PREFACE

In this twenty-fifth issue of the CYRIC Annual Report, we summarize the activities in research and development, and in training of radioisotope safe-treatment at the Cyclotron and Radioisotope Center (CYRIC) during the calendar year 2004.

Research at CYRIC was carried out in the fields of nuclear physics, nuclear chemistry, material sciences, nuclear medicine using PET (oncology, brain study, pharmacology), radiopharmaceutical chemistry, health physics, nuclear instrumentation, nuclear medical engineering (diagnosis and therapy technology), nuclear engineering and elemental analysis using PIXE.

Developments and improvements on nuclear instruments and techniques have progressed; the highlights are the construction of high-intensity neutron-beam course and the success of extraction of the negatively charged hydrogen beam, which are combined to extend the research with neutron beams. Also the beam attenuator device and the acceleration of C-O-Ne cocktail beam are introduced for testing semiconductor devices. A total of 2613 hours of beam-time was delivered by the K=110MeV cyclotron for scheduled operation in research work.

$[^{18}\text{F}]$FDG, $[^{11}\text{C}]$methionine, $[^{11}\text{C}]$doxepin, $[^{11}\text{C}]$raclopride, $[^{11}\text{C}]$donepezil and $[^{18}\text{O}]$water were routinely prepared and supplied to clinical PET studies. In October 2004, a clinical PET study using $[^{18}\text{F}]$FRP-170, a new hypoxia imaging agent, was started in virtue of the successful development of an automated synthesis module.

With $[^{11}\text{C}]$donepezil, research programs for Alzheimer’s dementia are under way. Beta amyloid imaging will be expected to initiate non-invasive diagnosis of dementia. The first patients will be studied before this report is issued. Histamine receptor imaging and dopamine receptor imaging have seen steady-progress this year. Brain imaging of BBB transport of several anti-histamine pharmaceuticals is one example of clinically oriented application of receptor studies. Whole-body oncology studies for cancers not reimbursed by insurance and metabolic imaging for sport science are still going on.

The research program on PIXE analysis has been carried out by using an electrostatic accelerator (4.5 MV Dynamitron) at the Fast Neutron Laboratory (FNL), Graduate School
of Engineering, Tohoku University, under the scientific tie up between CYRIC and FNL. A total of 350 hours beam-time was served to this program.

The training for radioisotope safe-treatment was carried out as usual. In 2004, totally 1122 staff members and students of Tohoku University received the training in three courses: 1) Radioisotopes and radiation generators (623 trainees), 2) X-ray machines and electron microscope (410), and 3) Synchrotron Radiation (89). The number of trainee increased by about ten % than 2003 (1008). The English classes were practiced too for each course, and totally 80 foreign students and scientists attended.

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