

AbstractID: 1584 Title: Electromagnetic Marker Tracking in the CyberKnife Suite: A Feasibility Study

The Aurora electromagnetic tracking system can potentially be used to locate and track tumors during radiotherapy. The Aurora was tested for sensitivity to interference from the 6 MV X-band linear accelerator that forms part of the CyberKnife radiosurgical system.

A small six degree of freedom robot was used as a precise positioner. The robot holds an 18 gauge needle with an Aurora sensor inside its tip.

The robot was moved to 34 data points in a 200 by 40 by 50 mm volume. At each point 100 Aurora readings are stored. The data was collected with the LINAC at two different distances and with the beam on and off for a total of four data sets.

The accuracy was determined by computing root mean square distances between any two data points. The average error was between 1.1 and 1.2 mm for all four tests with maximum errors of 4.1 to 4.3 mm. There appears to be no significant effect on Aurora accuracy from turning the CyberKnife beam on.

While no CyberKnife effects were noticed in the overall results, some effect from the CyberKnife beam can be observed by examining the 100 readings obtained at each data point. The standard deviations of the individual data sets increase when the beam is turned on.

In conclusion, the Aurora was sensitive to the linear accelerator but the interference was not large enough effect the Aurora accuracy. Therefore, the Aurora has the potential for use in tracking tumors during radiosurgery.