CyberKnife®

ACCURAY®

TREATMENT DELIVERY

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CYBERKNIFE® TREATMENT DELIVERY SYSTEM

The CyberKnife® System is the first and only robotic radiosurgery system to offer highly precise and customizable, non-surgical treatment options for a broad range of tumors anywhere in the body, providing the most flexible treatment options.

CYBERKNIFE® TREATMENT DELIVERY SYSTEM

Using robotic mobility and continuous image guidance, the CyberKnife® Robotic Radiosurgery System both detects and corrects for intrafraction target motion, intelligently delivering treatments with sub-millimeter precision. With a robotic manipulator and a compact, lightweight linear accelerator, the CyberKnife System is not subject to the mobility constraints of traditional gantry architecture and can deliver beams from thousands of non-coplanar angles. Treatments have excellent tumor coverage, steep dose gradients and tight dose conformality, regardless of target shape. The system eliminates the need for gating techniques and restrictive head frames, providing greater comfort for the patient.

HIGH DOSE RATE FOR SHORT TREATMENT TIMES

1000 MU/MIN LINEAR ACCELERATOR

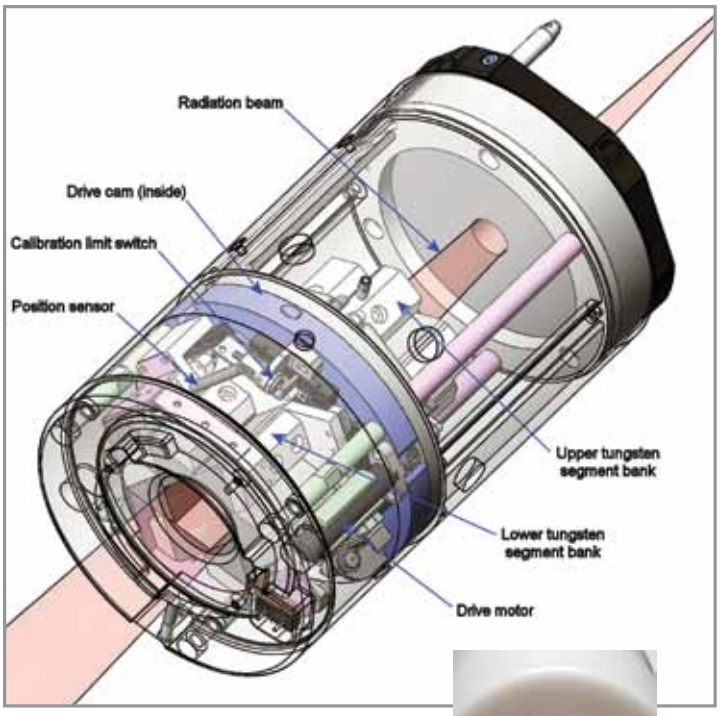
The compact and lightweight 6MV X-band linear accelerator operates at a dose rate of 1000 MU/min, significantly reducing beam-on time. Radiation beams are precisely shaped with either fixed collimators or the Iris™ Variable Aperture Collimator.

When the Xchange® Robotic Collimator Changer is installed, fixed collimators can be changed automatically – without the need for user intervention. The Xchange table is equipped with an advanced sensory system that confirms the pointing accuracy of the robotic manipulator at the beginning of each treatment path.

BENEFITS

- Dose rate of 1000 MU/min minimizes treatment time
- Fully compatible with the Iris Variable Aperture Collimator and Xchange System

The Xchange Robotic Collimator System automatically changes the secondary collimator using precision robotics.



The Iris Collimator includes two banks of six tungsten segments capable of rapidly manipulating beam geometry to deliver up to 12 unique beam diameters from each linac position.

PRECISE BEAM COLLIMATION FOR FLEXIBLE TREATMENT OPTIONS

IRIS™ VARIABLE APERTURE COLLIMATOR

The Iris Variable Aperture Collimator eliminates the need to exchange fixed collimators during treatment, making the use of multiple collimator sizes more efficient.

Using tungsten segments to rapidly manipulate beam size, the Iris Collimator offers up to 12 aperture sizes for each linac position. It efficiently uses larger apertures to deliver beams to the center of the target and smaller apertures to intricately sculpt dose to the target's periphery. With beam characteristics virtually identical to that of fixed circular collimators, the Iris Collimator delivers superior dose conformality and excellent preservation of healthy tissue.

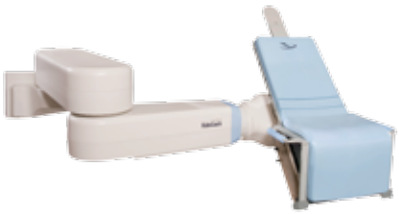
BENEFITS

- Enables faster treatments
- Facilitates routine delivery of highly conformal, multiple collimator treatments

ADVANCED PATIENT POSITIONING FOR COMFORT AND ACCURATE ALIGNMENT

ROBOCOUCH® PATIENT POSITIONING SYSTEM AND SEATED LOAD TABLE TOP*

The intelligent robotics of the CyberKnife® and RoboCouch® System's combine to offer complete access to targets anywhere in the body. With a full six degrees of freedom, the RoboCouch System can automatically control anterior/posterior, superior/inferior, left/right, pitch, roll and yaw corrections—for the sub-millimeter demands of full body radiosurgery and high-precision radiation therapy. With the Seated Load Table Top feature, patients are loaded for treatment from a seated position, making setup easier and more comfortable. Additionally, the RoboCouch integrated leg support and custom designed memory foam cushions help keep the patient calm and relaxed, minimizing patient motion during treatment.



The RoboCouch System has a low loading height, ideal for patients with limited mobility.

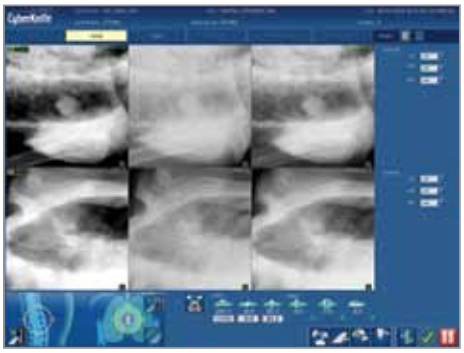
BENEFITS

- Increases patient comfort and reduces setup time
- Loads patients in a low, chair-like position
- Supports patients up to 500 pounds (227 kilograms)
- Allows patient positioning with six degrees of freedom: anterior/posterior, superior/inferior, left/right, roll, pitch and yaw

TREATMENT SIMULATION FOR OPTIMUM TRACKING RESULTS

SIMULATION APPLICATION

Intrafraction image guidance with the CyberKnife® System uses anatomical landmarks to track and automatically adjust to target motion throughout treatment. The Simulation Application, included with the Lung Optimized Treatment option, gives clinicians a logical workflow for determining the optimum tracking mode for lung treatments. The Simulation process is used to determine the visibility of the target in a set of orthogonal X-ray images. All three tracking modes ensure each beam is precisely delivered to the target throughout the respiratory cycle, in a non-invasive manner:



The workflow in the Simulation Application helps determine the optimum tracking method for treatment of a lung lesion.

- **Two projections:** If the target is visible in two projections, the Xsight® Lung Tracking System is used for treatment.
- **One projection:** If the target is visible in only one projection, the 1-View Tracking algorithm is used.
- **No visible target in either projection:** If the target is not visible in either projection, Xsight Spine Tracking is used for alignment.

MULTIPLE TARGET TRACKING MODES FOR NON-INVASIVE TREATMENTS

The Treatment Delivery software provides an intuitive user interface to efficiently control all interactions between the robotic manipulator, treatment couch and imaging system. The software quickly and automatically processes live images acquired throughout treatment, calculates offsets based on Digitally Reconstructed Radiographs (DRRs) and sends offset data to the robotic manipulator for immediate and automatic motion compensation.

Continuously adapting treatment to target motion is a challenge, and the CyberKnife System offers a growing set of options for tracking tumor types anywhere in the body — from head to spine to lung to prostate.

6D SKULL TRACKING SYSTEM

Rendering invasive stereotactic head frames obsolete, the 6D Skull Tracking algorithm uses the bony anatomy of the skull to continuously track intracranial targets and automatically correct for even the slightest translational or rotational target shift during treatment delivery.

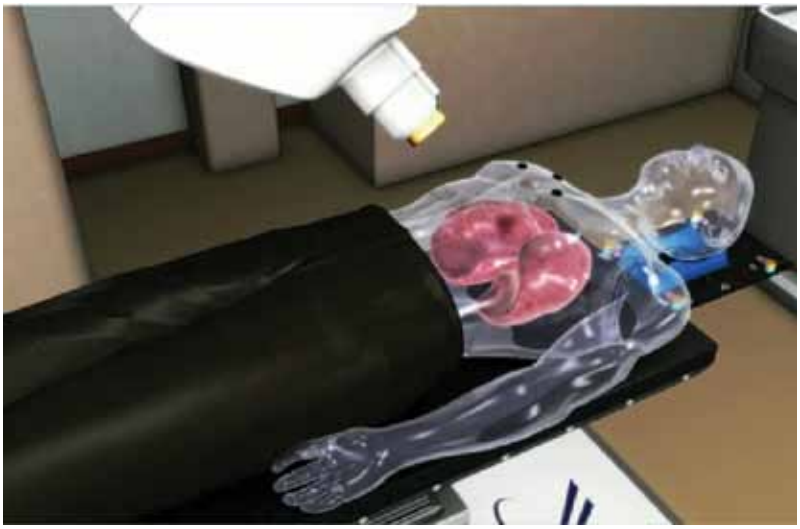
XSIGHT® SPINE TRACKING SYSTEM

The Xsight Spine Tracking System uses the bony anatomy of the spine to automatically locate and track tumors, eliminating the need for surgical implantation of fiducials and making radiosurgery in and near the spine more precise and less invasive.

XSIGHT LUNG TRACKING SYSTEM

Together with the Synchrony® Respiratory Tracking, the Xsight Lung Tracking System directly and non-invasively tracks the movement of lung tumors with precision throughout treatment.

MOTION TRACKING METHODS FOR THE PREDICTABLE AND NON-PREDICTABLE



The Synchrony System is capable of tracking a wide variety of target motions, including targets that move with respiration. Changes in breathing pattern are automatically detected by the Synchrony System and compensated for in treatment delivery.

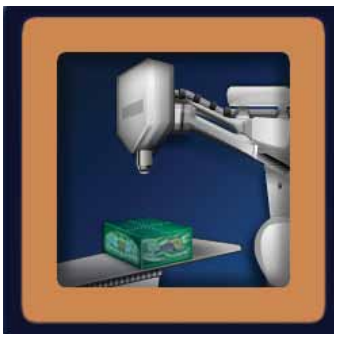
SYNCHRONY® RESPIRATORY TRACKING SYSTEM

The Synchrony® Respiratory Motion Tracking System tracks and corrects for predictable motion by continuously synchronizing beam delivery with the motion of the target, allowing clinicians to significantly reduce margins while eliminating the need for gating or breath-holding techniques. The Synchrony System can be used with the Xsight® Lung Tracking System, with 1-View Tracking or the Fiducial Tracking System.

INTEMPO™ ADAPTIVE IMAGING SYSTEM

The InTempo™ Adaptive Imaging System uses the CyberKnife® System's time-based image guidance to assist with tracking and correcting non-predictable intrafraction target motion. As targets move with time, the InTempo System compares the offset corrections applied between every two consecutive live X-ray acquisitions. If the corrections significantly change, the time between image acquisitions (the image age) is automatically shortened to ensure updated offset corrections are applied to the next beam. The InTempo System can be used with the 6D Skull Tracking System, Xsight Spine Tracking System, and Fiducial Tracking System*.

**The InTempo System can be used with the 6D Skull Tracking System, Xsight Spine Tracking System, and Fiducial Tracking System.*



QUALITY ASSURANCE FOR TREATMENT DELIVERY CONFIDENCE

The accuracy of the treatment delivery system — including both dosimetric and targeting accuracy — is assured for each treatment component and for the entire CyberKnife System. Accuray physicists work collaboratively with Quality Assurance (QA) product vendors to ensure CyberKnife QA tools are validated and CyberKnife QA procedures are documented. In addition, Accuray actively participates in industry and professional societies to ensure compliance with technical standards from around the world.

CYBERKNIFE® VSI™ SYSTEM

HARDWARE

Robotic Manipulator and Linear Accelerator – The compact 1000 MU/min 6 MV X-band linear accelerator is capable of being positioned in virtually any direction by a high-precision robotic manipulator with repeatable sub-millimeter accuracy.

Imaging System – The low-energy X-ray sources and the flush-mounted detectors create high-resolution anatomical images throughout the treatment. These images are continually compared to previously generated, digitally reconstructed radiographs (DRRs) to determine real-time target location.

Iris™ Variable Aperture Collimator – Rapidly manipulates beam geometry to deliver up to 12 beam diameters from each linac position with characteristics virtually identical to those of fixed circular collimators.

RoboCouch® Patient Positioning System – Robotically aligns patients precisely with six degrees of freedom, enabling faster patient setup. The Seated Load feature enables simple and comfortable loading of mobility-limited patients.

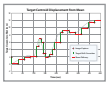
Xchange® Robotic Collimator Changer – Automatically exchanges collimators, allowing for greater treatment efficiency.

TRACKING

Synchrony® Respiratory Tracking System – Continuously synchronizes beam delivery to the motion of the tumor, allowing clinicians to significantly reduce margins while eliminating the need for gating or breath-holding techniques.

Xsight® Lung Tracking System – Directly tracks the movement of lung tumors without fiducials while maintaining precision, reliability and self-adjusting repeatability.*

Xsight Spine Tracking System – Eliminates the need for surgical implantation of fiducials by using the bony anatomy of the spine to automatically locate and track tumors.



InTempo™ Adaptive Imaging System – Intelligent, adaptive imaging system designed to address the unique challenges of prostate tracking resulting from random and excessive target motion.

Lung Optimized Treatment – Expands fiducial-free treatment options for lung SBRT patients. Simulation and comparison workflows, combined with unique tracking modes, allow the clinician to select from multiple, non-invasive options.

** Limited to specific tumor size and location*

DATA MANAGEMENT

CyberKnife® Data Management System – Provides comprehensive storage and processing of the patient data that is generated during the CyberKnife planning and treatment workflow.

Report Administration – Gives easy access to patient and system utilization data, along with a variety of departmental reports. Remote viewing is also enabled via the Report Administration web application.

Radiosurgery DICOM Interface – This interface utilizes the industry-standard DICOM protocol to export patient treatment plan and delivery information to an Oncology Information System.

Storage Vault – Hardware for long-term storage of patient records, provides approximately 10 TB of space for up to 5000 patient records. Includes automated storage of patient records based on user specified configurations.

TREATMENT PLANNING

Monte Carlo Dose Calculation – Often considered the gold standard for dose calculation, the CyberKnife System's Monte Carlo Dose Calculation produces highly accurate dose calculations in minutes.

Sequential Optimization – An intuitive and intelligent plan optimization algorithm for rapidly developing customized treatment plans for the unique clinical objectives of each patient.

AutoSegmentation™ – Automatically generate accurate contours for intracranial and male pelvic anatomy using both model-based and atlas-based delineation methods. Results can be generated using both CT and MR image information, requiring minimal user input.

QuickPlan™ – A complete treatment plan is generated and presented to the user for review. The entire planning process is automated based on clinical objectives set by the user, including plan parameters, optimization and dose calculation.

For more information on the CyberKnife Robotic Radiosurgery System, please contact Accuray Incorporated.

www.accuray.com sales@accuray.com

The CyberKnife System and CyberKnife options may not be available in some countries. Specifications, features and functionality subject to change without prior notification. For a complete list of CyberKnife Systems and options available, please contact Accuray at sales@accuray.com.

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