

Let's learn about our land Let's learn about ourselves

Nituuchischaayihtitaau Aschii 2nd Annual Scientific Gathering February 25-26, 2010

Summary of Presentations & Discussions

Prepared by Alanah Heffez Cree Board of Health and Social Services of James Bay

Montreal, April 2010













Québec



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Discussion on Zoonotic Infection

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Nituuchischaayihtitaau Aschii Annual Scientific Gathering Attendees

| Michel Plante (Thurs only) | Hydro Quebec |
|--|---|
| Alan Penn | Cree Regional Authority |
| Paul Linton | CBHSSJB |
| Jill Torrie | CBHSSJB |
| David Dannenbaum (Thurs only) | CBHSSJB |
| Elizabeth Robinson | CBHSSJB |
| Pierre Lejeune (Friday only) | CBHSSJB |
| Laura Atikessé | CBHSSJB |
| Veronique Gaudin (Thurs only) | CBHSSJB |
| Alanah Heffez | CBHSSJB |
| Reggie Tomatuk | CBHSSJB |
| Jocelyne Cloutier (Thurs only) | CBHSSJB |
| Evert Nieboer | McMaster |
| Leonard Tsuji | McMaster |
| lan Martin | McMaster |
| Grace Egeland | McGill-CINE |
| Louise Johnson-Down | McGill-CINE |
| Liana Del Gobbo | McGill-CINE |
| Robert Lazzinnaro | McGill-CINE |
| Eric Dewailly | CHUL-CHUQ |
| Benoit Levesque (Friday only) | CHUL-CHUQ |
| Suzanne Côté | CHUL-CHUQ |
| Floriana de Almeida | CHUL-CHUQ |
| Beatriz Valera | CHUL-CHUQ |
| Marie- Ludivine Château-Degat | CHUL-CHUQ |
| Martin Noel | CHUL-CHUQ |
| Françoise Proust | CHUL-CHUQ |
| Hugues Sampasa Kanyinga | CHUL-CHUQ |
| Gregory Brass (Friday only) | McGill |
| Pierre Haddad (Friday only) | Aboriginal People's Health Organization |
| Invitee of Grace Egeland (Friday only) | Université de Montréal |
| | |

Introduction

Presentation of Research Agreement

Laura Atikessé, Elizabeth Robinson and Jill Torrie, CBHSSJB

Note: The Research Agreement is a document which will be signed by the Universities and the Cree Board of Health. It includes decisions about control of the data from the project, and a process to be followed by researchers prior to submitting publications to scientific journals. The process involves getting community permission to name a community in a publication. Further Debate and resolution of these issues is covered in the PI Meeting minutes.

Eric Dewailly: If a community does not want to be named, this implies that communities are not comfortable with the results. We can use latitude-longitude to identify the location, but we are just turning around the problem. If a community does not want to be named, I want to speak with them.

Jill Torrie: Publication of the community name is the one thing that the community can control. They have been very happy so far with the papers reviewed on water quality and zoonoses. When we get into looking at obesity and other issues it is more important to bring communities on board. That's why we need a lot of discussion about where the analysis will be focused, the scientific perspective and the public health message. If community does not want to be referenced, that is a sign that we haven't done our communication job.

Ian Martin: Can the PIs bring some perspectives to this debate from their other work in other communities?

Eric Dewailly: This study is different because it was done by the communities whereas the Nunavik project was done by region.

Evert Nieboer: This is a complex issue and it's very important that we keep the academic perspective. I'm really worried that you are putting restrictions on the academic perspective. As an academic, I wouldn't want to be involved if there wasn't an academic component. The purpose isn't just to serve, but to move forward.

Eric Dewailly: I think the agreement is ok, but I agree with Evert that the research agreement needs to encourage publication. There's a lot of rotation in the scientists involved in the project.

Jill Torrie: There is so much bad literature (grey literature) on Aboriginals in Canada. It is assumed that quality publication is an objective of this study.

Jill Torrie: The process to review scientific publications of the CIHR Team on Aboriginal Antidiabetic Medicines has been the most difficult because of traditional knowledge issues and the potential for commercialization. But there are all kinds of publications coming out of that study both at the community level and in journals. People don't like to see results reflecting negatively on the community, so sometimes we have to find the right message.

Jill Torrie: Ian and Evert's work is difficult for us because we are coming at it from different perspectives and it's not clear what the public health message is. That's an area where we need discussion to figure out what the public health message is.

Eric Dewailly: When you are very close to local problems there can be local solutions (ie zoonoses and water quality). PFOS is a global problem, so there are different scales of action (territorial, provincial, national, international).

Jill Torrie: The Cree have a history of being willing to share with the rest of humanity.

A few words from the Principal Investigators

Grace Egeland: Our main interest is to work with the combined data of all communities. We have 3 domains of research:

- Methodology (advance how we do nutrition and environment research globally; ie food frequency and contaminant burdens).
- Descriptive (healthy eating index, diet quality, dietary adequacy, physical activity, description of the population)
- Etiology: Broaden the literature and bring home messages to the communities to help them combat the epidemic of obesity and type 2 diabetes. Beyond descriptive epidemiology to guide health promotion and interventions in the communities. Advancing knowledge in general and for the Cree communities.
- I hope to be involved with toxicologists with regards to risk and benefits statements.

Jill Torrie suggests link with Noreen Willows' work.

Eric Dewailly: We are studying interest in relationship between food and health (nutrition and contaminants aspect; metals and organic contaminants, mercury, certain POPs). There is a movement in aboriginal communities to look at POPs as a factor for diabetes.

(Outlines specific areas of research and presents researchers.)

Jill Torrie: There could be crossover between Françoise Proust's work on nutrients in wild meats and the Antidiabetic Plant Project because communities are interested in looking at animal medicines.

Jill Torrie: There is some new interest in cardiovascular disease within the communities because there have been some early deaths from people in their 50s.

Evert Nieboer presents Leonard Tsuji, a biologist who has done a lot of work on the west coast of James Bay and Oujé-Bougoumou (and is also a dentist). Tsuji's work is on environmental change, global warming, and how it affects health. He has also worked on lead shot and contamination related to that.

Ian Martin is an ecologist who works on impacts on ecological systems related to contaminant issues. Ian's approach is different from traditional epidemiology because he brings in factor analysis to identify sources of contaminants, etc.

Contamination Levels and Dietary Sources

Surveillance of Pregnant women in Iiyiyiu Aschii for contaminants Elizabeth Robinson, CBHSSJB

A handout was distributed but no abstract was provided.

Discussion:

Jill Torrie: Who are the 50% of women who were tested as opposed to those not tested?

Elizabeth Robinson: We have only had data by community since 2009.

Evert Nieboer: Health Canada is looking seriously at mercury again, as well as lead. They want to calculate a risk at every value from 5 g/dL, on down. The analytical techniques and detection have improved. There is no doubt that the level of concern will be reduced.

Eric Dewailly: It is interesting to see that high a level of inorganic mercury. The other main source is the amalgams.

Leonard Tsuji: Removal of mercury fillings can lead to inhalation of lead. It takes at least a month to go down.

Elizabeth Robinson: 7 women with high mercury levels were tested for inorganic mercury. 2 had high inorganic mercury (80% of total mercury was inorganic).

Paul Linton: The Awash program that is putting more focus on dental health for pregnant mothers in the first trimester.

Alan Penn: He clarifies that the study is looking for total mercury.

Ian Martin: There is evidence of a relationship between hair dyes and mercury.

Eric Dewailly: Questions whether this study should be continued. I don't think screening is justified when you only have less than 1 or 2 % with high mercury levels. For long-term surveillance, maybe every 5 years would be enough. But starting that up requires a lot of work – there are practical issues of restarting a program every 5 years vs continuing with a small sample.

Elizabeth Robinson: I agree that it is probably no longer justifiable to continue screening.

(somebody): Or, to improve the efficiency of your action, just limit the analysis to women who eat a lot of fish.

Evert Nieboer: To be able to publish it, you should ask the lab to do total and inorganic mercury on the rest of the samples, as well as a simple questionnaire about traditional foods to create links.

Intercommunity comparison of contaminant levels in residents, their potential relationships with sources, and possible associations with health.

Ian Martin^a, Evert Nieboer^b, and Leonard Tsuji^c

^aIan Martin Consultants (Elora, ON); ^bDepartment of Biochemistry and Biomedical Sciences, McMaster University (Hamilton, ON) and Institute of Community Medicine, University of Tromsø (Tromsø, Norway); ^cDepartment of Environment and Resource Studies, University of Waterloo.

The presentation consists of two parts. At the outset, Evert will present some summary statistics to illustrate the observed trends in concentrations of the traditional set of organochlorines (OCs) and toxic metals across the 5 communities of Mistissini, Wemindji, Eastmain, Waskaganish, and Chisasibi. Leonard and Ian will then demonstrate how principal component and correspondence analyses are helpful in summarizing the observed concentrations of PCBs and organochlorines pesticides (OCPs) into simpler contaminant variables (or axes). The dependencies of contaminant levels on community, gender, and age also are examined, as is their possible connection to sources of contamination and associations with human health.

Discussion on Contamination Levels and Dietary Sources (Presentation by Evert Nieboer)

Lead

Leonard Tsuji: lead shot is available for hunting small animals (illegal for migratory birds). It is preferred because it is malleable, spreads more and therefore is more likely to hit something. It is also less expensive than steel.

Alan Penn: The CTA is doing what it can to eliminate lead shot. It would be good to give these results back to the CTA.

Paul Linton: In Mistissini at the grocery store they have been putting the price of lead higher than steel. In Val D'Or and Amos the hunting supply stores are also selling lead at a higher price than steel. However, the ballistics are different so you have to adjust your aiming. We did a test on this with some hunters in Mistissini.

Cadmium

Jill Torrie: Cree are at a very high risk for kidney disease.

Paul Linton: Were the levels of lead and cadmium cross-referenced? Do smokers tend to have a higher level of lead?

Evert Nieboer: There is a weak contribution of smoking to lead in the blood. Tobacco plants accumulate cadmium and, to a lesser extent, lead.

Paul Linton: When they hunt they smoke at lot.

Evert Nieboer: Smoking likely also contributes indirectly to lead accumulation via inhalation because it destroys the cilia, which in turn inhibits respiratory clearance of particles.

PCPs, PDBEs

Grace Egeland: What is the time frame for the level of concern (exposure over 20 years?)

EvertNieboer: We are looking at instantaneous levels in blood. It has a half-life of 10 years, so it is quite hard to get rid of it.

Alan Penn: Are the results for Brominated PCPs (PBDEs) cumulative life-life exposure?

Leonard Tsuji: Exposure is mostly due to dust from items with flame-retardants. In another study done in British Columbia, remote communities have lower PBDEs.

Evert Nieboer: PBDEs have existed for about 10 years.

Eric Dewailly: For the PBDEs, it's interesting to see that younger people are more exposed. Is the large confidence interval due to low sample size, or to individual behavior?

Ian Martin: The same sample size would apply to estimations of other contaminants which have much more narrow confidence intervals.

Eric Dewailly: So that means that there are a lot of behavioral factors related to access to electronics (sources of PBDEs). Could we modify the questionnaire to identify major sources? These results suggest that it is not something that is shared by everyone.

Grace Egeland: Since PBDEs have only been around for about 10 years, it could be families who have purchased a carpet in the last 10 years.

Eric Dewailly: Is there a difference in PBDEs between young girls and boys? I think there is a huge difference. Hair dryers could be a source.

Ian Martin: We could calculate the difference between boys and girls, but not today.

Liana Del Gobbo: Variability of PBDEs is big in the general population. It has been proposed in the literature that it may be due to inter-individual variability and the existence of "super-accumulators," people who accumulate contaminants at different rates.

Eric Dewailly: If we don't find an ecological reason, it would be relevant to consider that it is a genetic, inter-individual variability.

Liana Del Gobbo: Also, I wonder whether consumption of milk and dairy could contribute?

Evert Nieboer: We don't see any links to diet in the case of PBDEs. PCPs are linked to diet (come from traditional foods).

Discussion about Component Analysis (Presentation by Ian Martin)

Eric Dewailly: We used to think that selenium would be high in people who eat a lot of fish. But now we associate it with "teenager food" like cereal. Grains are a major source of selenium in Canada because we have rich soil.

Alan Penn: Mistissini is also in a different geological pocket than Chisasibi (sedimentary).

Grace Egeland: Since the mercury levels are low in individuals with high selenium, we can assume that they are not eating fish.

Leonard Tsuji: We looked at women in the reproductive age group because in aboriginal populations, we see that women have higher rates of diabetes than men, (twice as many women as men with diabetes in this age group), which is not the case in the general population. Could this be related to pregnancy, where women develop some insulin resistance in order to provide more glucose to developing baby?

Grace Egeland clarifies that this data is not adjusted for lipids.

Ian Martin: These results are adjusted for age and BMI. This is fairly preliminary – other factors could be added.

Grace Egeland clarifies that these results do not include individuals with gestational diabetes (just type 2 diabetes).

Jill Torrie: We saw a significant increase in diabetes in the 30-39 age group between 2004 and 2009.

Eric Dewailly: There is a group of "Big eaters," people who eat more traditional food and more storebought food and therefore are at more risk from multiple sources. If you don't adjust on lipids, you can't derive any conclusion from that.

Evert Nieboer: Confidentially, we have a PhD student who has looked at pregnant women and measured organochlorines and other contaminants in 2nd trimester, at birth and post-partum. PCBs and pesticides reached maximum level at birth. The concentration increases with lipids. Once we adjusted for lipids, all this difference disappeared. However, the actual organochlorines in plasma is what the baby is exposed to, not the lipid-adjusted level. According to the literature, the relationship with BMI can be positive, negative or no relationship. One paper showed that pregnant women at the highest risk of pre-eclampsia and gestational diabetes had the highest lipids. There is very little evidence of causation in the literature for OCs and diabetes— only one study and the data are not strong. I think we are seeing organochlorines as a signature of lipidemia.

Eric Dewailly: This is largely debated. I am personally convinced that you should adjust for lipids.

Evert Nieboer: Triglycerides and total lipids had the strongest relationships with the OCs – the boost of triglycerides likely comes from the liver during pregnancy. We can't ignore the liver as a source of OCs.

Direct competition between lipids and uptake of OCs has been demonstrated in *in vitro* studies. We don't want to jump into causation right away.

Chronic Diseases and Risk Factors

Cardio vascular diseases and mercury exposure. What is the evidence?

Dewailly, E., Valera, B., Noel, M., Dery, S. and P. Poirier

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Some preliminary data suggests that the cardiovascular system should be considered a potential target for contaminants. For example, work conducted in the Faeroe Islands in children and in Greenland suggests association between mercury exposure and blood pressure and heart variability which are known risk factors for cardiac health. Other studies conducted elsewhere suggest association between mercury and heart diseases. These health conditions are rising in the North and our hypothesis is that this rise is not only due to a changing life style but also to contaminant exposure. Over the last years, we have conducted projects aiming at investigating associations between exposure to Hg on the emergence of heart diseases and related risk factors using large epidemiologic studies conducted among adults and children in different part of the world. In most cohorts, Hg was associated with decrease heart rate variability and increase blood pressure. However, these associations emerged only after adjustment for confounding nutritional factors (omega-3 fatty acids and selenium). Since heart diseases represent the most important causes of death, even a slight negative impact on the cardiovascular system could be of greater public health relevance than any other health effects related to contaminant exposure.

Epidemiology of selected risk factors of cardiovascular diseases and Type 2 diabetes among participants of Nituuschischaayihtitaau Aschi study: insight from Chisasibi and Waskaganish communities

Chateau-Degat ML, Dewailly E, Egeland GE, Dannebaum D, Robinson, E. Nieboer E.

Background: The Cree First Nations population of Quebec has undergone social transition toward a westernized lifestyle, with concomitant emergence of metabolic disturbances. Here, we list prevalence of major risk factors for chronic diseases such as cardiovascular diseases and Type 2 diabetes, in order to portray the extent of the risk for these diseases in the Cree communities.

Research Design and Methods: A larger cross-sectional Health Survey is ongoing among Cree communities of Quebec. Here, we present preliminary results from studies carried out in the Cree communities of Chisasibi and Waskaganish. This portrait is based on biological and anthropometric measures gathered during the survey, and from medical histories of participants collected in their medical files

Results: Overall, 442 individuals adults and children (176 from Waskaganish and 266 from Chisasibi) accepted to participate in the clinical and para-clinical exam. The participation rate in both communities was quite low and reached 38.3% and 39.0% in Waskaganish and Chisasibi respectively. Among adults (18 years and over) hypertension (defined as >140/90 mmHg or previous diagnose with or without medication) had a prevalence of 22.2 % and 29.8 % in Waskaganish and Chisasibi respectively. Obesity status was evaluated by body mass index (BMI >30 Kg/m²) and waist circumference (WC \geq 94 cm in men, and ≥ 88 cm in women). As previously observed in other villages visited, these anthropometric parameters were elevated in both communities (Waskaganish BMI> 30 Kg/m²: 53.5%; WC \ge 94 and 88 cm:82.8% and Chisasibi BMI \geq 30 Kg/m² :74.1%, WC \geq 94 and 88 cm:95.1%) and particularly among women. In both communities, smoking habits were around 40% (Waskaganish 35.3% and Chisasibi 43%). Furthermore, among adults from these communities, we observed that people with elevated WC experienced also other risk factors. For instance in Waskaganish, 95.5% of people with HTN have elevated WC, 97.1% of people with dyslipidaemia, all people with diabetes; 74.3 % of tobacco consumers have elevated WC. Similar trend was observed among participants from Chisasibi. Among young participants (under 18 years), elevated blood pressure was rare (total of 3 case in both Waskaganish and Chisasibi combined). However, prevalence of overweight (BMI >95pctile for age and gender) in 8 to 17 year old participants was high: 47.5% (19 out of 40) and 45.5% (25 out of 55) of children in Waskaganish and Chisasibi.

Conclusion: Preliminary analysis from the Waskaganish and Chisasibi visits revealed that the main concerns in these samples of the population are similar to those observed in the Mistissini, Wemindji and Eastmain communities in previous years. Obesity appears as a major health problem and reaches alarming rates in all age groups.

Mercury exposure and cardiovascular risk factors among Cree adults.

Valera. B, ¹Dewailly. E, ^{1,2}Poirier. P ^{3,4}

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Background: Epidemiological evidence suggests a negative impact of mercury exposure on cardiovascular risk factors such as blood pressure (BP) and decreased heart rate variability (HRV). High BP is a predictor of myocardial infarction and stroke while low HRV has been associated with risk of ventricular fibrillation and sudden cardiac death (SCD).

Objective: To assess the impact of mercury levels on BP and HRV among Cree adults considering potential confounding factors such as age, sex, obesity, cholesterol, triglycerides, diabetes, smoking, n-3 fatty acids, selenium, polychlorinated biphenyls and lead levels.

Methods: As part of the «Multi-Community Environment-and-Health Longitudinal Study in Iiyiyiu Aschii: Mistissini» Health Survey, a random sampling has been carried out in five Cree communities of the James Bay (Mistissini, Eastmain, Wemindji, Chisasibi and Waskaganish). A total of 760 adults ≥ 15 years old were recruited to participate in the study. Mercury was measured in whole blood which constitutes a biomarker of recent exposure. Blood pressure (BP) was measured according to the WHO clinical guidelines. HRV indices were derived from a 2-hour Holter monitoring system. HRV parameters included the standard deviation of R-R intervals (SDNN) and the standard deviation of R-R intervals measured over 5-minute periods (SDANN) which represent overall HRV as well as the square root of the mean squared differences of successive R-R intervals (rMSSD) and the proportion of interval differences of successive R-R intervals $\geq 50 \text{ ms}$ (pNN50) which are index of the parasympathetic activity. LF/HF is an index of sympathovagal balance. BP was compared across tertiles of blood mercury (T₁: 0.25-5.98, T₂: 5.99-21, T₃: 21.1-294.1 nmol/L) using ANOVA and ANCOVA analysis while the association with HRV was assessed using simple and multiple linear regressions.

Results: Systolic BP increased across tertiles of blood mercury (T₁: 115, T₂: 117 and T₃: 121 mmHg, $p_{trend} < 0.0001$) while no significant differences were observed after adjusting for confounders (T₁: 119, T₂: 118 and T₃: 119 mmHg, $p_{trend} = 0.99$). Similarly, diastolic BP increased across tertiles of blood mercury (T₁: 70, T₂: 72 and T₃: 74 mmHg, $p_{trend} = 0.0006$) but a non significant effect was observed after adjusting for confounders (T₁: 73, T₂: 73 and T₃: 72 mmHg, $p_{trend} = 0.67$). Regarding HRV, mercury in blood was significantly associated with LF/HF (β = 0.08, p< 0.0001), SDNN (r= -4.3, p< 0.0001), SDANN (r= -3.0, p< 0.0001), rMSSD (r= -0.06, p< 0.0001) and pNN50 (r= -0.15, p< 0.0001). However, in multivariable analyses only the association with LF/HF ratio (β = 0.04, p= 0.04) and SDANN (β = -2.04, p= 0.03) remained statistically significant.

Conclusion: The results of the present study suggest a negative impact of mercury on HRV among adults Cree of the James Bay.

Discussion on Contaminants and Chronic Diseases

Alan Penn: Do these results reflect long-term chronic exposure to mercury? Is that a confounding variable.

Beatriz Valera: Blood mercury measures short-term exposure.

Eric Dewailly: You raise 2 issues: how does current mercury exposure reflect past mercury exposure? And what is the difference between the effect of the mercury short-term and over the long term?

Alan Penn: There is debate that the contemporary mercury levels are not a good indication of the historical exposure. You could study blood samples from the 1990s to compare.

Eric Dewailly: Are the 1990s blood samples available? Is there a confidentiality issue?

Liana Del Gobbo: In a lot of the multi-variate models you adjusted for a lot of components, but not for electrolytes. Do you think electrolytes could be affecting heart-rate variability or BP? Is this a confounder?

Grace Egeland: We didn't get electrolyte measures.

Evert Nieboer: You have adjusted for many cofactors and risk factors. Is there a limit? Are some of them interacting with each other?

Beatriz Valera: We did not adjust for all variables at the same time.

Alan Penn: The Cree exposure levels to mercury were higher in the 1970s than what we're seeing today. Yet cardiovascular disease is seen as a relatively new phenomenon in the Cree population. Could we look at documented cases from the 1970s and 80s to see how that bears on the analysis you are looking at now?

Eric Dewailly: The observations at the ecological level will probably not point towards a link between mercury and CVD. However, the experimental work from Japan and other studies are quite convincing. My feeling is that mercury does contribute to the risk of CVD but the contributable risk is very small.

David Dannenbaum: If you're saying that increased mercury in blood has higher cardiovascular risk, then is it overriding the higher omega-3 intake?

Eric Dewailly: No. Overall, there is more benefit from eating fish. In these studies, if you don't account for the protective nutrients in your model, you don't see the effects. If you use fish consumption as a proxy for mercury levels, then you don't see the effect. What we want to demonstrate is the effect of mercury, not the effect of fish.

David Dannenbaum: What if you are eating only high risk predatory fish?

Eric Dewailly: In my opinion, your balance of risk is high compared to the benefit you get. But it is also healthy compared to other things you could eat. The smaller the fish, and the lower in the food chain, the better it will be for the risk balance.

David Dannenbaum: But if you eat what you catch and you are catching high mercury fish, is the risk outweighing the benefit?

Eric Dewailly: If you use a net, then you get a sample of the food chain. The fishing community usually catches different species.

Grace Egeland: The health effects ultimately depend on what you replace the fish with in the diet. It may be healthier if you replace predatory fish with tofu, but if you replace it with KFC that's another story.

Marie-Ludivine Château Degat raises issue of chronic inflammation since the people are big

Alan Penn: My impression is that the Cree economy has shifted towards big game, that there has been a shift from aquatic to terrestrial system food sources.

Eric Dewailly: The work of Françoise Proust on nutritional value of small mammals is a first step towards addressing this.

Evert Nieboer: Some communities have a very low average mercury level now. This could be linked to reliance on low-mercury fish like Cisco and whitefish. We need to get at that information (which fish tend to be consumed in each community) in order to address these questions. We might even have to go collect this information.

Nituuchischaayihtitaau Aschii: An atherosclerotic perspective

Noël M, Chateau-Degat ML, Counil E, Dewailly E

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Background: Cardiovascular disease has been well recognized to be the leading cause of mortality and morbidity among Canadian. On the other hand, less is know among aboriginals. Used as none invasive clinical assessment, carotid intima-media thickness (CIMT) has been reported to be a surrogate marker of subclinical atherosclerosis. Since the aboriginal people are undergoing drastic changes of lifestyle and dietary habit that were reported to lead to higher prevalence of risk factor for cardiovascular disease, we ought to investigate the subclinical atherosclerotic status of the Cree population evaluated by CIMT.

Methods: Individuals older than 40 years from Mistissini, Eastman, Wemindji, Waskaganish and Chisasibi community were randomly invited to participate in a cross-sectional health survey. The mean CIMT (near and far walls) of the bilateral common, bifurcation and internal carotids, free of plaque, were measured using high-resolution ultrasonography. During clinical assessment, a nurse drew blood from which fasting plasmatic concentration of glucose (FPG), lipid profile (Cholesterol, Low density lipoprotein, high density lipoprotein and triglycerides) and inflammatory markers (tumor necrosis factor alpha: TNF- α , interleukin-6: IL-6, oxidized LDL: oxLDL, high sencitivity C reactin protein: CRP) were analyzed. Anthropometric measurements (body mass index and waist circumference) were obtained as well as clinical hemodynamic evaluation (systemic blood pressure and heart rate). Data are presented as arithmetic mean \pm standard error. Group's comparisons of CIMT were calculated using analysis of covariance (ANCOVA) were CIMT was log-transformed in order to meet condition of application of analysis. All analyses were adjusted for age and gender. Significance level was set at 0.05.

Results: The CIMT in Cree was somehow lower to what has been reported among Caucasian but comparable to what we have observed among Inuit. (Cree: 0.79 ± 0.01 mm, Caucasian: 0.90 ± 0.38 mm, Inuit: 0.80 ± 0.17 mm) As previously reported, age and gender strongly correlated with CIMT (p<0.0001 and p<0.0001 respectively). Neither smoking (p=0.32), nor hypertensive (p=0.49), nor dyslipidemic status (p=0.68) imparted CIMT. As well, circulating inflammatory markers TNF- α (p=0.73), IL-6 (p=0.62), oxLDL (p=0.11) and CRP (p=0.81) were not associated with increased CIMT. Body mass index and waist circumference did not correlated with CIMT (p=0.42 and p=0.19, respectively). However, individual stratified as pre-diabetic or diabetic from circulating FPG showed great CIMT than healthy. (Healthy: 0.76 ± 0.02 mm, pre-diabetic: 0.78 ± 0.2 mm, Diabetic: 0.86 ± 0.17 mm; p<0.02).

Conclusion: Our observations suggest that the subclinical atherosclerotic status of the Cree is lower to what is being reported in Caucasians. Also, traditional risk factors of cardiovascular disease derived from Caucasian studies are not associated to subclinical atherosclerosis determined by CIMT among Cree. However, the strong association of fasting plasma glucose with CIMT is of great concern especially in a population were incidence of diabetes is omnipresent and increasing. Further longitudinal analysis aimed to identify the progression of CIMT is required to better understand our cross-sectional observations.

Discussion on Atherosclerosis (Martin Noel's presentation)

David Dannenbaum: Did you divide the Cree with CVD from those without CVD? This can be done based on chart data. That way you can compare diseased Cree with diseased Caucasian population and healthy Cree with healthy Caucasian population.

Louise Johnson-Down: Did you have enough people in the "normal weight" group to calculate the relationship between BMI and IMT?

Martin Noel: The numbers in the "normal" weight group were low but the population was about equally distributed between overweight and obese. No correlation with IMT was seen.

Jill Torrie: Did you look at frequency of smoking?

Martin Noel: No, but cadmium levels were used as a proxy.

Elizabeth Robinson: Who is included in the population with diabetes?

Martin Noel: These are clinical results, so people who are charted as diabetic but did not have high fasting glucose in clinical study are not included. The "normal" category may therefore include some diabetics.

Elizabeth Robinson: The "diabetic" category should actually be labeled "people who have fasting glucose over 7 mmol/L

David Dannenbaum: HS-CRP or CRP?

Martin Noel: CRP

David Dannenbaum: Higher rates of CRP in women would be related to diabetes, waist circumference, etc. Can HS-CRP be used as a cardiovascular marker for people who have inflammation around obesity?

Martin Noel: In terms of pathophysiology, I think CRP will negatively affect the cardiovascular integrity regardless of the origin. High inflammation will have an impact on the stability of plaque and the high inflammation individual will have more risk of rupturing.

Eric Dewailly: In Polynesia we found teenagers whose arteries were in worse condition than 30-35 year olds. In this case, you see mature adults who are worse than the grandparents. The older people have arteries in better health than their sons. It's not something that happened 200 years ago, it's happening now. This means that you will start to see the mortality very soon.

David Dannenbaum: This conclusion shouldn't get lost in the big report.

Jill Torrie: The really old group is not as obese as their children.

Martin Noel: Also, the link between diabetes and IMT is important. But there was no link with mercury.

Findings on Osteoporosis and Thyroid Hormones

Presented by Eric Dewailly

No abstract provided

Discussion on Osteoporosis

Elizabeth Robinson: I would have expected osteoporosis risk to be much lower because women are heavier and because of the age-group we are looking at (35 years+ as opposed to 50 years+ or older).

Eric Dewailly: The risk score is adjusted for age.

Elizabeth Robinson: We found that hip-fracture was very low because they are active. A certain generation was very active.

Dietary assessment and physical activity

Comparison of anthropometric indices and dietary behaviors for adults in 5 Iiyiyiu Aschii (Cree) Communities.

Louise Johnson-Down M.Sc. R.D., Grace Egeland Ph.D.

Center for Indigenous Peoples Nutrition and Environment, McGill University

Our aim is to study food consumption patterns, and nutrient and health status of the Eastern James Bay Iiyiyiuch. We are attempting to contrast traditional and food intakes to show the benefits of traditional food intake in the Iiyiyiu Aschii.

Health risks from BMI for adults are based on guidelines using cut-off values for individuals over 20 years of age and for all those 20 years of age and under will be compared for the 5 communities studied to date. Similarly, waist circumference measures will be contrasted for risks of health related complications due to central fat patterning based upon WHO cut-off values of 88 cm for women and 102 cm for men (WHO 2000). Percent body fat will also be looked at using age and gender specific cut-off values from a three country study (Gallagher et al. 1999) shows that over 90% of the population is at risk.

Traditional food intake increases with age in all communities studied to date. Participants in Mistissini reported a higher frequency of traditional food intake than those from other communities but adult's over forty years of age still reported eating traditional food more often than children and adults under 40. Omega 3 fatty acids correlate significantly with increased traditional food intake and trans fatty acids are negatively correlated with traditional food intake.

Comparing energy intake to basal metabolic rate to validate the results from the 24-hour recalls will be conducted. Macronutrient intake does not differ significantly between the 5 communities studied so far. Micronutrient intake continues to show deficiencies of vitamin C and magnesium with low intakes of fiber, calcium and vitamin D. Servings from Canada's Food Guide to Healthy Eating are inadequate for vegetables and fruit and milk and milk products for all age categories corroborating the evidence from the micronutrient analyses. Consumption of high sugar and high fat foods were also very similar in the 5 communities studied to date.

Analyses of food intake highlight that interventions in targeting the intake of soft drinks and other sugared drinks as well as snack foods, fast foods and baked goods would reduce calorie intake without reducing intake of important nutrients. Simple changes like replacing a can of pop with water over a life-time could result in remarkable improvements in achieving a healthy body weight and in promoting overall health and well-being.

Louise Johnson-Down clarifies that there was no statistical analysis in the comparisons presented.

Louise Johnson-Down describes a technique that looks at centiles of children's BMI and extrapolates to adult levels. She suggests that BMI cutoff for Obese should possibly be higher than 30.

Discussion on Dietary Assessment

Eric Dewailly: When dividing the population by age, it would be interesting to separate "young single" people from married people, and then separate 60+. It would be nice to see the elders separately, given what we saw with the carotid yesterday.

Evert Nieboer: Is there a link between consumption of caribou and the availability of caribou in the different regions?

Alan Penn: Eastmain and Waskaganish are at the southern limit of the caribou range. In those regions there would be woodland caribou which should not be overhunted.

Alan Penn: There are important ecological constraints with regards to supplying bush food to a population of this size. Access to land is increasingly scarce. Families who do have land will take kids out and spend time in the bush with the parents and this is an important social differentiation in the community. Other families are "trapped in the community" and do not have access to land.

Louise Johnson-Down: It would be interesting to compare traditional food intake with survey question about "time on the land."

Evert Nieboer: You have to have means to hunt. It has become a status symbol.

Elizabeth Robinson: Traditionally Cree did not consume milk or grains. Were they perpetually calcium deficient?

Louise Johnson-Down: Traditionally calcium could have come from bones (ground bones, broth, and powdered dried fish). They used to make tea from ground goose bones. Now they drink black tea which leaches calcium.

Alan Penn: The role of lard and flour goes back to the 19th century and becomes significant from the 1920s on. Influence of southern foods goes back through all generations that we are looking at.

Louise Johnson-Down: The new aboriginal Canada food guide takes the regular Canada food guide and puts pictures of traditional food. But there is little documentation about traditional sources of these nutrients. That is why we use the food guide for these analyses.

Alan Penn: The anthropological literature from the 1940s shows that there was starvation, underweight, and calorie deficiency. These are common in community memory going back to the 30s and 40s. The moose and caribou are relatively abundant now but they weren't in the past. There is an abundance now that people have not seen in the past. The small game is episodically available, every few years and

not a constant source of food. There's an ecological dimension to what people actually have access to, in addition to who really has choices.

Grace Egeland: Traditional meats such as liver and kidney, stomach contents of rabbit etc, were very nutrient dense food. The Canadian food guide gives meats a certain nutritional value. However, store-bought meat is not as nutrient rich as traditional meats. Traditionally, the Cree would have gotten a lot of nutrients from the meat that they could now get from fruits and vegetables. The Health Canada guide does not really allow us to capture that. But we could look at the organ meats, and some of the preparation such as bone broth, powdered bone, etc. It could be that there are a lot of good ways to get nutrients by following what elders did in the past. There is a lot of work to be done to capture this and transfer this knowledge to the younger generation.

Eric Dewailly: We could compare nutrient levels calculated according to reported food intake to nutrient levels in the blood.

Evert Nieboer: There is important work to be done in terms of coming up with a food guide that is property adapted to the Cree.

Jill Torrie: There is a debate in Mistissini about people who have adopted a more Western approach and are only eating "parts that were given to the dogs before" (ie thigh meat). In Mistissini, hundreds of people go out to the traditional camp and traditional food is available for everyone to eat during the week when the program is operating.

Robert Lazzinnaro: It is important to question whether it is still ecologically sustainable to recommend that level of traditional food consumption.

Alan Penn: This is a very important point – a lot of these resources will not continue to be available. There is also a sex issue because there is a pecking order where some portions of meat are reserved for different sexes and age groups.

Elizabeth Robinson: What data is missing? The nutrient composition of traditional dishes?

Louise Johnson-Down: We are missing literature that talks about what was traditionally eaten.

Grace Egeland: Story-telling with hunters and trappers and elders could be a means of documenting what we've missed.

Identifying the extent to which diet quality and other behaviors relate to obesity and insulin resistance in Iiyiyiu Aschii (Cree) adults.

Robert Lazzinnaro Supervisor: Dr. Grace Egeland Committee members: Dr. Eric Dewailly and Dr. Hugues Plourde

Summary: Indigenous people in Canada have endured a significant nutrition transition over the past half century, a transition which has seen a large percentage of their energy intake previously supplied by traditional foods replaced with highly processed market food. The nutrition transition and other lifestyle changes taking place in Indigenous communities has radically changed their health status, as Indigenous peoples currently have the highest rates of obesity and diabetes in Canada.

Background: The main objectives for this presentation are to describe the prevalence of individual behavioral risk factors associated with obesity and insulin resistance in the James Bay Cree.

Methods: Cross-sectional samples were obtained from the Nituuchischaayihtitaau Aschii, a multi community environment and health longitudinal study in the Iiyiyiu Aschii (Cree). Participation from the Iiyiyiu Aschii (Cree) communities of Mistissini, Wemindji, Eastmain, Waskaganish and Chisasibi was carried out from 2005 to 2008, with the ethical approval of Laval, McMaster and McGill. The population sampled includes adults 18 years of age and older, and does not include medically diagnosed diabetics. Assessment of dietary intake in the communities was carried out through a 24 hour diet recall and a Food Frequency Questionnaire (FFQ). The FFQ gathered dietary intake of traditional and market food, which will help assess habitual dietary behaviors that may be hard to capture with only one 24 hour recall. Physical activity was gathered in the Cree communities via International Physical Activity Questionnaire (IPAQ) and pedometer readings. Insulin Resistance was measured by the Homeostasis Model Assessment of Insulin Resistance (HOMA-IR). Indicators of diet quality examined thus far include the Canadian version of the healthy eating index (HEI), % of energy from saturated fat, % of energy from high sugar drinks, and traditional food consumption. Diet quality, physical activity levels and behavioral habits (smoking, alcohol use, etc.) were evaluated for their associations with obesity and insulin resistance. Statistical analysis of all the data was performed using STATA version 10.0.

Results: Behavioral variables were associated with adiposity. Regular walking (6 or more days per week) was inversely related to BMI category with 62%, 47.7%, and 45.6% walking among those with a BMI <29.9, 30 - 35, and > 35, respectively (P<0.001). As well, the percentage of energy intake from high sugar drinks increased with greater adiposity (P<0.05). Healthy eating index was low for all participants at a score of 53.53+/-8.35 whereas >80 indicates a healthy diet. However, the HEI was not significantly related to adiposity. Walking was related to a lower HOMA-IR, however the protective effect disappeared in analyses adjusting for adiposity which was strongly related to HOMAR-IR. The increase of insulin resistance across the BMI categories of <30 (n=175), 30-35 (n=153) and \geq 35 (n=158) shows a statistically significant trend (P<0.01), ranging from a geometric mean HOMA-IR score of 2.9+/-3.01, 7.71+/-2.80, 14.80+/-3.02, respectively. Indicators of diet quality were not significantly associated with insulin resistance in models adjusting for adiposity. Analyses are ongoing and results to date will be presented.

Discussion on the Relationship between Diet, Behaviour, Obesity, and Insulin Resistance

David Dannenbaum: According to your results, 50% of your population has BMIs over 40 and have normal HOMA-IR. Could you look at those in terms of walking or sugary drinks?

Robert Lazzinnaro: It may be possible to speak of "healthy obese." It is also possible that the calculation of HOMA-IR is imperfect.

Grace Egeland: You also have to take the age into account. It is way too premature to form an idea of "healthy obese". The individuals in question could be young and haven't had the time to develop the problems.

Liana Del Gobbo: In the case of the people who are obese but have normal HOMA-IR, do they have impaired fasting glucose? Maybe there is pancreatic exhaustion going on and they are entering a diabetic state so insulin is low.

Robert Lazzinnaro: Yes, this is what I mean by HOMA-IR calculation being imperfect.

Ian Martin: Since you have a lot of variables that are percentages, how do you deal with nondependence of variables for statistical analysis? These are variables that have no known distribution.

Grace Egeland: There are more multi-variable approaches you can use, as well as energy-intake adjustment.

Alan Penn: I suspect that obesity and diabetes are also determinants of socio-economic status. They would impact the jobs available to people and their geographical mobility.

A portrait of the dietary polyunsaturated and *trans*- fatty acids among Cree community members from the James Bay Territories, and related health considerations

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Background: The Cree population of Québec has seen its diet changing since the past decades, with a shift from highly nutritious country food to store-bought food with a poor nutritive value. Among dietary fatty acids, omega-3 polyunsaturated fatty acids (n-3 PUFA) are indicative of country food intake and have been demonstrated to have cardioprotective effects. In contrary, *Trans*-fatty acids (TFA) are indicative of industrial food and have been shown to have deleterious effects on cardiovascular health. Fatty acid profiles measured in the erythrocyte membrane phospholipids are validated biochemical indicators of dietary intake, providing us with an estimate of consumption over a longer (~ 120 days, *i.e.* the lifetime of an erythrocyte) period of time than plasma phospholipids (the past few days). Thus, because the Cree diet is changing rapidly, it is important to evaluate to what extent these changes are affecting the health of the people from these communities, based on the analysis of their fatty acid profiles and health outcomes.

Objective: To describe fatty acid profiles in both the communities of Waskaganish and Chisasibi, and compare them with the analyses done in the other Cree communities previously visited during the health survey.

Methodology: Data were collected during the *Multi-community Environment and Health Longitudinal Study in Iiyiyiu Aschii* health survey conducted in 2008 in the two Cree communities of the James Bay Territories: Waskaganish and Chisasibi, among 442 randomly selected participants. Our study included a total of 363 people \geq 8y (Waskaganish : n=141, and Chisasibi : n=222), for which questionnaires, clinical examinations and physiological measurements have been completed in order to gather information on sociodemographic characteristics and lifestyle habits, as well as on morphometric and biochemical characteristics. Concentrations of fatty acids (expressed as percent of total fatty acids) were determined in red blood cell (RBC) membrane phospholipids by gas-liquid chromatography using standard protocol from blood samples drawn from each participant. Descriptive statistics are presented for each community and have been stratified by age and gender. Analysis of variance was used to compare fatty acid relative mean concentrations between age groups.

Results: Total polyunsaturated fatty acid (mean [95%CI]) concentrations measured in RBC of participants were comparable between the two communities of Waskaganish (36.88 [36.46-37.3]) and Chisasibi (37.04 [36.9-37.2]), and did not differ between age categories. However, both of them differ significantly from Mistissini (37.86 [37.76-37.97]) and Eastmain (37.5 [37.35-37.65]; p=0.022) communities visited in 2005 and 2007, respectively. Combined EPA+DHA concentrations were similar among Waskaganish and Chisasibi individuals, and comparable to what has been observed previously in the three other Cree communities. The difference between age groups was highly significant (p<0.0001), with children (8-14y) levels being approximately 1.5 time lower than those of older adults (\geq 40y) (2.96 vs

4.36 in Waskaganish, and 3.05 vs 4.85 in Chisasibi). Among women, 22 % of the variability in the EPA+DHA level could be accounted for by differences between age groups in Waskaganish, and 48 % in Chisasibi. The n-6:n-3 ratio was comparable between the two communities, but differed between age groups in each community, with younger people aged 8-14y having a much higher ratio than older people aged 40y or more in Waskaganish (6.15 [5.75-6.55] vs 4.38 [4.01-4.75], respectively) and Chisasibi (6.22 [5.97-6.47]) vs 4.18 [3.94-4.41], respectively). The difference was highly significant (p < 0.0001). The relative mean TFA concentrations found in participants from Waskaganish was 0.45 [0.40-0.50] and differed significantly from those from Chisasibi (0.64 [0.6-0.67]; p < 0.0001), where TFA decreased from 0.73 to 0.56 % with increasing age (8-14y to \geq 40y) among participants, showing an opposite trend with n-3 PUFA concentrations. Surprisingly, unlike in the latter community, TFA levels in Waskaganish participants increased among the oldest; however, the difference was not statistically significant and was attributable to a higher level among women (0.6 [0.32-0.89]) than men (0.36 [0.25-0.47]). Nevertheless, the overall means (*i.e.* for all gender and age groups) were comparable to what was observed in the other Cree communities, except Mistissini where it was approximately three times higher.

Conclusion: Blood levels of n-3 PUFA are representative of fish and game consumption, and increase with age, whereas TFA are indicative of a deleterious dietary intake. Overall relative mean EPA+DHA concentrations found in Waskaganish and Chisasibi participants are approximately half the values found among Inuit of Nunavik, but still remain about 2-3 times those of the general population of Québec. However, the increasing n-6:n-3 ratio, which is a major determinant of the risk of cardiovascular diseases, as well as the high *trans*-fat intake, especially among the youngest, should be one of the priority target to be addressed in a health prevention perspective.

Discussion on Dietary Polyunsaturated and Trans-fatty Acids

Louise Johnson-Down: The Cree don't eat raw meat. How much fat gets lost in cooking?

Alanah Heffez: Isn't the fat collected and used for cooking?

Paul Linton: If you cook a beaver you get 2 inches of fat in the pan. You won't eat it all. It goes bad fast.

Evert Nieboer: If the beaver fat goes rancid, it must still be unsaturated after cooking.

Eric Dewailly: According to Françoise's results, there are also variations in the % of fat in the small pieces of meat that were sent to the lab.

Grace Egeland: For fish, if it's not cooked in oil (which introduces a different fatty acid), the relative distribution seems similar.

Eric Dewailly: Alpha-linolenic acid generally comes from plants. Usually animals transform it but we see that the beaver does not completely transform it. Beaver oil could be used to replace flax-seed oil.

Grace Egeland: In mammals that are eating lichen, such as moose and caribou, we would expect a high ALA.

Jill Torrie: If you wanted to test cooked food, we could take samples at the Mistissini camp.

Grace Egeland: We have seen that there are generally low levels of trans fat in Waskaganish. Why the difference between Chisasibi and Waskaganish?

Eric Dewailly: There is no population in the world with less than 0.5. It could just be due consumption of milk, etc. Chisasibi is relatively low compared to Mistissini.

Paul Linton: The variation could be due to cooking habits. People who deep-fat fry at home may use margarine instead of butter. It could depend on what the store sells. In Mistissini there was a really cheap margarine sold as replacement for lard. Up the coast there is more lard. We have met with the grocery store and all these things that were high in trans fats are gone (the inexpensive margarine tubs and the oil used to make fried chicken).

David Dannenbaum: The availability of food in the store in Waskaganish is lower than in Chisasibi.

Paul Linton: Did we do contaminant analysis on the animal samples? Because we should measure this before we start promoting it as a wonder-food.

Françoise Proust: There are enough of the samples left to do contaminant samples.

Liana Del Gobbo: Hydrophobic contaminants are lost during cooking (fat and moisture are reduced).

Liana Del Gobbo: Are there known benchmarks for fatty acids in red blood cells? Are these results saying that the population is ok in this regard?

Grace Egeland: There are few epidemiologic studies looking at fatty acid content of erythrocytes as it relates to disease. There is dietary transition leading to higher N6:N3s ratios. In addition, obesity is hindering the elongation process (synthesis of longer fatty-acid chains).

Eric Dewailly: There is a lot of information about recommended intake. Omega-3 index recommends an optimal range of 6-8%. These communities have 4-5%, which is better than the general Montreal population. N6:N3 ratio is recommended to be 3 (omega-6 should be no more than 3x the omega-3). There is a lot to do, either by increasing N3 or decreasing N6 coming from cookies etc.

Clarification: N6 in the beaver meat includes the linoleic acid and arachidonic acid.

Eric Dewailly: The beaver meat is well-balanced N6:N3 and good in terms of monounsaturated fats. This food should be promoted if there are enough beavers.

Paul Linton: Beaver fat spoils very fast. Goose fat as well.

Elizabeth Robinson: Can you test mercury and PCBs in the meat samples?

Eric Dewailly: We just have to put it in the budget.

Seroprevalence of nine zoonoses in the communities of Chisasibi and Waskaganish

Hugues Sampasa Kanyinga

Cree communities of James Bay are still attached to their traditional practices. Thus, they are still in close contact with wildlife and theoretically at higher risk of contracting zoonoses. Nine zoonotic infections have been investigated from sera of 267 participants in Chisasibi (166) and Waskaganish (101) in 2008. These people have also responded to a questionnaire documenting their sociodemographic characteristics and their hunting and trapping activities.

Seroprevalence rates higher for *Leptospira* sp. (23%), *Francisella tularensis* (18%), Jamestown Canyon virus (17%) and *Toxoplasma gondii* (9%) were documented. A seroprevalence of less than 5% was obtained for *Coxiella burnetii*, *Echinococcus granulosus*, *Toxocara canis* and the Snow Shoe Hare virus. Furthermore, no positive serology for *Trichinella* sp. could be detected in participants from both communities. The seroprevalence of infection with *Leptospira* sp. and *T. gondii* were higher in Chisasibi than Waskaganish, while that for Jamestown Canyon virus seemed higher in Waskaganish than Chisasibi. Some variables related to wildlife were statistically associated with exposure to various pathogens. There was a relationship between handling of rabbits and a positive serology for *Leptospira* sp. The absence of gloves while handling animals has been associated with exposure to Jamestown Canyon virus. Statistical trends were also detected on the relationship between handling of ducks and exposure to *Toxoplasma gondii*, and between the lack of gloves while handling animals and having hunting activities and trapping in spring and positive serology for *Leptospira* sp. in Chisasibi and Waskaganish respectively. The review of medical records did not reveal any significant health problems related to zoonotic diseases. Nevertheless, a significant proportion of the population has been exposed to certain pathogens, especially the Jamestown Canyon virus, *Leptospira* sp. and *F. tularensis*.

Population should be informed about the existence of these diseases and measures to prevent their transmission; same thing for health care workers about the signs and symptoms of these diseases, especially in the presence of compatible symptoms with high prolonged fever.

Reggie Tomatuk: The CBH is currently taking preventative action by teaching people about zoonotic disease. MAPAC has come to the communities of Chisasibi and Mistissini to teach preventative measures (in association with introducing traditional food in the local institutions).

Eric Dewailly: For one pathogen you mentioned that risk increases with age because individuals have had a longer time to be exposed. But do we know the lifespan of antibodies for other pathogens that do not increase with age?

Eric Dewailly: What is your bet for Whapmagoostui, considering that the rate of infection was about 80% in Kuujjuarapik which is the geographical place.

Hughes Sampasa: It would depend on the cooking practices and what animals they eat.

Paul Linton: Would this come down to traditional knowledge (handling practices) or cooking and nutritional practices?

Elizabeth Robinson: It would be interesting to present this data to doctors that work up North and we will try to schedule you for the next meeting. *Recherche faune et zoo* (a group of mostly veterinarians working for the ministry) could be interested in this research as well.

Eric Dewailly: Would it be wise to look at inflammation markers in people with positive serology?

(someone): Could there be sources of zoonotic infection that are unrelated to hunting and trapping?

Benoit Levesque: Generally it's related to rodents and rabbits. In Mistissini there was no variables related to rabbits. However, the sample size was pretty small in Mistissini.

Benoit Levesque: Overall, these results present good news. The burden of disease is quite low. For *JC virus* we had 23% prevalence but nobody even presented to the clinic. However, perhaps some of these infections are underreported. It would be useful to prepare a guide for clinicians in the Cree territory.

Reggie Tomatuk: Is there a rabies problem?

Paul Linton: A couple of years ago there were some rabid wolves, but no problem in humans.



Let's learn about ourselves

Appendix 1 PUBLICATIONS

Nituuchischaayihtitaau Study

- 1. Manuscripts (peer reviewed journals) published, in press or in progress
- 2. Abstracts for poster presentations
- 3. Abstracts for oral presentations
- 4. Theses





LAVAL UNIVERSITY:

1. Manuscripts (Peer reviewed journals)

Authors: Sophie Campagna, Benoit Lévesque, Elhadji Anassour-Laouan-Sidi, Suzanne Côté, Bouchra Serhir, Brian J. Ward, Michael D. Libman, Michael A. Drebot, Kai Makowski, Maya Andonova, Momar Ndao, Éric Dewailly.

Title: Seroprevalence of ten zoonotic infections in two Canadian Cree communities.

Status: Submitted to Diagnostic Microbiology and Infectious Disease (March 24, 2010)

Authors: Valera B, Dewailly E, Anassour-Laouan-Sidi E, Poirier, P.

Title: Impact of mercury and lead exposure on blood pressure cardiac activity among Cree adults (James Bay, Quebec, Canada).

Status: will be submitted soon

Authors: Chateau-Degat ML, Pereg D, Egeland GM, Nieboer E, Bonnier-Viger Y, Laouan-Sidi Elhadji A, Dannenbaum D. Dewailly E.

Title: Diabetes and related metabolic conditions in an aboriginal Cree community of Quebec, Canada

Status: published.

Journal: Canadian Journal of Diabetes. 2009. 33 (3): 156-162





Authors: Renée Dallaire, Éric Dewailly, Daria Pereg, Serge Dery, Pierre Ayotte.

Title: Thyroid function and plasma concentrations of polyhalogenated compounds in Inuit adults

Status: published

Journal: Environmental Health Perspectives. 2009. 117:1380-1386

Authors: Jean-Luc T. Bernier, Andrée F. Maheux, Maurice Boissinot, François J Picard, Luc Bissonnette, Daniel Martin, Michel G Bergeron.

Title: On-site Microbiological Quality Monitoring of Raw Source Water in Cree Community of Mistissini

Status: published

Journal: Water Quality Research Journal of Canada. 2009. Volume 44, no.4: 345-354

Authors: Lévesque B, Messier V, Bonnier-Viger Y, Couillard M, Côté S, Ward BJ, Libman MD, Gingras S, Dick D, Dewailly E.

Title: Seroprevalence of zoonoses in a Cree community (Canada).

Status: published

Journal: Diagnostic Microbiology and Infectious Disease 2007; 59: 283-286





Authors: Bussieres D, Ayotte P, Levallois P, Dewailly E, Nieboer E, Gingras S, Côté S.

Title: Exposure of a Cree population living near mine tailings in northern Quebec (Canada) to metals and metalloids

Status: published

Journal: Arch Environ Health 2006/2004; 59(12):732-41 (publication of issue 12 of 2004 was delayed until 2006).

Note: Included in this list because the 2002 Ouje Bougoumou study defines the core component of the present multi-community study.

2. <u>Abstracts for posters</u>

Authors: Valera B, Dewailly E, Poirier P.

Title: Impact of toxic metals on blood pressure, resting heart rate and heart rate variability in an Aboriginal population of Quebec (Canada).

Location: Poster presented at the Joint Conference - 50th Cardiovascular Disease Epidemiology and Prevention - and - Nutrition, Physical Activity and Metabolism, in March 2-5, 2010 (San Francisco, USA).

Abstract: Abstract is available online and will be published later in a supplement in Circulation journal.

(http://www.americanheart.org/downloadable/heart/1267139896704EPI_NPAM_FinalProg_ABSTRACTS.pdf)





Authors: Chateau-Degat ML, Dewailly E, Déry S, Pereg D, Egeland GM, Nieboer E, Bonnier-Viger Y, Ferland A, Weisnagel SJ, Robitaille J.

Title: Is gestational diabetes a good predictor of abnormal glucose metabolism among Canadian Aborigines?

Location: Poster presented at the International Diabetes Federation (IDF), Oct 19, 2009 (Montreal, Quebec).

Abstract: Abstract published in Canadian Journal of Diabetes 2009; 33(3) (Supplement).

Authors: Valera B, Dewailly E, Poirier P.

Title: Influence of environmental mercury exposure on blood pressure and heart rate variability in an aboriginal population of the James Bay (North of Quebec, Canada).

Location: Poster presented at the Joint Conference – 48th Cardiovascular Disease Epidemiology and Prevention, and Nutrition, Physical Activity and Metabolism – 2008, in March 11-15, 2008 (Colorado Springs, USA)

Abstract: Abstract published in: Circulation 2008; 117; e262.

Authors: Valera B, Dewailly E, Poirier P.

Title: Comparison of heart rate variability parameters in two aboriginal populations of Quebec.

Location: Poster presented at the Canadian Cardiovascular Congress, in October 20-24, 2007 (Quebec City, Quebec)

Abstract: Abstract published in: Can J Cardiol 23 (Suppl C), 131, 2007





Let's learn about ourselves

Authors: Valera B, Dewailly E, Poirier P.

Title: Impact du mercure sanguin sur la tension artérielle chez les adultes Cris de Mistissini (Baie James, nord du Québec).

Location: Poster presented at the Congress of the Quebec Society of Hypertension, in January 18-20, 2007 (Quebec City, Quebec)

Abstract: Abstract published in: Méd Sci 23 (Suppl 1), 2007.

Authors: Pereg D, Nieboer E, Dewailly E, Egeland GM, Ayotte P, Fontaine J, Bonnier Viger Yv.

Title: Levels and sources of environmental exposure to toxic metals and persistent organic pollutants in a Cree community of Quebec.

Location: Poster presented at the 11th International Congress of Toxicology (ICTXI), in July 14-21, 2007 (Montreal, Quebec)

Abstract: According to D. Pereg, if the abstract has been published, it's somewhere in the proceedings of the 11th International Congress of Toxicology.





McGILL UNIVERSITY:

1. Manuscripts (Peer reviewed journals)

Authors: Egeland GM, Dénommé D, Lejeune P, Pereg D.

Title: Concurrent validity of the International Physical Activity Questionnaire (IPAQ) in an liyiyiu Aschii (Cree) community

Status: published

Journal: Can J Public Health. 2008 Jul-Aug; 99(4):307-10.

Authors: Zhou YE, Kubow S, Dewailly E, Julien P, Egeland GM. Br J Nutr. 2009 Apr 2:1-7. [Epub ahead of print] PubMed PMID: 19338705.

Title: Decreased activity of desaturase 5 in association with obesity and insulin resistance aggravates declining long-chain n-3 fatty acid status in Cree undergoing dietary transition.

Status: published

Journal: Br J Nutr. 2009 Apr 2:1-7. [Epub ahead of print] PubMed PMID: 19338705

Authors: Bou Khalil C., Johnson-Down L., Egeland GM.

Title: Emerging Obesity and Dietary Habits Among James Bay Cree Youth.

Status: Accepted (more details to come)

Journal: Public Health Nutrition





2. Abstracts for posters

Authors: Lazzinnaro R, Plourde H, Dewailly E, Egeland GM.

Title: Identifying the extent to which diet quality and other behaviors relate to obesity and insulin resistance in Iiyiyiu Aschii (Cree) adults.

Location: Poster will be presented at Future of Food and Nutrition: A Multidisciplinary Graduate Research Conference, in April 10th, 2010 (Tufts University, Boston, USA).

Abstract: Abstract not published

Authors: Zhou, YE, Egeland, GM, Kubow, S, Dewailly E, Julien P and Nituuchischaayihtitaau Aschii Study GROUP.

Title: Adiposity associated factors as determinants of desaturase 5 (Δ 5) in Cree people.

Location: Poster presented at the 16th European Congress on Obesity (ECO), in 2008 (Geneva, Switzerland)

Abstract: Abstract not published

Authors: Yuan Zhou, Grace Egeland, Stan Kubow.

Title: Insulin Resistance, Age and Obesity Level are Related to the Activity of Desaturase 5 Activity.

Location: Poster presented at the CDA/CSEM Professional Conference and Annual Meetings, in 2007 (Vancouver, Canada)

Abstract: Abstract not published





3. Abstracts for oral presentations

Authors: Del Gobbo L, Robinson E, Nieboer E, Dewailly E, Torrie J, Egeland GM.

Title: Serum 25 (OH) D has no effect on insulin resistance among normoglycemic Cree.

Location: Oral presentation done at the IDF in Oct 2009 (Montreal, Quebec)

Abstract: Abstract not published

Authors: Yuan Eva Zhou, Stan Kubow, Éric Dewailly, Grace M. Egeland.

Title: Association of adiposity with desaturase 5 (Δ 5) among James Bay Cree.

Location: Oral presentation done at The Obesity Society Annual Scientific Meeting, in 2008 (Phoenix, USA)

Abstract: Abstract not published

4. Thesis

Author: Bou Khalil C.

Title: Emerging Obesity and Dietary Habits Among James Bay Cree Youth: 3 Communities.

Location: McGill University, September 2008.





McMASTER UNIVERSITY:

1. Manuscripts (Peer reviewed journals)

Authors: Nieboer, Martin, Tsuji, and Wainman as leading authors

Manuscript preparation is in progress on PCBs, organochlorines pesticides and brominated fire retardants measured in blood plasma using the combined database for Eastmain, Mistissini and Wemindji, and as reported in the Eastmain/Wemindji technical report that is currently being drafted. It involves principal component and correspondence analysis of traditional and market food consumption items and of the mentioned contaminants. Relationships between these summary variables adjusted for age, gender and community are used to identify putative exposure sources of the environmental contaminants mentioned.

