

Efforts on stable operation of the HIMAC irradiation system

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A stable operation of an irradiation system is essential for its clinical use. The current HIMAC irradiation system for carbon ion radiotherapy has been employed for 20 years without severe troubles. This stability contributes to the increase of the annual number of treatment irradiations at HIMAC. This increase leads to an increase in operation time for clinical use and the resultant decrease in the amount of time for maintenance. At present, we mainly implement three kinds of periodical maintenance program: daily, weekly and half-yearly. The daily program corresponds basically to the functional and safety check of devices before treatment. The weekly maintenance is the simplified accuracy confirmation of devices, and the detailed accuracy confirmation was implemented in the half-yearly maintenance along with improvements of devices. These maintenance programs were designed from the total number and/or the frequency of usage according to manufactures' specifications. Additionally, they have been improved by actual performances and records accumulated for about 20 years since the operation started. For example, some maintenance items were added into daily and weekly programs for forecasting device failures quickly. Also, it was required to modify the maintenance programs by some difficulties encountered as the system had become older, e.g. limited availabilities of replacement parts and supports from manufactures. In this report, the current maintenance programs are introduced together with our efforts on their modification.