Protecting disaster victims from infectious disease outbreaks after the earthquake

Soon after the Great East Japan Earthquake occurred, Tohoku University, the Graduate School of Medicine and the University Hospital, organized a special infection control team (ICT) to protect local communities against infections and provide clinical management and control for infections at hospitals/clinics.

The Tohoku University ICT assessed the infection risks at stricken areas and shelters, created an infection control manual, and made efforts to manage influenza outbreaks at shelters. The ICT also assisted with treatment for patients with infectious diseases that had been carried from the stricken area to the University Hospital, and analyzed the characterization of such diseases. An influenza outbreak actually occurred at a shelter with some 1,000 evacuees around ten days after the earthquake. The ICT set up a fever outpatient section immediately, and gave instructions on using alcohol for hand hygiene to the children and adults. As a result, the outbreak was successfully controlled in one week.

Some people said that "it was a miracle" that very few outbreaks occurred after such a large scale disaster. However, in hindsight, Prof. Mitsuo Kaku says: "It was not a miracle."

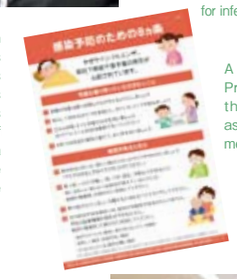
When the 2009 H1N1 pandemic influenza occurred, the Medical Association, core hospitals and Tohoku University cooperated and coordinated with one another to provide medical services in Sendai. This was called the 'Sendai system,' which in turn spread across the country. On March 18, a week after the earthquake, Prof. Kaku and his team prepared 8 fundamental rules to prevent communicable diseases and posted them on their homepage. They also distributed these to news media for broadcast.

The background of this was that those who engaged in medical services in Miyagi Prefecture had had meetings and worked to cooperate and coordinate with one another because of the "Tohoku Infection Control Network" which has covered the entire Tohoku area since its establishment in 1999.

WHO proposed the establishment of Global Infection Prevention & Control Network. The team, headed by Prof. Kaku, was invited to participate in that network. From left: Dr. Michael Bell from US CDC (Centers for Disease Control and Prevention), Dr. Carmen Lucia from WHO's infection control team, and Prof. Kaku.

A picture of doctors working for infection control and prevention in a shelter

Legionella infection has been noted as a typical infectious disease after disasters such as earthquakes or tsunami. A case of *Legionella* pneumonia was confirmed here for the first time in the world.



A poster showing the "8 Rules for Preventing Communicable Diseases" that was distributed to medical associations and reported by the news media after the Great Earthquake.

Professor, Infection Control and Laboratory Diagnostics, Internal Medicine, Medical Sciences, School of Medicine
Tohoku University Graduate

Mitsuo Kaku

Born in 1953 in Oita Prefecture. M. D. Graduated from the Nagasaki University Graduate School of Medicine. Worked as Lecturer at the Department of Clinical Laboratory of Nagasaki University Hospital, Senior Associate Professor at the Department of Microbiology of St. Marianna University School of Medicine. Has been in his current position since 1999.

http://www.tohoku-icnet.ac

Radically changing society through enhanced battery performance

Many power plants were damaged by the Great East Japan Earthquake, and the power supply has been under strain.

If wasted energy can be recovered in the form of electricity and stored in a battery for repeated use, as in a hybrid vehicle, the amount of energy used can be dramatically decreased.

The key to that technological innovation is further improvement in the performance of batteries. So says Professor Junichi Kawamura, who researches materials for lithium batteries and fuel cells.

His laboratory successfully developed an all-solid-state lithium-ion battery that is expected to be the battery of the future. This battery has a long life with no danger of leakage since it has no electrolytic solution in it.

Furthermore, as it can be made thin and has a high energy density, it is expected to be applied in various devices/apparatuses/machines.

In addition, a technique for diagnosing battery degradation was developed. If the amount of energy consumed in the process of battery production is not reduced, or if battery life is not extended, total energy usage cannot be reduced.

"In the process of researching batteries, various instruments were used to diagnose their degradation. We examined the internal structure of batteries with MRI for the first time. We also developed a diagnostic method for detecting the ultrasonic waves emitted by a battery. I hope that such diagnostic techniques will help advance our research for making battery life longer, and developing enhanced battery performance," says Prof. Kawamura.

The kinetic energy of a vehicle derived from the burning of gasoline changes into potential energy when the vehicle runs up a slope, and into heat energy when the brakes are applied. Such potential energy and kinetic energy are recovered by a regenerative brake that converts them to electricity. This is the principle of a hybrid vehicle that recycles energy.

An all-solid-state battery will be applicable to a wide range of uses, such as on-chip batteries in ICs or built-in batteries in ID cards. The amount of power used in such batteries is extremely small, so it is possible to generate power from captured radio waves passing through our living spaces (energy harvesting), and store that power.

Prof. Kawamura's laboratory mainly consists of physics students from the School of Science. Until now, batteries have been a subject for chemists, but now they are also a subject for physicists.

A diagnostic technique using the "Battery Doctors" that Prof. Kawamura proposed makes good use of thermography (temperature measurement), imaging (X-ray and MRI), AE measuring devices (stethoscope), and so on. The picture shows an MRI image being taken.

Director, Institute for Multidisciplinary Research for Advanced Materials (IMRAM)
Professor, Solid-State Ion Physics, Research Center for Sustainable Materials Engineering

Junichi Kawamura

Born in Nagano Prefecture in 1953. Ph.D. (Science). Graduated from the master's course, Chemistry II, School of Science, Hokkaido University. Worked as Assistant and then Lecturer at Faculty of Science, Hokkaido University, and then as Assistant Professor at Research Institute for Scientific Measurements, Tohoku University. Has been in his current position since 2006. Appointed as Director, IMRAM, in 2010.
Hobby: Mac

http://www.tagen.tohoku.ac.jp/labo/kawamura/index_j.html