Port Colborne

Community Health Assessment Project (CHAP)

Overview of Proposed CHAP Research in Port Colborne

Ventana Clinical Research Corporation
340 College Street, Suite 400,
Toronto, ON
M5T 3A9

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Background

INCO Ltd. operated a nickel refinery in the City of Port Colborne from 1918 to 1984. Elevated levels of nickel, copper, cobalt and arsenic, known as chemicals of concern (or "CoCs") in surrounding soils have been attributed to the refinery's past operations. A CoC is defined as a chemical currently present in the soil in Port Colborne in concentrations that exceed the Ministry of Environment (MOE) generic-effects-based guidelines, and is attributable to INCO's refinery operations. Under the MOE's regulatory authority, INCO will remediate affected Port Colborne soils to provide adequate protection to human health and the environment.

To address community concerns regarding the potential health risks associated with the presence of the CoCs in Port Colborne soils, INCO has agreed to fund an integrated set of health studies, known as the Community Health Assessment Project (CHAP). Ventana Clinical Research Corporation (Ventana) is conducting the CHAP research, with community oversight provided by the Public Liaison Committee (PLC), a committee appointed by the City of Port Colborne, and with technical oversight provided by the PLC's Technical SubCommittee (TSC).

Beginning in April 2001, Ventana held extensive consultations with the Port Colborne community to identify its health concerns. These concerns centred on the potential effects of the CoCs on their health. Specific issues were raised about cancer, respiratory problems, circulatory issues, the general health of children and adults, and possible elevated CoC body burdens.

Objectives of the CHAP Research

The CHAP studies will use the following Principal Objective to guide all CHAP research:

> *To determine if the health of the Port Colborne community varies significantly from the population of Ontario as a consequence of exposure to soil contamination from nickel, copper, cobalt and arsenic (known as chemicals of concern or "CoCs"), which have been associated with the past refinery operations of INCO Ltd.*
>
> *In conducting the CHAP studies, to make every effort possible to reduce uncertainty caused by confounding.*

Methodology for the CHAP Research

The current research includes three studies:

(A) *Self-Reported Health Assessment of the Port Colborne Community (SRHA)*

(B) *A Targeted Assessment of the Current Health Status of a Stratified Random Sample of Residents in Port Colborne*

(C) *A Comparison of Hospitalization Patterns in Port Colborne to the General Population of Ontario*

In addition, a feasibility study is underway to determine whether it is possible to assemble a relatively complete historical cohort of Port Colborne residents to enable two retrospective follow up studies to take place. The two contemplated studies include a cancer incidence study using the Ontario Cancer Registry, and a mortality study using the Ontario Mortality Database. Also, a reproductive health panel of international experts will be convened to review the available evidence on nickel health effects. This panel will report its findings and recommendations later this year.

Study A: Self-Reported Health Assessment of the Port Colborne Community

The perceived general health status of all Port Colborne residents will be evaluated by means of a mail-out survey involving a two-part questionnaire. One part will be given to adults (18 years and older), and the second to children or adolescents (0-17 years) through their parents or guardians. The adult questionnaire utilizes the SF-36 (Short Form 36 General Health Status Questionnaire) which consists of 36 questions organized within eight health domains: physical function, social function, activities of daily living, emotional issues, mental health, energy/vitality, general health perception and health change over the past year. The SF-36 instrument is used widely to measure health status and is sensitive to changes in the health of a general population. Its use permits comparisons to published results obtained from similar surveys conducted in the general population and specifically within Canada.

The health assessment of Port Colborne residents under 18 years of age will be done using a questionnaire drawn from the National Longitudinal Survey of Children and Youth (NLSCY) for ages up to 11 years and the Canadian Community Health Survey (CCHS) for ages

12 – 17. The questions for children/adolescents will assess general health status, limitations of activity due to health issues, and presence and severity of asthma.

The SRHA permits comparisons to be made of the general health of the Port Colborne community relative to other Canadian and international populations, and also permits comparisons to be made across broadly defined regions within Port Colborne. The questionnaires will be mailed out to each residence currently identified from telephone listings. Residents who have not received a questionnaire will be able to obtain copies from the Ventana Health Assessment facility located at 804 King Street, Port Colborne. Each mailed out questionnaire will be coded for one of five PC regions in which the household resides. Consequently, no specific resident within a given region can be identified.

Study A will enable limited inferences about specific self-reported health concerns to be drawn in relation to CoC exposure based on region of current PC residency. Its design does not permit any more detailed examination of the effect of current and historical CoC exposures on reported health conditions such as asthma and skin disorders. Study B will shed light on these larger issues,

Study B: A Targeted Assessment of the Current Health Status of a Stratified Random Sample of Residents in Port Colborne

The objective of this study is to characterize the current health status of Port Colborne residents, using a comprehensive health assessment questionnaire and medical testing, by sampling 1000 residents using a stratified random sample approach. In addition, the current health status of Port Colborne residents will be examined with respect to specific metal exposures, and compared between separate geographical areas of Port Colborne and to areas outside of Port Colborne.

Data will be gathered from a stratified random sample of 1,000 Port Colborne residents aged 12 years of age and older. Each participant will be asked to complete a questionnaire and undergo medical testing. Questionnaire completion and testing will be conducted over three visits to a study facility in Port Colborne.

The health questionnaire, consisting of 104 questions, explores current reported medical and psychosocial health status. It has five major sections: demographic information; residential,

occupational, lifestyle/dietary, educational, and other exposure information; a health related quality-of-life measure; current medical health status information; and mental health information. The medical tests will include blood and urine analysis to assess various organs such as the liver and thyroid, body system function tests such as lung function, blood pressure and ECG, and a skin sensitivity assessment. Blood and urine will also be analysed for concentration of CoCs in the body and for metals such as lead, mercury and cadmium that might be expected to demonstrate effects similar to those of CoCs.

While most tests to determine the presence of CoCs in urine and/or blood will be indicative of short-term exposure (arsenic, cobalt and nickel), they will not be able to assess long-term exposure or causality of disease if present. The study will be unable to differentiate whether current adverse health effects are due to current or historical exposure to CoCs, and indeed, whether exposure preceded the onset of disease. In addition, the measures of CoCs are not a reflection of the highest exposure, nor of the duration of exposure. However, the availability of residential information will allow some analysis to examine variations in risk based on period of residency in exposed areas. It is also worth noting that the tests for CoCs will only measure the presence and not the end organ effects of the CoCs.

The small number of residents in the area of greatest soil contamination in Port Colborne (Rodney Street community) means that relatively high response rates must be obtained to make meaningful comparisons within the city. Indeed, for some comparisons of rare diseases, there will be limited power to detect difference in disease rates between regions of Port Colborne.

Nevertheless, this study does measure levels of CoCs and other metals levels in blood and urine among current residents of Port Colborne that can then be compared to normative data. The prevalence of selected health conditions will be evaluated both from self-reports and through objective medical testing procedures. This will enable comparisons to be made within Port Colborne and to Ontario to assess whether CoCs are associated with an increased risk of selected diseases.

Study C: A Comparison of Hospitalization Patterns in Port Colborne to the General Population of Ontario

Using information from the Canadian hospital patient discharge database maintained by the Canadian Institute for Health Information (CIHI), the rates of hospitalization for non-malignant respiratory diseases can be compared for residents of Port Colborne relative to the Ontario population. The CIHI database codes each patient's stay in hospital by residence, thus enabling comparisons of hospital discharges rates for a non-malignant respiratory condition during the 1994-1999 time period to be made between Port Colborne residents and the Ontario population.

The size of Port Colborne does not allow for hospital discharge rates to be compared for specific types of respiratory disease. However, the use of hospitalization data will capture information on acute forms of disease that require admission to a hospital. The use of ecological data does not allow for the effects of other confounding variables to be controlled for. The CIHI data makes use of current place of residence, and therefore, long term residents of Port Colborne who have since moved would not be included in the calculation of separation rates for Port Colborne.

Feasibility Study of Cancer Incidence and Mortality Patterns in Port Colborne

It has been established that, following exposure to contaminants, there is a latency period before any health effects would provide a suitable signal to enable measurement. For most cancers, the latency period would be at least 10-15 years depending on the level and intensity of exposure. This latency period is different for all health issues. For example, the latency period for leukemia can be as short as two years.

To perform this study, it will be necessary to determine whether it is possible to assemble a cohort of individuals characterized by their length of residency in Port Colborne. To make this evaluation, property assessment information, voting records, and census data will be examined for historical residency information over a period of at least 15 years. If feasible, the residency information can be linked to the Ontario Cancer Care registry and the Ontario Mortality database by using personal demographics. This will allow exposure, defined as duration of residency in Port Colborne to be part of the analysis. In addition, occupational data from INCO Ltd. will

enable the study to partition the cohort by this employment. Using provincial databases, it will be possible to estimate the comparative incidence of various cancers in the Port Colborne community relative to the Ontario population; and its comparative mortality for various causes of death, again relative to the Ontario population. Neither protocol C nor protocol D will directly involve participation of the residents of Port Colborne.

Reproductive Health Panel Initiative

Dr. Evert Nieboer, Professor of Toxicology, McMaster University, will chair a panel of international experts to:

(i) Conduct a critical evaluation of the existing state of knowledge derived from animal experiments and human epidemiologic studies of reproductive health effects associated with exposure to the Port Colborne COCs, namely arsenic, cobalt, copper, and nickel.

(ii) Based on the evidence reviewed, determine the need for reproductive health studies in Port Colborne and, if deemed necessary, recommend the most effective study designs.

(iii) Prepare a scientific position paper summarizing the evidence reviewed and recommendations made.

(iv) Send out the position paper and recommendations for critical review by the Peer Reviewers

(v) Prepare a plain-language summary of the findings and recommendations.

(vi) Present the findings to the TSC and in an open community forum. The Niagara Municipality of Public Health is willing to act as host for the latter event.

The panel will meet in September 2002 in Murmansk, Russia, following the international nickel conference to be held there at that time, to conduct its deliberations. He has nominated the following experts for the panel:

- Valery Chashchin, M.D., Ph.D., Occupational Health Physician and Reproductive Health Research, Northwest Public Health Research Centre, St. Petersburg, Russia
- Jon Øyvind Odland, Ph.D., M.D., Gynecologist/Obstetrician and Expert in Male Reproductive Health and Reproductive Health Researcher, University of Tromsø, Norway

- James S. Kesner, Ph.D., Female Reproductive Health, Director of Reproductive Endocrinology Laboratory, National Institute for Occupational Safety & Health, Cincinnati, USA
- Helena Taskinen, M.D., Ph.D., Occupational Health Physician/Epidemiologist focused on Reproductive Health, National Institute of Occupational Health, Helsinki, Finland
- Steven Schrader, Ph.D., Chief, Reproductive Health Assessment Section, National Institute for Occupational Safety and Health, Cincinnati, USA

It is expected that the panel would send out its report for critical review by November 30, 2002, and would finalize this report for presentation to the community in early February 2003.

Conclusions

The CHAP research addresses both the concerns of the community and the scientific rationale to assess the overall health of the residents of Port Colborne. The overall results of the assessment will provide information to address the question: "Is the overall health of the residents of Port Colborne different than expected when compared to the normative values in the general population?"

The project does this by assessing the health of the residents in three main ways. First, the perceived general health of the community as a whole is determined by using validated general health questionnaires. Secondly, the evaluation of the current health status of a sample of residents of Port Colborne will enable an in-depth assessment of heath and health concerns to be addressed, inclusive of the current levels of CoCs in the body. This data will be comprised of specific answers from the community regarding health as well as medical test results. Finally the historic perspective of health will be determined by the database review of mortality, non-malignant respiratory hospitalizations and cancer. For mortality and cancer, years of residence in Port Colborne will be linked with outcomes defined under the respective database reviews.

In the analysis of all the information collected in Port Colborne, the CHAP will identify the perceived health of the entire community, the current health with a specific focus on key health concerns and the historical health of the community over time. It will enable the health profile of residents living in specific locations in Port Colborne to be compared and thus indicate

any local differences. In addition, any differences with respect to "Ontario" data, the comparator group, will also be highlighted.