Occupational Cancer Research Centre

OCCUPATIONAL CANCER RESEARCH CENTRE

YEAR 4 (2012-2013) OPERATING PLAN

February 15, 2012

Towards a cancer-free workplace

EXECUTIVE SUMMARY

The Occupational Cancer Research Centre (OCRC) was established in 2009. It is the first research centre of its kind in Canada. OCRC is funded by the Workplace Safety and Insurance Board's Research Advisory Council, Cancer Care Ontario, and the Ontario Division of the Canadian Cancer Society, with the support of the United Steelworkers Union. Representatives from these four organizations came together with the common purpose and objective of forming a research organization to fill the gaps in our knowledge of occupation-related cancers. The Centre is dedicated to the investigation of the causes of and the surveillance of occupational cancers, and the development of interventions with the goal to translate these findings into preventive programs to control workplace carcinogenic exposures and improve the health of workers.

The multiple funding sources and the diverse institutional support are facilitating the growth and expansion of the Centre as it approaches its fourth year. In year four, the Centre will increase the scope and complexity of its research projects, will expand its staff, and will extend its researcher network. The breadth and depth of research will be extended across the three major thrusts of the Centre's research: the investigation into the cause of occupational cancer, the surveillance of different sectors and their exposures, and the analysis of the human and economic burden of cancer which lays the foundation for focused interventions at the workplace and policy levels. It will extend its network of collaborators and affiliated researchers across Ontario, Canada, and internationally (see Appendix E). It will increase its staff to ensure a range of skills and expertise tied to the needs of the research grants that will be applied for, or research grants that will be received in year four.

The Centre has four strategic initiatives that help direct its activities: research, capacity building, knowledge exchange, and sustainability initiatives. These were outlined in the OCRC 5-Year Strategic Plan, which was developed and approved by the OCRC Steering Committee, consisting of representatives from the funding organizations, organized labour, employers, the Ministry of Labour, and the research community. The Year 4 Plan continues directing its activities along the lines of these strategies.

Strategy 1: Build a Research Program. The Centre will continue to expand its research program in Year 4. Research projects will be conducted in its major areas of focus (surveillance, causes, and interventions). The Centre will enter the year with 13 ongoing projects and several others that are planned, using a mix of research methods and engaging on these projects with collaborators across Ontario, Canada, the U.S., and Europe. A number of projects have been completed and the results will be shared with academic and other stakeholder communities through publications, including electronic media, and presentations.

Strategy 2: Build Research Capacity. As the Centre moves into Year 4, its core research team consists of a director, an associate director, five affiliated scientists**,** a post-doctoral fellow, six research associates, and an administrative support staff member. The OCRC will be expanding its network of affiliated scientists. We enter 2012 with five graduate students from the University of Toronto. Four of the five will complete their work on Centre projects in the first semester of 2012. We are in the process of recruiting at least five new graduate students who will be conducting practicum projects in the summer and in the fall/winter of 2012/13. The research associates and post-doctoral fellow act as mentors to the students. A number of the students have chosen to conduct multiple practicums at OCRC on linked projects that are extending their knowledge, skills and investment in the field of occupational cancer.

Strategy 3: Deliver and Exchange Knowledge. The OCRC will expand its work delivering and exchanging knowledge with stakeholders to build awareness of occupational cancer, encourage the emergence of new research questions, and inform policy and practice. This includes building the reputation and awareness of the Centre by giving presentations at stakeholder conferences, using the OCRC website, publishing and distributing plain-language research summaries in OCRC and other centres' publications, and actively engaging with stakeholders. The OCRC will create learning opportunities with a workshop on the classification of carcinogens held in the beginning of 2012, its 3rd Annual Research Day, a second research symposium on shiftwork, and through seminars sponsored or co-sponsored by our partners, such as the Health and Safety Associations, the Centre for Research Expertise in Occupational Disease (CREOD), the Institute for Work and Health, and Public Health Ontario.

Strategy 4: Build a Sustainable Centre. We are developing and expanding upon a strong core of researchers, staff, and students with an effective infrastructure. During the coming year we will continue to build strong relationships with the other occupational disease research centres funded by the WSIB (the CRE's and the Institute for Work & Health), Ontario universities, and non-research institutions (see Appendix E for collaborators). We will continue to build our internal network with Cancer Care Ontario, especially our presence and activities within the Prevention and Cancer Control Program in which OCRC is situated, and will extend our interactions with the Canadian Cancer Society, especially with its Research Institute (CCSRI). In Year 4, we also plan to actively seek out additional partners and additional core funding from traditional granting institutions, government agencies, and non-governmental organizations.

Three Year Review. Finally, in Year 4, the Centre will engage in a Three Year Review conducted by the WSIB's Research Advisory Council, in cooperation with the other funders. We are looking forward to this external evaluation of the OCRC as an opportunity to focus on the Centre's strengths, opportunities, challenges, and areas for improvement. This report and others that have been written for the funders, as well as research grants, academic journal articles, policy reports, literature reviews, posters, presentations, and plain-language resources will be part of this evaluation, together with direct input from researchers and stakeholders on the impact of the Centre.

OCRC OPERATIONAL PLAN FOR YEAR 4 (2012-2013)

The OCRC, established in 2009, is based at Cancer Care Ontario (CCO) and is jointly funded by the Workplace Safety and Insurance Board' Research Advisory Council (WSIB-RAC), the Ontario Division of the Canadian Cancer Society (CCS), and CCO, and was developed in collaboration with the United Steelworkers union. The goal of the OCRC is to fill the gaps in our knowledge of occupation-related cancers and use these findings to inform preventive programs to control workplace carcinogenic exposures and improve the health of workers. It is the only research centre of its kind.

The OCRC has been productive since its inception in 2009, but has undergone substantial growth, especially in the past year. At the end of Year 3, the OCRC had a full-time, permanent director (who arrived in 2010), an associate director (who was part-time in 2011, but is now full time in 2012), five affiliated scientists, a post-doctoral fellow, six research associates, and an administrative assistant. The Centre presently has five students. This strong complement of staff and students and an established governance structure, allows us to expect that Year 4 (2012/13) will be its most productive year to date.

This document outlines Year 4's initiatives following the outline of the OCRC's four-pronged strategy to: 1) build a research program; 2) build research capacity; 3) deliver and exchange knowledge; and 4) build a sustainable centre. These four strategic initiatives follow the OCRC 5-Year Strategic Plan, which was developed and approved by the OCRC Steering Committee. This committee consists of representatives from the three funding organizations, organized labour, employers, the Ministry of Labour, and the research community. See Appendix A for a one-page summary of the OCRC Strategic Plan or visit the website to view the full report: http://occupationalcancer.ca/aboutocrc/vision-strategic-direction/.

1. BUILD A RESEARCH PROGRAM

The goal of the OCRC is to expand its research program considerably in Year 4 with external research grants – both provincial and federal. Research projects will be conducted in the three areas of the research agenda (surveillance, causes, and interventions) and the results of this research will be shared with academic and other stakeholder communities through publications and presentations. The Centre will enter the new fiscal year with 13 ongoing projects, eight completed projects, and a number of other major projects in the planning stages. In Appendix B is a summary of the ongoing research projects in the areas of surveillance, causation, and interventions, as well as completed projects (Tables 1-4). Appendix C lists the submitted and accepted conference abstracts for 2012-2013, and Appendix D contains a list of manuscripts, reports and book chapters. The OCRC website outlines complete descriptions of ongoing research projects, which can be downloaded at: http://occupationalcancer.ca/topics/projects/.

This work meets the objectives related to building a research program in the OCRC's strategic plan, including: undertaking research, publishing and presenting in the Centre's areas of focus (surveillance, causes, interventions) using a mix of research methods, and developing and supporting a strong network of researchers working in collaboration with the Centre. More information about building a network of researchers can be found in the next section on building research capacity.

1. Surveillance: The OCRC has received funding from the WSIB-RAC to initiate two cancer surveillance projects in 2012/13 that will act as excellent research platforms. The first of these will be a collaborative project with Statistics Canada to analyze a national dataset created by linking the 1991 Canadian Long-form Census, which offers occupation and industry data, to the Canadian Cancer Registry (1992-2006). The dataset includes over 2 million people and will allow researchers to identify jobs or substances that carry an increased risk of cancer. The second project will develop a new model of cancer surveillance using WSIB lost time claims. These claims will be linked to Ontario's tumour registry to create a large database of workers in this province. This pilot study is a bold new initiative which has already incurred interest.

We are also increasing our work in the area of exposure surveillance. As part of our ongoing analysis of the Ministry of Labour's MESU database, we are looking at historic patterns and trends of exposure to carcinogens such as asbestos, benzene, diesel exhaust, silica and wood-dust. We have also initiated a large collaborative project with CAREX Canada that has created an excellent platform for a number of research projects that will be ongoing in 2012/13. Paul Demers, director of the OCRC, has kept his role as the Scientific Director of CAREX Canada, a national carcinogen surveillance project funded by the Canadian Partnership Against Cancer (http://www.carexcanada.ca). Although the CAREX staff are still primarily based in British Columbia, the goal for 2012/13 is to move elements of the program to the OCRC in order to create a CAREX Ontario.

2. Causation. Three of our major projects in 2012/2013 will focus on the causation of occupational cancer. There will be a continuing analyses of the Cross-Canada Study of Pesticides and Health (CCSPH), and analyses of the Toronto Lung Cancer Case-Control Study, and the National Enhanced Cancer Surveillance Study (NECSS). The CCSPH is a six province study examining the relationship between pesticides and the risk of non-Hodgkin's lymphoma (NHL), the fifth most frequently occurring cancer in Canada, and Hodgkin lymphoma (HL), the second most diagnosed cancer among those aged 15 to 29, as well as multiple myeloma, and soft-tissue

sarcoma. The research on the CCSPH is being done in collaboration with researchers in Saskatchewan and B.C. In the next year we will be pooling our data with studies from four U.S. states in collaboration with the U.S. National Cancer Institute. We will also be continuing our analyses of the Toronto Lung cancer study, which was created to examine the interactions between smoking, workplace carcinogens, and lung cancer. As well as performing our own analyses, the Centre is contributing data to an international study coordinated by the International Agency for Research on Cancer, called the Synergy Project. The last study, which was funded by the RAC, is an analysis of the relationship between bladder and colorectal cancer and diesel and gasoline exhaust using the NECSS dataset in collaboration with Health Canada and researchers in Quebec.

We are also negotiating with the Canadian Nuclear Safety Commission to fund an updated analysis of the Ontario Uranium Miners Cohort, and researchers affiliated with the OCRC are beginning work on a case-control study of breast cancer funded by CIHR that will include an occupational component. The Centre continues to explore opportunities to evaluate workplace exposures as part of the Ontario Health Study (OHS), which will hopefully allow for new research opportunities in 2012/13. Eventually, the OHS and its sister cohort studies in other provinces may become the most important platforms for occupational cancer research in Canada and involvement at this stage may present opportunities to develop collaborations with leading national and international cancer researchers.

3. Intervention: Intervention research is a developing area of research for OCRC. The Centre is conducting a feasibility study with the Centre of Research Expertise for Occupational Disease (CREOD) at two lung cancer clinics -- the Juravinski Cancer Centre in Hamilton and the Princess Margaret Hospital in Toronto. The OCRC is attempting to identify the barriers to submitting claims to workers' compensation boards encountered by workers with lung cancer and mesothelioma who may have been exposed to asbestos. The goal for 2012/2013 is to seek funding from RAC to do a larger roll-out of this study across Ontario's seven regional lung cancer clinics, and perhaps conduct a focused study in the area of Sarnia linking in the Ministry of Labour's database on asbestos exposure. A second exploratory study will be conducted at the Juravinski Cancer Centre examining exposure to anti-neoplastic agents among nurses and pharmacy workers, which will be funded by the Centre.

At the population level, a larger study, in collaboration with the Canadian Cancer Society, is being planned that will examine the human (new cancers, deaths, and time-lost) and economic burden of workplace carcinogens. A proposal in this regard will be submitted to the Canadian Cancer Society Research Institute (CCSRI) in 2012/13. This study, which will be conducted across Canada, is a team grant with the involvement of researchers from three different universities. The results of the study will raise awareness and identify priorities for prevention activities.

2. BUILD RESEARCH CAPACITY

The OCRC will continue to build its research capacity in Ontario and Canada in its fourth year of operations. Priority areas are building and retaining the core research team, recruiting and training students and post-doctoral fellows, expanding our network of affiliated scientists provincially, nationally and internationally, working with non-academic stakeholders on developing relevant research questions, and facilitating the development of research platforms. Our scientific staff are engaged in conducting both quantitative and qualitative research, including epidemiological and statistical analyses, and in writing grant proposals, policy reports, summary reports, and journal manuscripts.

Research team

2012-13 will be the first year that the OCRC will have a permanent director, an associate director, and a full complement of staff for the whole year. Entering Year 4, the Centre's core research team will consist of five affiliated scientists, a post-doctoral fellow, six research associates, and an administrative assistant. The Centre usually has four or five students per semester. Two more research associates will be hired in 2012/13 depending upon grant awards.

- Dr. Paul Demers, Director
- Dr. Desre Kramer, Associate Director
- Dr. Shelley Harris, Affiliated Scientist (0.75 externally funded by CCO)*
- Dr. Loraine Marrett, Affiliated Senior Scientist (externally funded by CCO)*
- Dr. John McLaughlin, Affiliated Senior Scientist (externally funded by CCO)*
- Dr. Paul Villeneuve, Affiliated Scientist (externally funded by Health Canada)*
- Dr. Minh Do, Junior Adjunct Scientist (0.80 externally funded and based at the Public Health Agency of Canada)*
- Dr. Anne Harris, Post-Doctoral Fellow
- Victoria Arrandale, Research Associate
- Ann Del Bianco, Research Associate
- Karin Hohenadel, part-time Research Associate
- Kate Jardine, Research Associate
- Krisy Moore, Research Associate
- Manisha Pahwa, Research Associate
- Priyanka Raj, Research Associate
- Barbara Nelson, Administrative Assistant

* Adjunct scientists do not work full-time on OCRC projects, but each plays a significant leading role in one or more OCRC projects (see Appendix B).

Student training

We will enter the year with five graduate students and a post-doctoral fellow working on Centre projects, as follows:

- Dr. Anne Harris, post-doctoral fellow (Ph.D. from University of British Columbia). Working

on Sinonasal cancer surveillance and exposure to sinonasal carcinogens in Ontario; analyses related to shiftwork, firefighting, and other exposures using the linkage of the 1991 Census with the Canadian Cancer Registry data; development of a new occupational cancer surveillance program for Ontario; and an analysis of shiftwork and insulin resistance in the Canadian Health Measures Survey.

- Garthika Navaranjan, MPH student (Epidemiology, University of Toronto). Working on an analysis of Hodgkin's lymphoma using the Cross-Canada study of pesticides; and analysis of the Ministry of Labour's MESU database of occupational exposures and linkage with CAREX estimates.
- Linda Kachuri, MPH student (Epidemiology, University of Toronto). Working on an analysis of multiple myeloma using the Cross-Canada study of pesticides.
- Joanne Kim, MPH student (Occupational and Environmental Health, University of Toronto). Working on analysis of the Ministry of Labour's MESU database of occupational exposures and linkage with CAREX estimates; and the assessment of the human and economic costs of occupational cancer.
- Jill Hardt, MPH student (Epidemiology, University of Toronto). Working on a comparison of occupational exposure assessment methods using the Toronto lung cancer case-control study.
- Desiree Latour, MPH student (Epidemiology, University of Toronto). Working on an investigation of the risk of lung cancer across different occupational groups using the Toronto lung cancer case-control study.

Four of the five graduate students listed above will complete their work early in 2012/2013. The goal for the 2012-13 fiscal year will be to continue recruiting to maintain at least five graduate students to work on OCRC projects throughout the year. In addition, we plan to recruit another post-doctoral fellow. In the three years of OCRC's existence, we have had ten students work at the Centre, and we continue to build capacity and skills in the student population. A number of students have asked to return to OCRC during different periods of their MPH and have engaged in multiple projects, which is a good indication of their growing interest in, and commitment to the field of occupational cancer research.

Affiliated scientists

The OCRC currently works on research projects with scientists from Ontario, across Canada, and internationally (see Appendix B). This network of scientists is helping expand the reputation of the Centre at the provincial, national and international levels, and helping establish OCRC as a world-class research centre in the field of occupational cancer research.

In 2012/2013, the Centre will continue to expand this network, encouraging our collaborators, especially those based in Ontario, to formally become OCRC affiliated scientists. These researchers have a history of conducting high quality occupational research across Canada. A team grant proposal will be submitted in March 2012 to the Canadian Cancer Society's Research Institute that will be led by researchers across the OCRC network. Having joint research studies will coalesce existing relationships as well as build future rich relationships.

The Centre also collaborates with researchers and research centres internationally. For example, OCRC is collaborating with: researchers in Finland, Norway, Sweden and Denmark regarding

occupational cancer surveillance; researchers across North America examining the health effects of exposure to pesticides on agriculture workers; and researchers across North America, the United Kingdom, and Europe examining the causes of lung cancer. These successful collaborations will strengthen this institution and bring resources that can be leveraged in Ontario.

Non-academic stakeholders

The OCRC will work to engage non-academic stakeholders and get them involved in the research cycle, to ensure the relevance of the research questions and the usefulness of the results. We will continue to meet with stakeholder groups to discuss the work of the Centre and seek input on research and prevention priorities. A research project planned for 2012/13 will involve patients and healthcare professionals at lung cancer clinics, union members and community activists examining the barriers to compensation for workers affected by asbestos exposure. For more information about knowledge exchange activities, see section 3 – “Deliver and exchange knowledge”.

3. DELIVER AND EXCHANGE KNOWLEDGE

The profile of the OCRC in Ontario, nationally and internationally is increasing, with a regular stream of invitations extended to the director of the Centre to speak at various events held by labour, non-profit, and academic groups. In 2012/13, the OCRC will expand its work delivering and exchanging knowledge with stakeholders to build awareness of occupational cancer, encourage the emergence of new research questions, and inform policy and practice. Our research staff will also contribute towards our knowledge transfer and exchange strategy by managing OCRC stakeholder events, creating plain-language products, populating the website, and giving talks and presentations at stakeholder conferences. We will also strengthen our communications with employer and multi-partite organizations, such as the Health and Safety Associations.

Learning opportunities

The OCRC will exchange knowledge with stakeholders and create learning opportunities at three major stakeholder events in 2012/13. A workshop aimed at increasing stakeholders knowledge of the process by which carcinogens are classified by the International Agency for Research on Cancer (IARC) will be held in the first quarter of 2012. About 100 students and interested stakeholders will be attending. The workshop will use the classification of shiftwork as a probable carcinogen as a case study. This workshop is being funded by the Canadian Institutes of Health Research (CIHR), with Len Ritter (University of Guelph) and Jack Siemiatycki (University of Montreal) as co-applicants.

In 2012/2013 the Centre will also hold its 3rd Annual Research Day in the third quarter with the theme of "Moving the Occupational Cancer Agenda Forward". A second research symposium on shiftwork and occupational disease which is co-sponsored by the Institute for Work and Health (IWH) is planned for September 2012. A grant from the WSIB-RAC will fund this symposium, focusing specifically on interventions. The proposal for the grant was submitted with Kristan Aronson (Queen's University) and Cameron Mustard (IWH) as co-applicants. Individual members of the OCRC research staff are taking responsibility for project managing these three major stakeholder events.

Knowledge translation

With the contribution of the expertise in knowledge transfer of the Centre's new associate director, the OCRC plans to expand the intensity and reach of its knowledge translation activities in 2012/13. The OCRC will:

- Continue to actively populate the OCRC website (http://occupationalcancer.ca), with plain language summaries of all research that the Centre is engaged in. We are also creating links to other, mostly Canadian, research in the field of occupational cancer. The launching in 2012/13 by CCO of collaborative work spaces on the website will enable researcher and stakeholder groups to have discussions and work on documents together.
- Continue to post OCRC research results, information about the OCRC team, and learning opportunities for stakeholders on the website. We will send out other communications as required on events to specific stakeholder groups such as for the Carcinogen workshop, Research Day, and the 2nd Shiftwork Conference. We will also conduct stakeholder surveys related to research (such as the survey on shiftwork interventions) on the web, with alerts

to a large mailing list of interested stakeholders.

- Continue to contribute to the monthly "Research Alert" abstracts disseminated by the Institute for Work & Health (IWH) to the Health and Safety Associations.
- Continue to contribute articles on OCRC research to the "News from the CREs" section of IWH's "At Work" newsletter.
- Develop and disseminate three "Ontario Cancer Fact" sheets on occupational cancer topics for stakeholders and the wider cancer control community. One that is already planned for 2012/13 will focus on trends in compensation for fatal occupational cancer and will be released in conjunction with the Day of Mourning in April.
- Give presentations at labour, health professional, and other stakeholder events. The Centre receives frequent requests for presentations on the work of the Centre or occupational cancer research and prevention priorities. For example, the director will be presenting on occupational cancer and emerging research at the Partners in Prevention convention in April, and will present the latest research on shiftwork to the Health and Safety Associations in May. OCRC research staff will be presenting at Prevention North in October 2012. The director generally presents once or more per month.

Stakeholder partnerships and collaborations

OCRC leaders and research staff participate in several committees related to occupational health and cancer, which increases the OCRC's visibility, builds relationships and influences policy and practice:

- Canadian Cancer Society-related committees
    - Ontario Environmental and Occupational Committee
    - National Environmental and Occupational Committee
    - CCSRI End 1 (Reducing Cancer Incidence) Development Committee
- Institute for Work & Health-coordinated committees
    - Health and Safety Association Liaison Committee
    - Knowledge Transfer and Exchange Hub
- Ministry of Labour-coordinated committee
    - Occupational and Environmental Health Interest Group
- Canadian Partnership Against Cancer
    - Primary Prevention Committee
- U.S. National Institute for Environmental Health Sciences
    - Gulf Oil Spill Workers Exposure Assessment Working Group
- U.S. National Institute for Occupational Safety and Health
    - Firefighters Study Advisory Committee

4. BUILD A SUSTAINABLE CENTRE

To build a robust Centre that attracts new funding and partners it is necessary to:

1. develop a strong core of researchers and staff;
2. build a strong Centre infrastructure; and
3. build a reputation of excellence in research and knowledge transfer and exchange.

The previous sections have described how we are developing a strong core of researchers and staff, and also summarized the upcoming research and knowledge transfer and exchange activities for 2012/2013. The basic infrastructure of the Centre was developed during its first years of operation, including its internal structure, advisory committees, and strategic plan. During the upcoming year we will strengthen our relationships and our collaborations with CREOD and the Centre of Research Expertise for the Prevention of Musculoskeletal Disorders (CRE-MSD) and with researchers at Ontario universities. We will also strengthen our internal links and connections within CCO, especially within the Prevention and Cancer Control program, to solidify its commitment to the long-term support of the OCRC. We will also establish better collaboration with non-research institutions with an interest in occupational cancer, such as the Occupational Health Clinics for Ontario Workers (OHCOW) and the Health and Safety Associations.

In its early years the Centre initiated a number of relatively small projects, such as analyses of existing data, systematic reviews, and the stakeholder survey. Most of these projects were funded internally and the work was performed using existing staff, although external funds were obtained for a few projects and pilot studies. These were all valuable and appropriate foundational projects and because they relied on internal funds, they allowed the OCRC to quickly establish momentum and a strong reputation. However, the ultimate goal will be to use core funding as seed money or as leverage for additional research funding, as well as to fund Centre activities for which external funding is difficult to obtain, such as knowledge transfer and exchange, and to obtain external funding to fund major new research initiatives.

Therefore in 2012/2013 we will attempt to explore the possibility of funding through external competitions and opportunities that are particularly appropriate for the Centre, such as team and programmatic grants. We will also begin to actively seek out additional partners to supplement our core funding. We will take advantage of the frequent requests for presentations to publicly announce that we are seeking additional partners and to arrange meetings with the leadership of potential partner organizations. With guidance from Jean-Yves Savoie, the chair of our Steering Committee, we will develop a strategy for directly approaching these and other institutions to request direct funding. We will also begin actively seeking programmatic funding opportunities from the Canadian Institutes for Health Research (CIHR) and the other traditional granting institutions.

APPENDIX A: OCRC Strategies and Objectives

OCRC Strategies and Objectives	
Strategies	**Objectives**
1. Build a research program	1.1 Undertake research, publish and present in the Centre's areas of focus (surveillance, causes, interventions) using a mix of research methods. 1.2 Develop and support a strong network of researchers working in collaboration with the Centre.
2. Build research capacity	2.1 Support researchers and stakeholders to build capacity, share knowledge, and identify collaborative research opportunities and priorities. 2.2 Facilitate the development of research platforms including data set assembly, cohort development, and innovative research methods. 2.3 Attract students, pre- and post-doctoral scientists, and researchers in other disciplines to occupational cancer research.
3. Deliver and exchange knowledge	3.1 Support awareness building and knowledge exchange for occupational cancer surveillance, causes, prevention and intervention at the policy, workplace, and community levels. 3.2 Develop and disseminate materials that are accessible and useful to the broad stakeholder communities. 3.3 Support stakeholders' occupational cancer initiatives to effect change at the policy, workplace, and community levels.
4. Build a sustainable centre	4.1 Build a strong base of funding and strategic partners. 4.2 Develop a strong core of OCRC researchers and staff. 4.3 Build strong Centre infrastructure including committees, structures, processes, and policies.

APPENDIX B: Research Projects

Table 1. Investigations into the causes of occupational cancer

Project	Broad Objectives	OCRC Team and Collaborators	Funder, Budget and Timeline	Status and plans for 2012-2013
Cross-Canada Study of Pesticides • The effects of multiple pesticides in combination on cancer risk • The potential for immunologic conditions and family history to act as effect modifiers for pesticides and cancer risk • Pooled analyses with similar studies from US National Cancer Institute (US NCI)	To examine the risk of non-Hodgkin lymphoma (NHL), Hodgkin lymphoma (HL), multiple myeloma (MM), and soft tissue sarcoma (STS) associated with exposure to specific and combinations of pesticides	*Staff:* Manisha Pahwa *Students:* Garthika Navaranjan, Linda Kachuri *Scientists:* Aaron Blair (PI), Shelley Harris, Paul Demers, John McLaughlin *Collaborators:* John Spinelli (BC Cancer Agency), Punam Pahwa & James Dosman (University of Sask.), Nichole Garzia (UBC), Karin Hohenadel (PHO), Laura Beane-Freeman (US NCI)	Core funding Ongoing analyses	- NHL, pesticides, & immunologic effects paper accepted for publication - HL & pesticides paper in preparation - MM pesticides analysis ongoing - Pooled analyses with U.S. studies in progress - Special session at the Canadian Association for Research on Work and Health scientific conference
Toronto Lung Cancer Case-Control Study Contribution of the Toronto data to the international Synergy pooled lung cancer case-control study coordinated by the International Agency for Research on Cancer	To collaborate on the Synergy project - creation of a massive dataset to: • examine dose-response relationships • synergistic effects of multiple carcinogens and smoking • examine associations with suspected carcinogens To examine these associations within the Toronto dataset	*Staff:* Kate Jardine *Students:* Jill Hardt, Desiree Latour *Scientists:* John McLaughlin (co-PI), Paul Demers (co-PI) *Collaborators:* Kurt Straif (IARC), Hans Kromhout & Roel Vermeullen (Utrecht University)	Toronto Analyses: Core funding Synergy: European Union and IARC Funded Ongoing analyses	- Collaborate with international investigators on pooled analyses - Conduct our own analyses of Toronto data - Abstract submitted to X2012
Occupational exposure to diesel and gasoline engine emissions and the incidence of colorectal and bladder cancer in Canadian men	To use the National Enhanced Cancer Surveillance System Data to examine the risk of cancer due to diesel and gasoline engine emissions associated with sites other than the lung	*Scientists:* Shelley Harris (PI) *Collaborators:* Paul Villeneuve (Health Canada, U of T), Kenneth Johnson (Public Health Agency of Canada), Marie-Elise Parent Institut Armand-Frappier, Institut national de la recherché scientifique, Quebec	WSIB RAC $161,000 (with Shelley Harris) 2011-2013	- Dr. Harris is leading this study from the Research Unit - Data transfer from PHAC in progress - Contract in place with INRS for coding of occupational exposures
Exposures to emerging environmental contaminants and risk of breast cancer in young women: a case-control study using biomarkers of exposure	To examine the risk of breast cancer among women aged 18-44 associated with environmental contaminants, particularly polybrominated diphenyl ethers	*Scientists:* Shelley Harris (PI) *Collaborators:* Paul Villeneuve (Health Canada, U of T), Beatrice Boucher & Michelle Cotterchio (CCO), Len Ritter (Univ. Guelph), Julia Knight (U of T), Cariton Kubwabo (Health Canada)	CIHR $846,000 (with Shelley Harris) 2011-2014	- Dr. Harris is leading this study from the Research Unit - Ethics have been approved
Ontario uranium miner cohort: Linkage with national mortality and cancer incidence files Creation of a pooled dataset of all 3 Canadian Uranium miners studies	To continue to assess the risk of cancer, as well as cardiovascular disease among Ontario uranium miners	*Staff:* Minh Do *Scientists:* Loraine Marrett (PI), Paul Demers , John McLaughlin, Shelley Harris *Collaborators:* Paul Villeneuve (Health Canada, U of T), other members of the National Uranium Miners Working Group	Canadian Nuclear Safety Commission Linkage funded by CNSC Contract in negotiation for analysis 2012-2013	- Finalize agreement for external funding - Receive linkage from Statistics Canada - Conduct analyses
Health risks among nuclear workers in Ontario who have been exposed to internal sources of ionizing radiation: A feasibility study	To assess the feasibility of an epidemiological study of nuclear workers in Ontario who have been exposed to ionizing radiation from internal emitters	*Staff:* Minh Do (Co-PI) *Scientists:* Loraine Marrett (Co-PI), John McLaughlin, Paul Demers *Collaborators:* Elisabeth Cardis (CREAL, Barcelona)	WSIB RAC $29,000 Extension requested to complete in 2012	- Feasibility study nearing completion - Report to be prepared

Table 2. Surveillance of Occupational Cancer and Carcinogens

Project	Broad Objectives	OCRC Team and Collaborators	Funder, Budget and Timeline	Status and plans for 2012-2013
Linkage of the 1991 Census with Canadian Cancer Registry data to study: • Lung cancer in welders • Occupations & ovarian cancer • Cancer among wood workers • Cancer among firefighters and police • Shiftwork & cancer • Cancer in agricultural workers • Eventually many others	To create a platform that would allow the study of new and existing questions on occupational cancer	*Staff:* Anne Harris *Students:* Jill Hardt, Lua Eiriksson *Scientists:* Paul Demers *Collaborators:* Michael Tjepkema, Paul Peters (Statistics Canada), CAREX Canada, Nordic Occupational Cancer Group, Finnish Institute for Occupational Health, Rick Burnett (Health Canada)	WSIB $312,000 2012-2015	- Papers on lung cancer in welders and occupational ovarian cancer in preparation - Analyses of shiftwork levels using the Survey of Labor and Income Dynamics - Analyses by exposure using MESU & CAREX being explored - Abstract on firefighters submitted to CARWH - Abstract submitted to NAACR
Development of an Occupational Cancer Surveillance Program for Ontario	To create a new occupational surveillance platform based only on Ontario data, by linking occupation and industry data to the Ontario Cancer Registry via records of WSIB claims	*Staff:* Anne Harris *Scientists:* Paul Demers, Loraine Marrett	WSIB $29,000 2012-2013	- Ethical and data access approvals underway - Linkage anticipated later in 2012
Analyses of the Ontario MoL exposure database (MESU)	To examine historical patterns of exposure to carcinogens in Ontario To use this data in collaboration with CAREX to create exposure matrixes that can be used for cancer surveillance and research	*Staff:* Kate Jardine, Victoria Arrandale *Students:* Joanne Kim, Garthika Navaranjan *Scientists:* Paul Demers (PI) *Collaborators:* Cheryl Peters (CAREX Canada)	CAREX Canada and core funding 2012-2013	- Analyses using the MESU dataset underway - Reports on exposure to carcinogens in Ontario from 1981-1996 in progress - Creation of exposure matrixes for use with 1991 Census linkage and Burden projects in progress
Sinonasal cancer surveillance and exposure to sinonasal carcinogens in Ontario	To examine the descriptive epidemiology of sinonasal cancer in relation to trends in exposure in Ontario	*Staff:* Anne Harris *Scientists:* Paul Demers (PI) *Collaborators:* Chris McLeod, Mieke Koehoorn, & Cheryl Peters (University of British Columbia)	Core funding 2012	- Comparison with parallel project in BC underway

Table 3. Intervention Projects

Project	Broad Objectives	OCRC Team and Collaborators	Funder, Budget and Timeline	Status and plans for 2012-2013
Assessment of the human and economic costs of occupational cancer	To raise awareness of the human and economic impacts of exposure to occupational carcinogens, and to calculate the burden of occupational cancer	*Staff:* Anne Harris, Manisha Pahwa, Ann Del Bianco *Students:* Joanne Kim *Scientists:* Paul Demers (PI) *Collaborators:* Emile Tompa (IWH), Anne-Marie Nicol & Chris McLeod, Doug Hyatt (Rotman School, U of T), France Labreche (IRSST), Jerome Lavoue (UM), Patrick Curly (AHS) , Sarah Bouma (CCS), Lesley Rushton (Imperial College, London)	Initially core funded Letter of Intent to CCSRI for $950,000 accepted, full grant to be submitted March 15, 2012 2011-2014	- Detailed workplan developed - Initial exploratory work to begin while waiting for funding
Making the link between exposure and respiratory cancer in the clinical setting: What are the steps?	To identify optimal methods of occupational history taking and referral for workers compensation To identify the barriers to receiving compensation for workers with asbestos-related lung cancer and mesothelioma	*Staff:* Krisy Moore *Scientists:* Loraine Marrett (Co-PI), Desre Kramer *Collaborators:* Linn Holness (Co-PI), Irena Kulda (St. Michael's Hospital), John Oudyk (OHCOW)	WISB RAC $30,000 To be completed in 2011/12	- Juravinski component completed - Princess Margaret data collection underway - Final report to be prepared
Pilot study of exposure to anti-neoplastic agents among Juravinski Cancer Centre workers	To study exposure to anti-neoplastic agents and feasibility of long-term surveillance of exposed healthcare workers	*Staff:* Ann Del Bianco *Scientists:* John McLaughlin (PI, Lunenfeld & OCRC), Paul Demers, Desre Kramer	Initially core funded Potential funding by Juravinski 2012	- Exploring feasibility of pilot study of history of exposure to anti-neoplastic agents - Exploring model of using the Ontario Health Study for long-term surveillance - If based at OCRC funding from Juravinski available

Table 4. Completed Research Projects

Project	Broad Objectives	OCRC Team and Collaborators	Funder, Budget and Timeline	Status and plans for 2012-2013
Trends in compensated workplace fatalities in Ontario and the rest of Canada	Update of the 2006 "5 Deaths a Day Report" focusing on compensated cancer and occupational disease cases in Ontario and Canada	*Staff:* Ann Del Bianco *Students:* Jill Hardt *Scientists:* Paul Demers, Desre Kramer	Core funded To be complete in March, 2012	- Report completed - Brochure to be prepared for Day of Mourning
History of occupational cancer research in Ontario and Canada	To raise awareness about the role of Ontario in the history of occupational cancer research	*Students:* Patricia Liu *Scientists:* Paul Demers	Core funding Completed in 2011	- Manuscript written - Full draft now being externally reviewed
Review of Canadian studies that have measured exposure to workplace carcinogens	To contribute to CAREX to help fill in gaps in our knowledge of exposure in Canada To develop a database of Canadian studies for the Burden project and other uses	*Staff:* Priyanka Raj, Kate Jardine *Scientist*: Paul Demers *Collaborators*: Calvin Ge, Cheryl Peters (CAREX Canada)	Core funding Completed in 2011	- Database finalized
A comparison of Ontario Occupational Exposure Limits for Carcinogens (OELs) to other jurisdictions in Canada and elsewhere	To raise awareness regarding OELs in Ontario To prepare a submission to the MoL when it revises its OELs	*Staff:* Manisha Pahwa *Scientist*: Paul Demers *Collaborators*: Cheryl Peters, Calvin Ge (CAREX Canada)	Core funding To be complete in February, 2012	- Final report to be submitted to MoL
Women and minorities and other trends in occupational cancer research: An update	To examine major trends in occupational epidemiology research To develop a database of Canadian studies for the Burden project and other uses	*Staff:* Priyanka Raj, Kate Jardine *Scientists:* Aaron Blair (PI), Paul Demers *Collaborators:* Sheila Hoar Zahm (US NCI) , Karin Hohenadel (PHO)	Core funding 2011/12	- Database finalized - Manuscripts in preparation
Systematic review of interventions for the prevention of occupational cancer	To identify whether the impact of interventions on cancer rates can be documented using epidemiologic studies	*Scientists:* Aaron Blair (PI), Paul Demers *Collaborators:* Karin Hohenadel (PHO), Kurt Straif (IARC)	Core funding Complete asbestos in 2011/12	- Presented at EPICOH in Oxford. - Manuscript for asbestos in preparation.
Mesothelioma patterns and projections in Ontario and Canada	To predict future trends in mesothelioma in Ontario and the rest of Canada	*Scientists:* Loraine Marrett (Co-PI), Paul Demers *Collaborators:* Mark Clements (Co-PI) (Australian National University)	Core funding Complete in 2011/12	- Manuscript in preparation
Cancer Among Nordic Firefighters	To collaborate with the NOCCA Study Group on investigations of cancer among firefighters	*Scientists:* Paul Demers *Collaborators:* Nordic Occupational Cancer Group, Finnish Institute for Occupational Health	Core funded 2011/12	- Manuscript in preparation

APPENDIX C: Accepted and Submitted Conference Abstracts for 2012-2013

Title	Primary Presenter	Conference	Status
Occupational cancer surveillance using a Statistics Canada cohort	Anne Harris	University of British Columbia School of Population and Public Health's Occupational and Environmental Seminar Series, 17 February 2012	Oral presentation, accepted
The Risk of Hodgkin Lymphoma in Canadian Men from Exposure to Multiple Pesticides	Garthika Navaranjan	The Ontario Public Health Convention (TOPHC), Toronto, 2-4 April 2012	Poster presentation, accepted
Occupational Cancer: Current Knowledge, Gaps, and the Role of Research	Paul Demers	Partners in Prevention, Mississauga, 1-2 May 2012	Oral presentation, accepted
Shiftwork – The New Carcinogen?	Paul Demers	Partners in Prevention, Mississauga, 1-2 May 2012	Oral presentation, accepted
Occupational Cancer: The Practical Applications of Research	Manisha Pahwa, Kate Jardine, Ann Del Bianco, Krisy Moore	Partners in Prevention, Mississauga, 1-2 May 2012	Oral presentation, submitted
Canadian Exposure Studies Database	Priyanka Raj, Kate Jardine	Partners in Prevention, Mississauga, 1-2 May 2012	Poster presentation, planned
Trends in compensated workplace fatalities in Ontario and the rest of Canada	Ann Del Bianco	Partners in Prevention, Mississauga, 1-2 May 2012	Poster presentation, planned
A Knowledge-transfer and Exchange Method of Evaluation (KEME) System: a framework to help evaluate occupational health and safety knowledge transfer interventions	Desre Kramer	Canadian Association for Research on Work and Health (CARWH) Conference, Vancouver, 1-2 June 2012	Oral presentation, submitted
The effect of immune conditions on pesticide use and the risk of non-Hodgkin lymphoma in Canadian men	Manisha Pahwa	Canadian Association for Research on Work and Health (CARWH) Conference, Vancouver, 1-2 June 2012	Oral presentation, submitted
"Making the link between asbestos exposure and respiratory cancer in the clinical setting: What are the steps?"	Krisy Moore	Canadian Association for Research on Work and Health (CARWH) Conference, Vancouver, 1-2 June 2012	Oral presentation, submitted
Surveillance of firefighter and police cancer risks in a national population-based cohort	Anne Harris	Canadian Association for Research on Work and Health (CARWH) Conference, Vancouver, 1-2 June 2012	Oral presentation, submitted
The Changing Face of Workplace Fatalities in Canada	Ann Del Bianco	Canadian Association for Research on Work and Health (CARWH) Conference, Vancouver, 1-2 June 2012	Oral presentation, submitted
Exposures to Multiple Pesticides and Combinations of Pesticides and the Risk of Hodgkin Lymphoma in Canadian Men	Garthika Navaranjan	Canadian Association for Research on Work and Health (CARWH) Conference, Vancouver, 1-2 June 2012	Poster presentation, submitted
Creation and analysis of a Canadian Exposure Studies Database	Priyanka Raj, Kate Jardine	Canadian Association for Research on Work and Health (CARWH) Conference, Vancouver, 1-2 June 2012	Poster presentation, submitted
Data Linkages Supporting Occupational Cancer Surveillance	Anne Harris	North American Association of Central Cancer Registries (NAACCR), Portland, 5-7 June 2012	Oral presentation, submitted
A comparison of exposure assessment approaches: lung cancer and occupational asbestos exposure in a population-based case control study	Jill Hardt	International Conference on the Science of Exposure Assessment (X2012), Edinburgh, 2-5 July 2012	Oral presentation, submitted
Using exposure data for surveillance and population-based studies (Symposium)	Paul Demers	International Conference on the Science of Exposure Assessment (X2012), Edinburgh, 2-5 July 2012	
Practical strategies to reduce the health impact of shiftwork	Manisha Pahwa	Forum North 2012 Conference	Oral presentation, planned
Trends in compensated workplace fatalities in Ontario and Canada	Ann Del Bianco	Forum North 2012 Conference	Poster presentation, planned
Assessing environmental and occupational exposures: CAREX and the Occupational Cancer Research Centre	Paul Demers	World Cancer Congress, Montreal, 27-30 August 2012	Oral presentation, accepted
CAREX Canada – Supporting the Prioritization of Primary Prevention Programs	Paul Demers	World Cancer Congress, Montreal, 27-30 August 2012	Oral presentation, accepted

APPENDIX D: Manuscripts, Reports and Book Chapters

Submitted Manuscripts

Pahwa M, Harris SA, Hohenadel K, McLaughlin JR, Spinelli JJ, Pahwa P, Dosman JA, Blair A. Pesticide use, immunologic conditions, and risk of non-Hodgkin lymphoma in Canadian men in six provinces. International Journal of Cancer (In press).

Kramer DM, Wells RP, Carlan N, Aversa T, Bigelow P, Dixon S, McMillan K. Did you have an impact? A theory-based method for planning and evaluation knowledge-transfer and exchange activities in occupational health & safety. International Journal of Occupational Safety and Ergonomics (In press)

Hon C-Y, Teschke K, Chu W, Demers PA, Astrakianakis G. Identification of determinants of antineoplastic drug contamination of work surfaces throughout the hospital medication system. Annals of Occupational Hygiene (Submitted).

Peters CE, Nicol AM, Demers PA. Prevalence of exposure to solar radiation (UVR) on the job in Canada. Canadian Journal of Public Health (Submitted).

Ostroumova E, Kesminiene A, Cardis E, Do M, Karotki AV, Baverstock K, Williams D. Health effects of the Chernobyl Nuclear Power Plant accident: 25 years on. Environmental Health Perspectives (submitted).

Manuscripts in Preparation

McLeod CB, Koehoorn M, Tamburic T, Demers PA. Evaluation of a physician letter to increase awareness of workers' compensation benefits for individuals with mesothelioma. Can Medical Assoc J.

Harris MA, Tjepkema M, Peters PA, Demers PA. Firefighter and police cancer risk surveillance in a national population-based cohort.

Hardt J, Harris MA, Demers PA. Welding and lung cancer: a population-based cohort study, Canada, 1991-2003.

Eiriksson L, Harris MA, Demers PA. Occupational exposures and ovarian cancer: a national population-based cohort study.

Navaranjan G, Hohenadel K, Blair A, Demers PA, Spinelli JJ, Pahwa P, McLaughlin JR, Dosman JA, Ritter L, Harris SA. Exposures to Multiple Pesticides and the Risk of Hodgkin Lymphoma in Canadian Men.

Raj P, Hohenadel K, Stegne M, Blair A, Demers PA. Trends in occupational cancer research.

Hohenadel K, Straif K, Demers PA, Blair A. The effectiveness of asbestos-related interventions in reducing rates of lung cancer and mesothelioma: a review.

Hohenadel K, Raj P, Stegne M, Demers PA, Blair A. The inclusion of women in occupational cancer research.

Demers PA, Martinsen JI, Weiderpass E, Kjaerheim K, Lynge E, Sparén P, Eero Pukkala E. Cancer Incidence among Nordic Firefighters.

Clements M, Demers PA, Marrett L. Mesothelioma patterns and projections in Ontario and Canada.

Reports

Pahwa M, Demers PA. A comparison of Ontario Occupational Exposure Limits for Carcinogens (OELs) to other jurisdictions in Canada and elsewhere. (Submitted to the Ministry of Labour).

Liu P, Demers PA. The history of occupational cancer research in Ontario and Canada (Undergoing external review).

Del Bianco A, Demers PA. Trends in compensated workplace fatalities in Ontario and the rest of Canada. (In preparation).

Moore K, Kramer D. Making the link between exposure and respiratory cancer in the clinical setting. (In preparation).

Do M, Demers PA. A feasibility study of health risks among nuclear workers in Ontario who have been exposed to internal sources of ionizing radiation. (In preparation).

Book Chapters

1. Blair A, Hohenadl K, Demers PA, Marrett L, Straif K. Prevention of Occupationally-Induced Cancers. Cancer Prevention and Screening, Anthony B. Miller, Ed. Springer Scientific: New York (*in press*).
2. Demers PA, Weinrich A. Wood Dusts (chapter), Encyclopedia of Toxicology, 3rd edition. Philip Wexler, Ed. Elsevier: Oxford, 2005 (*in press*).
3. Blewett C, Peters CE, Nicol AM, Demers PA. Asbestos and Canada. Atlas of Asbestos in the Americas, Pan American Health Organization, Washington, D.C. (in Press).

APPENDIX E: Research Collaborators

Ontario

Cancer Care Ontario
Centre for Research Expertise in Occupational Disease
Dalla Lana School of Public Health (UT)
Institute for Work and Health
Occupational Health Clinics for Ontario Workers
Queen's University
Public Health Ontario
Rotman School of Management (UT)
Samuel Lunenfeld Research Institute
St. Michael's Hospital
University of Guelph

Canada

Alberta Health Services
BC Cancer Agency
Canadian Cancer Society
CAREX Canada
Health Canada
Institut Armand-Frappier
Institut de recherche en santé et en sécurité du travail
National Uranium Miners Working Group
Public Health Agency of Canada
Statistics Canada
Université de Montréal
University of British Columbia
University of Saskatchewan

International

Agence nationale de sécurité sanitaire, de l'alimentation, de l'environnement et du travail
Australian National University
El Centre de Recerca en Epidemiologia Ambiental (Barcelona)
Finnish Institute for Occupational Health
Imperial College (London)
International Agency for Research on Cancer
Nordic Occupational Cancer Group
U.S. National Cancer Institute
U.S. National Institute for Occupational Safety and Health
Utrecht University (The Netherlands)