

# Rehabilitation



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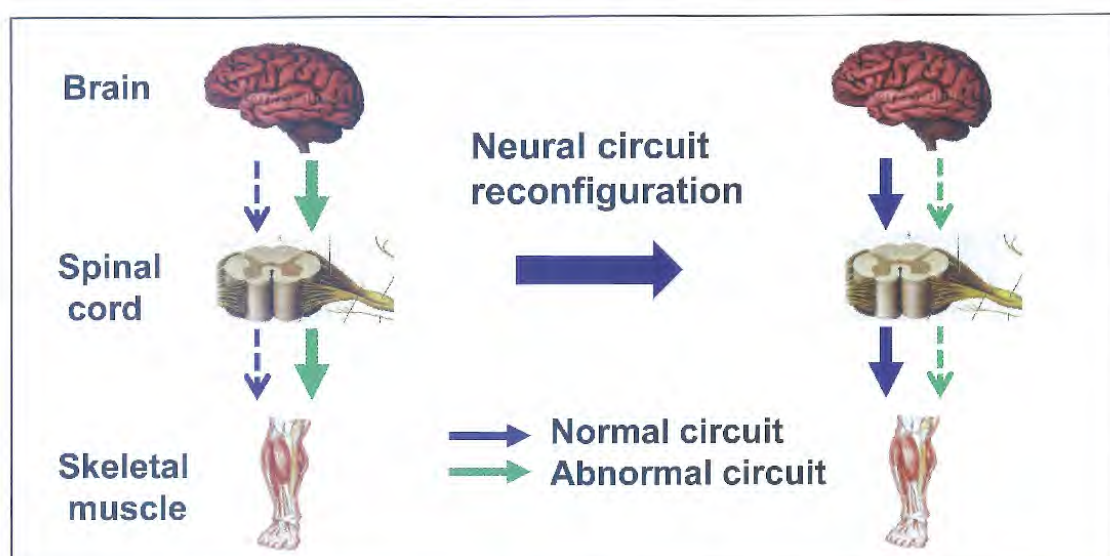


# Rehabilitation for patients with Minamata disease

Minamata disease is a neurotoxic disorder caused by methylmercury. Patients have difficulties in daily life, which are caused by disturbed motor and sensory functions. Regenerating damaged nerve cells of the brain or spinal cord is difficult even today. The brain, however, can compensate for damage in one region by utilizing other regions.

Rehabilitation promotes this compensatory function through plasticity of the brain which can reconfigure neural circuit and ameliorate neuronal dysfunction (Fig.). Although it is difficult to provide efficient rehabilitation to patients in the chronic phase, recent developments in neuroscience and neurorehabilitation have enabled us to provide efficient programs such as vibration therapy, electronic stimulation, repetitive facilitation exercise, and training assisted by robot suits. Our institute also has innovated these methods.

The symptoms experienced by patients with Minamata disease include involuntary movements (the abnormal movements of voluntary muscles against will), mental disturbance, abnormal muscle tonus, sensory disturbance, muscle weakness, and visual and hearing disturbances. Depending on individual symptoms and intellectual capacity, each patient is provided with a tailored rehabilitation program enabling to complete and bringing the necessary motivation.





## Outline of rehabilitation for outpatients

Our institute provides rehabilitation programs to patients with Minamata disease from 9:30 a.m. to 2:00 p.m. every Monday, and from 9:30 a.m. to 1:00 p.m. every Wednesday. The patients may also use our free transportation service.

In addition, we also arrange fun-filled seasonal events such as cherry-blossom viewing, a Star Festival, and a Christmas party as a part of the rehabilitation.



Pickup wagon service



Star Festival



Cherry-blossom viewing



Christmas party



# Rehabilitation program

## **Physical Therapy:**

Thermotherapy, vibration therapy, and electrical stimulation therapy are administered to relieve pain and high muscle tonus.

## **Exercise Therapy:**

To maintain and improve the power of skeletal muscles and prevent muscle atrophy and joint contracture, training is provided by a therapist or by using various equipment. The patients perform repetitive facilitation exercise (Kawahira method) induced by a therapist using facilitation techniques such as stretch reflex, skin-muscle reflex, and proprioceptive neuromuscular facilitation patterns. The Kawahira method is based on the theory that repetition of intended normal movement, which stimulates the desired neural pathways effectively, results in adequate strengthening of the neural pathways for normal movements. ref. <http://kawahira.org/>

Furthermore, gait training assisted by the robot suit HAL (Hybrid Assistive Limbs) is provided to reconfigure neural circuit based on the learning patterns of the brain.

## **ADL training:**

Guidance is provided and motion practice is performed by using tools to assist in carrying out the motions required for activities of daily living (ADL).

## **Making handicrafts:**

Making handicrafts is included for the training of finger movements and brain activation. Rehabilitation with enjoyment is effective for the stabilization of emotion, improvement in the quality of life, and fulfillment of life.



# Physical and Exercise Therapies (1)

## 【Vibration Therapy】



緩和肌肉緊繃，可助胎兒性病患站立起來

Hand-held vibration massagers (Thrive MD-01) can generate an effective frequency of 90 Hz vibration.



Direct application of vibratory stimuli to the plantar fascia decreases plantar pain and muscle tonus of the lower extremities.

Relief of muscle spasticity leads to smoother joint movement and better performance of repetitive facilitation exercise.

## 【Repetitive facilitation exercise (Kawahira method)】



The patients are made to perform exercise induced by a therapist using facilitation techniques such as the stretch reflex, appropriate positioning, skin-muscle reflex, and proprioceptive neuromuscular facilitation patterns.



The method is based on the theory that repetition of intended normal movement, which stimulates the desired neural pathways effectively, results in adequate strengthening of the neural pathways for normal movements.

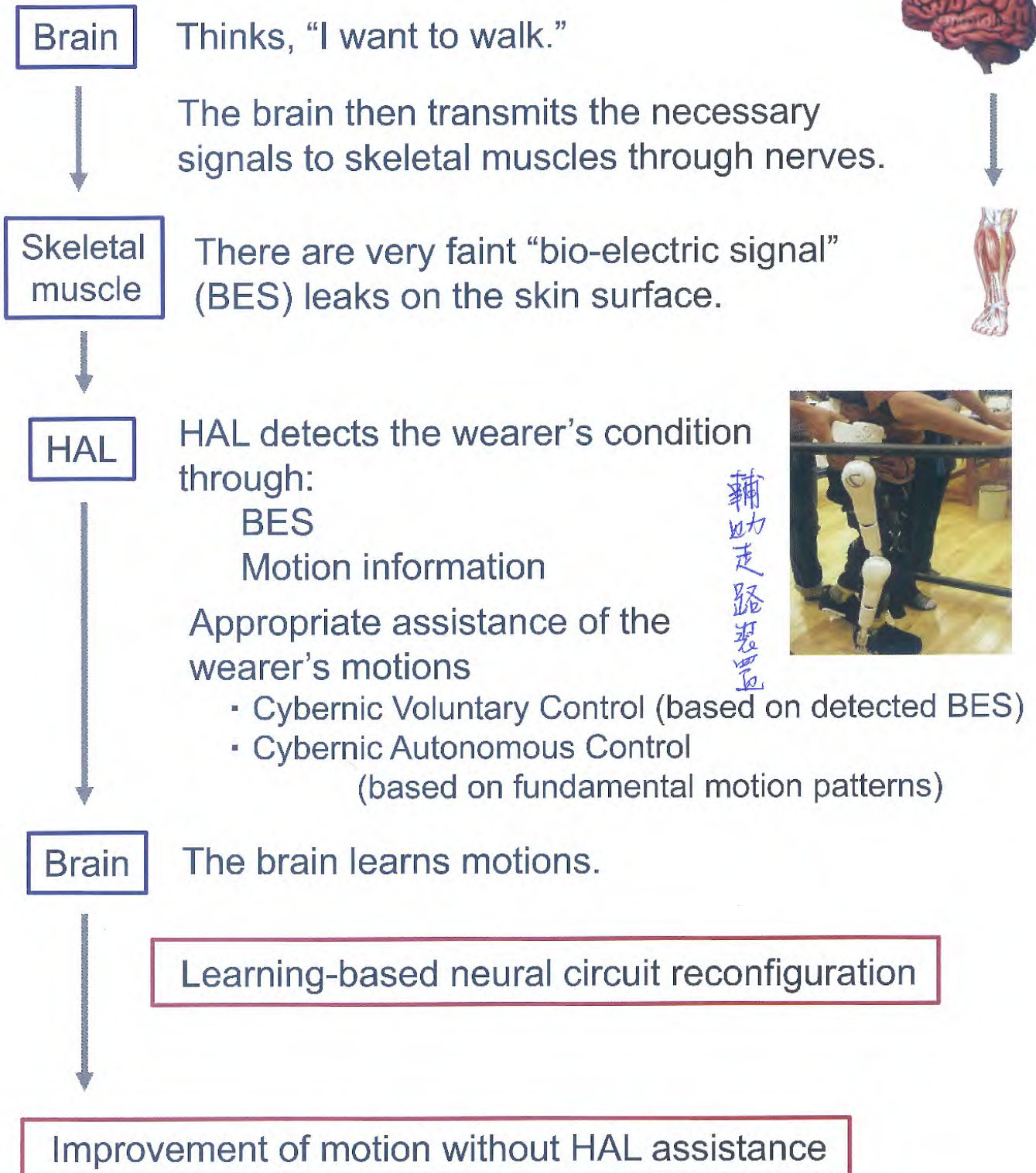
Repetitive learning of normal movement patterns enables patients to improve coordination of motor function.



# Physical and Exercise Therapies (2)

## ~Training with HAL (Hybrid Assistive Limbs)~

【Principle of training with the robot suit HAL】





# Combination effects of rehabilitation

3ヶ月の訓練、可愈速愈快



**Vibration therapy**



**Repetitive facilitation exercise**



**Gait training assisted by HAL**

The patient pictured had difficulty in ADLs such as standing and transferring due to severe sole pain, in which a therapist could not touch because of the severity of the pain.

Vibration therapy (left photo) relieved his pain and muscle spasticity of the lower extremities, resulting in the ability to smoothly perform repetitive facilitation exercise (Kawahira method) (middle photo).

The continuous rehabilitation mentioned above improved his tonus of the lower muscles and active range of motion (ROM) of ankle dorsiflexion, resulting in improved ADLs such as better balanced motion during standing and transferring, decreased fall risk when walking, and a decrease in assistance need.

The patient is involved in gait training assisted by the robot suit HAL with a positive attitude for rehabilitation (right photo).



# ADL training program

The ADL training program includes transfer training to a bed or a wheel chair and getting into bed. In addition, rehabilitation for dysphagia and eating motions is performed.



Training of eating motion with own spoon with modified shape



Dysphagia rehabilitation manual



Welfare equipment

Using welfare equipment enables patients to stand and transfer with the patient's residual function, resulting in a decrease in the need for physical assistance.

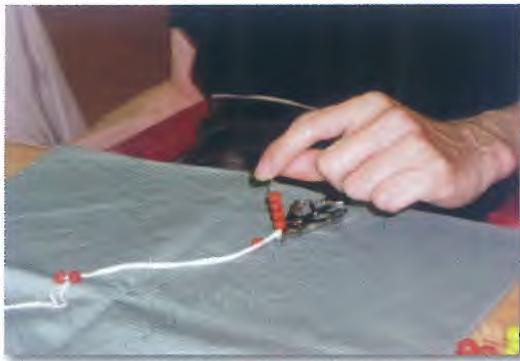


## Training by making handicrafts

Making handicrafts aims to activate brain function (judgment & structure abilities), improve physical function (fine movements, coarse movements, & coordination), and maintain and improve mental function (feelings of self-efficacy, a sense of fulfillment, & a sense of achievement).

### SKILL SCREEN

In order to improve fine finger movements and eye-hand coordination, patients are asked to thread plastic beads based on a design.



This patient cannot hold a needle in his hand, so a sewing tool was used to fix a needle on the table. This device enabled him to thread 30 or 40 beads (8 mm diameter) in a day.



Completed work

His fine finger movements and coordination ability were improved by this continuous training. Finally, he could hold a 4-mm diameter bead between the tips of his first two fingers. His eating motion with a spoon also improved.



## WOOL ART

A piece of wool string is first knotted at regular intervals. Then, the string is cut between each knot. Knots are pasted on a board using a preliminary sketch. Physically, the objective of this work is to improve fine finger movements.



## WOVEN FABRIC

'SAORI' is a handloom designed for access by the disabled. The workflow requires movement coordination between the upper and lower limbs to put a weft through the wrap threads and then tighten the weft. The patient below has visual and deep sensory disturbances. Although she could weave only 3-5 cm of cloth for 1 hour per day, this weaving activity stimulated her to perform more rehabilitation. She was very motivated and finally after five years 15 m of cloth was produced. The cloth was used to make a vest, a mat, etc.



SAORI



## LEATHER WORK

The objective here is to improve the movement of large joints, such as the shoulders and elbows, and to improve muscular power. The patient is also allowed to vent any aggression by pounding a carved seal with a wooden hammer.



This patient enjoys leather working. He often presents finished products to his friends. Having an objective is helpful to increase his activity, and maintain and improve function and faculty.

### Gift handicrafts for Ms. McCarthy, EPA Administrator

Ms. McCarthy, administrator for the U.S. Environmental Protection Agency (EPA), visited Minamata in 2016. Director General Mochizuki presented handicrafts (leather corsage and Skill Screen “Nine Horses”) made by patients with Minamata disease as part of their rehabilitation program.

Ms. McCarthy was very pleased with the gifts. She later wrote a letter mentioning that the gifts were exhibited in the Administrator Room and they reminded her of Minamata and Minamata disease.



(2016.5)





# Guide to Visiting the Exhibits

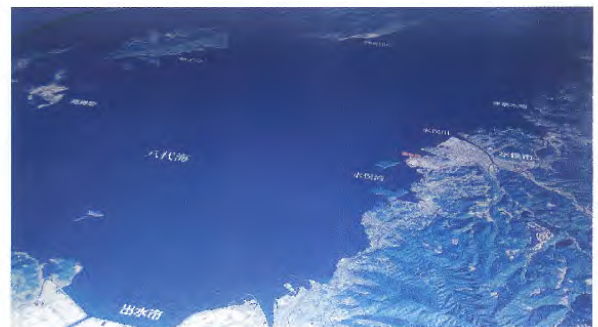
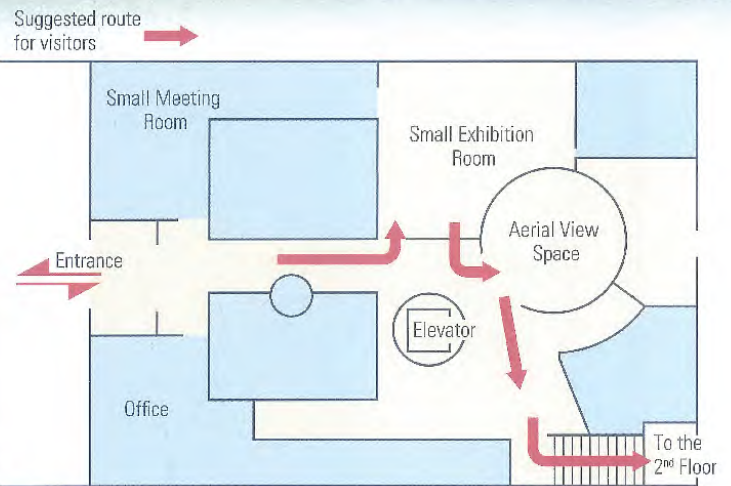


The Minamata Disease Archives exhibits present issues such as the results of research into mercury, which is the cause of Minamata Disease, how it exists in the environment, and its effect on humans.

## 1st Floor

In the 1<sup>st</sup> Floor aerial view of Minamata (Aerial View Space) space, visitors can see topographical characteristics of the city and the Yatsushiro Sea beneath them, as well as views of present-day Minamata on wall screens.

Visitors can view a vivid and colorful portrayal of modern-day Minamata in three videos on the wall screens: *Minamata as Seen from Above*, *Minamata in the Four Seasons*, and the *Seas of Minamata*. Each video is about 10 minutes in length.



Looking at satellite photos of the Yatsushiro Sea coastal area below them, visitors can see that it is a semi-enclosed inland sea.



# A Corner: Overview of Minamata Disease Why did Minamata Disease occur?

This exhibit explains the mechanism of how the disease occurred; the impact of methyl mercury, which caused the illness, on the brain and its symptoms; the process from the creation of methyl mercury to its release in the Bay; and the onset of Minamata Disease and characteristics of its symptoms. In addition, it presents an example of foods from around 1955. Visitors can also watch a video presenting testimony from those suffering from Minamata Disease about their symptoms and other issues.

**Exhibits**

- (1) What is Minamata Disease?
- (2) Effects of Methylmercury upon the Brain and upon Fetuses
- (3) Generation and Disposal of Methylmercury
- (4) Process of Methylmercury Accumulation in the Human Body



Example of food from 1955



## 2nd Floor

The 2nd Floor exhibit covers Minamata Disease and a research into mercury on the floor are translated into English.

# B Corner: Investigating the cause of Minamata Disease

## How was the cause found?

This exhibit explains the research and history behind finding the cause of Minamata Disease. Visitors can also see exhibits on treatment in the initial and chronic phases of the disease and watch a video about rehabilitation of those suffering from this illness.

**Exhibits**

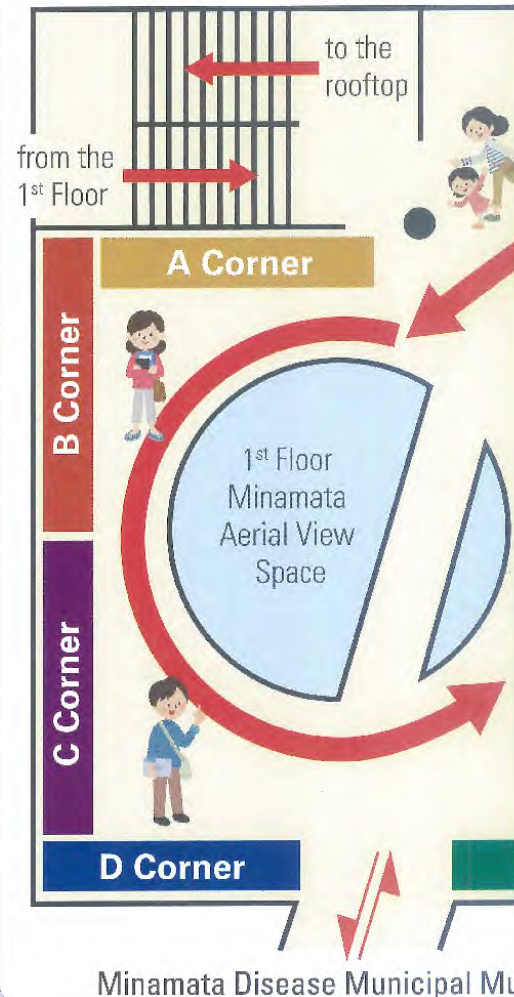
- (1) Investigation of the Cause of Minamata Disease
- (2) Epidemiology in the Early Stages
- (3) Investigation of the Cause of Minamata Disease by Kumamoto University, School of Medicine
- (4) Investigation into Minamata Disease performed by Chisso Corp.
- (5) Medical Treatment for Methylmercury Poisoning
- (6) Pollution in Minamata Bay and Environmental Restoration



Chronology of the search for a cause



What is the mercury concentration in Minamata Bay?



# C Corner: Mercury research

## What is mercury?

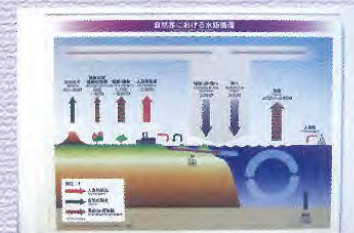
This exhibit explains such issues as the material form and characteristics of mercury, its circulation in the environment and concentration in the food chain, as well as methods of analysis.

**Exhibits**

- (1) Mercury as a Substance
- (2) Analysis of Mercury
- (3) Fish and Methylmercury
- (4) Mercury in the Natural Environment



Each cinnabar ore containing mercury

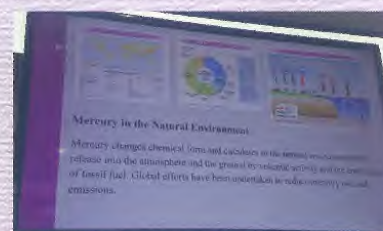


The movement of mercury in nature



## Foreign Languages

A Translation of 2nd Floor exhibits is offered in English, Chinese, Portuguese and Spanish. Choose one of the languages displayed on the touch panels at each corner.



present such topics as an overview of investigation of its cause, with study and innovation worldwide. Exhibits on the 2<sup>nd</sup> floor are available in English, Chinese, Portuguese, and Spanish.

Eco Park View

VTR Corner

restroom

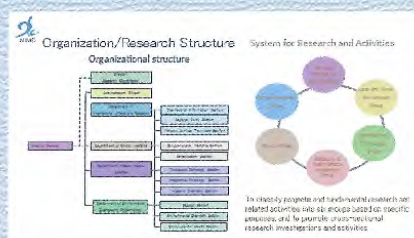
## F Corner: The Message of Minamata

### What is the NIMD?

This exhibit discusses the organization, research system, facilities, and research overview of the National Institute for Minamata Disease, as well as the Minamata Convention on Mercury.

Exhibits

- (1) Role and activities of the National Institute for Minamata Disease
- (2) Introduction to research conducted by the National Institute for Minamata Disease
- (3) Introduction to the Minamata Convention on Mercury



## E Corner: Question corner

Have a closer look!

This Corner features a touch panel to answer your questions about Minamata Disease and mercury.

Touch the screen to learn more about topics of interest.



## D Corner: Mercury contamination worldwide

### What issues are there worldwide?

Visitors can view videos about 12 examples of National Institute for Minamata Disease efforts concerning global mercury contamination. Recent problems include contamination from mercury that was discharged during gold mining and from abandoned mines, as well as issues regarding the proper handling of mercury remaining at former factory sites.



Global mercury contamination issues and NIMD efforts



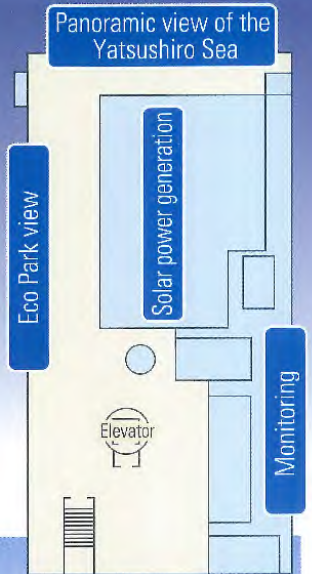
# Rooftop

Visitors can see Minamata Bay, Eco Park Minamata, and the Yatsushiro Sea framed by the Amakusa Islands, which were impacted by Minamata Disease. Eco Park Minamata is built on land reclaimed from the Bay.

From here, the National Institute for Minamata Disease monitors atmospheric and rainfall concentrations of mercury to better understand its circulation in the environment in East Asia.



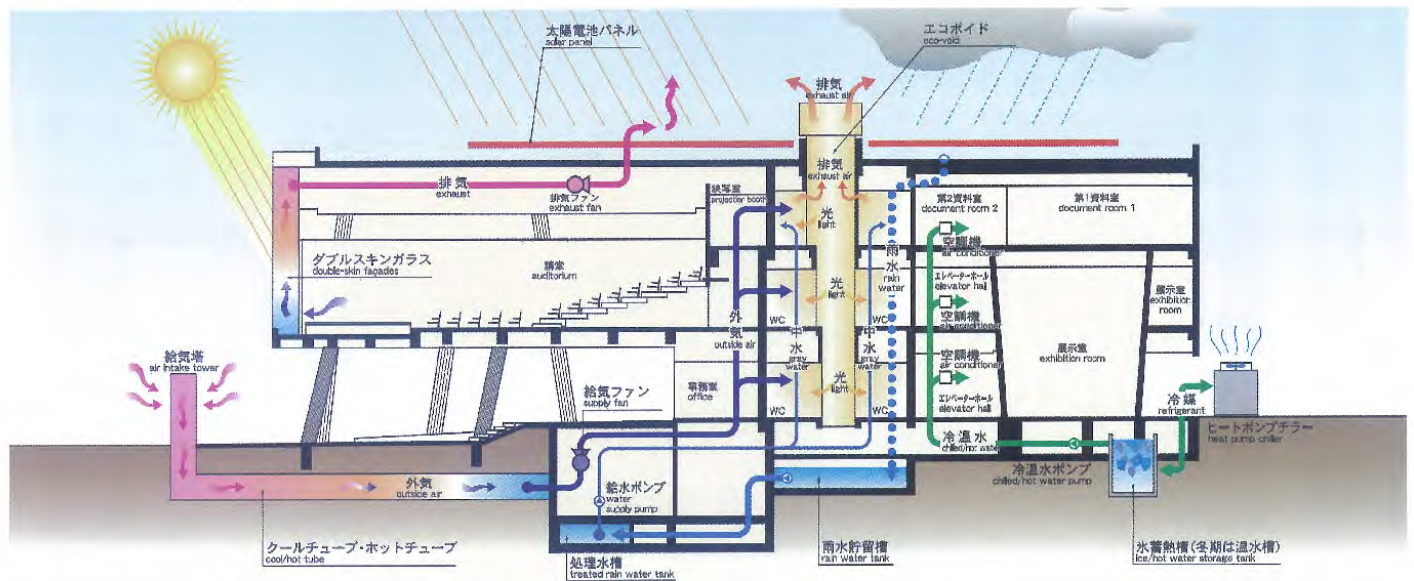
Rainfall monitoring equipment



## The National Institute for Minamata Disease was built with the environment in mind.

Solar power generation, ice thermal storage air conditioning, rainwater usage, and LED lighting have been adopted.

For example, the stairwell in the middle of the building uses sunlight for lighting, and this setup can also be used for extraction of excess exhaust and smoke during fires. For air conditioning, we conserve energy by using ice during the summer and hot water during the winter.



The National Institute for Minamata Disease building has adopted a variety of measures that keep the environment in mind.

### Please take note of the following points while visiting:

- Feel free to take pictures, but do not use tripods or otherwise cause inconveniences to those around you.
- Please do not bring food and drink or pets into the building and please do not smoke.
- Please do not engage in any acts that annoy other visitors.