

## Initial Experience with CyberKnife G4 System

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**Objective:** A CyberKnife G4 system (Accuray Inc.) went clinical at our cancer center on Oct. 17, 2006. The G4 platform is built on a 6 MV X-band linear accelerator mounted on a multi-jointed manipulator with 600 MU/min dose rate, 50% higher than the CyberKnife G3 system. The G4 also features flush-mounted, in-floor x-ray image detectors, providing an increase in treatment workspace and expanding the potential for extra-cranial applications. Our experience with the G4 and its comparison to the G3 will be presented here.

**Methods:** In two and half months of operation, 85 patients with 120 lesions and 223 fractions were treated with the G4 system. Pathologic diagnoses included acoustic neuroma, meningioma, trigeminal neuralgia, arteriovenous malformation, lung, pancreas, prostate, metastases and others. Of the 85 patients, 55 were tracking with 6D skull, 16 Xsight, 13 Synchrony and 1 Fiducial. Mean number of fractions per lesion was 2 (1 to 5), mean lesion volume was  $15.2 \text{ cm}^3$  (0.02 to  $78.6 \text{ cm}^3$ ) and mean prescription was 25.6 Gy (8 to 60 Gy) to the 78% isodose line (70-82%). Accuracy of beam delivery, system efficiency, E-stop interruption, machine downtime, customer support and treatment planning system were analyzed.

**Results:** Treatment in all patients was delivered as planned. The end-to-end accuracy was under 1.0 mm for all tracking modes. Improvements for the G4 system include an increase in treatment workspace, higher dose rate, enhanced power-up and power-down. Initially, the average treatment time was approximately 90 min (60 to 180 min), which was significant longer than our experience with G3. Cause of extended treatment time was identified and corrected.

**Conclusions:** The CyberKnife G4 system offers the latest technology for frameless stereotactic radiosurgery. Our initial experience with this new CyberKnife G4 system was generally very positive.