HyperArc high-definition radiotherapy
Deliver high-precision SRS

HyperArc™ high-definition radiotherapy (HDRT) is a potential solution for frameless, MLC-based, non-coplanar stereotactic radiosurgery (SRS). A defined workflow, including simulation guidelines, patient immobilization for imaging and treatment delivery, treatment setup, intra-fraction imaging and a pre-determined delivery sequence, enables a one-click delivery of non-coplanar SRS. HyperArc HDRT is designed to eliminate guesswork, trial and error, and promote the safe delivery of SRS with a standardized reproducible and efficient process.

Non-coplanar SRS encourages the management of cancer as a chronic disease by spreading out entrance dose, which may result in steeper dose gradients, limiting the dose to healthy tissue and organs at risk. However, an additional element of risk is introduced by adopting a non-coplanar delivery technique, which could result in the increase in delivery times for such treatments.

Patient safety
The goal of using a prescribed immobilization device is to allow the system to recognize the outer limits of the patient and immobilization envelope. This information is used to create an envelope that the gantry will not invade. This collision-free envelope is a 2 cm space around the patient and the immobilization device.

Automated intrafraction imaging
Imaging Waypoints
Imaging Waypoints are predefined points in the delivery sequence, before and after each arc, with the intent to take images safely. These Imaging Waypoints have been designed to be collision-free and automatically populated, and may be enabled or disabled by the user.

Stepping Stones

Stepping Stones is an algorithm that is built to allow the safe retraction of the gantry-couch system to a known, safe location. The algorithm is designed to be invoked in a treatment interruption, or if a KV volumetric image is desired. The retraction sequences are calculated to be collision-free and efficient.

Defined workflow

HyperArc HDRT allows non-coplanar treatments to be much more standardized by prescribing everything from patient immobilization to intrafraction imaging.

Immobilization/patient setup

The prescribed frameless Encompass™ SRS Immobilization System by Qfix restricts the movement of the patient and allows positioning of the patient with sub-millimeter accuracy. More information on the Encompass System may be obtained by referencing Qfix documentation.

Machine Performance Check (MPC)

MPC will include a beam and geometry check and an evaluation of couch walkout performance through the full range of couch motion (180°).

Automated treatment delivery

HyperArc HDRT is designed to allow more efficient delivery of non-coplanar treatments with a possible single button delivery, and automated couch movement eliminating the need to re-enter the room during treatment. Our goal is to reduce treatment time to 20 minutes.

Changes to the TrueBeam user interface

The changes to the TrueBeam® system user interface include the HyperArc HDRT logo, blue automation indicators, and red boxes that indicate collision risks.

Encompass SRS Immobilization System required to use HyperArc

Enhanced MPC to test couch performance

TrueBeam user interface for HyperArc treatment
Additional information

HyperArc treatments are MLC-based and do not require accessories. The use of the accessory tray is disabled, therefore, no accessories can be used during a HyperArc treatment delivery.

High-resolution CT with slice thickness of 1.25 mm or less is recommended.

An MRI or other additional images are not required but may be beneficial for accurate target contouring.

Devices connected through the TrueBeam Motion Management Interface (MMI) are not required and cannot be used during HyperArc treatments.

Recommended additional products

PremierAssurance™ contract
HD120™ MLC
High Intensity Mode energy (6X or 10X)

References

Non-coplanar radiosurgery bibliography

Research and development partners

University of Alabama at Birmingham
Washington University in St. Louis
University of Glasgow
University of California, Los Angeles

Prerequisites

TrueBeam system software version 2.7 or higher
Encompass™ SRS Immobilization System
PerfectPitch™ 6 degrees of freedom couch

Not all features or products are available in all markets and are subject to change.

Intended Use Summary

Varian Medical Systems’ linear accelerators are intended to provide stereotactic radiosurgery and precision radiotherapy for lesions, tumors, and conditions anywhere in the body where radiation treatment is indicated.

Safety Statement

Radiation treatments may cause side effects that can vary depending on the part of the body being treated. The most frequent ones are typically temporary and may include, but are not limited to, irritation to the respiratory, digestive, urinary or reproductive systems, fatigue, nausea, skin irritation, and hair loss. In some patients, they can be severe. Treatment sessions may vary in complexity and time. Radiation treatment is not appropriate for all cancers.