Research Note

2014 Report on Research Results for Minamata Disease in First Nations Groups in Canada (Preliminary Report)

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From the end of August to the beginning of September in 2014, the research members at the Research Center for Minamata Studies visited indigenous reserves in Ontario, Canada, where Minamata disease is occurring. These reserves belong to the Grassy Narrows First Nation (in the Ojibway language: Asubpeeschoseewagong Netum Anishinabek) and Wabaseemoong Independent Nations (while known in English as "Whitedog," this report uses "Wabaseemoong" for the sake of accuracy). Field studies were conducted on these reserves from medical, environmental, and social perspectives. This report presents an overview of the problems found, a brief report of a part of the overall results. The comprehensive quantitative and qualitative data is currently being examined in detail. This report only introduces a portion of the study's findings.

This study was initially launched in the mid-1970s by Dr. Masazumi Harada based on requests from the local people. Since the 2000s, the Research Center for Minamata Studies has continued these studies in cooperation with local victims.

Research Period

August 26, 2014 to September 3, 2014

Research Location

Two Indigenous Communities in Grassy Narrows and Wabaseemoong (Ontario, Canada)

I. What is Canadian Minamata disease?

I-1. Damage Caused by Minamata Disease and Three Hardships Faced by Canadian Indigenous Peoples

We recognize that the damage caused by Minamata disease (events causing methylmercury poisoning) that occurred among the First Nations is the result of a combination of the following three factors:

- First Factor: The problem is a consequence of the history of persecution and discrimination against the indigenous peoples in Canada from the 17th century to the present.
- Second Factor: The two Ojibway reserves have experienced land restrictions, residential schools, forced relocations and pollution and degradation of their land from industrial development (including hydro dams, mining). Furthermore, they have experienced destruction of their local infrastructures and traditional ways of life due to intensive logging of the forests that sustain their contemporary traditional livelihood. The damage inflicted by Minamata disease is another example of destruction of this livelihood.
- Third Factor: The indigenous peoples were forced to relocate to their current reserves and were unaware that a pulp and paper factory was dumping upstream. Damage from Minamata disease was caused by the factory's dumping of mercury into the river. It is still important to clearly understand the whole picture.

We therefore believe that the solution to the problem of Minamata disease in Canada must be based on the resolution and immediate alleviation of the hardships indigenous peoples have experienced so far.

I-2. Simplified Progression of Canadian Minamata Disease

Confirmation of Occurrence and Initial Reaction

- In 1969, the Ontario provincial government conducted a study of mercury pollution of the province's rivers that detected a high concentration of mercury in the English-Wabigoon River system and confirmed that the fish were contaminated.
- In 1970, the level of mercury in residents' hair was detected to be over 100 ppm.
- While in the past annual fish catch exceeded 100 tons, the provincial government prohibited fishing.
- Dryden Paper Mill, the original source of the mercury, was advised to not dump mercury into the rivers.

Canadian Minamata Disease Continually Ignored

- The Ontario provincial government conducted health studies in 1971 and announced that although internal mercury values were high, no adverse health effects were present.
- In 1973, an Ontario working committee proposed to the provincial legislature closure of all contaminated rivers, provision of food to the reserves as well as creation of new employment and the implementation of local education programs on mercury poisoning. However, the measures stopped at the installation of freezers in 1975. These freezers provide uncontaminated frozen fish to the residents of the reserves. Importantly, this frozen fish is not the fish that was the staple of their traditional diet, walleye. Also, culturally, as contamination of their local fisheries removed people from the process of fishing, it has severely threatened this part of their way of life as well as devastated their local economy. This ‘take it or leave it’ approach to the industry created problem and the severe deprivation it has caused these reserves is another example of the gross negligence of Canadian authorities.

Start of Compensation for Damage

- The Constitution Act was signed in 1982, and the rights of indigenous people began to be legally recognized.
- At this time, the Canadian government was spending more than four million Canadian dollars on each of the two reserves for economic development.
- Legal compensation for victims of Minamata disease was not officially recognized until the indigenous peoples filed a motion with the court and a settlement was reached through arbitration in 1985.

- Under the terms of the settlement, the Canadian federal government, the Ontario provincial government, and the three companies responsible were to pay compensation to both reserves. Along with this, the settlement opened an avenue for residents with neurological symptoms of Minamata disease to receive compensation by establishing the Mercury Disability Board (an organization consisting of federal, provincial and indigenous representatives) in 1986.

I-3. Overview of Two Reserves (Research Sites)

Grassy Narrows First Nation (Asubpeeschoseewagong Netum Anishinabek)

Population: 1519 (registered population in December 2014)
(Total on reserve: 939 people; 469 male and 470 female)
Reserve: 41.45 km^2
Available land area prior to signing Treaty 3: 6500 km^2
Near border between Ontario and Manitoba
80 km north of city of Kenora
Grassy Narrows lakeside in English-Wabigoon River system

Wabaseemoong Independent Nations
(Reserve known as 'Whitedog' in English)

Population: 1767 (registered population in December 2014)
(853 people on reserve)

The three communities of Whitedog, One Man Lake, and Swan Lake were forced to relocate due to flooding caused by dam construction and were integrated into this reserve at the beginning of the 1960s.

Reserve: 110 km^2
Near border between Ontario and Manitoba
80 km northwest of city of Kenora

II. Minamata Disease Research Studies on First Nations

II-1. Previous Studies by Japanese Team

1975-1976 Study
2002-2004 Study
2010 Study
(See paper authored by Harada et al. in References)

II-2. History of Interactions and Research

- 1975-1976 Field study conducted by Dr. Harada and invitation of Canadian indigenous Minamata disease victims to visit Japan
- 1976 Visit of Japanese Minamata disease patients to Grassy Narrows
- 2002 Field study in Canada by Dr. Harada, Dr. Fujino and others
- 2004 Field study in Canada by research group at the Research Center for

Minamata Studies

- 2005 Invitation of indigenous peoples to visit Japan. Invitation to the ceremony for establishment of the Research Center for Minamata Studies and seminars
- 2006 Invitation of Canadian aboriginal representatives to the International Forum on Environmental Damage in Kumamoto Gakuen University
- 2010 Field study by research group at the Research Center for Minamata Studies (Group leader: Dr. Masazumi Harada)
- 2011 Invitation of Canadian indigenous peoples to visit Japan
- 2012 Site Visit – Debriefing session in Toronto. Report on study results
- 2013 Invitation to the 2nd International Forum on Environmental Damege in Kumamoto Gakuen University.
- 2014 Field study in Canada by research group at the Research Center for Minamata Studies (Group leader: Prof. Masanori Hanada)

II-3. Previous Studies and Data in Canada

Research and Data in Canada

The Cosway Report is a comprehensive collection of organized data. For problems in recent years, the 2010 and 2011 reports by the Mercury Disability Board can be referenced.

Situation in Canada

Challenges we know:

- What is the issue? The necessity of understanding the true state of health damage as well as the current state of environmental contamination caused by methylmercury.
- Present-day issues for indigenous peoples: Compensation and relief for health damage and examination of the possibilities of restoring the natural environment to pre-contamination levels.
- The necessity to examine the 2011 report by the Mercury Disability Board.
- Examine the commonalities and differences between Canada and Japan concerning problems with recognition and compensation.

Examination by the Ontario provincial government, the Mercury Disability Board, and an organization of indigenous peoples began at the end of 2013, but was suspended in the spring of 2014.

III. Purpose of and Challenges in This Study

- Local Request: Request by the leader of Grassy Narrows for a study where a medical team is dispatched, and successive requests for personal consultations from the local residents to the authors of this paper.
- Discussions set up between Canadian doctors and the Mercury Disability Board members.

Proposal by Canadian authorities regarding the problem of revising recognition standards

- Medical examinations by Japanese doctors.
  Continuation of past studies and extraction of challenges involved
  Study by Tsuruta team using magnetoencephalography (MEG)
- Environmental study on water quality and fish, and study on mercury in hair.
- Interaction and exchange of opinions among victims.

IV. Results

IV-1. Composition of Research Group

The research group was organized into two groups: the first group was an environmental study team responsible for studying environmental contamination and collecting samples of and analyzing hair and other items; the second group was a medical team in charge of medical examinations of the residents on the two reserves. The environmental study team was headed by Prof. Shigeharu Nakachi. The medical team was led by Prof. Akitomo Shimoji and consisted of nurses, laboratory technicians, and three doctors. The general overseer responsible for both groups was Prof. Masanori Hanada. These studies were made possible by generous cooperation from the band offices of the Grassy Narrows and Wabaseemoong reserves.

IV-2. Current State of Mercury Contamination in the Environment: Mercury Data for Fish and Hair and Dr. Chan's Report

The environmental study team collected fish from the river system at the study location. After measurements such as weight and size were taken, the fish were cut into pieces, dried in the shade, transported back to Japan and analyzed.

The Ontario provincial government took measures to stop the discharge of chemicals into rivers in 1971, and abolished processes using mercury in 1975. Although 40 years have passed since then, it was found that mercury values in fish still remain high. When these values are contrasted against those listed in Dr. Chan's 2003 report, it indicates that the concentration of mercury has been declining only gradually.

Furthermore, the total mercury value of many fish exceeded 0.4ppm, which is the provisional standard set by the Japanese government. As long as fish is not eaten every day, it is thought that symptoms of Minamata disease will not develop. However, because eating the fish may have long-term health effects, it is better to avoid eating fish from this river system. The bigger the fish grow, the longer they have been alive and the higher mercury value contained.

At these locations, recommendations for how often fish should be eaten are given based on the size of the fish. As for sport fishing, recommendations for catch and release appear in local fishing guidebooks. Given the history of the two reserves and their prior, prolonged exposure to mercury contaminated fish, this is disastrous. Formerly their healthy, traditional fish-based diet is now a serious health risk as consumption of fish from

the English-Wabigoon River system continues. Thus, the effects of permanent damage to the central nervous system increase for frequent fish eaters.

Analysis of Total Mercury Contained in Canadian Fish Specimens

Specimen No	Total Mercury Value (mg/kg wet wt)	Collection Area	Species	Length (cm)	Notes
1	0.40	Grassy Narrows	Walleye (small)	29	
2	0.38				
11	0.72	Grassy Narrows	Walleye (medium)	47	
12	0.75				
21	0.58	Grassy Narrows	Northern Pike	57	
22	0.58				
41	1.65	Wabaseemoong	Walleye	70	Obtained from fisherman
42	1.37				
51	0.81	Wabaseemoong	Northern Pike	57	
52	0.78				
61	0.65	Wabaseemoong	Walleye	56	
62	0.60				

Anaysis by Hirokatsu Akagi of International Mercury Laboratory (http://i-m-l.sakura.ne.jp/index.htm).
Walleye, Sander vitreus, are in the Percidae family and are a staple fish of the Anishinabek diet. Northern Pike, Esox Lucius, are also carnivorous and can be cannibalistic.
Japan's provisional standards in 1973: Total mercury 0.4 ppm; methylmercury 0.3 ppm
There are 6 samples, each measured twice.

Reference Data

2010 Study Fish Data (Analysis by Hiromi Hironaka of Fukuoka Institute of Health and Environmental Sciences)

Collection Area	Data of Collection	Type	Total Mercury (ppm)	Methylmercury Conversion (ppm)
Wabaseemoong	3/28/2010	Walleye 1	0.242	0.260
Wabaseemoong	3/28/2010	Walleye 2	0.202	0.219

Samples obtained from residents. Specific collection areas unknown.

Dr. Chan's Report (2003 study)

Contaminated lakes and rivers in English-Wabigoon River system.

Walleye

Lake	N	Average Hg (mg/kg)	Standard dev Hg	Average length (cm)	Range length (cm)
Ball	20	1.070	0.638	56.6	35.0 - 80.0
Caribou	13	0.910	0.501	57.8	33.0 - 86.5
Clay	20	2.982	0.847	38.4	28.0 - 69.0
Garden	6	0.575	0.274	44.2	29.0 - 58.0
Goshawk	21	0.785	0.417	48.7	23.0 - 63.0
Indian	20	0.643	0.424	43.7	32.0 - 66.0
Maynard	19	0.417	0.204	50.4	35.0 - 66.0
One Man	21	0.916	0.487	54.1	29.2 - 62.5
Separation	20	0.600	0.217	36.39	33.0 - 47.0
Swan	12	0.951	0.488	50.1	33.5 - 62.3
Tetu	16	0.643	0.300	438.	30.5 - 65.0
Tide	27	0.979	0.481	56.0	36.0 - 69.0
Winnipeg	24	0.760	0.568	55.5	15.2 - 75.5
Total	240	0.964	0.800	48.9	15.2 - 86.5

Northern Pike

Lake	N	Average Hg (mg/kg)	Standard dev Hg	Average length (cm)	Range length (cm)
Ball	21	0.834	0.420	59.1	37.0 - 100.0
Caribou	11	0.937	0.430	50.9	29.0 - 74.0
Clay	20	2.142	0.844	50.4	39.0 - 68.0
Garden	13	0.597	0.265	50.2	42.0 - 71.0
Indian	21	0.894	0.459	55.9	42.0 - 85.0
Maynard	20	0.436	0.222	51.4	37.0 - 66.0
Old Man	14	0.884	0.627	62.4	46.7 - 94.5
Separation	21	1.026	0.698	52.6	40.0 - 86.0
Swan	9	0.520	0.160	57.5	46.5 - 71.5
Tetu	23	0.804	0.400	55.8	33.0 - 86.0
Tide	21	0.651	0.282	55.5	41.0 - 85.0
Total	193	0.908	0.908	55.4	29.0 - 100.0

Source: "Our waters, our fish, our people". Mercury contamination in fish resources of two Treaty #3 communities. Final report prepared by Laurie Chan, Ph.D.

Among these lakes, the territory (hunting and fishing area) in Grassy Narrows are Ball, Clay, Garden, Indian, Maynard, Separation, and Tide lakes; the territory in Wabaseemoong are the Caribou and Winnipeg rivers and the Goshawk, Old Man, Swan, and Tetu lakes.

IV-3. Hair Mercury Data

In the environmental study group, Prof. Nakachi collected hair from examinees in the Wabaseemoong area, brought it back to Japan, and analyzed the concentration of total mercury. The hair donors were also asked how frequently they ate fish. With regard to those who offered their hair, many people wanted to receive a medical examination and we were unable to respond to everyone's requests. Therefore, not all of the hair donors underwent medical examinations.

In a field study conducted in 2004, hair was collected from examinees in Grassy Narrows and the total mercury concentration was analyzed by International Mercury Laboratory. Because the overall concentration was low, we had not initially planned to collect hair. However, because the residents of Wabaseemoong strongly desired this testing, we altered our plan and collected hair. It should be noted that hair from Grassy Narrows was not collected in this study.

The results are as follows:

Wabaseemoong

Differentiation by Sex

Sex	No. of People	Average Age	Age Range	Average Concentration	Mercury Value Range
Male	25	40	1 - 61	1.36	0.05 - 9.41
Female	48	38.8	0 - 71	0.53	0.03 - 2.65
Total	73	39.2	0 - 71	0.82	0.03 - 9.41

Differentiation by Age

Age	No. of People	Average Concentration	Mercury Value Range
0 - 19	17	0.32	0.03 - 1.28
20 - 39	12	1.25	0.05 - 9.41
40 - 49	14	0.47	0.04 - 2.29
50 - 59	22	1.16	0.11 - 5.24
60 -	8	0.88	0.07 - 2.65

Analysis by International Mercury Laboratory

Food

Fish Eating Frequency	No. of People	Average Age	Average Concentration	Mercury Value Range
4 or more times a week - daily or almost daily	8	45.4	2.00	0.11 - 9.41
1-2 times or more a week - up to 3 to 4 times a week	20	44.8	0.87	0.06 - 4.89
Once or more a month - once a week or up to 5 times a month	32	35.3	0.58	0.03 - 5.24
No fish or less than once a month	13	36.5	0.58	0.04 - 2.41

The mercury values are lower than those of Japanese Minamata disease patients. Even when compared to hair mercury concentrations in our 2004 study, the values are reduced. This is assumed to be because the danger of fish is to a certain extent known, so the consumption of fish has decreased compared to the past and because most of the time fish from outside of the English-Wabigoon River system is eaten.

With respect to hair mercury values and the onset of Minamata disease, the Japanese government asserts that symptoms do not appear unless the mercury value is 50 ppm or more. However, according to Japanese researchers, values of 10 ppm or greater have been shown to cause some kind impact on health.

Reference: hair mercury data of the 2004 study

Grassy Narrows

Defferentiation by Sex

Sex	No. of People	Average Age	Age Range	Average Concentration	Mercury Value Range
Female	26	46.3	5 - 86	1.96	0.06 - 3.3
Male	57	42.6	6 - 75	2.74	0.069 - 25
Total	83	43.7	5 - 86	2.2	0.06 - 25

Defferentiation by Age

Age	No. of People	Average Concentration	Mercury Value Range
0 - 19	14	0.52	0.18 - 2.6
20 - 39	16	0.75	0.11 - 4.3
40 - 49	16	2.54	0.1 - 6.20
50 - 59	18	2.92	0.38 - 5.7
60 -	19	3.71	0.42 - 25

Analysis by Environmental Monitoring Laboratory

IV-4. Medical Examination Results and the Number of Occurrences of Sensory Disturbance

Medical examinations were conducted by doctors in both the Grassy Narrows and Wabaseemoong communities. Dr. Akitomo Shimoji, Dr. Yohei Itai, and Dr. Kazuhito Tsuruta, who have abundant experience in examining Minamata disease patients, worked on the examination. Nurses Masami Tajiri and Yukari Inoue, who have conducted health studies for over ten years and have experience examining Canadian indigenous peoples, worked in assisting with the examinations.

Regarding medical examination records, the same questionnaires and clinical charts were utilized as those previously used for examinations of Minamata disease in the Minamata, Japan area.

There were no medical facilities in the communities so, similar to past examinations, quiet environments that ensured the privacy were set up: a health center in Grassy Narrows, and the gymnasium of a local school in Wabaseemoong.

English speakers and hired Japanese translators among the local assistants from Canada worked on the intake of life history and subjective symptoms. Before the start of the study, lectures on how to record medical details were given to these research assistants. The lectures used questionnaires in English about life history and subjective symptoms and were about the purpose of the study, intake methods, and the questionnaires. Some medical examinees did not understand English. When this happened, a family member of the examinee interpreted from the Ojibway language to English.

The following results are collected descriptions on sensory disturbance transferred from the clinical charts of examination results for Dr. Shimoji and Dr. Itai. The data for Dr. Tsuruta was not included in this aggregation due to time constraints.

Dr. Tsuruta used a device to measure somatosensory evoked potential (SEP) and then conducted medical examinations. Detailed results will be released in a separate report.

Residents were notified regarding the medical examinations through each of the communities' respective band offices (autonomous organization) and those who wished to receive examinations became examinees. Among those desiring medical examinations included people with the will to actively cooperate with our study, those anxious about their health, those who did not agree with the results of the Mercury Disability Board regarding compensation recognition, and those not sure about the cause of their health issue despite having been seen at a local medical faculty. Many residents were anxious about the health effects caused by mercury. Few residents had precise knowledge about what kinds of symptoms Minamata disease exhibits, and they trusted the Japanese doctors who have abundant experience in examinations for Minamata disease. These are believed to be the reasons why many people wanted to receive more accurate examinations.

The age and sex of the examinees are listed below:

Examinees

No. of Examinees

	Total	Sex		Age							
		Male	Female	0 - 9	10 - 19	20 - 29	30 - 39	40 - 49	50 - 59	60 - 69	70 and over
GN	43	16	27	1	3	4	9	9	11	5	1
WD	40	10	30	1	7	2	2	11	9	8	
Other region	1	1			1						

(GN: Grassy Narrows, WD: Wabaseemoong)

Aggregation of Sensory Disturbances

	Whole Body	Glove & Stocking Type	Glove & Stocking Type + Perioral	Perioral	Half of Body	Patches	No Sensory Disturbances	Total
GN	24	11	6	11	0	3	2	43
WD	18	14	9	19	0	5	5	41

This report only shows the aggregate results compiled before the release of this report, but the incidence of sensory disturbances (tactile) is extremely high. It goes without saying that comprehensive examination that combines medical interview data and other test results is required, but it should be noted that these numbers indicate that a large portion of the population has health impairments due to the effects of mercury. Next we will show the combination of these results with those of a past study of a research team organized by Dr. Harada.

Comparison to Past Study

Number of occurrences of sensory disturbance

Year of Study	No. of examinees in both areas	Whole Body	Glove & Stocking Type	Glove & Stocking Type + Perioral	Half of Body	Irregular	Unable to Test	
1975	89	-	15	-	-	-	-	Dr. Harada and others
2002 & 2004	187	32	114	-	-	10	-	Dr. Harada and others
2010	160	26	70	27	10	19	2	Collection by medical record
2014	83	43	25	17	0	8	-	Collection by medical record

Source: Harada, et al., Kankyo to Kogai, Vol. 34 No. 4

Two-point Discrimination Test Results

For two-point discrimination, only Grassy Narrows was aggregated. Wabaseemoong was not aggregated.

	Right Index Finger (mm)				Tip of Tongue (mm)					
Total	1 - 4	5 - 9	10 - 19	20 and over	1 - 2	3 - 3.5	4 - 6	7 - 9	10 - 19	20 -
42	15	10	9	8	7	10	15	1	7	2

Normal values indicated by process of creating common medical certificates:

Normal values (mm) for two-point discrimination threshold (Takaoka et al., 2014)

Right Index Finger	59 years old and younger	3
	60 years old and older	4
Tip of Tongue	59 years old and younger	2
	60 years old and older	2

Summary of Medical Examination Results

Some form of sensory disturbance was observed in nearly all of the people who received medical examinations in this study. These results are consistent with the 2002-2004 and 2010 studies. It is necessary to make this determination through the combination of epidemiological data, such as residential and life history, with neurological test results apart from sensory disturbances. Even still, when compared to control data in Japan, the values in this study are clearly higher.

Surprisingly, high rates of sensory disturbances can also be seen in young

generations. This point requires more detailed consideration.

In two-point discrimination tests, extremely high percentages have been found in people whose two-point discrimination threshold exceeds the normal value confirmed in Japan (64% for the right index finger, 83% for the tip of the tongue). The reduced ability to discriminate between two points is considered to originate from problems in the cerebral part of the central nervous system and is very likely based on the effects of methylmercury.

In the future, it is important to combine other test results conducted in medical examinations, as well as to monitor the test subjects.

V. Conclusion and Outlook

- **Continuation of Discussions with the Mercury Disability Board and Doctors**
  A forum was held on August 28 in Grassy Narrows. The participants from Canada were the chair of from the Mercury Disability Board (MDB), an MDB doctor (general practitioner), as well as local residents and a lawyer. The presence of local doctors, including the consulting neurologist hired by the MDB, was initially expected, but they were unable to participate as there were some difficulties organizing the schedule and venue. Among the Japanese participants were Dr. Shimoji and Dr. Tsuruta who reported on the current state of and challenges facing Minamata disease medicine in Japan. The Mercury Disability Board reported an overview of the situation in Canada. This was the first time this kind of discussion by Japanese and Canadian experts was held, and it was a valuable opportunity. We considered this as only the beginning of the exchange of opinions and information. It will be necessary, and is thought possible, to proceed forward in the future with continuously sharing information and exchanging opinions with the Canadian government agencies, the Mercury Disability Board (committee consisting of three representatives), and local doctors. Furthermore, at the forum, Mercury Disability Board doctors were asked to be present at the medical examinations of Japanese doctors, and medical examination methods were shared.

- **Mercury Levels in Fish and Hair in the English-Wabigoon River System in Canada**
  Deprivation of First Nations' Living Area - The mercury values of the fish are still high in the river system where the indigenous peoples' living area was contaminated by mercury. They were deprived of not only of the nature from the hunting land they lived off of, but it has been confirmed once again that the indigenous peoples have lost the rivers where they fish to provide for themselves.

  Water Purification and Detoxification - Indigenous leaders from Grassy Narrows and Wabaseemoong who visited Minamata in Japan observed the results of massive dredging operations and landfills that were engineered beginning in the 1990's and are proposing a clean-up of their own river systems. In light of the fact that there are still fish that show high concentrations of mercury forty years after discharging was stopped, it is believed this request should be met with expediency. In this regard,

rather than a landfill system like the one in Minamata Bay, what is hoped for is the rivers to be dredged and the polluted mud to be detoxified. These discussions have only just begun, and Japan's experiences should be shared.

Hair mercury values also have been found to be low.

- **Medical Examination Results and Analysis**

High Incidence of Sensory Disturbance - Consideration of medical examination results will continue in the future, but there needs to be analyses that combine these results with those of past studies. This being said, sensory disturbances and two-point discrimination abnormalities were found in most of the examinees (volunteers), which makes it clear that chronic Minamata disease is still continuing seriously. Continuing studies in the future are desired based on the fact that research studies in Canada have a low likelihood of being conducted, almost no doctors in Canada have experience diagnosing Minamata disease, and the Japanese research team has built a relationship of trust with the local community organizations.

- **Continuation of Studies and Exchanges with Persons with Minamata disease**

Building International Cooperation - This research group was joined by Minamata patient representatives, including Mr. Hideki Sato, and opinions were exchanged with leaders and representatives of the two local reserves. These exchanges confirmed our efforts to continue exchanges in the future and we plan to promote international cooperation among people with regard to Minamata disease.

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