

# VARIATION OF MERCURY, LEAD AND CADMIUM LEVELS IN THE INUIT POPULATION OF NUNAVIK

Julie Fontaine<sup>1</sup>, Eric Dewailly<sup>1</sup>, Pierre Ayotte<sup>1</sup>, Daria Pereg<sup>1</sup>, Serge Déry<sup>2</sup>

1. Public Health Research Unit CHUQ-CHUL; 2. Regional Board of Health and Social Services of Nunavik

## CONTEXT

The general public often thinks that Arctic regions are free of pollution. However, contaminants travel from Southern regions to the North, transported via air and ocean currents. Many heavy metals and persistent organic pollutants can be found in the Arctic environment. Different studies<sup>1,2,3</sup> have shown that mercury, lead and cadmium are the three heavy metals of public health importance for which the Inuit populations are exposed. In 1992, Santé Québec conducted the first major health survey to assess the general health status of the Inuit population of Nunavik<sup>4</sup>. The mean (geometric) concentrations for mercury at that time was 79.6 nmol/L (range= 4-650 nmol/L)<sup>1</sup>, 0.42 umol/L (range= 0.04-2.28 umol/L) for lead<sup>1</sup> and 32.9 nmol/L (range= 2.6 to 196 nmol/L) for cadmium<sup>2</sup>.

This survey has shown that it is through their traditional diet, mainly composed of fish and marine mammals, that Inuit of the Nunavik are exposed to mercury. In the past years, there has been promotion of less contaminated food (like Arctic char) in the Arctic<sup>5</sup>. Despite significant emission reductions from industry in Europe and North America, mercury levels are still high in the Arctic<sup>5</sup>. It has been clearly shown that lead levels are decreasing in Arctic regions because of the ban of leaded gasoline<sup>5</sup>. However, high levels of lead can still be found in Inuit populations in certain Arctic regions due to the past and/or present use of lead shot for harvesting wild game<sup>5</sup>. In 1999, the use of lead cartridges was banned in Canada for the hunting of migratory birds, and the public health authorities of Nunavik actively informed the population about lead<sup>6</sup>. Again, the survey showed that diet (consumption of game) is the main source of lead exposure. For cadmium, the data indicates that the concentrations were closely linked with the use of tobacco. The average concentrations of cadmium in individuals who smoked were found to be six times higher than those of non-smokers. The survey also showed that the dietary habits of the Inuit population are probably changing<sup>7</sup>.

## HYPOTHESIS

Because of a possible modification of the dietary habits of the Inuit population and in conjunction with environmental improvement, we suspect that a downward trend will be observed in biological exposure among Inuit of Nunavik, between 1992 and 2004.

## OBJECTIVES

The general objective is to examine the evolution of contaminant exposure since 1992 and their sources among the Inuit of Nunavik by measuring the contaminant levels in blood and establishing levels of traditional/country food consumption.

## METHODOLOGY

### SAMPLING AND DESIGN

In this cross-sectional study, we will use data collected during the Nunavik Health Survey. This survey was conducted in the 14 communities of Nunavik (Fig.1), in collaboration with the Québec National Institute of Public Health, the Nunavik Regional Board of Health and Social Services and the Statistics Institute of Québec. Data collection took place during fall 2004 on a Canadian Coast Guard icebreaker and scientific research vessel. A total of 1058 people were recruited into the study. Face-to-face interviews were conducted on board the Amundsen to collect information on socio-demographic characteristics, environmental factors and lifestyle habits (actual country food versus store-bought food intakes, smoking, alcohol consumption, exercise, drug use, etc.). Blood samples were taken during the clinical session to evaluate the levels of contaminants. Another face-to-face interview was conducted to administer a 24-hour dietary recall and a food frequency questionnaire.

FIG. 1 THE AMUNDSEN'S ROUTE AROUND NUNAVIK



## LABORATORY ANALYSES

Blood samples will be analysed for heavy metals for the end of 2005 by ICP-MS.

## STATISTICAL ANALYSES

After descriptive analyses, we will perform Pearson correlations between contaminants levels and related food variables in order to determine their sources. The influence of different variables (age, sex, etc.) on each contaminant will be analysed by linear regression and ANOVA. Finally, the contaminant levels and their sources will be compared with the data obtained in 1992.

All statistical analyses will be done during summer 2006 and the first results will be available in fall 2006

## EXPECTED RESULTS

This study will provide an update of information by the measurement of mercury, lead and cadmium and their links with traditional/country food consumption and protective nutritional factors (selenium and fatty acids). We will also be able to evaluate the variation of the contaminants levels by comparing those data with the data collected in 1992.

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