

Robotic Cancer Treatment

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The CyberKnife stereotactic radiosurgery system located at The Community Cancer Center is one of only 100 such devices worldwide. This revolutionary device offers the most sophisticated treatment for cancerous and non-cancerous lesions as well as certain types of painful conditions such as face pain or pain caused by cancer. The CyberKnife system is an extremely accurate form of radiation that was developed by a neurosurgeon, John Adler M.D., who wanted to treat his patients without the damage to the brain or spinal cord that can occur with traditional open neurosurgical procedures. This system was found to be so accurate that it was developed into a device that could also treat other parts of the body where cancers may reside. Thus, patients can now enjoy the benefits of cancer treatment without worrying that healthy parts of the body may be harmed during treatment. Currently, the CyberKnife treats brain tumors, spinal cord tumors, lung, liver, prostate and other tumors throughout the body without the need of traditional open surgery. Imagine treatment of previously inoperable tumors that requires no incision, no anesthesia and no hospital stay. For a select group of eligible patients in Central Illinois, the CyberKnife offers new hope.



CyberKnife stereotactic radiosurgery is an extremely precise non-operative radiation treatment using focused x-ray beams to treat a variety of cases, including tumors located in inoperable or difficult-to-reach areas. The number of treatments will vary depending on tumor size, location, and shape, but usually a course of treatment consists of between one and five treatments. These treatments will inactivate or eradicate most cancerous conditions. Treatments involve delivery of x-ray beams that converge on a target to

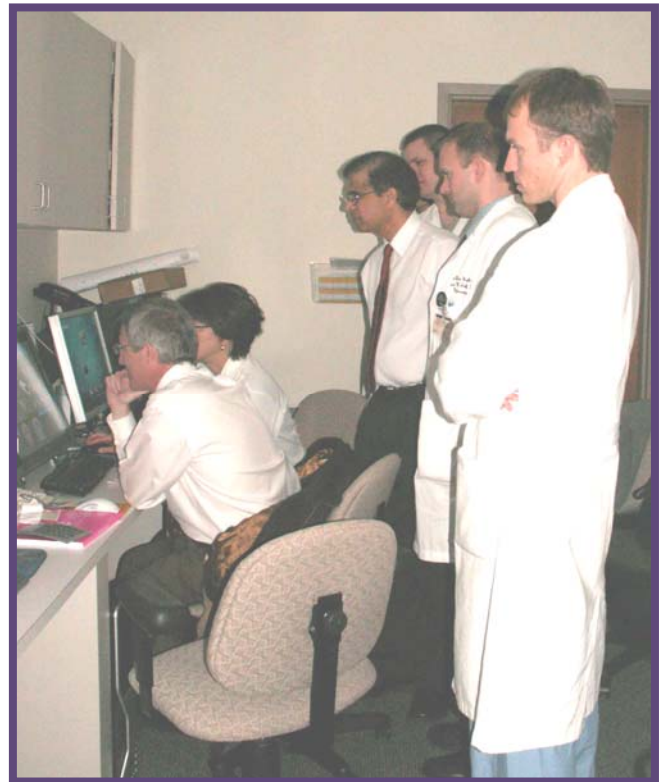
deliver the radiation only to the diseased tissue. Stereotactic radiosurgery does not actually remove the tumor. It works by disrupting the DNA of cancer cells, thus stopping their growth. The radiation dose is delivered to the target while minimizing the effects to surrounding tissues by using multiple planes to deliver the treatment. Prior to stereotactic radiosurgery, conventional radiation therapy treatment required longer treatments and often radiated through normal tissues, possibly causing skin breakdown and burns. With

CyberKnife treatment, the process is much less time-consuming and because of its incredible accuracy, it greatly reduces radiation exposure to surrounding vital tissues.

The CyberKnife works by using a compact linear accelerator (LINAC) mounted on a robot, delivering beams of radiation to the target from multiple positions. Through a procedure called real-time tracking, the robot knows exactly where the tumor is inside the patient, because xrays are constantly taken throughout the procedure by an xray machine mounted in the ceiling of the treatment room. Real-time tracking allows the CyberKnife to adjust to changes in body position and patients' breathing, giving physicians the capability to deliver radiation to within 1mm of accuracy. The CyberKnife can do this by referring to bony landmarks such as the skull or vertebral body via continuous x-ray imaging.

Automatic adjustments can be made during treatment delivery, which allows safer delivery of much higher doses of radiation to the tumor with minimal damage to the surrounding tissue. These focused treatments allow for lesions to be treated in one or a few sessions with minimal disruption to a patient's daily life.

The treatment process involves an initial consultation to determine patient eligibility. Once eligibility is determined, patients are imaged with multiple scans, which may include CT, MRI or PET scans. Through sophisticated computer technology, the images are fused together and reformatted into a 3-dimensional picture which is used to plan the treatment. The radiation oncologist and neurosurgeon then make final target plans and review the images. After CyberKnife



treatment protocols are finalized, the patient will return for the actual treatment. The process takes approximately one hour and involves lying on the treatment bed with a cushion or facemask affixed to a bed frame in order to limit motion. The CyberKnife has been used to successfully treat patients who want to avoid, or who are not candidates for, open surgical intervention. It is also used for treating areas located near crucial parts of the brain, spine, or body, allowing for safe and very effective treatment.

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The Central Illinois Neuroscience Foundation (CINF) is a non-profit organization dedicated to the advancement of neurological healthcare through education and research.