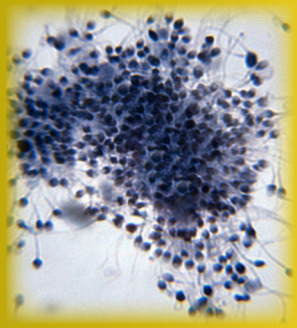

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Early Detection of Cancer

Early detection of cancer was identified as one of the original six strategic research priorities of the CIHR Institute of Cancer Research (ICR). In December 2002, a small working group was convened to recommend the most appropriate course of action for addressing this priority. Detection of early stage malignant, or even pre-malignant, lesions through screening has been shown to reduce mortality rates for a number of cancers including those of the breast, cervix, and colon. Ideally, screening tests should be safe, non-invasive, cost-effective and offer a high degree of both sensitivity and specificity. There should be clear evidence that early detection results in an improved outcome for the patient and screening programs should be population-based, reaching all individuals at risk.

Cancer Screening from a Canadian Perspective

In November 2003, ICR launched a first initiative entitled *Cancer Screening from a Canadian Perspective* that focused on three broad areas:

- comparison and evaluation of new cancer screening technologies;
- cost/benefit analysis of existing Canadian cancer screening programs; and
- obtaining Canadian data on the rate of serious complications (such as perforations) resulting from routine colonoscopies.

Results and Outcomes

The following one-year operating grants were funded for a maximum of $100,000 each.

Projects funded under the Cancer Screening from a Canadian Perspective – Strategic Operating Grants RFA

Principal Investigator	Institution Name	Project Title
Bernstein, Charles N; Smith, Ian; Cormack, Palmer	University of Manitoba, National Research Council (NRC)	Evaluation of advanced spectroscopic methods for the diagnosis of colorectal cancer.
Rabeneck, Linda	Sunnybrook and Women's College Health Sciences Centre	Serious complications of colonoscopy among four Canadian provinces.

Drs. Bernstein, Smith and Cormack's project, "*Evaluation of advanced spectroscopic methods for the diagnosis of colorectal cancer,*" focused on the hypothesis that colon tumours shed both cells and chemicals that are characteristic of the tumour. The team used magnetic resonance spectroscopy and advanced mathematical methods to produce a chemical signature of stool samples prior to a patient undergoing colonoscopy. Patients

testing negative were then spared the possible complications of the more invasive colonoscopy screening procedure. The ICR grant enabled the team to increase their recruitment into the study to 510 patients and normals and results indicated a 92% accuracy in determining cancer in the colon. The team has since submitted a manuscript for publication, has established two patents on the technology and are collaborating with a North American company to bring the technology to market.

Dr. Rabeneck's project, "*Serious complications of colonoscopy among four Canadian provinces,*" represented the first large-scale Canadian study to focus on colonoscopy-related bleeding and perforation. The project involved 97,204 individuals undergoing outpatient colonoscopy during a one-year period in British Columbia, Alberta, Ontario and Nova Scotia. The results indicated a bleeding and perforation rate (serious enough to require hospital admission within 30 days), of 1.64/1000 and 0.85/1000 respectively. Predisposing risk factors included older age, male sex, having a polypectomy and having the colonoscopy performed by a low-volume endoscopist. These results indicate that colonoscopy is a relatively safe procedure in Canada but that the experience of the endoscopist is an issue that deserves further attention.

Pilot Project Grants – Colorectal Cancer Screening

Canada has one of the highest incidences of colorectal cancer in the world. The disease affects both men and women equally and, for 2007, it was estimated that 20,880 new cases of colorectal cancer would be diagnosed and that 8,700 would die of their disease. Regular screening for colorectal cancer can detect the disease at an early stage and is proven to reduce mortality from colon cancer. It can also prevent the disease through the detection of precancerous polyps, which can be easily removed. Although the National Committee on Colorectal Cancer Screening recommended, in 1998, that population-based screening programs be introduced across Canada, implementation of these programs has been delayed for a variety of reasons. In 2005, ICR launched the "*Pilot Project Grants – Colorectal Cancer Screening"* initiative to encourage research to inform the development of population-based colorectal cancer screening programs.

Results and Outcomes

The following one-year pilot projects were funded for a maximum of $100,000 each.

Projects funded under the Pilot Project Grant – Colorectal Cancer Screening RFA		
Principal Investigator	**Research Institution**	**Title**
Baxter, Nancy N.	St. Michael's Hospital	Effectiveness of colonoscopy for the prevention of colorectal cancer and mortality from colorectal cancer: A population-based case control study.
Hilsden, Robert Jay	University of Calgary	Understanding Canadians' preferences for a colorectal cancer screening program: A pilot study to develop a multi-province discrete choice experiment.
Little, Julian	University of Ottawa	Pilot assessment of germline genomic profiling as adjunct to other methods of population-based screening for colorectal cancer.
McGregor, S. Elizabeth	Alberta Cancer Board	Engaging family physicians and patients in an intervention to increase uptake of colorectal cancer screening: A pilot study.

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Early research outcomes include results from Dr. Julian Little, at the University of Ottawa, who completed a comprehensive meta-analysis of genetic polymorphisms associated with colorectal cancer and their potential relevance as an adjunct to traditional screening technologies. To assess the potential for integrating germline genetic profiling into standard population based screening methods, Dr. Little surveyed public and professional stakeholders on their willingness to include genomic profiling in strategies for population-based colorectal cancer screening. The issue of acceptability is fundamental to developing a successful screening strategy, and genomic profiling is a novel idea for which no acceptability evidence exists. This research is challenging the way we think about population-based screening and the possible role of integrating genomic information into colon cancer diagnostics. In addition, the results of the meta-analytic work have revealed an overlap in the genetic susceptibility factors for colorectal cancer and those for other cancers and possibly other chronic diseases, suggesting the possibility of a single genetic panel for multiple screening purposes.

Dr. Elizabeth McGregor's project focused on developing educational materials that would better inform family physicians and their patients about the need for colorectal cancer screening and the types of screening tests available. The ICR funds enabled the development of two print brochures, a website and a telephone counselling protocol to address specific barriers to screening for the general public. Dr. McGregor has since received a grant from the Alberta Cancer Board Research Initiatives Program to test pilot these resources and obtain information needed to conduct a randomized controlled trial to assess the efficacy of these resources in increasing colorectal cancer screening uptake. These materials will also be used in an intervention study, funded under the ICR Emerging Team Grant program, to try and increase screening uptake among adults who do not respond to traditional screening requests.

Emerging Team Grant: Colorectal Cancer Screening

This initiative was launched by ICR in 2006, following a one-day consultation workshop, to build on the previously described initiatives. Specifically, the initiative was intended to encourage applications focused on ways to implement currently available technologies at a population level in order to reduce colorectal cancer mortality in Canada in the shortest time frame possible. A further objective was to support research on the development of new technologies and screening tests able to stratify patients into low and high risk groups, with minimal side effects. It is hoped that this research will eventually lead to large-scale randomized control trials appropriate for comparing different screening modalities.

Results and Outcomes

The following five-year Emerging Team Grants were funded for a maximum of $500,000 each.

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Projects funded under the Team Grant – Emerging: Colorectal Cancer Screening RFA		
Principal Investigator	**Research Institution**	**Title**
Tai, Isabella	University of British Columbia (UBC)	CIHR Team in Genomic, Imaging and Modeling Approaches to Advance Population-Based Colorectal Cancer Screening
Rabeneck, Linda	Sunnybrook Health Sciences Centre	CIHR Team in Population-based Colorectal Cancer Screening.

The "*CIHR Team in Genomic, Imaging and Modeling Approaches to Advance Population-Based Colorectal Cancer Screening*," based at UBC, plans to build multidisciplinary research teams that will:

- identify and validate genetic markers suitable for screening applications;
- develop imaging technologies to enhance screening strategies; and,
- apply computer simulation models to assess the potential benefit of using multimodality screening protocols.

Already, in the five months since the project began, this team has established new and efficient pathways of communication enabling the sharing of insights, skills and expertise among clinicians and clinician scientists and has begun the process of hiring trainees from a variety of different disciplines.

The "*CIHR Team in Population-based Colorectal Cancer Screening*" based in Toronto, intends to bring together a team of researchers, educators and health policy makers from Ontario, Alberta, the United States and the Netherlands to provide the evidence on how best to implement currently available screening tests in Canada at a population level. ICR funds will also build research capacity through the training of junior investigators. It is hoped that this opportunity will allow the evaluation of new screening programs and generate crucial new knowledge that will reduce the health and financial burden of colorectal cancer.

Through the initiatives described above, ICR has invested almost $6 million into the early detection of cancer, primarily to support projects focused on colorectal cancer screening. In addition, one of the projects recently funded under ICR's Access to Quality Cancer Care initiative included a colorectal cancer screening component. It is anticipated that collectively these research projects will have a significant impact on our understanding of screening programs in general and in the implementation of colorectal cancer screening programs specifically. Improved methods of early detection are likely to significantly reduce cancer morbidity and mortality in the future.