

**JSPS Core-to-Core Program**  
**FY2009 Implementation Plan (Project No. : 18006 )**

**Research Theme** Stem Cells and Cancer Stem Cells  
**Duration of Project** 2008.4.1 – 2011.3.31 ( 36 months )  
**Core Institution in Japan (Co-Chair)** Keio University  
( Prof. Toshio Suda )

**Implementing Organizations**

○ **Japan**

Japan	Core Institution	Keio University	
	Co-Chair (name and title)	Toshio Suda	
	Cooperating Institutions		Number of Cooperating Institutions
			0

○ **Partner Countries**

Sweden	Core Institution	Lund University	
	Co-Chair (name and title)	Stefan Karlsson, Professor	
	Cooperating Institutions		Number of Cooperating Institutions
			0

Sweden	Core Institution	Karolinska Institutet	
	Co-Chair (name and title)	Sten Lindahl, Director	
	Cooperating Institutions		Number of Cooperating Institutions
			0

UK	Core Institution	University of Oxford	
	Co-Chair (name and title)	Sten Eirik Jacobsen, Professor	
	Cooperating Institutions		Number of Cooperating Institutions
			0

USA	Core Institution	MD Anderson Cancer Center	
	Co-Chair (name and title)	Naoto Ueno, Associate Professor	
	Cooperating Institutions		Number of Cooperating Institutions
			0

USA	Core Institution	Stowers Institute for Medical Research	
	Co-Chair (name and title)	Linheng Li, Associate Investigator	
	Cooperating Institutions		Number of Cooperating Institutions
			0

## Objectives of Research Exchange (including the five years after the project finishes)

Stem cell, holding self-renewal activity, causes tissue formation. It is divided broadly into tissue stem cell which causes normal tissue and embryonic stem cell which is produced from embryos. There are a tremendous amount of researches on stem cells have been conducted in many countries aiming for regenerative medicine. We propose “choice and concentration” program instead of “omnidirectional” research system, with the main aim of fundamental research of tissue stem cell and its clinical application focusing on cancer and regenerative medicine. At “Integrated Action Initiative” program, we promoted our research focusing on hematogenesis and neural stem cell to accomplish the significant discovery regarding stem cell niche and molecular mechanism both at Lund University and Keio University ultimately. Also at “Strategic Research Network” program, we are going to continue “choice and concentration” researches with 5 core institutions in Sweden, UK and US. This is to say, the aim of our research is to demonstrate dynamics of normal stem cells and cancer stem cells focusing on “How tissue stem cells stay as stem cells.” These researches are expected to reach fruition as expansion of stem cells and drug discovery of cancer stem cells inhibitor 5 years later.

## Results to the present

### Joint Research

Students in the doctoral program of Dr. Karlsson of Lund University visited Keio University. They conducted a research on hematogenesis under the direction of Dr. Suda (1 student for 2 weeks / 1 student for 5 months)

### Seminar

In March 2009, there was “US-Japan Joint Seminar on Leukemogenesis” held in Hawaii. About 30 researchers in hematopoietic and leukemic stem cells of US and Japan gathered. There was an intensive discussion pertaining to endosteal niche with Dr. Zon, who has been leading the research on hematopoietic stem cells, and Dr. Morrison, one of the most important researchers in the field of stem cell research, who has been questioning the existence of cancer stem cells. The output of the discussion was conveyed to Dr. Li of Stowers Institute for Medical Research. Furthermore, the output of the discussion about stem cell signaling will be useful for the cooperative research with Dr. Jacobsen of Oxford University. The discussion about TGF signal at stem cell self-renewal was very fruitful for the cooperative research with Dr. Karlsson of Lund University. In addition, 2 young Keio researchers had an oral presentation and poster presentation. Their minds should have been motivated by a series of intensive discussions.

### Research Exchanges

Young researchers were sent to core institution and attended international conferences in the stem cell field (i.e. ISSCR: International Society of Stem Cell Research) and symposiums such as Keystone Symposia and Gordon Research Conferences at which young elite researchers gather. Besides making presentations, they successfully deepen exchanges with the researchers to establish the network for the future collaboration in the stem cell field.

### **Training program for young researchers**

In July 2008, there was Summer School held in collaboration with Karolinska Institutet on Keio campus. 6 PhD students from Karolinska, Keio PhD students and young researchers participated in one-week-intensive lectures. Karolinska students also joined four-week-laboratory work. Since Karolinska students obtained credit transfer for their work at Keio, Summer School was an official academic exchange between 2 universities.

## **Summary of FY 2009 Exchange Plan**

### **Joint Research**

Keio University is going to promote researches on stem cells and cancer stem cells such as cooperative researches with the following core institutions through “Strategic Research Network” program.

#### **Lund University:**

It will continuously develop the cooperative research in hematogenesis, cancer stem cells and neuroscience. A student in the doctoral program of Laboratory of Dr.Karlsson will visit Keio University for a month from middle of June and 3 months from October in order to conduct the cooperative research on osteogenesis and hematogenesis. A Keio young researcher will be sent to discuss the cooperative research on neurogenesis in the adult brain and regenerative medicine of cerebral infarction.

#### **Karolinska Institutet:**

The cooperative research will be on the behaviors of neural stem cells and vascular cells from the aspects of metabolism and blood brain barrier during the recovery of brain injury.

A debrief session will be held at Karolinska.

#### **Oxford University:**

Keio University will continue the cooperative research with Dr. Jacobson of Weatherall Institute for Molecular Medicine (a former professor at Lund University), which is superior in the field of hematogenesis and haematologic disease. A Keio PhD student who has studied in Oxford will continue the research on TPO/mpl signal, which is the common theme for Oxford and Keio.

#### **MD Anderson Cancer Center:**

Keio University will continue the project with Dr. Elizabeth Grimm on melanoma stem cells and the cooperative research on breast cancer stem cells with Dr.Naoto Ueno. Mouse brain tumor which was established in Saya's Lab was provided to Dr. Victor Levin in Department of Neuro-Oncology. They will facilitate the global communication among young investigators through the exchange of information on preclinical for anti-cancer drugs. 2 young researchers will be sent to MDACC for some months. The cost will be partly born by the matching fund of MDACC.

#### **Stowers Institute for Medical Research:**

Keio University will conduct a cooperative basic research on development biology and stem cells niche. Keio University will promote the research on hematopoietic niche by exchanging opinions with Dr. Liheng Li, and the research on germline stem cell niche with Dr. Ting Xie.

### **Seminar**

“Keio-Lund Summer School 2009” (2 days in August, 2009)

Keio University will hold Summer School in collaboration with Dr. Olle Lindvall of Lund University. The lectures will be given by Dr. Lindvall and the researchers who will visit IUPS. PhDs of Lund University and Keio University will have short presentation or participate in a poster session.

“JSPS Core-to-Core Program Symposium” (1 day in October, 2009)

Keio University will hold a symposium on hematopoietic stem cells and have a discussion about the cooperative research with 3 professors and 3 young researchers from Lund University. There will be an evaluation session of the presentation of the research results by 13 young Keio researchers (Tenure Track) by 3 professors of Lund University. Keio will ask them to give a lecture at the Annual Meeting of the Japanese Society of Hematology in Kyoto.

- 1) A discussion about the cooperative research on hematopoietic stem cells
- 2) A evaluation of the output of Keio young researchers based on the global standard. They will expect some advice for the proceedings hereafter.

### **Researcher Exchanges**

Besides academic exchange between the core institutions, it is also significant to attend international conferences regarding stem cells and cancer stem cells and to communicate with researchers of advanced research institutes in the world. Through such actions, we will be able to obtain diverse opinions from diverse fields and to expand the relationship efficiently and effectively. Major plans are as following.

- Keystone Symposia : Wistler, Canada  
Meet Dr. Liheng Li of Stowers Institute for Medical Research
- ISSCR (International Society for Stem Cell Research) : Barcelona, Spain  
Meet Drs. Liheng Li and Ting Xie to discuss stem cells niche.
- ISEH (International society for Experimental Hematology) : Athens, Greece  
Meet Dr. Karlsson of Lund University to discuss the research on hematopoietic stem cells.
- Basic Cardiovascular Sciences Conference (American Heart Association) : Las Vegas, US
- ASH (American Society of Hematology) : New Orleans, US