

●Development Stage

(Fiscal Year 2007-2009)

Foot of Mt. Fuji Area

Establishment of the Pharma Valley Cluster for the health industry that answers health needs by developing ultramodern cancer diagnoses and treatments

Shizuoka Organization for Creation of Industries - Pharma Valley Center

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Framework for Project Promotion

- Corporate General Manager... Ken Yamaguchi (Shizuoka Prefecture Board of Director and President of Shizuoka Cancer Center)
- Project Director... Kengo Inoue (Shizuoka Organization for Creation of Industries - Pharma Valley Center)
- Chief Scientist... Susumu Hirose (Vice-Director General, Research Organization of Information and Systems - National Institute of Genetics)
- Science & Technology Coordinator... Masao Yaso
- Science & Technology Coordinator... Teruo Bando

Core Research Organizations

- Research Organization of Information and Systems - National Institute of Genetics,
- Shizuoka Cancer Center, Numazu National College of Technology, Numazu Technical Support Center of Industrial Research Institute of Shizuoka Prefecture, Waseda University, Tokyo University of Agriculture and Industry, Tokyo Institute of Technology

Major Participating Research Organizations

- Industry... KYOWA MEDEX Co., Ltd. Asahi Kasei Pharma Co., Ltd. Medical Biology Research Center Co., Ltd. Yanaihara Institute Inc. Toshiba Instrument Co., Ltd. Sumitomo Bakelite Co., Ltd. BL Co., Ltd. NSG Group ABLE Corporation Co., Ltd. Bioinformatics Institute for Global Good, Inc. (BIGG) Yazaki Co., Ltd. Mitaka Kohki Co., Ltd. Techno Smart Co., Ltd. Ichimaru Pharcos Co., Ltd. Cosmo Oil Co., Ltd. Ricoh Co., Ltd.
- Academia... National Institute of Genetics, Numazu National College of Technology, Waseda University, Tokyo University of Agriculture and Technology, Tokyo Institute of Technology, Tokai University
- Government... Shizuoka Cancer Center, Numazu Technical Support Center of Industrial Research Institute of Shizuoka Prefecture Fuji Technical Support Center of Industrial Research Institute of Shizuoka Prefecture

Aims of Project

The activities of the Pharma Valley medical cluster are empowered by joint research conducted by the National Institute of Genetics, universities of medical science and technology, and the clinical research undertaken by the Shizuoka Cancer Center.

Created at the foot of Mt. Fuji, the cluster administers and promotes the development and commercialization of cancer-diagnosis equipment and drugs, ranging from the development of tumor markers and biomarkers for the early detection of cancer to advances in immunotherapy.

The present project makes use of results from the City Area (Basic Stage) Program, including cancer-diagnosis medicines, antibody-production technology, the creation of easily applied tumor-analysis kits, a genechip for cancer diagnosis, and clinical immunotherapy applications. The project is concerned with the development of biotechnologies, including cancer diagnosis and treatment, and equipment for spectroscopic analysis, all with the cooperation and technical support of science and technology universities.

Contents of Project

Group 1 - Development of Genomics-based Early-diagnosis Agents and Equipment for Cancer

1. Development of cancer diagnostics using psoralen derivatives
It is possible to verify diagnosis technologies based on the detection of gene transcription features in cancer cells. Our aim is to develop fast, sensitive, and easy-to-use cancer diagnosis methods.
2. Application of research advances in chromosomal division in the expansion of biomedical businesses
Cancer cell chromosomes inherit some of the functions located in their centromer region; this is essential for cell division. The aim of this research is to develop useful markers and medicines by targeting the centromer region.
3. Gene Targeting of genetic diseases, and applications
Our aim is to commercialize low-cost and efficient new models to support the screening of new medicines and their evaluation: data are collected from mutant mice banks and patient cells.

Group 2 - Development and commercialization of new tumor-diagnosis systems by marking cancer cells

1. Development of a new tumor-diagnosis system based on protein and gene detection
Commercialization of new lung-cancer diagnosis kits: detection is based on protein markers obtained from lung-cancer cell cultures.
2. Improvement of diagnostic methods using new markers of cancer of the digestive organs
This new diagnosis device, applied directly to the patient's excrement, works by identifying cancer markers labeled with porphyrin.

Group 3 - Development of immunotherapy technologies and clinical applications

1. Development of new cancer treatments based on immunocytes
Attacking cancer cells using immunocytes (T cells) with specific receptors: the technology is applied to patients with highly malignant melanoma.
2. Production of antibodies based on genetic engineering, and clinical applications
The aim of this research is to develop a highly sensitive, rapid, and easy-to-use immunochromatographic measurement kit for the detection of infectious diseases.

Group 4 - Development of Diagnostic Agents and Diagnosis Equipment for Cancers

1. Utilization of spectroscopic analysis for non-invasive diagnosis of skin cancer
Biopsies are commonly avoided because of the high risk of metastasis by blood circulation. We are currently developing non-invasive analytical technologies for the detection of skin cancers using hyperspectral imaging.
2. Nanotechnology-based molecular design of a "magnetic bead" applied to cancer treatment
In this research, magnetic beads are developed in order to support the screening of cancer cells and immune cells markers.
3. Utilization of aminolaevulinic acid and derivatives as a technological support system
Aminolaevulinic acid is used to increase the accumulation of protoporphyrin in cancer cells. The technology is used to help locate cancer cells during, for example, surgical excision.

Main Results

1. Manufacture of three types of antibodies

Cancer has a number of negative effects on chromosomal division. New possibilities exist in drug development for diagnosis and treatment by targeting the proteins localized in the centromer region of chromosomes. With the release in Fiscal Year 2007 (by MBL Co., Ltd.) of three antibodies ("anti-centromer proteins"), there are high expectations to ultimately obtain a diagnosis drug.



Antibodies CENP-K, CENP-50, and CENP-O

2. Successful manufacture of a prototype for the diagnosis of pigmented lesions using a hyperspectral camera

We developed diagnostic and analytical techniques that enable the non-invasive biopsy analysis of superficial skin tumors. In Fiscal Year 2007, we successfully developed a prototype of non-invasive diagnostic equipment for skin cancer (fiber and microscopic specifications determined by hyperspectral camera).



Microscopic specifications determined by hyperspectral camera

Fiber specifications determined by hyperspectral camera

3. Development of a database of immunization-related genes

Cancer-specific cells are isolated from the patient's blood cells, and cultures (dendritic cells) are developed in order to produce tailor-made medical treatments such as vaccines. The technology involves detecting and isolating the B-cell gene sequences implicated in the production of antibodies specific to cancer cells. The genetic information related to the immunization coverage is collected in a database.

