

RESEARCH WITH ARCTIC PEOPLES: UNIQUE RESEARCH OPPORTUNITIES IN HEART, LUNG, BLOOD AND SLEEP DISORDERS

Working group summary and recommendations

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ABSTRACT

Arctic peoples are spread over eight countries and comprise 3.74 million residents, of whom 9% are indigenous. The Arctic countries include Canada, Finland, Greenland (Denmark), Iceland, Norway, Russia, Sweden and the United States. Although Arctic peoples are very diverse, there are a variety of environmental and health issues that are unique to the Arctic regions, and research exploring these issues offers significant opportunities, as well as challenges. On July 28-29, 2004, the National Heart, Lung, and Blood Institute and the Canadian Institutes of Health Research co-sponsored a working group entitled "Research with Arctic Peoples: Unique Research Opportunities in Heart, Lung, Blood and Sleep Disorders". The meeting was international in scope with investigators from Greenland, Iceland and Russia, as well as Canada and the United States. Multiple health agencies from Canada and the United States sent representatives. Also attending were representatives from the International Union for Circumpolar Health (IUCH) and the National Indian Health Board. The working group developed a set of ten recommendations related to research opportunities in heart, lung, blood and sleep disorders; obstacles and solutions to research implementation; and ways to facilitate international comparisons. These recommendations are expected to serve as an agenda for future research.

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Working group objectives

Under the co-sponsorship of the National Heart, Lung, and Blood Institute (NHLBI) and the Canadian Institutes for Health Research (CIHR), the Institute for Aboriginal Peoples' Health (IAPH), invited speakers, NHLBI staff, and observers (see Appendix I for list of participants) participated in a working group to address three objectives related to research with Arctic Peoples and to develop a list of recommendations for future research. The three working group objectives were:

- 1) Identify and prioritize scientific opportunities for research on heart, lung, blood and sleep disorders that may be uniquely addressed with Arctic peoples,
- 2) Identify obstacles to implementing health and intervention research studies and methods to address them,
- 3) Facilitate international comparisons.

Working group presentations

Dr. Barbara Alving, Acting Director, NHLBI, provided opening remarks and the charge to the working group. She stressed the importance of current efforts between the United States and Canada to build partnerships and collaborations, and suggested that their common interest in Natives of the Arctic may offer an additional opportunity. She acknowledged the success of current NHLBI-funded projects in the Arctic, and noted that more could be done. She wished the participants success in assisting the NHLBI and the CIHR in identifying and prioritizing those opportunities. Finally, she thanked the CIHR-IAPH for co-sponsoring the working group, and expressed her desire that it would lead to further collaborative efforts with the NHLBI.

Session on research priorities

The first speaker, Ms H. Sally Smith, is a Yup'ik Eskimo, co-chair of the working group, and current Chair of the National Indian Health Board. She provided a broad overview of the health of Alaska Natives and urged the participants to recognize that the interests of the NHLBI and CIHR may, or may not, overlap with those of the Native community. She noted that the total population of Alaska is 627,000 people; half live in Anchorage. Natives represent 19% of the population and are a diverse group. She contrasted their health priorities in 1950 with those of today, noting the decrease in infectious diseases, continuing high rates of injuries and accidents, and the increase in chronic diseases, including cardiovascular disease (CVD). She noted that CVD rates have remained stable in Alaska, while declining for two decades in the lower 48 states. Citing results from the Behavioral Risk Factor Survey, she explained that half of all deaths in Alaska Natives can be related to lifestyle choices. Community concerns focused more on alcohol and substance abuse, declining traditional lifestyle, and the effects of contaminants. She stressed that current needs include a system to monitor the health behaviours of tribes, a surveillance system to monitor chronic disease, including disease registries, and intervention studies to prevent and treat diseases with rising incidence.

Barriers to research in Alaska are numerous. Historically, research is seen as not offering much benefit and potentially harming the community. Distrust increased because of investigators taking and never giving back to the community. Often, research results were shared with the scientific community

before being shared with the Native community. Other barriers include limited formal education, leading to a lack of understanding of research, short supply of Native scientists, lack of educational programs to train students interested in biomedical research, and a dearth of mentors to train and inspire students. Potential solutions include the creation of mentorships, the development of advanced degree programs in Alaska educational institutions, simplification of the grant application and reporting processes, emphasis on community partnerships for research projects, and more rapid responses for funding decisions. Distance learning programs may offer a solution to the formidable barrier of geography. Programs to train clinicians have begun to make inroads. However, few are recruited to research, because clinical needs are so great. Natives have made great progress in managing their health care. Now they want to manage their health research.

Dr. Jeff Reading, Director of the CIHR – IAPH, voiced strong support for developing more collaborations and partnerships. He noted that several have been developed in the past three years including one with HHS Secretary Thompson and another with Australia and New Zealand. The CIHR-IAPH remained open to additional collaborations related to Arctic Health. Dr. Redding then offered a Native perspective on research from Canada. He presented the conclusions of a report entitled “Dialogue on Northern Research”, summarizing a meeting held in early 2004 that included Aboriginal representatives, researchers and government agency representatives. Dr. Reading noted that it had been well-received by the Native communities, that enjoyed being heard, and by the

researchers, who felt less isolated following the meeting. Recommendations included increasing capacity within the communities regarding research, giving greater weight to traditional knowledge in reviewing applications, establishing community-based research, and developing an integrated northern policy. Specific needs include developing more infrastructure and people for research, offering more educational alternatives within northern communities, establishing a community relevance review as a necessary step in the research approval process, giving equal, or greater, weight to experience and knowledge of Native people than to formal education, and consulting with the communities earlier in the process.

Dr. Peter Bjerregaard presented the results of research with the Inuit in Greenland, which represent 90% of the population of Greenland. The government of Greenland is run by the Inuit; decisions on research are made by the Greenland government and the researcher. Conditions for research are similar to Northern Alaska and Northern Canada. There are no roads between villages. All transportation is by air, or by boat; towns and villages are small. Health priorities are related to lifestyle and include suicide, alcohol, tobacco and the metabolic syndrome. Research priorities include societal development and health, social inequality, child health, interventional research, and human biology and disease.

Three surveys have been completed on Greenland Inuit, in 1993-94, in 1997-99, and in 1999-2001. Surveys focused on diet and CVD risk, westernization, blood pressure, obesity and physical activity. Mortality statistics indicate that the notion that CVD is low is a myth. Available data indicated CVD was

more frequent in Greenland than in Denmark; ischemic heart disease (IHD) is similar, but the incidence of stroke is much higher. Diabetes rates are 25% higher than in Denmark and 70% is undiagnosed. Lipid levels rise with obesity but, for any given waist size, lipids are lower in Greenland than in Denmark. He suggested that obesity may be different among the Inuit, conferring lower risk than for Caucasians. High density lipoprotein (HDL) levels are higher in Greenland than in Denmark. The metabolic syndrome prevalence is higher in men, but lower in women with greater westernization. Carotid ultrasound data indicate that atherosclerotic plaques are equally prevalent in Greenland and Denmark. The main obstacle to research with the Inuit in Greenland is a lack of infrastructure. For example, many of the Inuit speak only Greenlandic, so interviews must be done in that language. In addition, research costs are high, because of the low density of the population and high travel expenses.

Dr. Kue Young presented results from research with Inuit in Canada. Early data indicated IHD of the Inuit was 50% of the rate for whites, cholesterol levels and triglycerides were low, diabetes prevalence was low, and dietary intake of polyunsaturated fatty acids was high. As in Greenland, obesity did not seem to confer the same degree of risk as for non-Natives. The proportion of the Native population currently smoking cigarettes was very high compared to non-Natives. Genetic risk factors varied, but in both directions, e.g. ACE high-risk alleles were less frequent, but ApoE high-risk alleles were more frequent.

Dr. Larisa Tereshchenko provided results of analyses on the Native population in the Tyumen Region of Siberia, Russia. The Native population comprises 38,000 Natives,

including nomadic and non-nomadic Yamal Nenets (72%), the Khants (23%), and Selkups (5%). Their diet was high in raw fish from the sea and rivers, and includes meat and vegetables, but not much starch. Mortality is higher than non-Native Russians in the area, but about the same as the country as a whole. Diseases with high incidence, or prevalence, include tuberculosis, rheumatic fever and congenital heart disease. The prevalence of alcoholism is very high among non-nomadic Yamal Nenets, but not among the nomadic Yamal Nenets. The prevalence of hypertension is lower than the non-Native population. Coronary artery disease incidence is low, with few myocardial infarctions. The prevalence of obesity is low compared to non-Natives.

Dr. Barbara Howard, co-chair of the working group, presented results from the GOCADAN Study. The study included examinations of 1,214 Eskimo men and women aged 18+ from the Norton Sound Region of Alaska. Data indicate a high prevalence of atherosclerotic plaques. The prevalences of diabetes, insulin resistance and metabolic syndrome are low, particularly compared to American Indians. In addition, the study identified unusual gender differences with Eskimo men having much lower rates of diabetes and metabolic syndrome. Hypertension rates were low. Total cholesterol levels are about the same as in the U.S. population but with lower LDL levels and significantly higher HDL levels than the U.S. population. The prevalence of cigarette smoking is very high among Eskimos. Inflammatory markers (highly sensitive C-reactive protein and fibrinogen) are high and the infectious disease burden is high.

Dr. Elizabeth Nobmann presented data on the diet of Alaska Natives, primarily from the GOCADAN study. One major risk factor that

differs between traditional Alaska Natives and the general U.S. population is diet. Fish consumption among Alaska Natives is six times the consumption of the general U.S. adult population. This difference in fish and sea mammal consumption accounts for higher levels among Natives in monounsaturated fatty acid consumption and omega-3 fatty acid consumption. Dietary sources differ by generation, with younger generations relying more on market foods. The younger generation has a diet higher in carbohydrates, but lower in fat, polyunsaturated fatty acids (PUFA) and omega-3 fatty acid intakes. Primary sources of omega-3 fatty acids among Native foods are seal oil, salmon, other fish and seal blubber. Sources of omega-3 fatty acids differed by age; however, native foods are the primary source for omega-3 fatty acids and vitamin B-12. Little data are available on the changes in dietary intake by season. There needs to be a standardization of the nutrient database for foods across countries since items such as fish and market foods differ between countries.

Dr. Laurie Hing Man Chan presented dietary data from the Center for Indigenous Peoples' Nutrition and Environment (CINE) in Canada, with particular emphasis on contaminants. He presented results from three dietary surveys, including Dene'/Metis communities along the Mackenzie River, the Yukon First Nation communities in the Yukon, and the Inuit communities across Arctic Canada. Together, these surveys include 24-hour dietary recalls on more than 3,600 individuals. Diets are a blend of traditional foods and market foods. Traditional foods include sea mammals, land animals, birds, fish and seafood, and plants. Inuit consume a higher percentage of calories from traditional foods

and have a greater variety of traditional foods available. Inuit eat primarily caribou, sea mammals and fish. Yukon First Nations and Dene'/Metis eat primarily moose, caribou and fish. Analyses show a higher consumption of carbohydrates, sucrose and saturated fat in meals that do not include traditional foods. Traditional foods also contribute to contaminant exposure including mercury, toxaphene and chlordane. However, traditional foods also offer important socio-cultural benefits that define the Inuit. Thus, the consumption of traditional foods represents a balance of risks and benefits that must be addressed in partnership with the Native communities. The online nutrition course in Nunavut is an example of the outputs from such partnerships (<http://www.cine.mcgill.ca/nunavut/>).

Dr. Hakon Hakonarson reported on the efforts of deCode Genetics to mobilize the resources within Iceland to address genetic causes of disease. The strength for genetic research in Iceland is the phenomenal genealogical database. Records have linked genotype and phenotype data, including medical records, to produce a data base that can quickly explore scientific questions linking distant relatives. Genotyping included 1200 markers per subject for more than 100,000 subjects; the goal was to identify genes that at least double disease risks and account for a large percentage of patients. Examples of success include the NRG1 gene for schizophrenia, the BMP2 gene for osteoporosis, and the FLAP gene for myocardial infarction (MI) and stroke. The approach of deCode includes three steps: (1) use hundreds of families with thousands of patients to map the general location of genes for broadly defined phenotypes, (2) saturate regions of interest with hundreds

of additional markers to refine the search, and (3) confirm findings in another population. DeCode continues to look for collaborators with extensive genealogical and medical records to facilitate additional research and to replicate findings.

Dr. Peter Bjerregaard presented results from collaborative efforts in studies of the Inuit in Greenland and other countries. He explained that Arctic populations are very diverse. In North America, there are hundreds of recognized tribes; in Eurasia, there is even more diversity. However, the Inuit/Eskimos ranging from eastern Siberia, northwest Alaska, Northern Canada and Greenland are more similar and have become the focus of collaborative international efforts. In the 1990s, there were four surveys using somewhat similar methodology; they included more than 2,000 participants from Kivalliq, Nunavut, Canada; Nunavik, Quebec, Canada; Bering Strait Region, Alaska; and West Greenland. Data suggested that the pathology of CVD was more complex than originally assumed. HDL levels were high across studies. The relationship between obesity and lipids varied from that observed in the non-Native populations. The metabolic syndrome appeared to show gender differences in relation to westernization. The small size of the Inuit populations in any one country, the homogeneity within a country and the environmental heterogeneity between countries, support the need for a circumpolar Inuit study. Obstacles to the existing and future efforts included the lack of synchronization and of common protocols among studies across countries, and the need to standardize protocols within a given country with respect to previous work. International leadership is needed to develop a

more coordinated effort. Additional methodology development may also be needed (e.g. valid physical activity measure).

Discussion revolved around the pros and cons of starting an entirely new effort versus building on existing studies. It became clear that research results across studies, even with varying protocols, provided support for atypical risk factor patterns and disease prevalence and incidence that offered unique research opportunities. Table I provides a summary of the risk factor levels of Native populations compared to the general population of the country (or to Denmark in the case of Greenland), as compiled in studies since 1990. Table II provides similar comparisons for disease incidence and/or prevalence. Of note, there were no references to sleep research results in the discussion, suggesting that little, or no population-based research has been done in the Arctic on this subject. A carefully focused effort to establish a central database and to synchronize longitudinal surveillance for existing studies may be the most efficient first step.

Barriers and solutions to arctic research

Dr. Ruth Etzel described the organizations delivering health care to Alaska Natives. She noted that Alaska Natives have made more rapid progress in self determination than many other Native groups in the United States. They have assumed ownership and management of the Alaska Native Medical Center and other hospitals and health care centers, and are now assuming more responsibility for health research done in their communities. An advantage for health research is the centralized, computerized medical record system, initiated many years ago by the Indian Health Service, for all health care of the Alaska Native