CUTTING-EDGE EXPERIMENTAL EQUIPMENT

Facilities for High Quality Research

The Kyoto University's state-of-the-art laboratories and research facilities provide students and researchers with the hands-on practical experience vital to their development as world-class scientists and scholars.

MEDICINAL SCIENCE

The Facility for iPS Cell Therapy

And the iPS Cell Stock Project.

The Facility for iPS Cell Therapy (FiT), a cell processing center at the Center for iPS Cell Research and Application (CiRA), is a core facility to support clinical research through techniques for the generation, expansion and differentiation of induced pluripotent stem cells or iPS cells. Managed by FiT director Dr. Shin Kaneko, an associate professor at CiRA, the facility houses closed and open cell processing rooms, a cell reservation room, a quality control room, a supply room, and a monitoring room. Currently over ten researchers and technicians are working on the production of iPS cell lines in compliance with Good Manufacturing Practice (GMP) standards.

The iPS Cell Stock Project, one of CiRA's major initiatives, takes place at the FiT. The staff generate iPS cells derived from blood cells from healthy HLA-homozygous donors. The iPS cells made at the FiT are rigorously examined for safety and efficacy, and only high quality iPS cells are selected and frozen for stockpiling. The stored iPS cells will be distributed to other research institutes and businesses where they will be differentiated into functional cells such as neurons and heart muscle cells for use in clinical research or cell transplant therapy. CiRA plans to preserve up to ten iPS cell lines to cover approximately thirty to fifty percent of the Japanese population by the end of March 2018. The stock project is part of CiRA's efforts to make iPS cell-based therapy readily available at a reasonable cost.

WEB www.cira.kyoto-u.ac.jp/e/index.html

Cell reservation room

Supply room

CLINICAL MEDICINE

Next-Generation Hybrid Operation Room

Integrated Angiographic Image Supported Operation System.

Recent technological advancements and refinements in endovascular surgery and interventional cardiology have enabled many open surgical procedures to be performed less invasively. Such procedures are called hybrid procedures, and include transcatheter heart valve implantation or endovascular aneurysm repair. Hybrid operating rooms (OR) equipped with angiographic imaging systems are essential for such minimally invasive but complex procedures. Recently, a state-of-the-art hybrid operation room called a next-generation hybrid OR was built at the Kyoto University Hospital. The hybrid OR is an extremely complex working environment that enables a large team of surgeons, interventionalists, nurses, anesthesiologists, and technicians to work seamlessly together. A multi-axis angiographic imaging system based on robotic technology (Artis Zeego, Siemens, Germany), which can be positioned as required, was also installed. The system, which can be controlled with far greater ease and precision than conventional C-arm systems, has three

major advantages: (1) Imaging excellence: benifiting from syngo DynaCT Cardiac acquisition when positioned to the side or laterally to the head, and with the potential for higher speed and accuracy in the rotational run. (2) Enhanced workflow: thanks to its small footprint and multiple park positions, the Artis Zeego is ideally suited for the OR environment. The flexible working height reduces the fatigue associated with long procedures. (3) Economic efficiency: it is possible to perform pre- and post-operative high-end imaging directly in the OR.

In addition to the angiographic imaging system, a surgical navigation system (Brainlab, Germany) was installed. This system ties together the crucial aspects of surgery—from planning and navigation to data management and intra-operative imaging. This integration helps clinicians fully leverage patient data that is continually growing in volume and complexity. Also, this system includes software which helps surgeons make the most of such data during the pre-operative planning. With features such as automatic image fusion and automated workflow options, it enables intelligent planning for a wide variety of procedures in neuro, vascular, trauma, otolaryngologic, and orthopedic surgeries.

Dr. Ryuzo Sakata

Deputy Director of Kyoto University Hospital/Director of Surgery Unit, and Professor and Chairperson, Department of Cardiovascular Surgery in Kyoto University Hospital

WEB www.med.kyoto-u.ac.jp/E/grad_school/introduction/1406/

Civil Engineering

The First Multi-Megawatt Floating Offshore Wind Turbines in Japan

Offshore wind energy resources in Japan's EEZ (Exclusive Economic Zone) are now considered to be huge. In order to utilize the large amount of renewable energy located in relatively deep water areas (water depth range: 50-300 m), the Ministry of the Environment initiated a demonstration project on floating offshore wind turbines (FOWT) in 2010. Kyoto University is leading this six-year national project as one of its core members.

The half-scale model

Two FOWTs have been installed for the project. The first is mounted with a downwind type 100 kW wind turbine, and it is only about half as long as the second FOWT. It is therefore called a half-scale model. The second FOWT is mounted with a downwind type 2 MW wind turbine. This is called a full-scale model. The full-scale model measures 172 m from the bottom of its floating foundation to the top of its blades.

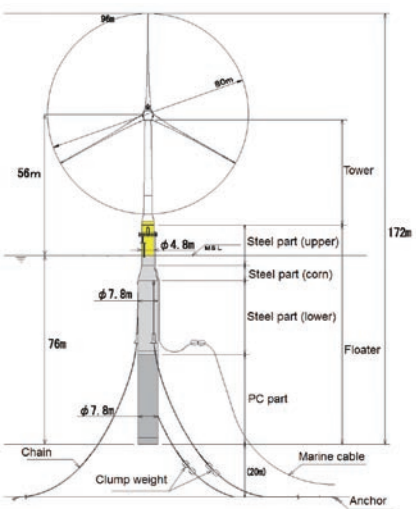
The FOWTs consist of a cost-effective PC-steel hybrid spar, and are moored with three anchor chains. On June 11, 2012, the half-scale model was installed at an offshore site near Kabashima Island in Goto City, Nagasaki prefecture as the first grid-connected FOWT in Japan. In September of the same year, the half-scale model was struck by Typhoon Sanba (1216), the most severe tropical typhoon in the world that year. However, the half-scale model survived with no damage, proving the survivability of the spar-type FOWT against typhoons.

After the very successful at-sea experiment of the half-scale model, the full-scale model was installed. The opening ceremony for the first multi-megawatt FOWT in Japan was held on October 28, 2013, and was attended of the Minister of the Environment. This project is anticipated to blaze a trail for the utilization of a huge amount of renewable offshore wind energy resources.

Dr. Tomoaki Utsunomiya

Associate Professor, Department of Civil and Earth Resources Engineering

WEB goto-fowt.go.jp/english/



Dimensions of the full-scale model