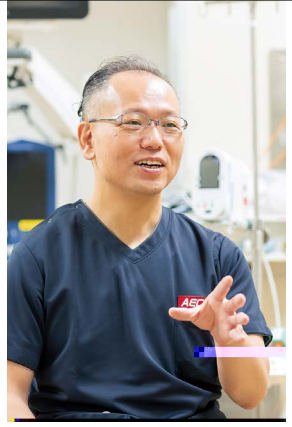
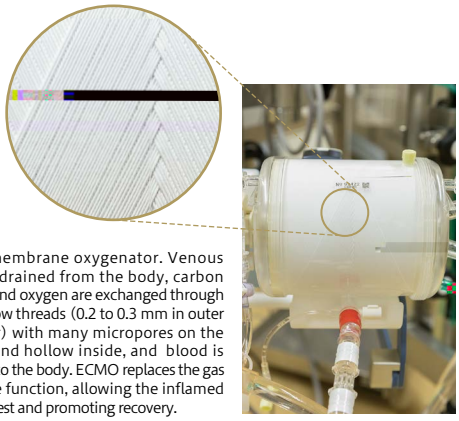
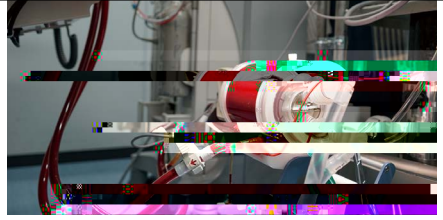
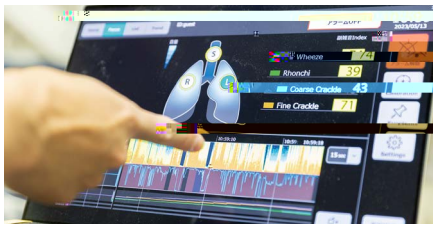




ECMO membrane oxygenator. Venous blood is drained from the body, carbon dioxide, and oxygen are exchanged through thin hollow threads (0.2 to 0.3 mm in outer diameter) with many micropores on the surface and hollow inside, and blood is returned to the body. ECMO replaces the gas exchange function, allowing the inflamed lungs to rest and promoting recovery.



Membrane oxygenator in operation. Since severe respiratory failure requires ECMO for a long time, it is essential to have skilled staff such as physicians and clinical engineers who can quickly exchange artificial lungs and nurses who can appropriately manage blood clots and bleeding.



A respiratory sound monitoring system that numerically "visualizes" respiratory sounds, without relying on the skill or auditory sense of physicians and medical staff, was developed in collaboration with a domestic medical device manufacturer. Currently, the system is being developed for monitoring critically ill patients in intensive care units and operating rooms, and for telemedicine for home patients and hotel care patients.

Associate Professor,
School of Medicine
Graduate School of Biomedical and Health Sciences

OHSHIMO Shinichiro

Field of specialization

Severe respiratory failure, mechanical ventilation, extracorporeal membrane oxygenation (ECMO)

Associate Professor Ohshimo was not originally a critical care physician, but specialized in respiratory medicine and has long investigated fibrotic lung diseases (i.e. a disease that involves inflammation and fibrosis of the tissue between the alveoli). Under the policy of his mentor that, "Respiratory physicians need to be able to treat all organs of the body," he was assigned to the Department of Emergency and Critical Care Medicine. Six months later, he encountered the H1N1 influenza pandemic and experienced the importance of extracorporeal membrane oxygenation (ECMO). He says, "If I had been assigned one more year later, I would not be who I am today. I feel that life has a mysterious fate."

10 years together with ECMO

— To save lives that could not be saved —

Many of you must have had a difficult high school life due to the COVID-19 pandemic. Did you know that in 2009, when many of you were still very young, Japan had another pandemic crisis? It was the H1N1 influenza virus. Until then, influenza was considered a slightly stronger form of the common cold. However, with the H1N1 influenza, many patients developed severe respiratory failure that they could not keep breathing even with mechanical ventilators.

At that time, I had just started working in the Department of Emergency and Critical Care Medicine at Hiroshima University Hospital. The world was scared of this invisible and mysterious infectious disease. It was just like when the COVID-19 pandemic started. Meanwhile, reports came in from overseas that even critically ill patients could be saved by using an ECMO machine.

However, in Japan at that time, many patients could not be saved, even with the use of ECMO. Why do you think that was? This was due to the special nature of treatment for patients using ECMO. In severe respiratory failure, where the treatment period was long, it was necessary to prepare for infections, complications, blood clots, etc. And whole-body care was essential to cope with the heavy stress on the heart, kidneys, brain, etc. In Japan back then, this was not well known yet. We required not only devices but also the development of human resources. Since then, I have trained in ECMO know-how in the United States, the United Kingdom, and Sweden, which were considered advanced countries regarding ECMO at the time. At Hiroshima University, we repeatedly held ECMO seminars for doctors, nurses, and clinical engineers across the country in cooperation with like-minded emergency intensive care physicians.

Then came the COVID-19 pandemic in 2019. Emergency intensive care physicians across the country, including us, demonstrated the ECMO management and treatment skills we have developed over the past 10 years. We also used our network beyond our hospitals to provide medical support in areas where medical care was about to collapse. As a result, the survival rate of patients with severe COVID-19 who received ECMO was 65%, one of the highest in the world. The number of ECMO cases at Hiroshima University Hospital is among the highest in Japan, with a survival rate of 93% last year. Doctors from all over the country are now coming to our hospital to learn the skill.

However, there are still lives that cannot be saved. At Hiroshima University, we are researching the mechanisms by which strong spontaneous breathing damages the lungs and its treatment using animal models. In addition, emergency intensive care physicians work not only in hospitals but also outside, such as in air ambulances and DMAT (Disaster Medical Assistance Team). Taking advantage of this characteristic, we are also focusing on transporting critically ill patients, aiming to further improve the survival rate.

Medical care is very important for people to happily and peacefully live. It is also important to take care of your own health by getting regular checkups and avoiding unhealthy habits. However, if you need medical treatment for illness or injury, Hiroshima University Hospital will always do its best to treat you, so you can live your life with peace of mind.

Emergency intensive care physicians are trained to work outside hospitals, such as in air ambulances. In patients treated by emergency intensive care physicians, there are often no treatment protocols (i.e. predetermined treatment procedures and plans). They must be able to examine the entire body and quickly determine and provide necessary treatment.

Distinctive research facilities

Attached Research Institute

Research Institute for Radiation Biology and Medicine

The Institute conducts comprehensive research projects on the effects of radiation on the human body, ranging from cutting-edge basic research in genomics to advanced clinical deployment of regenerative medicine, etc. While being involved in research and development of medical treatments for A-bomb survivors for over half a century, the Institute is actively engaged, as a research hub in the field of radiation disaster medical science, in joint research projects with researchers and doctors across the country.

Joint Education and Research Facilities on Campus

- Research Institute for Nanodevices
- Research Institute for Higher Education
- Information Media Center
- Natural Science Center for Basic Research and Development
- Morito Institute of Global Higher Education
- Health Service Center
- The Center for Peace
- Environmental Research and Management Center
- Hiroshima University Museum
- Beijing Research Center
- Hiroshima Astrophysical Science Center
- Institute for Foreign Language Research and Education
- Hiroshima University Archives
- Institute of Sport
- HiSIM* Research Center
- Amphibian Research Center