due to budget limitations often only routine data is used, which does not necessarily expand the existing knowledge. To facilitate this WHO, with the participation of McLaughlin Centre affiliate scientist Dr. Arden Pope, undertook the task of developing Guidelines for Concentration and Exposure-Response Measurement of Fine and Ultra Fine Particulate Matter for Use in Epidemiological Studies to be used by national and international organizations undertaking studies in this area. Air Pollution and Health: A European and North American Approach (APHENA), a project carried out by an international team of investigators at several institutions in Europe and North America will produce analyses that characterize effects of air pollution on mortality and morbidity in Europe and North America, using a common analytic framework, in order to describe and explain spatial variation in the health effects of air pollution. The methodological research is intended to evaluate the comparability of methods used by the investigative groups, to develop and apply analytic methods for characterizing heterogeneity of air pollution effects across locations, and to explore the degree of mortality displacement. These methods will then be applied to existing databases on mortality and hospitalization from the European Air Pollution and Health: A European Approach (APHEA) 1 and 2 Studies, the US National Morbidity Mortality and Air Pollution Study (NMMAPS), and from the Canadian studies. This project addresses the analysis and quantification of environmental factors (air pollution) and interacting factors (climate) on health outcomes (mortality and morbidity) and will produce innovative analytical methods for the development of national and regional air quality standards in both developed and developing countries.

1.1 **Work performed in relation to terms of reference:**  
1) Funding obtained from Health Effects Institute ($800,000; 2002-2005).  
2) Analysis of data ongoing (10 Canadian cities, 25 European cities, 90 U.S. cities).

1.2 **Recommendations, where applicable, for further implementation of the activity:**  
1) Final report currently under preparation to be available in 2007.  
2) Develop funding proposal “Source Apportionment of US. Particulate Matter and Human Mortality” to submit to the Health Effects Institute in 2006.

2. **Collaboration between the centre and WHO/PAHO:**  
1) Dr. Arden Pope is a member of the Outdoor Air Pollution Working Group of the WHO Global Burden of Disease Comparative Risk Assessment Project.
II. Radiation Health Risks

A. WHO Epidemiological Study of Cellular Telephones and Head and Neck Cancer

Principal Investigator(s): Daniel Krewski, Mary McBride, Jack Siemiatycki
Funding: CIHR, CWTA
Description of Project: Potential health effects of electromagnetic fields (EMF) have been a topic of scientific interest since the late 1800s, and have received particular attention in the last 40 years. Common sources of these fields include power lines, household electrical wiring, appliances and motor driven instruments, computer screens, telecommunications and broadcast facilities, cellular telephones and their base stations. Cellular telephone use has increased steadily in the past few years in many countries. Evidence suggests that low-level exposure to radiofrequency electromagnetic fields due to cellular telephone use may result in adverse health effects. Further study is required to determine whether cellular telephone use is associated with increased incidence of brain tumours, salivary gland tumours and other head and neck tumours. In 1998, an international group of scientists convened by the International Agency for Research on Cancer (IARC) recommended a coordinated international study of cancer risks related to the use of cell phones. Thirteen countries have been invited to participate, including Canada. The primary objective is to evaluate the relationship between cell phone usage and the incidence of adult leukemia and head and neck cancer. Three centres in Canada – Montreal, Ottawa and Vancouver/Victoria – have been selected due to a high prevalence of cell phone use over several years enabling a sufficient number of population-based cases to be identified and the availability of a non-biased control group. The three Canadian centres that are collaborating in this study have already acquired a substantial sum of funding and the McLaughlin Centre will coordinate the Ottawa activities. The McLaughlin Centre will act to coordinate and create a central database for cell phone billing records for the verification of cell phone usage in study patients with cancer. The McLaughlin Centre will coordinate, collect and analyze the data from the Ottawa cohort of patients involved in the study.

1.1 Work performed in relation to terms of reference:
1) Completion of diagnostic database by Melanie Kusznireckyj in February 2005.
2) Meeting in April 2005 with Industry Canada and Melanie Kusznireckyj for mobile phone characteristics registered in Canada.
3) Joint meeting in July 2005 between CWTA, Health Canada, Industry Canada and McLaughlin Centre staff attended by Dr. Daniel Krewski and Daniel Bedard regarding INTERPHONE update, status of Canadian study.
4) Completion of data collection in June 2005.
5) Completion of SMP study in August 2005.
6) Completion in August 2005 by Daniel Bedard, Jenna Schultz, Michelle Turner and Melanie Kusznireckyj of Base-Station measurements with Telus Mobility.
7) Completion of billing record collection for Canadian retrospective validation study.
8) Initiated GSM Base-station study with Rogers Wireless. Collaborated with Geoff Francis and Micheline Lafleur.
9) Completion of database of mobile phone characteristics.
10) Completion of network history questionnaire for all four network providers in Canada.

1.2 Recommendations, where applicable, for further implementation of the activity
1) Complete Retrospective Validation Study analysis in collaboration with Dr. Martine Vrijheid and Dr. Elisabeth Cardis (IARC).
2) Complete data collection and analysis of Base-Station study with Rogers Wireless for the GSM network.
3) Start Canadian analysis for all 3 centres in Canada. The analysis will be done at the McLaughlin Centre in Ottawa.
4) Publish Canadian results in a peer-reviewed journal.
5) Send Base-Station results from Rogers Wireless to IARC (Dr. Elisabeth Cardis and Dr. Martine Vrijheid).
6) Further discussion on main INTERPHONE paper with IARC and Dr. Daniel Krewski.
7) Collaborate with IARC on papers to be published using Canadian data (Retrospective Validation Study, Base-station study, SMP study).

2. Collaboration between the centre and WHO/PAHO:
1) Weekly contacts from January to June 2005 between (IARC) Dr. Elisabeth Cardis and Isabelle Deltour with Dr. Daniel Krewski and Daniel Bedard regarding final database of Canadian data for INTERPHONE study.
2) Weekly contacts in 2005 between Dr. Martine Vrijheid (IARC) and Dr. Daniel Krewski and Daniel Bedard for Canadian protocol of retrospective study, SMP study and Base-Station study.
3) Weekly contacts from January to August 2005 between Monika Moissonnier (IARC) and Daniel Bedard for Canadian study database of interviews.
4) Full Study Group meeting at IARC June 5-6, 2005 to discuss draft results attended by Dr. Daniel Krewski and Daniel Bedard.
5) Analysis Sub-Committee meeting at IARC on June 7, 2005 attended by Dr. Daniel Krewski.
7) Liaison with IARC – Daniel Bedard, Visiting Collaborator November, 2005 working on Retrospective validation study analysis with Dr. Martine Vrijheid and Isabelle Deltour.
8) Weekly contacts from July 2005 to December 2005 between Emilie Combalot (IARC) and Daniel Bedard.
9) Ongoing discussions between IARC and Dr. Daniel Krewski regarding main INTERPHONE paper on brain tumors and mobile phones.
11) Contribute to the development of the methodology of INTERPHONE study.
12) Development of a grant to study the association between brain cancer and occupational chemicals and EMF in the INTERPHONE study with IARC to be submitted to NIH in 2006.
12) Dr. Daniel Krewski was a visiting scientist at IARC from 2005-2006.
B. Royal Society of Canada Report on Health Risks of Radiofrequency Fields

Principal Investigator(s): Daniel Krewski, Craig Byus, Barry W. Glickman, W. Gregory Lotz, Rosemonde Mandeville, Mary McBride, Frank S. Prato, and Donald F. Weaver

Funding: Health Canada

Description of Project: The Royal Society of Canada is the senior national body of distinguished Canadian scientists and scholars with a primary objective to promote research in the natural and social sciences as well as the humanities. One the Royal Society’s roles is to provide independent expert advice on significant issues of concern to Canadians. The Royal Society fulfills this role by convening Expert Panels to prepare independent authoritative reports according to well-established process developed by the Royal Society. Dr. Krewski was selected by the Royal Society to chair the Expert Panel on the Potential Health Risks of Radiofrequency Fields from Wireless Telecommunication Devices in 1998. Funding for this Expert Panel was provided by Health Canada, who requested a review of the scientific literature on the potential health risks of radiofrequency fields and an assessment of the implications of this review for Safety Code 6, which provides guidelines on safe levels of exposure to radiofrequency fields in Canada. The Expert Panel’s report was published by the Royal Society of Canada in 1999, and subsequently appeared in a special issue of the peer reviewed Journal of Toxicology and Environmental Health (Vol B4, 2001, pp. 1-143). Members of the Expert Panel have continued to work together following the completion of their original report, and have prepared biannual updates to the original report. The first update, covering the period 1999-2001 has been published in the Journal of Toxicology and Environmental Health (Vol B4, 2001, pp. 145-159).

1.1 Work performed in relation to terms of reference:

1.2 Recommendations, where applicable, for further implementation of the activity:
2) Development of a manuscript which specifically reviews the epidemiological studies which examine the associations between cell phone use and cancer.

2. Collaboration between the centre and WHO/PAHO:
1) Dr. Michael Repacholi, WHO, Coordinator, Radiation and Environmental Health, meeting January 20-21, 2005 in Geneva with Dr. Daniel Krewski and ongoing discussions of radiofrequency fields.
2) Dr. Elisabeth Cardis, IARC, will be asked to participate in the development of a review on cell phone use and cancer risks.
C. Electromagnetic Fields (EMF) and Health

**Principal Investigator(s):** Daniel Krewski, Riadh Habash, Lynn Brodsky, William Leiss, Michael Repacholi  
**Funding:** CWTA, CIHR $850,000

**Description of Project:** The McLaughlin Centre, led by Daniel Krewski, participated in the WHO-sponsored development of a report on risk assessment, risk perception, and risk communication issues pertaining to the health effects of electromagnetic fields, based on the international reviews in Vienna in 1997 and Ottawa in 1998.

1.1 Work performed in relation to terms of reference:
1) Preparation of four manuscripts:

2) Development of a grant to study the association between brain cancer and occupational chemicals and EMF in the INTERPHONE study.

1.2 Recommendations for further implementation of the activity:
1) Submit grant to NIH in 2006 to study the association between brain cancer and occupational chemicals and EMF in the INTERPHONE study.
2) Prepare and submit a paper on the association between EMF and Non-Hodgkin’s Lymphoma.

2. Collaboration between the centre and WHO:
1) Collaboration with IARC to develop a grant to study the association between brain cancer and occupational chemicals and EMF in the INTERPHONE study.
2) Dr. Michael Repacholi, WHO, Coordinator, Radiation and Environmental Health, ongoing discussions about electromagnetic fields and health.
D. Residential Radon and Risk of Lung Cancer- A Global Study

Principal Investigator(s): Daniel Krewski, Kevin Brand, Jan Zielinski

Funding: MRC (CIHR), $81,000; 1999-2001

Description of Project: The World Health Organization has been concerned with air pollution and, in particular, its dangers to human health for over 30 years. In addition to being present at high concentrations in many types of underground mines, radon is found in homes and is also present outdoors. Extensive measurements of indoor radon concentrations in homes show that although concentrations vary widely, radon is universally present raising concerns that radon in homes increases lung-cancer risk for the general population, especially those who spend a majority of their time indoors at home. For the purpose of developing public policy to manage the risk associated with indoor radon, there is a need to characterize the possible risks across the range of exposures received by the population. The report “Biological Effects of Ionizing Radiation (BEIR) VI Report: "The Health Effects of Exposure to Indoor Radon" confirms that radon is the second leading cause of lung cancer in the U.S. and that it is a serious public health problem. The study fully supports EPA estimates that radon causes about 15,000 lung cancer deaths per year, however, the report acknowledges that there are gaps in our scientific knowledge about the effects at low levels of radon exposure. Daniel Krewski contributed to the combined analysis of North American radon case-control studies and was an integral member of the team investigating radon and lung cancer risk in both the US and Canada. This project began in 1995 and is ongoing. Currently, European nations are undertaking their own radon and lung cancer studies to assess the risk of residential radon in their communities. The McLaughlin Centre, led by Daniel Krewski, will participate in the global pooling of the North American data and European data for a global assessment of the risks of residential radon exposure in the development of lung cancer.

1.1 Work performed in relation to terms of reference:
1) Publication of four manuscripts:

2) Dr. Daniel Krewski served as co-chair of the risk assessment and global burden of disease committees of the WHO Radon Project 2005-2008 and gave a presentation on the pooling of North-American residential radon case-control studies at the First Meeting of the Expert Group for the WHO Project on Residential Radon Risk, Geneva, Switzerland, January 17, 2005.

3) Dr. Daniel Krewski represented North America in the EU global pooling of residential case-control studies.


5) Dr. Daniel Krewski gave a presentation on the combined analysis of North American case-control studies of residential radon and lung cancer at the CIIT Centers for Health Research, Research Triangle Park, North Carolina, April 14, 2005.

6) Dr. Daniel Krewski gave a presentation on Residential Radon Risk Management, June 22, 2005, at the Radon Round Table at the Annual Meeting of the Canadian Radiological Protection Society, in Winnipeg, Manitoba.

1.2 Recommendations, where applicable, for further implementation of the activity:
1) Adapt WHO Global Burden of Disease methodology to develop risk estimates specific to Canada.
3) Publish Health Canada radon and lung cancer workshop report.

2. Collaboration between the centre and WHO/PAHO:
1) Dr. Daniel Krewski served as co-chair of the risk assessment and global burden of disease committees of the WHO Radon Project 2005-2008.

3. Collaboration with other WHO collaborating centres:
1) Dr. Daniel Krewski attended meeting in Geneva (January 17-18, 2005) to present the results of the North American pooling of residential radon and lung cancer case-control studies. Discussions were held regarding the Global Pooling of Residential Radon data with Göran Pershagen, Professor, WHO Collaborating Centre for Environmental Health Effects/Institute of Environmental Medicine, Karolinska Institute and Chair World Pooling Group for Residential Radon Exposure and Lung Cancer.
E. International Collaborative Study of Cancer Risk among Radiation Workers in the Nuclear Industry

Principal Investigator(s): Daniel Krewski, William Sont, Jan Zielinski, JP Ashmore, H Jiang, PR Band
Funding: CIHR, $240,000

Description of Project: The International Collaborative Study of Cancer Risk among Radiation Workers in the Nuclear Industry is a retrospective cohort study of over 600,000 nuclear industry workers in seventeen countries initiated in 1990. The objective of the study is to obtain direct estimates of the effect of low-dose protracted exposure to ionizing radiation in order to assess the adequacy of radiation protection standards for environmental and occupational exposures. The specific purpose of the study is to obtain data for comparison with the risk estimates derived from studies of persons having received high dose/high dose-rate exposures. This will provide a direct test of the adequacy of the extrapolation models used currently for radiation risk assessment and for the setting of radiation protection standards, and may assist in the construction of improved risk assessment models. A subcohort nuclear industry workers from the National Dose Registry has been analysed for mortality as Canada’s contribution to the IARC study. Using the National Dose Registry of Canada, scientists at the McLaughlin Centre, WS Sont, JM Zielinski, JP Ashmore, H Jiang, PR Band and D Krewski, are examining cancer incidence and occupational radiation exposure. The National Dose Registry of Canada data enables McLaughlin scientists to obtain direct estimates of the effect of low-dose protracted exposure to ionizing radiation in Canadian Nuclear Workers.

1.1 Work performed in relation to terms of reference:
1) Submission of manuscript using NDR (Canada) to examine radiation exposure in medical workers.

1.2 Recommendations, if applicable, for further implementation of the activity:
1) Publication of manuscript using NDR (Canada) to examine radiation exposure in medical workers.

2. Collaboration between the centre and WHO/PAHO:
1) Dr. Pat Ashmore contributed data and expert analysis to IARC International Nuclear Worker Study lead by Dr. Elisabeth Cardis.
III. Chemical Risk Assessments

1.1 Work performed in relation to terms of reference:
1) Dr. Daniel Krewski chaired IARC monograph meeting on polycyclic aromatic hydrocarbons from October 11-18, 2005.
3) Dr. Daniel Krewski chaired the IARC working group 2005-2006 on “Estimates of the cancer burden in Europe from radioactive fallout from the Chernobyl accident” Lyon, France, September 21-22, 2005.
4) Dr. Daniel Krewski participated in a scientific working group to prepare IARC monograph on avoidable causes of cancer (March 21-23, 2005).
5) Dr. Daniel Krewski participated in a scientific meeting at IARC from May 4-6, 2005 to update the preamble on carcinogenic risks to humans.
6) Dr. Daniel Krewski was part of an advisory group to develop priorities for future IARC monographs on carcinogenic risks to humans (December 5-7, 2005).
8) Dr. Daniel Krewski was Chair, U.S. National Academy of Sciences Committee on Toxicity Testing and Risk Assessment of Environmental Agents (2004- ).
9) Dr. Daniel Krewski was Member of the IARC Advisory Group to Recommend Updates to the Preamble to the IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, International Agency for Research on Cancer, Lyon, France, May 4-6, 2005.
10) Dr. Daniel Krewski was Member of the IARC Advisory Group to Review the Amended Preamble to the IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, International Agency for Research on Cancer, Lyon, France, December 5-9, 2005.

1.2 Recommendations, where applicable, for further implementation of the activity:
1) Contribute to the planning for IARC Monograph #100.
2) Examine the potential human health risks from chromium and cobalt exposure due to metal on metal hip implants.
3) Examine the association between occupational chemical exposures and lung cancer risk.
4) Examine child health outcomes associated with parental pesticide use in the Ontario Farm Family Study.

2. Collaboration between the centre and WHO/PAHO:
1) Dr. Daniel Krewski chaired IARC monograph meeting on polycyclic aromatic hydrocarbons and the working group on cancer burden in Europe from the radioactive fallout from Chernobyl.
2) Dr. Daniel Krewski participated in a scientific working group to prepare IARC monograph on avoidable causes of cancer, in an IARC scientific meeting to update the preamble on carcinogenic risks to humans, and was part of advisory groups to develop priorities for future IARC monographs on carcinogenic risks to humans and to recommend and review updates to the Preamble to the IARC Monographs on the Evaluation of Carcinogenic Risks to Humans.
3) Dr. Daniel Krewski participated in the working group for the Cogliano et al. 2005 publication and IARC monograph on formaldehyde.
4) Dr. Daniel Krewski was a visiting scientist at IARC from 2005-2006.
3. **Collaboration with other WHO collaborating centres:**

1) Dr. Daniel Krewski met with Salomon Sand and Ajnieta Falk-Filipsson at the WHO Collaborating Centre for Environmental Health Effects/Institute of Environmental Medicine, Karolinska Institute to discuss risk assessment methodology and possible collaborations for further methodological developments from September 29-30, 2005.
IV. Risk Perception

A. Public perception and acceptable levels of health risk among Canadians

Principal Investigator(s): Louise Lemyre, Daniel Krewski, Louise Bouchard, Kevin Brand, Christine Dallaire, William Leiss, Pierre Mercier

Funding: Health-Canada

Description of Project: Social, psychological and political factors have considerable influence on the impact of risk judgments. Determination of those psychosocial parameters which most strongly affect risk perception and acceptable may be extrapolated to various societies and cultures throughout the world. For global organizations, the use of psychosocial parameters to model risk perception and acceptability will enhance the ability to implement risk management strategies through changes in public policy. This research program will elucidate the factors shaping public perceptions of risk and risk acceptability. Specifically, a psychosocial model for understanding the factors influencing attitudes and opinions about risk will be developed. Established guidelines of risk acceptability will be reviewed in detail, and psychosocial values underlying acceptability of risk examined. Common-sense benchmark risk scales to assist in understanding and communicating scientific information on health risks, particularly small risks difficult to identify and comprehend, will be developed. Public and expert perceptions of risks to health will be evaluated through representative national surveys. A predictive model of risk perception and risk acceptability will also be developed. The use of the research results in informing national policies for health risk management will be explored. Our objectives are: (I) to document the conceptualization of risk and of risk acceptability from both the public and regulatory perspectives; (II) to describe profiles of risk perception and risk acceptability according to types of risk (known, voluntary, involuntary, theoretical), expert status (toxicologist, physician, public), and sociodemographics (gender, age, ethnolinguistic identity, and region); to track the evolution of such profiles over the last decade; to elucidate the role of risk characteristics (e.g., familiarity, controllability, severity) with respect to perception and acceptability; and (III) to model the role of risk perception and acceptability in decisions about risks, such as judgments and evaluations of risk that have implications for risk management and policy-making.

1.1 Work performed in relation to the terms of reference:
1) Analysis of survey results from National Survey of risk perception conducted in Canada in 2004.
3) Submission of manuscripts:
4) Research meeting in Sevilla and work on threat assessment as part of international collaboration (2004-2007) with European Union Coordination Action Project “Assessment of the vulnerabilities of modern societies to terrorism acts employing radiological, biological, or chemical agents with the view to assist in developing preventive and suppressive crisis management strategies (ASSRBCVUL)”.

1.2 Recommendations, where applicable, for further implementation of the activity:
1) Examine risk perception in South America using a risk perception survey specifically designed to evaluate risk perception and risk acceptability in South America.
2) Identify other countries where this work may be of interest.
3) Lead a child health and environment project in Argentina with the Canadian Institute of Child Health for a risk perception survey.

2. **Collaboration between the centre and WHO/PAHO:**
   1) Collaboration with Dr. Emilie Van Deventere and Dr. Michael Repacholi, WHO, on the role of risk perception in the WHO precautionary framework.
   2) Electronic collaboration with Dr. Lars Weiseath (Oslo), WHO, on mental health and disasters.
   3) Research meeting and collaboration with Dr. Beverly Rapheal (Australia), WHO, on mental health and disasters.
   4) Electronic collaboration with Dr. Simon Wesseley (UK), WHO, on mental health and disasters.
   5) Facilitation meeting with Dr. Natacha Joubert (Ottawa) on population mental health at WHO.
B. Psychosocial and bioenvironmental risk assessment and management tools to enhance response to CBRN attacks and threats in Canada

**Principal Investigator(s):** Louise Lemyre, Daniel Krewski, Wayne Corneil, M. Brodhead, John Shortreed, E. Weekman, Sam Kacew, D. Lean, E. Todd, Robert Clarke

**Funding:** CRBN Research and Technology Initiative (CRTI)

**Description of Project:** Following the recent spate of terrorist activities, both in the US and abroad, countries are forced to develop both short and long-term response strategies in the event of a bioterrorist attack or threat. These response strategies must also include early detection and prevention. Behavioural and psychological impacts of bioterrorism associated with the risk of massive outbreaks of human illnesses and death may well be the most widespread, long-last and costly consequence. Infrastructures required to address CBRN threats or attacks include federal and local governments, police, fire and other emergency services, hospitals and specialized laboratories. We have developed a proposal to develop strategies to deal with psychosocial impacts following CBRN threats and attacks. This proposal seeks to understand and mitigate the psychosocial impacts arising from social disruption, stress, panic, acute individual trauma, and anticipated behavioural changes. A transdisciplinary team of psychologists, scientists and risk analysts are well positioned to address these issues. The proposed program aims to develop an integrated psychosocial and bioenvironmental risk management framework for biological agents and practical field based training tools to enhance the capability of first responders to mitigate the human health and psychosocial impacts of bioterrorist threats and attacks. The *Psychosocial Risk Assessment and Management Module* includes surveys, field work and natural laboratory experiments to assess CBRN risk perceptions among Canadians.

1.1 Work performed in relation to the terms of reference:

1) Analysis of data collected as part of the National Survey of CBRN risk perception conducted in 2004.
2) Submission of manuscripts:
3) Research meeting in Sevilla and work on threat assessment as part of international collaboration (2004-2007) with European Union Coordination Action Project “Assessment of the vulnerabilities of modern societies to terrorism acts employing radiological, biological, or chemical agents with the view to assist in developing preventive and suppressive crisis management strategies (ASSRBCVUL)”.

1.2 Recommendations, where applicable, for further implementation of the activity:

1) Examine risk perception in South America using a risk perception survey specifically designed to evaluate risk perception and risk acceptability in South America.
2) Identify countries where this work may be of interest.

2. Collaboration between the centre and WHO/PAHO:

1) Electronic collaboration with Dr. Lars Weiseath (Oslo) WHO on mental health and disasters.
2) Research meeting and collaboration with Dr. Beverly Rapheal (Australia) WHO on mental health and disasters.
3) Electronic collaboration with Dr. Simon Wesseley (UK) WHO on mental health and disasters.
4) Facilitation meeting with Dr. Natacha Joubert (Ottawa) on population mental health at WHO.
V. Building Research Capacity and Training

A. Injury Surveillance

Worldwide, it is estimated that injuries accounted for five million deaths and 12% of the burden of disease in the year 2000, and is expected to rise. Road traffic injuries, self-inflicted injuries, interpersonal violence, and drowning were among the leading causes of death and disability. Injuries have been seen to disproportionately affect people living in low and middle income countries including the Caribbean. Currently, however, insufficient is known about the epidemiology of injuries in these areas for the purpose of assessing needs, developing policy and evaluating interventions. An injury surveillance system was established in Trinidad and Tobago in 2002 by CAREC and the SWRHA through support from IDRC at the San Fernando General Hospital. Currently the resources are not available for the timely analysis and dissemination of the information gathered by the surveillance system. By partnering with the SWRHA and CAREC, the McLaughlin Center will assist in developing capacity and serve as the analytical support to describe the epidemiology of these injuries in order to provide policy makers with important priorities for injury prevention. The injury surveillance system will provide a model that can be used in other areas of Trinidad and Tobago and the broader Caribbean region.

1.1 Work performed in relation to the terms of reference:
1) Funding proposal “Caribbean – Canadian Partnership, Injury Surveillance in Trinidad” funded by the Pan American Health Organization Biennial Program Budget.
2) Michelle Turner and Michael Garner, McLaughlin Centre, visited CAREC and the SWRHA from June 7 – 10, 2005 to evaluate the injury surveillance system at the San Fernando General Hospital.
3) Training session held at the McLaughlin Centre from October 3-7, 2005 for Roanna Bynoe from the SWRHA on epidemiological data analysis and paper writing related to injury surveillance data.
5) Dr. Daniel Krewski, Dr. Robert Clarke, Michelle Turner and Robert Hawes from the McLaughlin Centre visited CAREC and the SWRHA from November 21-25, 2005 to disseminate research findings to date from the current collaboration and to initiate a strategy for the expansion of injury surveillance throughout Trinidad & Tobago. Presentations were given to the Rotary Club of San Fernando South, the Southwest Regional Health Authority, and at a multistakeholder workshop with representatives from Trinidad, Tobago, and the broader Caribbean.
6) Two papers submitted for presentation at the Caribbean Health Research Council (CHRC) 51st Annual Scientific Meeting to be held in April 2006 in Frigate Bay, St. Kitts:

1.2 Recommendations, where applicable, for further implementation of the activity:
1) Develop funding proposal to continue collaboration with CAREC and the SWRHA.
2) Develop funding proposal to initiate expansion of the injury surveillance system throughout Trinidad & Tobago and the broader Caribbean.

2. Collaboration between the centre and WHO/PAHO:
1) Funding proposal developed in collaboration with CAREC (Dr. James Hospedales, Ms. Marlene Francis)
2) Injury surveillance system evaluated and evaluation report prepared in collaboration with CAREC (Ms. Marlene Francis)
3) Scientific papers prepared for presentation at the CHRC 51st Annual Scientific Meetings in collaboration with CAREC (Ms. Marlene Francis)
4) Training session for Roanna Bynoe developed in collaboration with CAREC (Ms. Marlene Francis)
5) Ongoing discussions with CAREC personnel: Dr. James Hospedales and Ms. Marlene Francis
B. Graduate Certificate Program in Population Health Risk Assessment and Management
Population health risk assessment is the comprehensive assessment of health risks in the general population based on environmental, genetic, economic, social and behavioural determinants of health. This leads to evidence-based population health risk policy analysis, and ultimately, cost effective population health risk management decisions. The Graduate Certificate in Population Health Risk Assessment and Management offered through the McLaughlin Centre is specially designed for those individuals employed and/or interested in population health analysis and risk assessment. The certificate aims to provide the professional skills and knowledge needed to pursue careers in both the public and the private sectors.

1.1 Work performed in relation to terms of reference:
1) The Graduate Certificate was launched in September 2004.
2) Training session held at the McLaughlin Centre through collaboration on injury surveillance with CAREC from October 3-7 2005 for Roanna Bynoe from the SWRHA on epidemiological data analysis and paper writing related to injury surveillance data.

1.2 Recommendations, where applicable, for further implementation of the activity:
1) Continue to successfully graduate students.
2) Develop short courses and e-learning modules related to specific aspects of population health risk assessment and management.
3) Hold training program in risk assessment for Chinese delegation in collaboration with the Canadian International Development Agency (CIDA).

2. Collaboration between the centre and WHO/PAHO:
1) Training session for Roanna Bynoe developed in collaboration with CAREC (Ms. Marlene Francis).
VI. Risk Management

A. WHO Workshop on the Precautionary Framework for Developing Public Health Policy Options in Areas of Scientific Uncertainty

The lack of global scientific consensus on the long term health risks associated with electromagnetic radiation exposures from cellphones has resulted in inconsistent radiation exposure standards around the world. As a result, WHO initiated the development of the framework in parallel with their International EMF project to provide assistance to regulators in member states in formulating policies on the EMF issue and other emerging issues in which technological development has outpaced the scientific assessment of the risks. More than 120 scientists, academics, regulators, and representatives of industry and non-governmental organizations from 17 countries worldwide convened at the University of Ottawa on July 11-13, 2005 to participate in a Workshop on Guiding Public Health Policy in Areas of Scientific Uncertainty. The Workshop was spearheaded by the World Health Organization (WHO) and organized in collaboration with the McLaughlin Centre for Population Health Risk Assessment to seek stakeholder feedback on a draft WHO framework designed to assist member states in managing issues where scientific evidence of the risks is uncertain. The objectives of the workshop were to:

- Discuss the use of precautionary measures in the development of public health policy
- Review and provide useful inputs on the draft Framework
- Discuss the implications of its implementation with stakeholders
- Challenge the Framework to a series of relevant case studies to ensure it is useful and practical
- Critique the Framework so it can withstand reasonable criticism and therefore serve as a “global” Framework

1.1 Work performed in relation to the terms of reference:

1) Workshop held in Ottawa from July 11-13, 2005 to discuss a WHO precautionary framework for developing public health policy options in areas of scientific uncertainty.
4) Workshop report prepared and disseminated (Appendix 1).

2. Collaboration between the centre and WHO/PAHO:

1) Discussions with Dr. Michael Repacholi, Coordinator, Radiation and Environmental Health, WHO and Emilie Van Deventere, WHO.
VI. Prion Diseases

A. PrioNet
In recent years, Canada along with many other countries has faced a growing number of crises related to the safety of agricultural products. These concerns have ranged from the use of antimicrobials and growth hormones in food-producing animals, to the use of genetic modification (transgenic animals, rBST, StarLink corn) and to concerns over the emergence of zoonotic diseases from animal populations (SARS, Avian Influenza, and BSE or mad cow disease). The costs to industry and consumers have been massive. A fundamental problem in attempts to address BSE as a health, economic and social risk issue to date has been the adoption of an incomplete approach to risk management. Following the BSE outbreak in England it was evident that the lack of inclusion of social impacts in the science advice to policy makers was an important flaw in the risk management system. This practice was repeated in Canada and other countries, as evidenced by risk assessments that primarily focussed on the probabilistic risks of exposure and not on the consequences

1.1 Work performed
1) Development of a proposal for a Network of Centres of Excellence: PrioNet. Three main components of Prion Disease risk management will be studies:

1. Develop a conceptual Integrated Risk Management Framework.
A fully integrated RM framework will be developed.

2. Risk Estimation
Existing models for the projection of prion disease risks are subject to considerable uncertainty, and rely on a number of unvalidated assumptions. We will extend these models using more current information, both population and laboratory based, to achieve more accurate estimates of risk

Our risk management framework will be applied to the analysis of BSE risks in Canada, using the new information developed in this project. We will work closely with policy makers in the federal government (particularly the Canadian Food Inspection Agency, the Public Health Agency of Canada, Health Canada and Agriculture and Agri-Food Canada) as well as industry, community and other stakeholder groups to ensure that it meets Canada’s risk management needs.