Life Sciences IT Environment Nanotech/Materials

Kobe Translational Research Cluster

Kobe

Creating advanced medical industries based on regenerative medicine and other innovative medical technologies

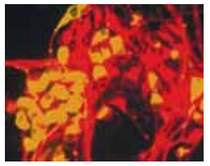
Cluster Vision

In the Kobe region, the Foundation for Biomedical Research and Innovation (FBRI) served as the core organization of the cluster, which involved a broad range of local universities, research institutions, and private companies. We were systematically and comprehensively involved in the practical application of advanced medical technologies, including regenerative medicine using stem cells. FBRI was also working as a whole to promote new business creation from technological “seeds” research and to stimulate translational research (the use of basic research results in clinical applications). FBRI was also closely linked to [the Life Science Park] SAITO (Northern Part of Osaka Prefecture), named “Kansai Wide Area Cluster,” and was working in close cooperation with neighboring biomedical clusters, leading to the creation of a “Biomedical Super Cluster”

Project Overview

Stem cell research has advanced markedly in the universities and research institutions located in and around the Kansai region. On the basis of this research, we [our medical project in Kobe] aim to develop treatments for intractable illnesses, including cerebral and nervous system disorders (such as Parkinson’s disease) and heart infarctions. To realize medical treatments for these diseases, we must develop cell/tissue culture and cell sorter technologies, which are expected to foster as well novel industries. Another target is the development of effective treatments for diabetes; here, we are using the results from the recently completed sequencing of the human genome.

- Embryonic stem (ES) cells have the unique ability to differentiate into various types of cells, including neurons (nerve cells).Using ES cells, we are developing treatments for intractable neural diseases such as Parkinson’s disease.
- Using state-of-the-art engineering and technology, we have developing cell chip and new microscope technologies. Utilizing these technologies, we are improving the quality control of cultured cells and tissue in order to contribute to regenerative medicine and to the development of new pharmaceuticals.
- Using human blood vessel (hematopoietic) stem cells that exist even in mature adulthood and myocardial (heart muscle) stem cells, we are developing treatments for cardiovascular diseases, including cardiac infarctions and vascular occlusions.
- With the use of the most-advanced genetic analysis technologies, we are searching for genes related to “lifestyle-related diseases”; e.g., diabetes, high blood pressure, and high cholesterol-related disease (hyperlipidemia). In return, treatments for these diseases will be also developed.



Nerve cells that have been differentiated from monkey ES cells within a test tube
Yellow: dopamine cells
Red: other nerve cells

FBRI provided various systematically and comprehensive workshops and seminars for venture companies and researchers on regulatory affairs, intellectual property, licensing and others which are important for industrializing state-of-the-art medical technologies.

President
Hiroo Imura, *M.D.*

Dr. Hiroo Imura has previously served as chancellor of Kyoto University, president of Kobe City General Hospital, and executive member of the Council for Science and Technology Policy of the Cabinet Office.

Promoting a State-of-the-Art Medical Industry Ensures that Citizens Achieve a Healthy and Fulfilling Life.

Here in Kobe, we are developing the core facilities which are necessary for the formation of a medical industry-based city. Our current task is to effectively utilize these existing infrastructure resources and to add the “software” to the “hardware” so that the entire organization works as a comprehensive organization. We are now at the stage where we must “breathe spirit into the statue of Buddha.” With these initiatives, we have great expectations that our Knowledge Cluster Initiative will play a central role in achieving this goal.
In creating the Knowledge Cluster, our aim has been the realization of regenerative medicine and the development of a broad spectrum of clinical technologies. We already posses advanced research on several diseases, including research on Parkinson’s disease, myocardial infarction, and diabetes. Individual research results have led to joint research, which has fostered progress in areas like patent applications and drug-manufacturing business.
Since 2003, we have selected particular research themes, which are now coming to the stage of practical application. To ensure that there is substantial support for such research activities, we are strengthening our collaboration with SAITO (in the northern part of Osaka Prefecture) to form the Kansai Wide-Area Cluster. We have also forged links with other nearby biomedical-related clusters, including Tokushima, Takamatsu, Hiroshima, and Kansai Science City (KSC). Together these disparate entities will be united to serve as the basis for a Biomedical Super Cluster. By promoting research and development within our cluster, we will help to realize healthy lives for our citizens and we will also create new businesses to provide further support for healthy living.

Cluster Headquarters

- ○Advisor……Masaaki Terada (Former Chairman, Food Safety Commission)
- ○President……Hiroo Imura (President, Foundation for Biomedical Research and Innovation / Chairman, Kobe Medical Industry Development Project Study Group)
- ○Project Director……Tomokichiro Fujisawa (Former Chairman, Board of Trustees, Kobe Pharmaceutical University)
- ○Vice President and Chief Scientist…Shin-ichi Nishikawa (Deputy Director, Center for Development Biology, RIKEN)
- ○Deputy Chief Scientist and Science and Technology Coordinator…Ryoji Yano
- ○Science and Technology Coordinators…Masahiko Ito, Hideki Takeda, Yoshikuni Ito

Core Organization

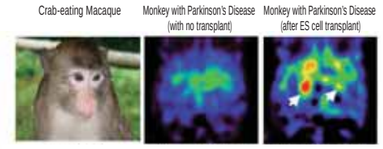
Foundation for Biomedical Research and Innovation

Participating Research Organizations (Bold: Core Research Organization)

Industry…Shin Nippon Biomedical Laboratories, Ltd., Dainippon Sumitomo Pharm Co., Ltd., and others
Academia…**Kyoto Univ., Osaka Univ., Kobe Univ.,** Kyoto Prefectural University of Medicine, University of Hyogo
Government…**Institute of Biomedical Research and Innovation (IBRI); Center for Developmental Biology (CDB), RIKEN;** Kobe City General Hospital; Research Institute of Cell Engineering (RICE, National Institute of Advanced Science and Technology); National Hospital Organization Osaka National Hospital; National Cardiovascular Center

Main Results

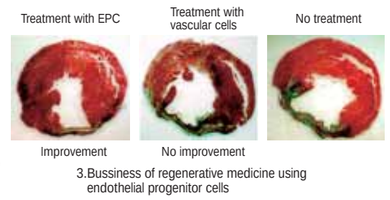
1. Treatment of an animal model of Parkinson’s disease using stem cells
Using embryonic stem (ES) cells(cells that have attracted attention as “master” cells), we have successfully achieved efficient dopamine neuron production in vitro. We noted a reduction in movement disorders three months after transplantation of these cells into the brain (corpus striatum) of the monkey that served as the Parkinson’s disease model.



Transplantation of ES cell-derived dopamine neurons resulted in increased activity of dopamine neurons (red portion) within the brain of the crab-eating macaque (Macaca fascicularis)

2. Identification of multiple treatment target molecules for lifestyle-related diseases including diabetes
We succeeded in identifying multiple diabetes target genes such as MCP1, Stra13, KLF15, and HG-EGF. Several are being jointly researched with companies. They are expected to be important target molecules. Study of the development process from embryonic stem cells to adipocytes is revealing the physiological significance and potential for clinical use of adipose stem cells.

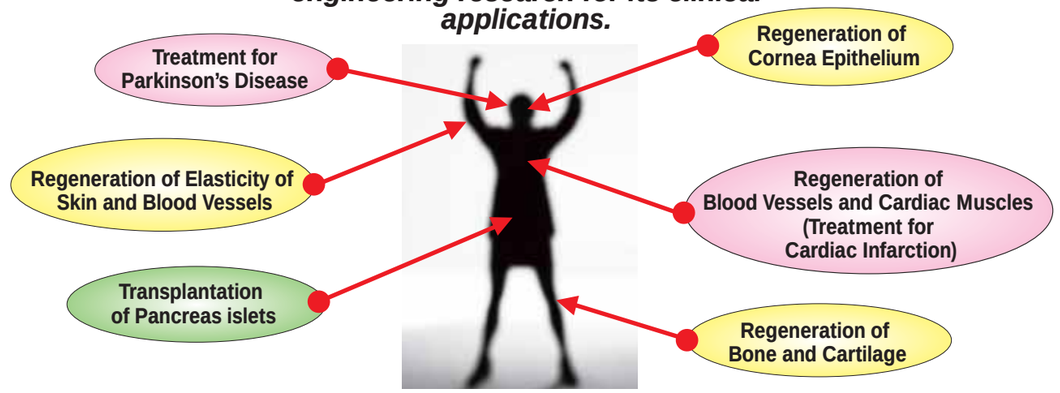
3. Bussiness of regenerative medicine using endothelial progenitor cells
We isolated cells that become blood vessels from blood and succeeded in growing them. We conducted a clinical study that treated areas like the lower limbs where blood was not flowing with EPC.
Based on this technology, StemMed Co., Ltd. was established, and we are work on further development of regenerative medicine.



3.Bussiness of regenerative medicine using endothelial progenitor cells

Clinical Applications of Tissue Engineering

The Kobe Cluster Project is supporting tissue engineering research for its clinical applications.



Development of Technologies supporting Regenerative Medicine

Novel Growth Factors
New Devices (e.g. Cell Tips)
Germ-line Stem Cells (GS cells)
3-D Scaffold
Serum-free Culture System