

The CyberKnife is a radiosurgery delivery system that uses an x-band linear accelerator mounted on a computer-controlled robotic arm. The robotic arm has 6-degrees of freedom and is used to sequentially deliver pencil beams of radiation as it moves around patient. The CyberKnife provides a frameless approach to both intracranial and extracranial radiosurgery. Real time image-guidance is accomplished using 2 kilovoltage imagers. During delivery, the patient position is monitored and the delivery is modified to correct for patient movement. Orthogonal kilovoltage (kV) x-ray sources are mounted to the ceiling and directed at amorphous silicon detectors on both sides of the table. Kilovoltage images are obtained before and during the treatment to monitor the alignment of the patient. The CyberKnife delivers radiation at a discrete set of linac positions (called nodes). A typical treatment plan uses approximately 40-50 nodes (short path) or 60-75 nodes (full path). The nodes are distributed approximately uniformly over about one half of a sphere centered on the treatment site. This presentation will provide an overview of CyberKnife radiosurgery.

The educational objectives include:

1. Understand the physics of CyberKnife radiosurgery.
2. Understand the steps in CyberKnife treatment planning.
3. Understand the CyberKnife tumor tracking techniques
4. Understand the quality assurance requirements for the CyberKnife