1. Outline of Research Activities

The National Institute of Radiological Sciences (NIRS) was reformed as an Independent Administrative Institution (IAI) in April 2001, and the first Mid-term Plan (2001-2006) has been completed successfully. This fiscal year (April 2006- March 2007) is the first year in the second Mid-term Plan. The research activities directly supported by the government were categorized and re-organized to five fields; heavy charged particle therapy for cancer treatment, radiation effects on the human body for use in radiotherapy, molecular imaging, radiation safety, and radiation emergency medicine. To perform these researches, four research centers and one fundamental technology center were established. Details of these research activities will be presented in the following pages.

The transfer from the first to the second Mid-term Plan has been done smoothly, and many accomplishments were obtained in all the research fields. Judging from the number and quality of the presentations at scientific meetings and the research papers and reports, it can be concluded that the researchers were active and much progress was achieved this year. The number of original papers published by NIRS members reached 280 papers, and many of them were published in international journals with good reputations. Furthermore, we had more than 160 proceedings at international or domestic scientific meetings, 450 oral presentations, and 50 patent applications. Collaborative studies and exchanges of researchers were also very active: 84 collaborative studies were carried out, 1200 researchers worked as visiting staff, and 280 students were accepted as trainees.

The clinical study of cancer treatment using with the Heavy Ion Medical Accelerator (HIMAC), conducted in the Research Center for Charged Particle Therapy, experienced much progress and more than 500 patients were treated this year. The total number of patients treated has reached approximately 3200 since 1995. The development of new types of irradiation systems, such as the spot-scanning system and rotating gantry was started. The new irradiation facilities with these systems will become available at the end of this Mid-term Plan (2011). Basic biological studies were also conducted to obtain biological evidences of particle therapy and to develop further an effective protocol of treatment. In the Molecular Imaging Research Center which was established last year, investigations on advanced imaging of cancer and neuronal function were carried out, mainly using positron emission tomography (PET). Development of advanced measuring techniques including new types of PET probes was continued and obtained many achievements. This year, the Center also started collaboration studies with other institutes and universities as a national center for molecular imaging with financial support of the Ministry of Education, Culture, Sports, Science and Technology (MEXT).

The research on radiation safety and emergency medicine, an important mission of our institute since its establishment, was mainly carried out in the Research Center for Radiation Safety and the Research Center for Radiation Emergency Medicine. Activities were focused on the health effects of low dose radiation, levels of natural radiation, radiation effect on the environment (non-human biota), and development of medical treatment and dose estimation in the event of radiation emergency. These centers also preformed as a national hub center for collaboration with international organizations including the International Atomic Energy Agency, International Commission of Radiation Protection, United Nations Scientific Committee on Atomic Radiation, World Health Organization, and so on.

The Fundamental Technology Center was newly established this year to support various studies of NIRS with advanced fundamental technology. Some developmental research was carried out including single particle irradiation system to cells, a neutron irradiation device for animal experiments, and radiation measurement apparatus for cosmic rays.

Some other research programs were also continued or newly started with supports of funding agencies including MEXT, the Ministry of Economy, Trade and Industry, the Ministry of Environment, and so on.

Readers will see in the following pages that all the research activities started smoothly in the first year of the second Mid-term Plan. I would like to finish with heartfelt thanks for cooperation and advice given to us during FY 2006.

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