

**JSPS Core-to-Core Program**  
**FY2013 Implementation Plan (Project No. : 23003)**

Research Theme Forming research and educational hubs of medical physics  
 Duration of Project Apr.1, 2013 – Mar. 31 2016 ( 36 months)  
 Core Institution in Japan (Co-Chair) Osaka University  
 ( Nariaki Matsuura )

**Implementing Organizations**

○ **Japan**

Japan	Core Institution	Osaka University	
	Co-Chair (name and title)	Nariaki MATSUURA, MD. PhD. Professor	
	Cooperating Institutions	Osaka Medical Center for Cancer and Cardiovascular Diseases, Hyogo Ion Beam Medical Center, National Cerebral and Cardiovascular Center, University of Tokyo, Kyoto University, Juntendo University ,	Number of Cooperating Institutions  6

○ **Partner Countries**

United States	Core Institution	Indiana University	
	Co-Chair (name and title)	Indra J. DAS, PhD. Professor	
	Cooperating Institutions	Purdue University, University of Minnesota	Number of Cooperating Institutions  2

Netherlands	Core Institution	The University of Groningen	
	Co-Chair (name and title)	Sytze BRANDENBURG, PhD. Professor	
	Cooperating Institutions	Paul-Scherre Institute	Number of Cooperating Institutions  1

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

International research exchange is to be promoted aiming the development of particle radiotherapy and high-accuracy radiotherapy as medical physics in radiotherapy to cancer. Currently, particle radiotherapy in Japan is storming the world in the development of equipment. Japan-made equipment is introduced to leading cancer treatment facilities all over the world. In order to remain as a leader, it is important to continue developing the particle radiotherapy and associated equipment. In Osaka, the construction of particle radiotherapy center in few years, come off the drawing board and becomes a real possibility. The introduction of new technology of high-accuracy radiotherapy, such as IMRT, SBRT, IGRT has been proceeding rapidly in these two years. It is an urgent business to develop the research which is based on the both of particle radiotherapy and high-accuracy radiotherapy. **The basis to foundation for educational medical physics on international has been formed** through core-to-core Integrated Action Initiative project. At the Integrated Action Initiative project, research exchanges on basic medical physics are centered and mainly, graduate students are sent to counterpart core institutions and tried to cultivate research skill of medical physics. Gradually, our trial is boring fruit. At the Strategic Research Network project, medical physics is to be promoted newly to support and develop these two fields and specific research results can be gained. Moreover, as the basic research, new research fields such as biological signaling response to both particle beam and photon beam, radiation biology on the movement of stem cells at the irradiation and so on, and physical biological chemistry are to be developed. These biological researches are related with low-dose exposure, which has come to an issue since Fukushima nuclear accident. This can be related with the medical physical interpretation on the exposure to low irradiation of scattered rays at particle radiotherapy and of photon beam at the high-accuracy radiotherapy. At the five years after this project has finished integrated fields will blossoming and a solution to low-dose exposure can be offered.

The aim of Strategic Research Networks project is to promote the integration of basic biology and medical physics on particle radiotherapy and high-accuracy radiotherapy.

## Results to the present

Young researchers, doctoral students and master students have been sent to Indiana University and the University of Groningen and joint research activities have been promoted. They received clinical training in the advanced countries in medical physics. In the past, one young researcher, four graduate students (doctoral:2, master:2) were sent to Indiana University and one young researcher, 3 graduate students (doctoral:2, master:1) were sent to the University of Groningen. Though they were short stays from 3 weeks to 5 months, they showed successful results, such as many contribution to international conference(First Author: 5, Coauthor: 4), and to domestic conference(First Author:1), submission of paper(First Author: 1, Coauthor: 4 ) and writing paper (First Author: 1, Coauthor: 1). There also are some papers to write and the number of papers are to increase. Students sent overseas made active communication with cooperating scientists and advance researches on their motive. “Researchers with high performance who play an active role in international arena” are being nurtured in the field of medical physics.

## Summary of FY 2013 Exchange Plan

### **Joint Research**

6 researchers in charge of below research themes are to be sent to co-institutions for one week to two months.

- a. Development of the next generation particle radiotherapy device
- b. Dose calculation for high-accuracy radiotherapy
- c. Development of the next generation diagnostic devices
- d. The research of the image-guided adaptive radiotherapy, and radiotherapy to tumor with respiratory displacement
- e. Development of cancer information systems
- f. Research of particle radiobiological effectiveness

### **Seminar**

International summer school for graduate will be held at Osaka University in order to cultivate world-class new generation leaders. Expenses for holding summer school are necessary.

### **Researcher Exchanges**

About 10 researchers or students are sent to either co-institution for two to six months to counterpart co-institutions to advance above research projects.