

PROGRESS IN REACTOR AND ACCELERATOR BASED BNCT AT KYOTO UNIVERSITY RESEARCH REACTOR INSTITUTE

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The world's first clinical irradiation for boron neutron capture therapy (BNCT) was carried out using a neutron irradiation field for BNCT, installed at a research nuclear reactor in USA in 1951. After this year until 2012, BNCT has been performed only using reactor-based irradiation systems. In Kyoto University Research Reactor Institute (KURRI), BNCT clinical study using the Heavy Water Facility installed in Kyoto University Reactor (KUR) came to be regularly performed from February 1990. At first, BNCT in this institute was performed just for malignant brain tumor and melanoma. The application was extended for head and neck tumors in 2001, and for body tumors such as liver tumor, lung tumor, malignant pleural mesothelioma, etc. in 2005. There were the several interruption periods, but 510 clinical irradiations were carried out using KUR Heavy Water Facility as of June 2016. Concurrently with the clinical study using KUR Heavy Water Facility, the development of accelerator-based system has been studied. In early 2009, the world's first accelerator-based system for BNCT clinical irradiation, "Cyclotron-Based Epi-thermal Neutron Source (C-BENS)" was completed. The clinical trial using C-BENS was started in 2012. BNCT using various accelerator-based irradiation systems including C-BENS may be carried out at plural facilities in the near future. Thus, it is the time when BNCT is shifting from a special particle therapy to a general therapy, now. The progress in BNCT at KURRI are reported focusing on the topics for physical engineering and medical physics.