

ACCEPTANCE TEST FOR CYBERKNIFE UNIT

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Purpose : To assure the accuracy of image-guided system, robotic arm, and dosimetry for Cyberknife unit and to prepared it for the clinical use.

Method and Materials : Cyberknife is consisted of one robotic arm with a 6MV Linac and one image guided system with two-sets of X-ray units. It is one of the dedicated equipment for stereotactic radiosurgery. The accuracy of the robotic arm was tested to verify the agreement between the arm positions and the isocenters at various SAD using the Isopost system provided by the manufacture. The accuracy of the Target Locating System (TLS) was tested by both 6D skull tracking mode and 6D fiducial tracking mode using a special phantom. As for the whole Cyberknife system, we applied “End-to-End” method, using anthropomorphic phantom and Gafchromic film, to verify its accuracy.

Results : The agreement of robotic arm positions and isocenters at various SAD were within 0.5 mm which is within the tolerance of the manufacture suggested value. For the test results of Target Locating System, the errors (including translation and rotation) are less than 0.5 mm for both tracking modes. The end-to-end test results for the entire Cyberknife system are all better than 1 mm.

Conclusions : From the results of our Acceptance Tests and Commissioning, the Cyberknife could be used in clinic for radiosurgery procedures. The image-guided function for the unit makes it an accurate and effective radiation treatment modality for radiosurgery.

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