
**CIHR Team in Circumpolar Health Research:
Averting Emerging Chronic Diseases in Northern Populations:**

1. Overview

Northern populations in the circumpolar region have begun to experience the emergence of chronic diseases such as cardiovascular diseases, diabetes, obesity and the metabolic syndrome which have occurred in other populations undergoing rapid social, cultural and economic transition.

Our Team Grant will create, develop and sustain an international, collaborative research program to monitor the burden of emerging chronic diseases among northern peoples; investigate genetic, behavioural and environmental risk factors that may be unique to these populations; and design and evaluate interventions in order to avert future epidemics. It formalizes an existing network across several circumpolar countries, linking academic research centres, regional health authorities, and indigenous peoples' organizations. It leverages funding from other sources and incorporates as integral components knowledge translation, research dissemination and training support. It aims to create a long-lasting legacy of enhanced capacity for robust health research in the North and for the North and improvement in the health of northern residents.

1.1 Importance and relevance

While there are many different pressing health concerns affecting northern populations, strategically the time to conduct intensive research into chronic diseases prevention is now, when the problem is still relatively limited in scope and early in its evolution. Northern populations are in the unique situation where rapid translation of research into policies, programs and practices can have a significant impact on improving health. Northern populations share many characteristics, including small size, remoteness and lack of human resources, and a team approach to research, especially one that adopts a circumpolar perspective, is essential. Our proposal is a direct response to the recommendations of the tri-council *Dialogue on Northern Research* workshop held in Whitehorse in 2004 [www.nserc.gc.ca/about/northern_summ_e.htm].

1.2 Overall Objectives

The proposed research program addresses the following broad scientific and public health questions. Specific objectives relating to individual projects are presented in Section 9.

- What is the current burden and distribution of chronic diseases among northern populations and what genetic, behavioural and environmental factors are responsible for their development?
- Why do northern communities differ in their risk of chronic diseases and in the impact of various health determinants?
- Why do northern peoples fare poorly compared to the general population of the larger nation-states with which they are associated?
- What can be done to reduce the burden and impact of prevalent and emerging chronic diseases affecting northern peoples?

The proposed Team, in executing its research plan, aims to cross traditional academic disciplines, while connecting multiple investigators, institutions, research sites and geographic regions. At the end of the 5-year Team Grant, the following short-term process outcomes or “deliverables” are expected:

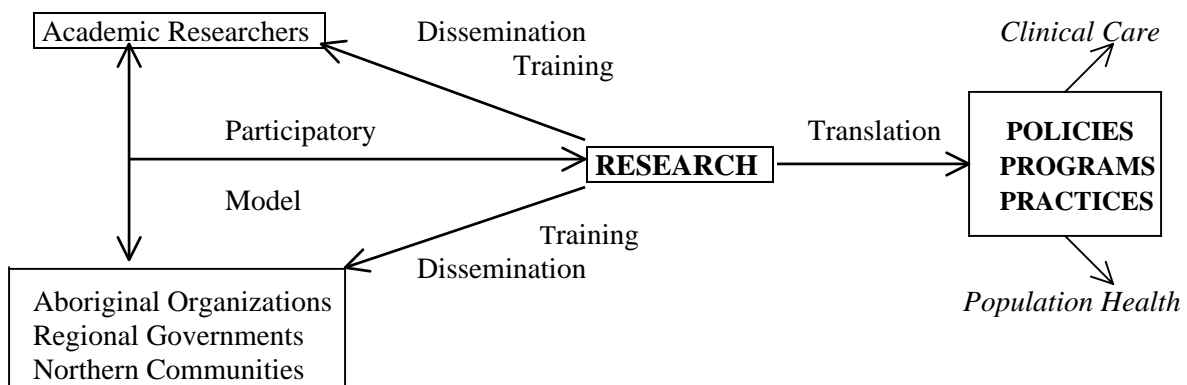
- Increase the capacity for research in northern regional health authorities and community organizations, reflected in the establishment of functional, northern-based research and health data analysis units;
- Leverage funding from multiple sources, as a result of the research infrastructure that has been created;
- Promote creativity and innovation in research, measurable in terms of publications of results in high-impact scientific journals;
- Improve the competitiveness of Team-funded trainees, as indicated by the proportion who proceed to obtain salary awards from national and provincial funding agencies;
- Create and maintain viable linkages with regional decision makers in the application of research data to the formulation of public health policy and clinical practice guidelines.

1.3 Hypotheses and Conceptual Framework

The Team research program will test the following main hypotheses. Subsidiary hypotheses are discussed under each theme/project in Section 9.

- Northern populations differ in the burden of chronic diseases and distribution of their risk factors from the national population; within the North, between indigenous and non-indigenous peoples; and among indigenous peoples, between different ethnocultural groups;
- All northern populations have experienced an increasing trend in the burden of chronic diseases and unfavourable shift in risk factor distribution;
- Chronic diseases develop in northern populations as a result of a complex interaction among genetic, behavioural and environmental factors, some of which are unique to these populations
- Community-based primary prevention of chronic diseases using a participatory approach and embedded in indigenous people’s culture and traditions is effective in changing health-related behaviours.

The research program situates research within an overall framework that encompasses partnership-building, training, dissemination, and translation:



1.4 Research plan

The 5-year research program consists of 7 *Projects* organized around 3 *Themes*. Timelines for the implementation of the Projects are provided in Section 9. For the Team as a whole, it is expected that Year 1 will be devoted to team mobilization – developing

the management structure, and organizing financing mechanisms for PIs and the northern research units. Extensive consultations with northern stakeholders will continue and refinements made to the projects made where necessary.

Theme I: Identifying and Assessing Health Risks

Project 1: Inuit Health in Transition Study

Project 2: Core Laboratory: Genetic Polymorphism and Cardiovascular Risks

Project 3: Risk Assessment and Communication of Environmental Contaminants in Traditional Foods

Theme II: Monitoring Changing Disease Burden

Project 4: Circumpolar Chronic Diseases Observatory

Project 5: Tri-territorial Birth Outcomes and Child Health Surveillance

Theme III: Designing, Implementing and Evaluating Interventions

Project 6: Community Based Health Promotion Demonstration Projects

Project 7: Northern Cochrane Network Site: Northern Adaptation of Best Practices

1.5 Team linkages/integration

Our Team formalizes an existing network across several circumpolar countries, linking researchers with a track record of productive, collaborative research, and considerable experience in partnership with regional health authorities and Aboriginal organizations.

Team Leader:

- Kue Young, TransCanada Pipelines Chair in Aboriginal Health, CIHR Senior Investigator, Professor of Public Health Sciences, University of Toronto, Toronto

Principal Investigators:

- Éric Dewailly, Professeur, Département de médecine sociale et préventive, Université Laval; Directeur, Unité de recherche en santé publique du CHUL-CHUQ, Québec
- Grace Egeland, Canada Research Chair in Environment, Nutrition and Health, Centre for Indigenous People's Nutrition and Environment; Associate Professor, School of Dietetics and Human Nutrition, Macdonald Campus of McGill University, Montreal
- Laurie Chan, NSERC Northern Chair, Centre for Indigenous People's Nutrition and Environment; Associate Professor, School of Dietetics and Human Nutrition, Macdonald Campus of McGill University, Montreal
- Robert Hegele, Canada Research Chair in Human Genetics, J.J.Wolfe Distinguished Medical Research Chair; Professor of Medicine and Biochemistry, University of Western Ontario; Scientist, Blackburn Laboratory of Cardiovascular Genetics, Robarts Research Institute, London
- Laura Arbour, Assistant Professor of Medical Genetics, CIHR-Institute of Genetics Clinical Investigator, University of British Columbia, Vancouver
- Sharon Bruce, Assistant Professor, Department of Community Health Sciences; University of Manitoba, Winnipeg

Co-Investigators:

- Christopher Furgal, Co-Director, Nasivvik – Centre for Inuit Health and Changing Environments; Assistant Research Professor, Département de science politique, Université Laval, Québec
- Wendy Lou, Canada Research Chair in Statistical Methods for Health Care, Associate Prof, Departments of Public Health Sciences and Statistics, University of Toronto

- Suzanne Jackson, Director, Centre for Health Promotion, University of Toronto
- Lisa Lix, Research Scientists, Manitoba Centre for Health Policy; Assistant Professor, Department of Community Health Sciences, University of Manitoba, Winnipeg

Canadian Collaborators:

- Isaac Sobol, Chief Medical Officer, Nunavut Health and Social Services, Iqaluit, NU
- Mary Ellen Thomas, Executive Director, Nunavut Research Institute, Iqaluit, NU
- Kami Kandola, Regional Medical Health Officer, Stanton Territorial Health Authority, Yellowknife, NT
- Ewan Affleck, Clinical Director of Family Medicine, Yellowknife Health and Social Services and Stanton Regional Hospital, Yellowknife, NT
- Maria Santos, Territorial Epidemiologist, Northwest Territories Department of Health and Social Services, Yellowknife, NT
- Susan Chatwood, Chair, Arctic Health Research Network; Co-representative, Northern Cochrane Site, Yellowknife, NT
- Lori Duncan, Health Director, Council of Yukon First Nations, Whitehorse, YT
- Jody Butler Walker, President, Yukon Public Health Association, Whitehorse, YT
- Gerry Ewert, Director, Yukon Bureau of Statistics, Whitehorse, YT
- Paula Pasquali, Director, Community Health Programs, Yukon Department of Health and Social Services, Whitehorse, YT
- Ross Goodwin, Manager, Arctic Science and Technology Information System, Arctic Institute of North America, University of Calgary, Calgary, AB
- Janice Linton, Librarian, Aboriginal Health Collection, Neil John Maclean Health Sciences Library, University of Manitoba, Winnipeg, MB
- Onalee Randell, Health Director, Inuit Tapariit Kanatami, Ottawa
- Tracy O’Hearn, Director, Ajunggingiq Centre, National Aboriginal Health Organization, Ottawa
- Russell Wilkins, Senior Analyst, Health Analysis and Measurement Group, Statistics Canada, Ottawa
- Daryl Pullman, Associate Professor of Medical Ethics, Faculty of Medicine, Memorial University of Newfoundland, St. John’s, NL

International Collaborators:

- Peter Bjerregaard, Professor of Arctic Medicine, Director, Centre for Health Research in Greenland, National Institute of Public Health, Copenhagen, Denmark
- Bert Boyer, Associate Professor, Institute of Arctic Biology, Centre for Alaska Native Health Research, University of Alaska, Fairbanks, AK, USA
- James Berner, Director of Community Health Services, Alaska Native Tribal Health Consortium, Anchorage, AK, USA
- Barbara Howard, President, MedStar Research Institute, Hyattsville, MD, USA
- Juhani Hassi, Editor, International Journal of Circumpolar Health, Oulu, Finland

Our Team consists of a core of strong and experienced researchers in Northern/ Aboriginal Health in the role of *principal investigators*, with disciplinary backgrounds in epidemiology/public health [Egeland, Dewailly, Young, Bruce], genetics [Hegele, Arbour], toxicology [Chan, Dewailly], nutrition [Egeland, Chan], anthropology [Bruce, Young], and endocrinology [Hegele]. Their expertise is complemented by the *co-investigators* offering specific skills in statistical analysis of longitudinal data [Lou], planning and evaluation of health promotion [Jackson], the social sciences in

environmental health [Furgal], and health services research methods utilizing linked administrative databases [Lix]. Among the 11 investigators are 5 holders of Canada Research Chairs and other endowed Chairs.

The academic researchers based in research-intensive institutions are linked to northern-based *collaborators* from community organizations and regional government agencies who will play an active role in specific projects, especially in health monitoring and disease surveillance and the planning of health interventions, and in cross-cutting areas such as training, dissemination and knowledge translation. [The roles of northern and Aboriginal partners are discussed further in Section 6].

Listed as international collaborators are senior investigators of companion studies in Greenland [Bjerregaard] and Alaska [Howard, Boyer, Berner]. Howard's distinguished association with the Pima Study and Strong Heart Study among Native Americans will assist our team in achieving the highest international scientific standards.

1.6 Potential contributions

While we are not predicting discoveries that will eliminate diabetes and other chronic diseases, the 5-year program will obtain answers to key questions relating to the distribution, etiology, natural history, and control of chronic diseases in the North. It will have a positive impact on the health status and health care of residents of northern communities and provide scientific data that will also benefit other populations.

The key is on “averting” future epidemics, such that northern people will not follow along the paths of many Aboriginal groups in southern Canada. [In a recent diabetes workshop, an Inuit elder expressed the hope that perhaps her people “could sit this one out”].

The longitudinal design, multi-level analyses, data linkage, and banking of biological specimens in Project 1 offer unique opportunities for methodological innovations.

2. Background

The present proposal concerns northern populations, both indigenous and non-indigenous. In Canada, the population of the three northern territories of Yukon (YT), Northwest Territories (NT) and Nunavut (NU) was just over 92,000 in 2001, about 0.3% of the total population of Canada. Several projects have a particular focus on the Inuit, who number 170,000 worldwide and whose homeland stretches across from the easternmost tip of Russia, across Alaska and Canada to Greenland.

2.1 Literature review

The population of the three northern territories is characterized by its youthfulness and high proportion of Aboriginal people. Table 1 summarizes several health indicators. It highlights the health needs of the population and raises important issues that our proposal aims to address. The disparities in health status relative to the Canadian population, exemplified by life expectancy at birth, are least in the Yukon and worst in Nunavut, with NWT occupying an intermediate position. This ranking generally reflects the proportion of Aboriginal people, which ranged from 23% in YT, to 51% in NT, to 85% in NU. Some chronic diseases (eg. diabetes) are generally less prevalent than the national average, while others (eg. stroke) exceeds it. In terms of risk factors, northern populations are comparable to all Canadians with regard to obesity, while smoking prevalence is generally high, reaching 65% in Nunavut, which does not bode well for the future.

While the gradation in disease risk across the territories is also influenced by the relative size of the Aboriginal population, such a generalization tends to overlook the fact that in

YT, Dene First Nations constitute the predominant Aboriginal group, while NU is overwhelmingly Inuit. Both Inuit and Dene are represented in NT. The two Aboriginal populations differ in many significant ways in both disease burden (eg. high stroke mortality and low diabetes prevalence among the Inuit) and risk factor prevalence (eg. high smoking rates among the Inuit). In their statistical reports the territorial governments have generally not distinguished between Aboriginal and non-Aboriginal residents, and when reporting on the Aboriginal population, rarely acknowledged differences between Inuit and First Nations, even though ethnic identifiers are available. Our Team will offer programming and data analysis resources to territorial agencies, in collaboration with Aboriginal organizations, to generate ethnic-specific information. With our circumpolar partners, it can also lead to Inuit and Dene health profiles across international borders.

Table 1. Selected health indicators of the three northern territories and Canada

	YT	NT	NU	Canada
Population 2001	28,520	37,100	26,670	29.7 million
% <15	20.7	26.5	36.5	18.9
% Aboriginal	22.9	50.5	85.2	3.4
Life expectancy at birth – Male	74.1	73.7	67.2	77.0
Life expectancy at birth – Female	79.6	78.8	70.2	82.0
Infant mortality rate (per 1000 livebirths)*	5.5	10.1	15.7	5.3
Age-standardized prevalence of diabetes (%)**	3.8	4.0	1.3	4.8
ASMR of ischemic heart disease†	117.3	95.5	79.7	111.2
ASMR of stroke†	61.9	76.2	111.7	48.7
Age-standardized prevalence of overweight and obesity (%)	50.5	53.7	48.6	48.2
Prevalence of current smoking (%)	27.5	36.6	64.7	22.9

Source: Statistics Canada. *Health Indicators – January 2005*

[www.statcan.ca/english/freepub/82-221-XIE/82-221-XIE2005001.htm]

* Mean of 1997-2001, from Statistics Canada, CANSIM table 102-0030

**Diabetes data from National Diabetes Surveillance System, reported in CIHI

[[//secure.cihi.ca/cihiweb/en/pub_login_PRTWG_2004_Reports_Diabetes_Updated.html](http://secure.cihi.ca/cihiweb/en/pub_login_PRTWG_2004_Reports_Diabetes_Updated.html)]

†ASMR – age-standardized mortality rate (per 100,000)

While some data relating to the burden of chronic disease are available for the northern territories, current systems for surveillance are underdeveloped, and the quality of routinely collected data (eg. mortality) uncertain. The unique health care systems (eg. “transferred” services under First Nations control in some YT and NT communities, and the use of nurses in primary care settings in NT and NU) means that even data capture procedures using administrative databases [eg. the National Diabetes Surveillance System] well validated in the provinces need special adjustments in the territories.

Our research program has a special focus on the Inuit. The health of the Inuit has undergone substantial changes, as a result of interactions with external influences, a process which was accelerated considerably in the past several decades [1]. While overall indices such as life expectancy at birth have improved substantially, and infectious diseases have receded, in their place the emergence of chronic diseases has been observed. This health transition among the Inuit and other indigenous peoples reflects the interaction of genetic and environmental factors [2-3]. Their long habitation in the Arctic

has resulted in the evolution of many genetic (and cultural) adaptations which allowed them to thrive successfully in one of the most inhospitable environments on earth. Moreover it is the recent introduction of new stressors and their compression into a short time period which has the most significant impact.

Traditionally, the Inuit appeared to have a low burden of atherosclerotic diseases, diabetes and obesity. The apparent “protection” from these diseases is disappearing, primarily because of the rapid change in lifestyles [4-8]. Traditional food use is declining rapidly, though not uniformly across the Arctic, with dietary fat from market foods exceeding that from traditional, marine-mammal-based sources [9-11].

While the Arctic is often assumed to be a pristine, unpolluted area, many man-made chemicals are now transported to the Arctic by ocean and atmospheric currents, and then are biomagnified in the marine food web, ultimately ending up in humans [12-14]. This is superimposed on “old” environmental health problems related to crowded housing and inadequate water supply and sanitation. In terms of the broader socio-economic environment, by almost any indicator – education, income, housing, employment and occupation – the Inuit also fare poorly. Health also becomes adversely affected when there is discrepancy between modern and traditional values [15-16].

2.2 Previous collaboration

This proposal follows the successful conclusion of the IHRT award to Kue Young and colleagues (2000-05), which dealt with diabetes in First Nations in southern Canada, among whom the epidemic is already far advanced. The present proposal is not a continuation of the IHRT, as it shifts geographic focus to the Arctic/Subarctic and broadens the scope to the family of chronic diseases with overlapping risk factors, including diabetes. The majority of the investigators of this Team are members of the International Network for Circumpolar Health Research (INCHR), created as a result of a development grant under the CIHR Global Health Research Initiative (2003-04).

2.3 International dimensions

Our proposal is timely. In July 2004, the NIH’s National Heart, Lung, and Blood Institute convened a workshop on *Research with Arctic Peoples: Unique Research Opportunities* [www.nhlbi.nih.gov/meetings/workshops/arcticpeoples.htm], which was attended by several members of our Team. The workshop focused on collaborative research in the epidemiology of cardiovascular diseases, and a request-for-proposals is being planned. In October 2004, CIHR and NIH signed a cooperative agreement in indigenous people’s health [www.cihr-irsc.gc.ca/e/25074.html] to promote collaborative research on health issues relevant to both countries’ indigenous populations.

The years 2007-2008 have been designated International Polar Year (IPY) - the last time was 50 years ago - when an intense international research program in multiple disciplines will be launched by many countries [www.ipy.org/about/index.htm]. As a northern country, Canada is expected to play an active role. The Team research program has also been included in a submission to, and accepted by, the International Joint Committee. If funded, this would be a major Canadian contribution to IPY’s health sciences program.

3. Advantages of Team Approach

Our research exemplifies the spirit, mandate and vision of CIHR by cutting across basic biomedical, applied clinical, health services, and population health research. Each of our projects involves 2+ sectors, occurring in the laboratory, the clinic, and the community.

3.1 Added value

The health issues relating to chronic diseases in northern population are complex and interrelated, and they cannot be adequately addressed by separate projects in isolation. Our team members are experienced and cohesive, and have previously collaborated in various research projects, or have participated in national committees to develop public health and research strategies for northern/Aboriginal communities.

Methodologically, a multi-site, team approach is not only desirable but essential. The small, scattered population in each northern country eliminates many research questions from being addressed because of small sample size. Joint planning from the outset with comparable protocols in different countries can overcome the difficulties of post hoc pooling of results from studies with inconsistent or incompatible methods.

Our Team program goes beyond the execution of a suite of research projects. It also aims to leave a legacy in research infrastructure and capacity development in the North.

3.2 Resources sharing

The creation of 3 northern-based research units at the territorial capitals allows different projects to share local administrative and human resources. With a core staff they will serve the requirements of the projects, some of which are seasonal in nature, and also serve as staging points for projects implemented further afield in remote communities.

Our international linkages also allow us to learn from the health information systems in other circumpolar jurisdictions. For example, the Alaska Native Epidemiology Center [www.anhb.org/epicenter/index.html] is a model that can be emulated in part by Aboriginal health authorities in our northern Territories.

4. Training Plan

Our Team promotes training in two ways – researcher development and researcher interactions. Training occurs both in research-intensive institutions and in the North.

4.1 Graduate and postdoctoral fellowships

The budget will allocate training fellowships and scholarships for all levels: Post-Doctoral, Doctoral, and Master's students (3 positions each year in each category). The Team Grant will supplement student support currently available through the CIHR-IAPH's ACADRE centres associated with Team members at Laval and Toronto. The Laval "Nasivvik" centre [www.nasivvik.ulaval.ca] caters to Inuit students and Inuit health projects. At U of T the Indigenous Health Research Development Program supports Ontario residents studying/researching anywhere, and students from elsewhere studying in Ontario institutions [www.ihrdp.ca]. The Team Grant will be able to target other groups, eg. non-Inuit northern residents. Team members will supervise graduate students conducting research in the North and also provide northern-based training opportunities.

4.2 Learning environment

The Team Grant will support exchanges of scientists and trainees among member institutions. The three northern regional research units will facilitate community/academic exchanges by arranging shorter term (<12 months) practica and field placements for graduate students, which provide an opportunity for "real world" experience that also benefits the host agencies. Such placements can also provide summer internships for health professional students, particularly those from northern and/or aboriginal communities, to promote health research as a career choice. Team-funded trainees will attend annual workshops as a form of shared common learning. Held in

conjunction with annual general meetings and other scientific meetings, they focus on research methods, ethical issues, grantsmanship, and research-in-progress.

The Team program represents an opportunity for mutual learning between scientists and Aboriginal communities. Such interactions will strengthen the research capacity of Aboriginal organizations and inform researchers of community priorities and sensitivities. An example of empowerment of Aboriginal people through training is the development of an on-line nutrition course by Team member Chan and colleagues, in consultation with Inuit communities, focusing on traditional foods and diabetes prevention.

5. Team Organization and Management

The proposed Team operates on the collegial rather than hierarchical model, with a flexible administrative structure.

5.1 Central coordination

The coordinating centre is located at the University of Toronto, under the overall direction of the Team Leader, who is accountable to CIHR for the execution of the research as proposed and approved. A research coordinator will be based here to oversee financial/administrative matters, maintain communications, and handle media relations.

5.2 Regional research units

The Team is committed to creating regional research units based in the North, in Yellowknife, Iqaluit, and Whitehorse, which will be fully involved in data collection, management and analysis, and coordinate consultation and liaison with northern governmental and non-governmental agencies. They will be allocated separate, locally administered budgets supervised by a research coordinator. Such units will provide administrative and logistical support to community-based projects and organize continuing education and short, intensive courses for researchers. It is our intent that these units would evolve into autonomous entities and develop their own governance structures.

5.3 Financial management

The University of Toronto will be the recipient and administrator of the Team Grant, with the Team Leader as signing authority. Individual PIs in charge of specific projects will be allocated subgrants under bilateral agreements between their institutions and the U of T regarding payment scheduling and reporting requirements. Project leaders are fully independent within their budgetary allocation.

5.4 Collective decision-making

An executive committee of PIs will meet quarterly to keep each other informed of progress, plan schedules, and solve problems. It is the decision-making body on issues affecting the whole team (eg. training, dissemination and policy). The co-investigators and Canadian collaborators relate primarily to the PIs in specific projects. International collaborators play a mainly advisory role. The entire team will meet annually at annual general meetings, and occasionally at special symposia and workshops.

5.5 Internal communication

Regular communication among Team members and field staff, is via e-mail and a listserv, supplemented by occasional tele- and video-conferencing. Team members, as members also of the International Network for Circumpolar Health Research, have access to its website [www.inchr.org] which contains a research archive of protocols, data dictionaries, questionnaires, laboratory standards; and a documentation centre of reports

and monographs, members' publications, etc. It also provides links to researchers, research centres, and regional governmental and non-governmental agencies.

5.6 Institutional support

The host institution [Public Health Sciences at U of T] has recently established the Indigenous Health Research Development Program as an intra-departmental unit, with generous and dedicated office space. It also hosts the first endowed chair in Canada in Aboriginal and northern health, jointly funded by TransCanada Pipelines Ltd, Province of Ontario, and the University. A multi-departmental Collaborative Program in Aboriginal Health has recently been approved by the Ontario Council for Graduate Studies.

6. Community Partnerships

Our Team program builds on existing partnerships with community organizations and regional government agencies. Appendix 1 provides a list of collaborators who will be active in specific projects or Team-wide tasks such as training, knowledge translation and dissemination, and institutional supporters.

6.1 Indigenous peoples' organizations

Team members have had extensive past experiences of consultations and involvement with northern indigenous people's organizations. Team members Dewailly and Furgal are co-directors of the Nasivvik Centre which has a board of directors composed of national and regional Inuit representatives. Team members Egeland and Chan are from McGill's Centre for Indigenous People's Nutrition and Environment, which has a board with directors from several Inuit, Dene and Métis organizations in the North. In preparing this proposal, the Team Leader made presentations jointly to the health department of Inuit Tapariit Kanatami (ITK, the national Inuit organization), and the Ajunnginiq Centre of the National Aboriginal Health Organization (NAHO) in July 2005. The President of the Yukon Public Health Association (Walker) presented the proposal to the Yukon First Nations Health Commission in Moosehide, YT in July 2005. Additional stakeholder consultation meetings were conducted in September 2005 in Whitehorse, Yellowknife, and Iqaluit. It is fully recognized that these are just the beginning of a process that will be ongoing after the research program has been in place, and that the partnership occurs not just at the planning stage, but also in the subsequent implementation and evaluation.

Our program follows an important recommendation of the 1999 Inuit Health Policy Forum which called for the sharing of information, experience and expertise across provincial-territorial boundaries and the establishment of the Inuit Health Information Initiative to analyse, manage and report nationally and regionally Inuit-specific health data [www.itk.ca/health/infostructure.php]. This proposal also responds to the recommendations of the 1999 Yukon Health Summit on the need for chronic disease prevention and partnerships between academic centres and northern communities. Our Team will offer resources to ITK, NAHO and the Council of Yukon First Nations to achieve their health information objectives. We recognize that full and meaningful partnership with Aboriginal organizations is critical for the success of the Team.

6.2 Regional health authorities

The Team Leader made a presentation to the inaugural meeting of Territorial Chief Medical Officers in Iqaluit in July 2005, attended also by the federal Minister of State for Public Health. All three Territorial health departments and Health Canada's First Nations and Inuit Health Branch support this proposal [see Appendix 1]. The underdevelopment

of a comprehensive chronic disease surveillance system in the North is widely acknowledged, and our Team intends to serve both the needs of researchers with specific interests and northern policy makers and planners who require timely health intelligence. With funds from the planning grant, the Team Leader contributed to the salary of a coordinator, who is based in Yellowknife, to assist in the development a territorial research network consisting of health professionals, researchers, government scientists and representatives of Aboriginal organizations. A “think tank” was held in N’dilo, NT in May 2005 with key regional stakeholders to discuss terms of reference, governance structure and funding strategy.

7. Dissemination and Knowledge Translation

The Team will use and produce different types of information intended for various audiences: those which communicate detailed results to other researchers, those which summarize results and make recommendations for health care practitioners and decision-makers, and those which communicate directly with the public in northern communities.

7.1 Bibliographic databases and publications server

The Arctic Institute of North America's Arctic Science and Technology Information System (ASTIS) [www.aina.ucalgary/astis] will cite, index and abstract these publications in an online bibliographic database. The database will include publications by the Team, other important resources identified by team members, and health-related publications already covered by ASTIS. It will emphasize publications that are difficult to obtain from standard scientific databases. It will be searchable by disease, aboriginal group, region, author, year, and keywords. It will provide links to the full text of most publications on the publisher's website or, when copyright allows, on the ASTIS publications server.

ASTIS already has an online bibliographic database of 57,000 records (of which 2,300 are health-related) supported by experienced staff, the capability to make subsets available from separate websites, and a publications server with the necessary capacity. Other ASTIS bibliographic projects, such as the Northern Contaminants Program Publications Database, the Nunavut Environmental Database, the Nunavik Bibliography, and the Inuvialuit Settlement Region Database will share the cost of creating the database. The records created will be widely disseminated through automatic inclusion in the main ASTIS database, in all appropriate ASTIS subset databases and in the international Arctic and Antarctic Regions database that combines all the world's major polar databases. This will ensure that the Team's output are preserved, and available in regional, national, and international databases to users who are not aware of the research program.

7.2 Information service outreach

The Team Grant will expand the University of Manitoba Neil John Maclean Health Sciences Library's outreach service to the Kivalliq Region of Nunavut to include other northern territories [<http://umanitoba.ca/libraries/units/health/reference/kivalliq.shtml>]. Northern health care managers, practitioners and researchers are hampered by the lack of access to research libraries, which adversely affects their professional effectiveness and severely limits their opportunities for continuing education. The information outreach service will offer literature searches on specific topics and document delivery (by fax and mail), and on-line training/advice on accessing and searching electronic databases. A current awareness service could be set up for individual researchers and health program managers to keep current on the latest advances in specific fields. The service will be available to all professional/technical health staff of collaborating agencies.

7.3 Symposia and publications

The Team will organize, sponsor, and host national and international meetings on specific topics over the course of the grant, and will utilize primarily the *International Journal of Circumpolar Health* [<http://ijch.oulu.fi>], a quarterly peer-reviewed journal, fully indexed by Index Medicus, to publish periodic special issues and symposia proceedings resulting from Team activities. The journal provides free full-text access to all articles on its website and is widely distributed in the circumpolar countries.

7.4 Interactions with policy-makers and service providers

The translation of research results into policy occurs at two levels – improving clinical practice through evidence-based guidelines, and the development of a population health strategy. The team will establish strong links with territorial health workers (nurses, physicians, community health representatives, dietitians, etc).

The Team will be a vehicle for regional health authorities, statistical bureaus, territorial health departments and Aboriginal organizations to access evidence-based policy advice. The regional research units will be the key link between southern universities and northern organizations and agencies. The Team will support as one of its projects [No.7] the development of a northern site of the Cochrane Collaboration for systematic reviews focussing on health issues relevant to the North. While drawing on the international expertise to strengthen local/regional evidence-based public health and clinical practice, the Team will also facilitate adaptation of Cochrane reviews to northern/aboriginal populations. This support is particularly critical for many First Nations which are delivering programs and services with limited resources.

8. Ethical Issues

Specific projects will be reviewed by various research ethics boards of the principal investigators' institutions. Team members are aware of, and will adhere to, general ethical principles with special reference to northern/Aboriginal people as outlined in such documents as the *Tri-Council Policy Statement* and ethical guidelines and codes of research of various bodies such as the Royal Commission on Aboriginal Peoples, the National Aboriginal Health Organization, Alaska Native Health Board, the Alaska Native Science Commission, the National Science Foundation, and the Commission for Scientific Research in Greenland [these documents have been posted on www.inchr.org/Ethical.asp]. Applications will be made to the relevant territorial regulatory bodies for research licenses [summarized in www.ipy-api.ca/english/documents/ipy_reslic_updated_0705_e.pdf].

Team members fully respect the principles of ownership, control, access, and possession (OCAP) which have been articulated by Aboriginal organizations relating to data stewardship. We shall enter into consultations and negotiations with First Nations and Inuit communities to create a mutually acceptable and beneficial framework on the collection, use and dissemination of health data on Aboriginal people.

We appreciate the unique ethical issues and sensitivities of genetic research and are committed to proceeding with the proposed research only when community participatory processes, ethical and institutional reviews and individual consents demonstrate approval and support. We have among our collaborators an experienced applied ethicist (Pullman) with special expertise in genetics research, especially in addressing the complex procedural issues of privacy, consent and biological sample collection inherent in the studies planned (Projects 2 and 5). His experience serving on the CIHR Institute of

Genetics advisory board and the Ethics, Legal and Social Issues Committee of the Canadian Longitudinal Health Initiative will be invaluable. Team members Arbour and Chan are members of CIHR's Aboriginal Ethics Working Group, and Chan also serves on the Tri-Council Ethics Committee.

9. Project Descriptions

Theme 1 Identifying and Assessing Health Risks

Project 1 Inuit Health in Transition Study

This is a long-term prospective cohort study of over 12,000 Inuit adults across the circumpolar North in Greenland, Canada, and Alaska, investigating the impact of the social and physical environment, health behaviours, and genetic susceptibility, on cardiovascular diseases, diabetes and other chronic diseases [Note: only funding for Canadian investigators will be requested in this Team Grant].

Project Leaders: Egeland, Young, Dewailly

Participants/Collaborators: Lou, Chan, Sobol, Bjerregaard, Howard, Boyer, Randell

Hypotheses:

- Inuit are susceptible to a similar set of genetic, behavioural and environmental risk factors for cardiovascular diseases and diabetes identified in other populations;
- Inuit experience different exposure to these risk factors, with different dose-response relationships, biological effects and attributable fractions;
- There are risk factors unique to the Arctic environment and lifestyle which promote or protect against the development of chronic diseases among the Inuit.

Background:

It was the original observations among Greenland Inuit by Bang and Dyerberg [17] which identified the beneficial effects of n-3 fatty acids in cardiovascular and other chronic diseases [18]. The consumption of the traditional marine diet, however, also led to increased tissue levels of persistent organic pollutants and heavy metals in the Inuit [13,14,19,20]. Some contaminants also play an etiologic role in chronic diseases – eg. selenium as an antioxidant [21]. Within a generation the Inuit have significantly reduced their consumption of traditional marine food. The complex relationships between diet, contaminants and chronic diseases can best be investigated in a cohort study.

The genetics of atherosclerosis and diabetes is complex, with the contributions of numerous genes interacting with environmental factors [2-4,22]. Of 15 alleles of candidate genes which have been shown to be associated with atherosclerosis and its intermediate traits, it was found that, among the Inuit, 5 were consistent with decreased risk, 5 with increased risk, and 5 with no difference when compared to Europeans.

During the 1990s, Team members have conducted separately a series of cross-sectional surveys on cardiovascular disease, diabetes and their risk factors among the Inuit of Alaska, Canada, and Greenland, with a combined sample size of 2,545 [23-30, 7-10]. The next stage is a longitudinal study with a uniform protocol which will permit causal inferences to be drawn on risk factors - disease associations.

Design and methods

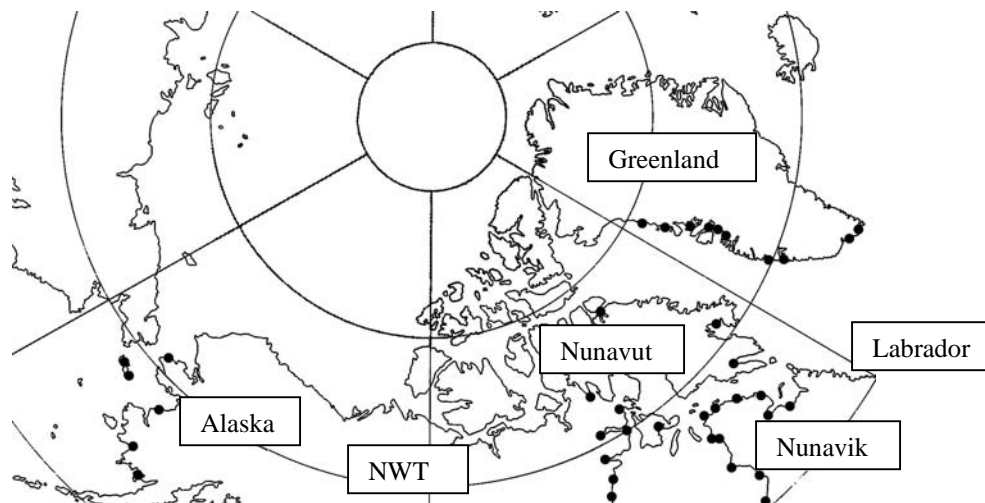
The basic design of the project is a prospective cohort study with a baseline cross sectional survey. The baseline survey consists of interviews, clinical examinations, and laboratory tests. The follow-up period will be at least 10 years, with periodic repeat examinations (every 5-7 years) and tracking of major health events through review of

medical records. The core protocol is described below. New elements may be added according to the interests of the participating regions, communities and researchers. We will conduct both cross-sectional and longitudinal analyses, in particular the mixed models and generalized estimating equations approach to account for the intra-subject or within-cluster correlations.

Sampling and study sites

We aim to recruit into the cohort 4,000 adult participants aged 18 and above each from Alaska, Canada, and Greenland, totalling 12,000. Based on past experience, a 70% participation rate is anticipated, and accordingly an initial sample of 17,000 eligible individuals will be identified and invited to participate. Because of the scattered population and high transport costs, simple random sampling of the target population is not feasible. Communities will be identified through consultations and negotiations among the investigators, regional organizations, and local councils. In many small communities, the entire adult population will be invited to participate.

The sample is designed to be broadly representative of all major Inuit regions in the three countries. Within Canada, we plan to select 1000 participants from the Nunavik region of Québec, 2000 from Nunavut [Baffin Island: 1000, Kivalliq region: 750, and Kitikmeot region: 500], 500 from the western NWT [Inuvialuit], and 250 from Labrador.



The number of participants ($N=12,000$) will detect a statistically significant relative risk (RR) of 1.16 between two exposure groups for diseases with a prevalence of 10%, and $RR=1.24$ for 5% prevalence; for a single region ($N=4,000$), the RRs are 1.29 and 1.43, respectively (95% and 80% significance levels for type I and type II errors).

Data collection

Travel to the communities will be by regular air service, or charter of the research icebreaker SS Amundsen, operated by ArcticNet [a Network of Centre of Excellence based at Laval, with which some Team members are associated]. This ship was used successfully in the Nunavik survey in the summer of 2004. We have tentatively scheduled ship time for travel to Greenland in the summer/fall of 2006, and to Baffin Island in 2007. The components of the interviewer-administered questionnaire, clinical examinations, and laboratory tests are listed below [details in Appendix 4]. Blood samples will be banked for future analyses of newly identified risk factors.

<u>Interview</u>	<u>Clinical Examination</u>	<u>Laboratory Tests</u>
Sociodemographic	Anthropometry	Glucose [Fasting, 2 hr]
Diet, Physical Activity	Blood Pressure	Insulin [Fasting, 2 hr]
Physical Activity	Carotid ultrasonography	Lipids
Psychosocial Stress	Bioelectrical impedance	Contaminants
Tobacco, Alcohol	Electrocardiography	Inflammatory markers
Self-rated Health		

Time schedule

A uniform cross-national protocol has been agreed over a series of international workshops between 2001 and 2003 and field tested in Greenland in September 2003 and one community in Nunavut in May 2005. The baseline surveys have been completed in Alaska (Norton Sound/Bering Straits and Yukon-Kuskokwim regions) and Nunavik (northern Quebec) in 2004 (with separate funding from NIH to Alaska; and CIHR, Santé Québec and ArcticNet to Nunavik). The Team grant will co-finance baseline surveys in Greenland, Nunavut, NWT, and Labrador beginning in 2006.

	2005	Y1('06)	Y2('07)	Y3('08)	Y4('09)	Y5('10)
Community consultations/ planning						
Baseline surveys		GL	BF	Oth		
Data entry						
Data analysis						
Community feedback				GL	BF	Oth
Planning for follow-up					All regions	

Note: GL-Greenland; BF-Baffin Island; Oth-Other regions in NU, NT, and Labrador
Beginning in Year 3, planning will begin for the development of the infrastructure to coordinate follow-up of the cohort. Health outcomes of participants will be tracked through annual medical record reviews. Future re-surveys of all participants in the various regions will occur in the second 5-year period after renewal of the Team Grant.

Project 2 Core Laboratory: Genetic Polymorphism and Cardiovascular Risk

Project Leader: Hegele

Participants/Collaborators: Young, Arbour, Bjerregaard, Howard, Boyer

Specific objectives:

To characterize the genetic architecture of the Inuit communities, specifically the genomic determinants of cardiovascular disease (CVD) and its risk factors, such as hyperlipidemia, hypertension, obesity, metabolic syndrome and diabetes.

Hypotheses:

CVD-related phenotypes in Inuit are associated with:

- Common genomic sequence variants (polymorphisms) in candidate genes;
- Rare and/or private genomic sequence variants (mutations and/or polymorphisms);
- Newer forms of genomic variation, specifically copy number polymorphism.

Background:

We have published extensively on the genetics of CVD-related traits in Canadian aboriginal people. Main contributions include: (a) discovery of a type 2 diabetes susceptibility mutation in Oji-Cree [31]; and (b) genetic associations with CVD risk, obesity and plasma lipoproteins in Inuit [2-5, 32-43]. To date, no causative mutations

have yet been found among Inuit subjects for monogenic disorders associated with CVD, such as familial hypercholesterolemia (FH) or familial hypoalphalipoproteinemia (FHA).

Overall study design:

Specific experimental designs to detect genetic associations with CVD phenotypes will depend upon the study sample and units of organization.

- Hypothesis 1: Unrelated individuals will be evaluated using a case-control design with multivariate linear regression, entering the candidate gene SNP (single nucleotide polymorphism) genotypes as covariates. Sampling whole family units, with known relationships, lends itself to multigenerational linkage analysis, or TDT (transmission disequilibrium testing) analysis using specific parent-offspring units.
- Hypothesis 2: The proposed large study samples will permit ascertainment of individuals at the extremes of quantitative trait distributions likely to have a monogenic cause for their biochemical disturbance. For instance, plasma LDL cholesterol in the top 1 percentile would identify potentially FH subjects, whose genomic DNA would be sequenced to find causative mutations in *LDLR*, *APOB*, *PCSK9* or *ARH* genes. Similarly, plasma HDL cholesterol in the bottom 1 percentile would identify potentially FHA subjects, whose genomic DNA would be sequenced to find causative mutations in *ABCA1*, *APOA1* or *LCAT* genes.
- Hypothesis 3: A subfield within human genetics is determination of prevalence, distribution and phenotype associations of large scale copy number polymorphisms (CNPs) in the human genome. Hegele is Principal Investigator on a Genome Canada funded project to map such novel forms of human genomic variation. These state-of-the-art methodologies will become established and even routine over the term of the current proposal, and will be accompanied by development of reference databases in various healthy populations. These forms of genomic variations can thus be evaluated for CVD-related phenotype associations in Inuit using approaches that are analogous to the current evaluation of SNPs or microsatellites.

DNA archive and analysis:

- Whole blood samples in EDTA will be shipped from the site of sampling to the Robarts Research Institute, London, ON. DNA will be extracted using Puregene isolation kits (Gentra, St. Paul, MN), purified, quantified and archived using an established protocol and proven overall organizational approach [31-43].
- The Hegele lab generates ~300,000 genotypes/year for ongoing studies of genetic determinants of CVD risk in such Canadian communities as Hutterites, Chinese Canadians, South Asian Canadians, Oji-Cree and Ojibway. For specific hypotheses related to candidate genes, subjects will be genotyped using established procedures. Genotyping will be performed using gel-based platforms, with alternate methodologies available through the London Regional Genomics Centre (director: R. Hegele). Focused sequence analysis will examine either positional or functional candidate genes in subjects with discrete or severe phenotypes. Mutations will be evaluated for dysfunction using standard procedures. The LRGC also has the Affymetrix analysis system to analyze RNA expression profiles and genome-wide SNP analysis for association, linkage and copy number analysis.

Data analysis:

SeqScape v.2 (ABI, Mississauga) will be used to analyze sequence data. GeneMapper v.3.7 (ABI, Mississauga) will be used to analyze SNaPshot allele-specific genotyping

reactions. SAS v8.2 will be used to estimate genotype and allele frequencies, deviation from Hardy-Weinberg equilibrium, sources of variation for quantitative traits, and odds ratios for association with discrete traits. We have broad experience in statistical model design for association and with the use of programs such as PHASE, GeneHunter, dCHIP, SIBPAL, GeneSpring GX and CNAT (Affymetrix).

Expected results:

For candidate gene variants studied, we will construct an atlas of CVD susceptibility among Northern peoples. We will find sub-population specific genetic determinants of CVD traits and will compare these associations across the Inuit samples, and also to our archive of other Canadian communities (currently ~4000 individuals). When differences are noted between communities, frequencies of the genomic variants and such attributes as obesity, diet, activity, cultural factors and perhaps other genes (epistasis) can be studied. Genotype-phenotype associations will be identified, involving candidate genes in lipoprotein metabolism, diabetes, blood pressure, obesity and/or the metabolic syndrome. The following genomic variants – from previous analyses of relatively smaller samples of Kivalliq and Greenland Inuit – will be evaluated as the first step in the proposed studies. Gene names are: *APOE*, apolipoprotein E, *PPARG*, peroxisome proliferator-activated receptor gamma; *LMNA*, lamin A/C; *PON1*, paraoxonase-1; *MTHFR*, methylene tetrahydrofolate reductase; *F5*, clotting factor 5; *AGT*, angiotensinogen; *HL*, hepatic lipase; *APOC3*, apolipoprotein C3; *GNB3*, beta3 subunit of G-protein.

We will sequence candidate genes to detect the first mutations in any aboriginal population for monogenic CVD-susceptible phenotypes such as FH and FHA. Finally, we will perform the first genome-wide studies to detect CNPs in any aboriginal population and test for their potential association with CVD-related phenotypes.

Time schedule:

DNA extraction will be simultaneous with the collection of other blood markers from the communities. Genotyping will follow soon thereafter for the candidate genes specified above and for about four years as samples, continuing after all samples have been received, using appropriate markers. Statistical analysis will follow after sample receipt. Finally, dissemination of results and follow-up with communities will commence in the third year and will continue to the end of the project and beyond.

	2005	Y1('06)	Y2('07)	Y3('08)	Y4('09)	Y5('10)
DNA extraction						
Genotyping						
DNA sequencing						
Genome analysis, LCV						
Statistical analysis						
Dissemination/follow-up						

Project 3 Risk Assessment and Communication of Environmental Contaminants in Traditional Foods

Project Leaders: Furgal, Dewailly

Participants/Collaborators: Chan, Egeland, Walker, Duncan, Bjerregaard

Background:

Much has been learned about contaminant transport, levels in the Arctic environment, and human exposure in the past two decades. The Canadian Northern Contaminants Program, the Arctic Monitoring Assessment Program (AMAP) supported by the Arctic Council,

and regional health and Aboriginal authorities have delivered much of this information to communities and individuals to support informed decision making in the North [44,45]. The approaches used to disseminate this information to communities have been varied, ranging from print media to spoken word, and only recently have evaluative exercises been conducted to understand the successes and challenges in delivering this information [46,47]. With increasing knowledge of the potential effects of these substances on infant health and development in high exposure regions, and the identification of new substances of concern such as polybrominated diphenyl ether (used in fire retardants), the risk management process of balancing of benefits and risks and the delivery of contaminant risk messages have become even more complex.

Communicating risk to northern communities has experienced certain challenges in the past due to an incomplete understanding of how the information would be viewed by Aboriginal communities and individuals. Differences in culture, language, the politicization of information, and cross-cultural misunderstandings can all undermine the best intentions of health communications. Many of these challenges have been reported in early attempts to communicate, for example, the presence of PCBs in breast milk in Broughton Island, NWT to current concerns being raised about the communication of contaminants in fish in Alaska [48].

In 1997 AMAP recognized that formulating public health advice about contaminants in food is complicated by the key role that indigenous foods play in people's social, spiritual, and cultural identity. Indigenous foods also provide excellent nourishment and help protect against chronic diseases. It proposed that public health advice must include insight about native cultures and local lifestyles. Dialogue with local people, not just among scientists, becomes essential in this process, and communication must be based on both respect and knowledge [49]. However, awareness of the potential difficulties in making health decisions and communicating these issues has not necessarily been translated into action. Five years later, AMAP is still espousing the same approach to communication, but without showing how it has been developed in any of the participating countries at the local level, and without any evaluation of the success of such efforts to date [50].

We therefore propose to conduct a series of case studies on risk assessment and communication in the 4 Inuit regions of Canada (Labrador, Nunavik, Nunavut, and Inuvialuit), Yukon, Alaska, Greenland, and the Russian North, to document these factors and share best practices and lessons learned among regions.

Objectives:

- Develop models for the analysis of risks and benefits associated with a key contaminant and health issue in selected communities;
- Assess the pros and cons of communication strategies associated with this risk analysis in each region;
- Identify key factors determining the outcome of the communication strategies;
- Compare and contrast results from different case studies to identify “best practices” applicable to all regions;
- Share “best practice” lessons learned among regions and make recommendations for improvements in risk communication at the regional or community level;
- Train and support regional/local personnel in conducting the research and evaluation of case studies of the communications event;

Funding has been secured for the 4 Canadian Inuit case studies under the Northern Contaminants Program. The Team Grant will allow the scope of the project to be expanded to other circumpolar regions.

Hypotheses:

- A comprehensive risk assessment model can be developed for circumpolar regions;
- Common sociocultural factors at the individual and community levels influence the success of risk communications related to contaminants, country foods and health;
- The identification and understanding of these common factors can improve the development and release messages related to Arctic environmental health issues.

Locations:

Through initial consultation with international partners, the following regions and communities have shown interest in participating in this project as the research sites:

- Health advisory on toxaphene in Lake Laberge, Yukon (Old Crow);
- Health advice re POPs exposure in the Aleutian and Pribilof Islands, Alaska;
- General health messages on contaminants in country foods in Greenland (Nuuk)
- Return of results of the Russian Persistent Toxic Substances study.

Design and methods:

A series of case studies (one per region) will review past distinct risk assessment and communications events (e.g. analysis of exposure data and public release of health advisories or advice) on contaminants, health and country foods. Criteria to identify cases include case characteristics, context and logistical considerations. Standardized methods will be applied in each case study and cases will be evaluated using a common framework to be developed in Year 1, covering aspects such as community reception, retention, comprehension, compliance to messages and perception of risk issues. Methods used in case studies will include document review and key informant interviews, review of benefit and risk data, and a small randomly sampled survey of community members. Field research will be conducted in cooperation with local/regional researchers who received training via a series of workshops convened by the research team.

Milestones:

Regional consultation and identification of cases	Months 1-3
Report reviewing of case risk / benefit analyses	Month 12
Researcher training and initial case study document collection	Months 13-24
Qualitative and quantitative data review and analysis	Months 16-30
Key-informant interviews and community surveys	Months 24-36
Data analysis and interpretation	Months 30-42
Preparation of community and scientific reports	Months 36-42
Community communication and results release	Months 42-48

Theme II Monitoring Changing Disease Burden

Project 4 Circumpolar Chronic Diseases Observatory

Project Leaders: Bruce, Lix

Participants/Collaborators: Young, Lou, Wilkins, Sobol, Kandola, Santos, Ewert, Pasquali, Walker, Duncan, O’Hearn, Randell

Rationale:

A major goal of the Team Grant is to strengthen the health information system of northern health agencies and Aboriginal organizations and improve their capacity for

generating ethnospecific health data. In the three northern territories, there are three major Aboriginal groups - Inuit, Dene First Nations, and Métis, and also non-Aboriginal people. These groups have vastly dissimilar risk factor profiles and disease burdens. Health information that ignores this reality and produces a “weighted average” of the territorial population does not facilitate the appropriate targeting of health resources.

We propose the creation of a Circumpolar Chronic Diseases Observatory. In NT, they dovetail with proposed initiatives to create electronic health records and a digital health information system. When fully established in Canada, the Observatory will link up with comparable systems in Alaska and Greenland. It will be modeled after the International Circumpolar Surveillance project for infectious diseases, coordinated by the Centers for Disease Control in Alaska [www.cdc.gov/ncidod/aip/research/ics.html].

The Observatory will track (a) selected chronic diseases through the territorial vital statistics and health care databases and (b) risk factors (socioeconomic determinants and personal behaviours) through custom analyses of territorial samples of national surveys.

4a. Tracking Disease Burden Using Administrative Databases

The following framework guides our data collection activities and analyses:

Stage	Objectives	Measures and Outputs	Program/Policy Links
1	Describe the overall burden of chronic diseases	<ul style="list-style-type: none"> • Incidence, prevalence and mortality • Related health care use • Past trends and future projections 	<ul style="list-style-type: none"> • Conduct education and advocacy regarding the public health importance of chronic diseases
2	Describe variations in disease burden	<ul style="list-style-type: none"> • Comparisons of community-specific disease rates • Compile disease rates for regions and territories • Compile disease rates for transnational ethnic groups [Inuit, Dene, non-indigenous] 	<ul style="list-style-type: none"> • Identify opportunities and imperatives for prevention and care activities • Select high risk communities for the implementation of preventive interventions
3	Identify factors associated with higher disease burden and poorer outcomes	<ul style="list-style-type: none"> • Ecological investigation of factors associated with higher burden of chronic diseases • Study of variations in clinical care associated with poorer outcomes 	<ul style="list-style-type: none"> • Develop appropriate community-level preventive interventions. • Design and implement programs to improve the quality and accessibility of clinical care.

Hypotheses:

- The burden and impact of chronic diseases varies by geographic region and ethnic identity;
- The Inuit/Dene/Non-indigenous differentials in disease rates are maintained across territorial and national borders
- Persons with one or more chronic diseases are at increased risk for hospitalizations and mortality overall and certain clinical outcomes relative to persons without chronic diseases; and such risks among Aboriginal persons with chronic diseases exceed those of non-Aboriginal persons with chronic diseases.

Background

Administrative data have been used extensively in health services and epidemiologic research and considerable effort has been devoted to determining their quality and accuracy [51,52]. For some chronic diseases such as diabetes, a high degree of concordance has been demonstrated for cases identified from health interview survey responses and from diagnostic and treatment codes in administrative data [53,54]. The accuracy of case identification from administrative data generally increases with the number of databases (i.e. hospitals, physicians, pharmaceuticals) and years of data available for linkages using a unique personal health identification number. Considerable experience has been accumulated in Manitoba [55,56] and the methodologies developed there have been adopted nationally, for example, in the National Diabetes Surveillance System. At the Manitoba Centre for Health Policy, further research is being undertaken to develop case definition algorithms for chronic diseases such as hypertension, heart disease, asthma and arthritis and also their translation from ICD-9 to ICD-10.

Methods and research plan

- Data sources: Individuals with selected ICD-9 (and/or ICD-10) diagnostic codes corresponding to chronic diseases of interest will be identified from the territorial mortality and health care databases (i.e. physician contacts, hospitalizations). Person-specific longitudinal records will be constructed by data linkage using the personal health identification number. Data on health outcomes (e.g. death) and clinical patterns of care (e.g. continuity of primary care) will be obtained from vital statistics, physician and hospital claim files.
- Case definition: Algorithms to define cases of chronic disease are developed by identifying relevant diagnostic and treatment codes, the number of occurrences of these codes, and the years of data required to confirm that an individual has the disease. For example, a person is categorized as diabetic if there are at least 2 physician contacts or one hospital separation with ICD-9 code 250 in a 2-year period.
- Validation: Cases identified via administrative data algorithms will be compared with cases identified from chronic disease registries maintained at health centres and regional hospitals (for clinically diagnosed cases) and against health surveys (for self-reported cases). Sensitivity and specificity of alternate algorithms will be evaluated and the optimal algorithm will be selected based on their simultaneous maximization.
- Ethnic identity: Birth and death records in the three territories contain identifiers for Aboriginal status. Communities in the North [apart from the major towns] can be distinguished on the basis of primarily “Inuit-inhabited” or “First Nations-inhabited” using standard geographic codes or generated from postal codes. Developing and validating indirect means of ethnic identity will be an initial task of this project.
- Analysis: Small-area variation statistics and regression analyses will be used to describe geographic and ethnic differences in disease rates and to test the factors associated with these variations.

Time schedule:

Planning and negotiations with the relevant territorial authorities will occur in Years 1-2, to discuss data access and the protection of privacy and confidentiality, and resolve technical issues relating to data linkage, housing of databases, and programming. Pilot testing of the methodology will begin in Year 3. A preliminary report format will be piloted with key decision makers in Year 4 and a final version will be produced in Year 5, after which regular annual updates will be routinely produced.

4b. Monitoring Health Behaviours and Socioeconomic Determinants through National Surveys

Background:

Many large, national health surveys have been conducted in Canada since the 1970s, some of which provide useful information on the residents of the northern territories, including the *Nutrition Canada Survey* (1970-1972), the *Health and Activity Limitation Survey* (1986) and *Canada's Health Promotion Survey* (1985). Beginning in the mid 1990s, the series of *National Population Health Surveys* (NPHS) and *Canadian Community Health Surveys* (CCHS), which cover the territories, include questions on both “ethnicity” (with categories for “North American Indians”, “Métis” and “Inuit”) and “race” (with a category for “Aboriginal peoples of North America”). The size of the various territorial samples in NPHS and CCHS are shown in Table 2. While the NPHS contains a longitudinal panel starting in 1994/95, with the same individuals being interviewed in successive cycles, the territories were not part of this component. Beginning with cycle 4, NPHS became strictly longitudinal and thus no longer covers the territories. The CCHS continues to include the territories and is structured to allow comparisons between health regions in Canada. Each territory (as well as Nunavik and Labrador) are considered as health regions.

Table 2. Territorial sample sizes included in national health surveys

	Yukon	NWT	Nunavut
NPHS 1994/95	1,280	740	
NPHS 1996/97	863	608	
NPHS 1998/99	886	564	420
CCHS 1.1 - First Nations	140	299	7
- Inuit	2	108	564
- Métis	10	93	5
- Others	659	526	136
CCHS 2.1 - Non-Aboriginal	617	664	274
- Aboriginal	161	390	441

The *Aboriginal Peoples Survey* (APS) of 1991 covered all Inuit and First Nations in the territories (with the exception of 3 communities in the Yukon). In 2001, Statistics Canada conducted another *Aboriginal Peoples Survey* (APS-2), again with high participation of communities in the territories [57].

The territories were not involved in the *First Nations and Inuit Regional Health Survey* (1997), which included 517 Inuit from 5 coastal Labrador communities. No Inuit participated in the second *Regional Health Survey* (2002/3), but First Nations in both the Yukon (9 communities, n=594) and NWT (16 communities, n=848) were included [www.naho.ca/firstnations/english/regional_health.php].

The limitations of self-reports in assessing both past diseases and the presence of risk factors are well recognized [58]. Currently Statistics Canada is collecting directly measured height and weight data as part of the CCHS 2.2, which is focussed on nutrition. A Canadian Health Measures Survey (CHMS) is being planned, to include a variety of directly measured anthropometric, clinical and laboratory tests, filling a long identified

gap in the monitoring of chronic diseases and their risk factors. Our Team is well placed to assist territorial authorities to analyse these new datasets as they become available.

Rationale:

Tremendous resources are devoted to producing new national surveys at the rate of one every two years. Currently there is little capacity within territorial health departments or Aboriginal organizations to take full advantage of the wealth of information from these surveys to guide health policy and design programs. Our Team will provide the programming and analytical resources to assist northern agencies, and use these resources for secondary data analyses to address research questions.

Objectives:

- To analyse territorial datasets from periodic national health surveys and provide timely feedback to northern-based decision-makers and planners;
- To track changes in the prevalence of behavioural and socioeconomic determinants of chronic diseases over time by ethnic group and region;
- To identify factors predisposing and promoting changes in these behavioural and socioeconomic determinants.

Design and methods:

- The territorial subsets of CCHS and NPHS cross-sectional surveys will be analysed;
- Prevalence estimates will be computed using the sample weights provided by Statistics Canada, which sum to the target population at the time of data collection;
- Comparisons will be made with Canada nationally and among the 9 “peer groups” of health regions created by Statistics Canada based on demographic characteristics;
- For inter-ethnic comparisons within the North, the reliability of the estimates will be improved by combining CCHS cycles 1.1 and 2.1, and similarly NPHS cycles 1 to 3.
- Multivariate modeling will be used to identify factors (at both individual and ecologic levels) accounting for differences between the North and other regions, among ethnic groups within the North, and changes over time;
- Data analysis will be done at in the Statistics Canada Regional Data Centres located at the Universities of Manitoba and Toronto by affiliated Team members and trainees, using the original Master Files rather than the public-access microdata. Some analyses will also be done by collaborator Wilkins, a member of Statistics Canada’s Health Analysis and Measurement Group.

Time schedule:

Year 1 will be concerned with planning and infrastructure development, and consultations with northern partners and users. Years 2-3 will be devoted to analyses of existing datasets. By Year 4 the Team will be primed to respond quickly to the new data releases using templates established earlier.

Project 5 Tri-territorial Birth Outcomes and Child Health Surveillance

Project Leader(s): Arbour, Corriveau

Participants/Collaborators: Sobol, Chatwood, Santos, Pasquali, Ewert, Duncan

Background and rationale:

The importance of child health in the North is reflected in the high proportion of the population under 15 years of age and the substantially higher infant mortality rates, particularly in Nunavut (Table 1, p.6). Although there are some chronic conditions exclusive to children, and disproportionately high among indigenous populations such as congenital malformations [59], just as important is the impact of prenatal and early

childhood influences on adult chronic diseases. A life course approach to population health is needed to understand disease causation and implement interventions [60].

In Nunavik during 1987-1994, the infant mortality rate was 5 times that of southern Québec, with congenital anomalies accounting for 33% of deaths, sudden infant deaths 28%, and infections 28% [61]. A chart review of over 2,500 births in Nunavik and Nunavut showed that the rate of major malformations was twice that of Canada [59]. The 'northern' diet, known to be low in folate, may have contributed. A CIHR-funded project is underway in Nunavut to determine if current efforts in vitamin fortification are sufficient to prevent birth defects in the Inuit. Preliminary results suggest that genetic polymorphisms may subtly alter folate metabolism and absorption [62,63].

The full extent of the problem of birth defects in northern Aboriginal populations is unknown although the territories are now included in the Canadian Perinatal Surveillance System (CPSS) [64]. Information on congenital anomalies is derived from hospital discharge and death certificates, but not outpatient data, and is therefore limited [65].

Databases which include direct source reporting (eg. Alberta's ACASS) are known to be more informative [66]. The relatively low number of births in the territories (about 1600/year) but greater risk of birth defects justifies the development of a comprehensive reporting system. A recent community consultation in the NWT suggested that not only congenital anomalies should be recorded, but other chronic conditions of childhood that may be contributing to health disparity [67]. Thus, we propose the creation of a comprehensive research data base and surveillance system that covers the 0-7 age range to include congenital anomalies and several important childhood diseases, such as lower respiratory tract infections [68], fetal alcohol syndrome [67], rickets [69], and hearing loss [61]. It is likely that some conditions will have a higher incidence than the general population, and others will be lower, determined by the interaction of genetics, available nutrients, and the environment [70], which will likely vary across the north.

A comprehensive research database will also serve as a tool for case control studies in each region to investigate etiology. This method is ideal for small sample sizes in defined ancestral populations but within a common environment.

To complement statistical reporting, we also propose to collect primary data (Guthrie blood spot) to test specific genetic factors that may be influencing health outcomes, such as infant mortality. For example, the carnitine palmitoyltransferase 1 (CPT1) P479L mutation [71] for a fatty acid oxidation defect may have historically provided a metabolic advantage to those on a traditional low carbohydrate diet [72]. This mutation, however, may impair the ability to maintain glucose levels during periods of stress such as that associated with fever and/or infection, resulting in hypoketotic hypoglycemia. The presence of the mutation recently confirmed in Inuit and First Nations populations from NWT and coastal BC has raised interest since it is rarely seen in non-native populations. Most confirmed cases of CPT1 deficiency to date have been children, homozygous for the mutation, presenting with various combinations of hypoglycemia and fatty liver, sometimes only evident when childhood death occurs [73]. Furthermore, many family members of probands were also homozygous for the mutation without apparent health effect, suggesting the carrier rate might be high [74,75], with other factors modulating the ultimate impact of the condition. A recent newborn screen in the Kivalliq region of Nunavut by Dr. Cheryl Greenberg of the University of Manitoba has determined the carrier frequency is high with 86/120 newborns homozygous for the mutation [73]. The

potential association with non-alcohol related fatty liver disease and insulin resistant diabetes in later years deserves investigation. Because of the potential for intervention (monitoring for hypoglycemia) that might prevent death in infants at risk, this pilot screening project will be commenced as soon as possible in collaboration with Dr. Greenberg. The method of pan-territorial newborn screening will be assessed as part of the pilot project to demonstrate feasibility and efficiency for similar projects elsewhere. Other genetic polymorphisms potentially influencing birth defects, immune function, and rickets will also be considered in case-control studies.

The research tool linking anonymized health data with biological samples will provide a wealth of information for the evaluation of health disparities in northern children. This model is well-established in the California Birth Defects Registry. While our population is much smaller, ethnic clusters of specific conditions will strengthen the ability to find a particular genetic effect that may be responding to one or more environmental factors.

Objectives:

- To initiate a comprehensive, sustainable, privacy-protected, infant and child health surveillance system with linked biological samples in the three territories;
- To assess burden, investigate etiologies and explore potential interventions of conditions occurring disproportionately in children of the circumpolar region.
- To institute territorial-wide genetic newborn screening based on results of the feasibility study of *CPT1* P479L.

Hypotheses:

- A pan-territorial comprehensive surveillance research tool will efficiently reveal common demographic and etiological factors influencing child health disparities;
- *CPT1* P479L mutation is associated with increased SIDS and infant mortality rates.

Design and methods:

- The project team will consist of a coordinator, an information technology consultant, a medical geographer, a data entry clerk in each territorial capital, and a part time nurse at each birthing centre. Community consultations will occur in Nunavut and Yukon, based on the model utilized recently in the NWT by Chatwood [67]. A list of reportable conditions will be defined, comparable to those in the Alaska Birth Defect and Reportable Disease Registry to promote international circumpolar studies.
- The BC Vital Statistics Health Services Registry (HSR) database (Appendix 4) will be used and accessible from each major centre. Following planned training, the data entry clerk will collect prenatal, birth records (about 10 per week per territory), discharge summaries, and outpatient forms and record prenatal exposures, vitamin use, maternal health status, fetal deaths, birth weight, head circumference and length, birth defects and other pre-defined conditions.
- Unique, coded identifiers will prevent multiple entries and preserve privacy according to federal privacy laws, following existing models of surveillance (CPSS, ACASS, BC Vital Statistics). Information will be collected from birth until age 7. At the child's birth new mothers will be invited to participate in the collection of an additional Guthrie blood spot paper to be stored at UBC for further data-linked but de-identified studies. Self-declared ethnicity will be recorded.
- For the pilot *CPT1* screening study, acylcarnitine profile and genotypes will be carried out in the labs of Dr. Vallance at the BC Children's Hospital and Dr. Greenberg (Appendix 4). Both are Canadian leaders in biochemical newborn

screening programs. Autopsies of all child deaths will be reviewed for evidence of association with the mutation and CPT1 testing will be done. Geographic and ethnic specific rates will be determined and correlated with SIDS and infant death rates. Results will be provided to territorial chief medical officers to determine the merits of continued screening and develop prenatal health promotion strategies.

- Remaining DNA, blood spots will be preserved for further pertinent case-control association studies (i.e. folate metabolism polymorphisms for birth defects, vitamin D receptor genotypes for rickets) as determined to be relevant according to the database information. Arbour will collaborate with Hegele (Project 2) in planning future funding for case-control studies of genetic susceptibility.

Analysis:

- Trends of birth defects will be computed using standard rate/1000 live births with 95% confidence intervals for time period, geographical location and aboriginal ancestry. Rates of specific and over-all birth defects will be compared among the Territories and with other Canadian birth defects data bases.
- Nested case-control studies of specific birth defects or conditions will be carried out to test association with prenatal and other exposures (eg. smoking, alcohol, folic acid, and genetic polymorphisms). Population specific prevalence of pertinent alleles will be established. The sample size needed for genetic association studies will vary according to the genetic effect of the putative polymorphism, its population prevalence and the prevalence of the condition.

Time schedule:

Year 1 will be devoted to community consultations in Yukon and Nunavut, creation of the web-based registry and establishing policies and procedures. Data collection will begin in Year 2 and continue thereafter. The 12-month CPT1 pilot study will occur during Year 1 and 2. Analyses of surveillance data and case-control studies will begin in Year 5.

Theme III Designing, Implementing and Evaluating Interventions

Project 6 Community Based Health Promotion Demonstration Projects

Our research program recognizes the need to offer communities evidence-based, effective interventions while descriptive and analytical studies are ongoing concurrently.

Community-based interventions increasingly involve using a range of strategies targeting individual behaviour change, collective capacity and action, and supportive environments. Such strategies are aimed at individuals, groups, communities, organizations and policies.

Project Leader(s): Chan, Egeland, Jackson

Participants/Collaborators: Sobol, Arbour, Walker, Pasquali, Duncan, Randell

Objectives:

- To collect information on existing health promotion projects in the circumpolar countries and identify successes and challenges;
- To field test intervention strategies in two short-term pilot projects;
- Based on the best available evidence, to design, implement and evaluate longer term demonstration projects in all three northern territories.

Background:

A central strategy in chronic disease prevention in the North is the promotion of traditional/country foods, which are nutritionally, culturally, and economically important for Inuit people. Land and sea mammals provide a diet high in protein, low in carbohydrates, with relatively high levels of polyunsaturated fatty acids and a low omega-

6/omega-3 fatty acid ratio known to inhibit the development of cardiovascular diseases [9,17,76,77]. Other dietary characteristics include high intakes of antioxidants, vitamins, micronutrients and phytochemicals [78-80]. Currently, there is a dietary transition away from traditional foods to more convenient market foods from the South which are generally high in fat, but low in fibre, complex carbohydrates and nutrient-density [11].

Traditional food provides economic benefits to families. Food insecurity, or the unavailability or inaccessibility of nutrient-dense and high-quality foods, is in a crisis for the Inuit in Nunavut. According to the CCHS 2000/01 [81], the prevalence of food insecurity in Nunavut was the highest at an alarming rate of 56% compared to the Canadian average of 15%. Barriers to food security are strongly rooted in poverty, inexperience with market food preparation, and the absence of someone in the household capable of hunting. Food in the North is more expensive due to high distribution costs [82], and young people, women and the elderly the vulnerable for food insecurity [81].

A health intervention strategy centred on promoting traditional foods in the diet in fact affects multiple risk factors. The lifestyle associated with hunting is by necessity physically demanding. Hunting and its associated cultural practices also facilitate sharing, social networking, and a sense of community well-being [83].

Methods and time schedule:

6a. Circumpolar Health Promotion Clearinghouse

In Year 1, an inventory of existing health promotion intervention programs, activities and initiatives across circumpolar jurisdictions will be undertaken, which will document best practices and potential pitfalls. Gaps in data available will be identified in order to inform new research and data collection efforts. Projects that promote health through general improvements of well-being and those that target specific health problems or risk factors will be included. Different types of information will be collected:

- Key informants – the person in a health agency or non-governmental organization who is chiefly responsible for health promotion programs [under various titles];
- Project description – current status, type of health problem targeted, objectives, financing, frequency of interventions, target groups, sites,
- Project experience – barriers and challenges during implementation, participation rate, attrition rate; promotional media produced; scientific publications;
- Evaluation – type, method, by whom; results and impact.

A searchable database will be created, to allow searches by region, community, disease, age-sex group, etc. It will be post on the INCHR website as a freely accessible resource for use by students, community groups, and health agencies.

6b. Short-Term Pilot Projects

Two pilot projects recently funded separately by CIHR to Team Members Chan and Egeland will be ready for implementation in Year 1-3 in the communities of Kinngait and Pangnirtung on Baffin Island. Both projects aim to improve diet quality, but with different approaches and strategies. Both projects involve researchers working in collaboration with the community and front-line health professionals in the planning, implementation, and evaluation of the project.

(1) Kinngait pilot project:

This project aims to improve overall dietary quality by increasing the security of traditional foods through a program that supports hunting, maintains a community freezer, and facilitates food distribution.

We hypothesize that by creating a more stable hunting network and a well maintained communal food storage and distribution system, the supply of traditional food to the community will increase. Households will opt for the traditional food and demand will shift towards a higher quality diet. The nutritional status of the vulnerable populations including children, youth, women and elderly will be improved.

The research addresses the following broad questions:

- What support is needed to make this a community sponsored initiative?
- How can this communal hunting/freezer program become a long-term social investment sustained by the community?
- Will the use of traditional food increase if support for hunting improves?
- Will dietary quality of household be improved if traditional foods are made more readily available?
- What partners are needed to ensure that this project is relevant to the community?
- Will this intervention improve the dietary quality of vulnerable populations within the community, e.g. children young women and elderly.

A working group to oversee the planning, implementation and evaluation of the project will be formed, consisting of researchers, community members, technical/professional staff of the Nunavut health department, and representatives of the national Inuit (ITK) and regional Qikiqtani Inuit Association. The activities include:

- Recruiting community members willing to learn hunting skills to acquire traditional foods for their community; and experienced hunters to teach these skills;
- Acquiring and maintaining a community freezer to store game meat and fish; these will be made available to community members free-of-charge, with special provisions for vulnerable groups such as pregnant and nursing women, elders, and children
- Supporting cooking classes to build skills in traditional food preparation methods and blending of traditional and market foods in daily meals.

The project will be evaluated by conducting pre- and post-intervention surveys of all women under 45 years of age, elders aged 65 and above, and children 10-12 years of age, on the frequency of traditional food use, and other relevant health-related questions.

(2) Pangnirtung pilot project:

This project identifies opportunities for, and barriers to, healthy living, especially on food choices (traditional and market food) and participation in traditional harvests activities that promote physical activity.

In the planning phase, focus group discussions and a series of call-in radio programs will solicit community input regarding opportunities for improving dietary quality and physical activity. Elders in the community will also be engaged to share their knowledge, beliefs and behaviors associated with good health. The primary aim is to improve diet quality and increase the frequency and duration of physical activity associated with traditional harvests. The project will be evaluated in a dose-response fashion to assess improvement in diet quality and physical activity outcomes over time. All children and adolescents will be considered “exposed” to the community-wide intervention, while those that participate in additional activities will be assigned to the higher exposed intervention group(s). Examples of interventions include one-on-one dietetic counseling, student group trips to the grocery store to measure shelf-space designated for high fat, high sugar, and high glycemic index food, and a fun activity cooking class for children

that incorporates nutrition education and promotes quality market and traditional food. Other activities will be incorporated based on community input in the planning phase. The evaluation will involve pre- and post-intervention surveys of two groups of 40 children aged 10-18 in each gender, at two intervention exposure levels, a total of 160 individuals. There are 250 children and adolescents in the community within the target age range. Based on past experience, a 75% participation rate will yield 188 individuals.

6c. Design of Long-Term Demonstration Projects

In Year 3-5 extensive consultations will be undertaken with indigenous people's organizations and communities to decide on priorities and overall approach in the design of integrated chronic disease prevention programs, based on the lessons learned in Project 6a and 6b. Communities will be selected and long-term demonstration projects lasting 5-10 years planned. These projects will likely be implemented and evaluated in the second 5-year term (2010-2015) in partnership with northern based organizations.

Project 7 Northern Cochrane Network Site: Northern Adaptation of Best Practices

Project Leader(s): Kandola, Chatwood

Participants/Collaborators: Affleck, Sobol, Walker, Pasquali, Duncan, O'Hearn

Rationale:

Northern health agencies are not exempt from the health care gap, a shortfall between best practice and actual clinical or public health practice. "Best practices" refer to the optimal use of interventions as determined by research evidence. The gap can consist of under-use of effective interventions or use of ineffective interventions. Applications of best evidence to change clinical practice and policy can be challenging. In Northern Canada there are additional challenges given its cultural and linguistic diversity, traditional belief systems and the geographic isolation of the population. The Northern Cochrane Centre, a newly created Cochrane Network site based in Yellowknife, will explore the integration of Cochrane systematic reviews and other sources of knowledge available in the North, including indigenous knowledge. This will occur through the adaptations of best practices for chronic disease in northern settings and the process of receiving broad input on dissemination strategies. These activities will create the foundation for an environment where high quality evidence is accessible to northerners for decision-making by consumers, policy makers and health care workers.

Background:

Founded in 1993, the Cochrane Collaboration [www.cochrane.org] is a repository of up-to-date, accurate information on health care interventions. It produces and disseminates systematic reviews and promotes the search for evidence in the form of clinical trials and other studies. Reviews are published electronically in the *Cochrane Database of Systematic Reviews* and included in the Cochrane Library. Preparation and maintenance of Cochrane reviews is the responsibility of international collaborative review groups, composed primarily of health care professionals and researchers. Cochrane Centres have been established in many countries, which are not directly involved in the reviews, but exist to help establish and support the review groups.

Objectives:

- Assist and support the development and sustainability of the Northern Cochrane Network Site;

- Create Cochrane based summaries for best practices in the treatment and prevention of selected chronic diseases with adaptation for northern populations;
- Promote the use of northern adaptations of best practices by health care workers in developing strategies targeting the treatment and prevention of the selected diseases.

Design and methods:

Over the course of the Team Grant, a series of reviews will be conducted. As a first project, the adaptation of best practices for the prevention and treatment of obesity will be explored. Obesity is a significant problem in the NWT. In 2003, 22% of the NWT population was obese [84]. The NWT currently has two strategies in which obesity has been targeted: the Health Promotion Strategy [85], and the NWT Active Living Strategy [86]. The Cochrane Library currently contains a number of systematic reviews that focus on the treatment and prevention of obesity [87-91]. However, these reviews are specific to a given intervention and stand alone as best evidence. It is necessary that they are applied within the context of current health promotion strategies and cultural practices in the North. For example literature on traditional foods sources, such as traditional food fact sheets [92], would need to be highlighted and explored for inclusion in the synthesis.

7a. Review and synthesis

- Accessing the Cochrane Library and other electronic sources (such as the Campbell Collaboration [www.campbellcollaboration.org]; Guide to Community Preventive Services [www.thecommunityguide.org] and www.health-evidence.ca) to identify systematic reviews on the treatment and prevention of the selected condition;
- Searching the grey literature for information specific to northern and aboriginal populations, in conjunction with the broader review of programs in Project 6a;
- Review and synthesis of the literature on best evidence and the contextual findings for health practices in the North and the creation of a comprehensive summary.

7b. Dissemination and knowledge translation

- Host a facilitated workshop to introduce the results of the review to a broad spectrum of health professionals, policy makers and community representatives;
- Develop with workshop participants a comprehensive and coherent dissemination and knowledge translation strategy that is best suited to the North, identifying target groups and selecting specific contents;
- A pre- and post-workshop evaluation will be used to measure the knowledge gained on the treatment and prevention of the selected condition;
- At six-month post-workshop, a follow-up survey will be conducted to evaluate the utilization of knowledge gained and the extent the information has been disseminated and in what format.

Time schedule:

Year 1 will be taken up with organizational activities. The obesity project will begin in Year 2, followed by other topics to be identified through consultations with community organizations and health professional groups. More than one review may be undertaken concurrently. Each review may last about 12 months from initial planning to post-workshop evaluation.