Corporate Medical Policy

Intensity Modulated Radiation Therapy for Tumors of the Central Nervous System

File Name:	intensity_modulated_radiation_therapy_for_tumors _of_the_central_nervous_system
Origination:	10/2010
Last CAP Review:	8/2011
Next CAP Review:	8/2012
Last Review:	8/2011

Description of Procedure or Service

For certain stages of cancers, postoperative radiation therapy improves outcomes for many patients. Adding radiation to chemotherapy also improves outcomes for those with inoperable tumors that have not metastasized beyond regional lymph nodes. Over the past several decades, methods to plan and deliver radiation therapy have evolved in ways that permit more precise targeting of tumors with complex geometries. Most early trials used 2-dimensional treatment planning based on flat images, and radiation beams with cross-sections of uniform intensity that were sequentially aimed at the tumor along 2 or 3 intersecting axes. Collectively, these methods are termed conventional external-beam radiation therapy (CRT).

Treatment planning evolved by using 3-dimensional images, usually from computed tomography (CT) scans, to delineate the tumor, its boundaries with adjacent normal tissue, and organs at risk for radiation damage. Radiation oncologists used these images, displayed from a “beam’s-eye view,” to shape each of several beams with compensators, blocks, or wedges to conform to the patient’s tumor geometry perpendicular to the beam’s axis. Computer algorithms were developed to estimate cumulative radiation dose delivered to each volume of interest by summing the contribution from each shaped beam. Methods also were developed to position the patient and the radiation portal reproducibly for each fraction, and immobilize the patient, thus maintaining consistent beam axes across treatment sessions. However, “forward” planning used a trial and error process to select treatment parameters including the number of beams and the intensity, shape, and incident axis of each. The radiation oncologist modified one or more parameters and re-calculated dose distributions, if analysis predicted underdosing for part of the tumor or overdosing of nearby normal tissue. Furthermore, because beams had uniform cross-sectional intensity wherever they bypassed shaping devices, it was difficult to match certain geometries, in particular concave surfaces. Collectively, these methods are termed 3-dimensional conformal radiation therapy (3D-CRT).

In the mid-1990s, 3D conformal methods were further developed to permit beam delivery with non-uniform cross-sectional intensity. This technique often relies on a device (a multi-leaf collimator, MLC) situated between the beam source and patient that moves along an arc around the patient. As it moves, a computer varies aperture size independently and continuously for each leaf. Thus, MLCs divide beams into narrow “beamlets,” with intensities that range from zero to 100% of the incident beam. With an alternative, termed tomotherapy, a small radiation portal emitting a single narrow beam moves spirally around the patient, with intensity varying as it moves. Each method (MLC-based or tomotherapy) is coupled to a computer algorithm for “inverse” treatment planning. The radiation oncologist delineates the target on each slice of a CT scan, and specifies the target’s prescribed radiation dose, acceptable limits of dose heterogeneity within the target volume, adjacent normal tissue volumes to avoid, and acceptable dose limits within the normal tissues. Based on these parameters and a digitally reconstructed radiographic image of the tumor and surrounding tissues and organs at risk, computer software optimizes the location and shape of beam ports, and beam and beamlet intensities, to achieve the treatment plan's goals. Collectively, these methods are termed intensity-modulated radiation therapy (IMRT).

Multiple studies have generated 3D-CRT and IMRT treatment plans from the same scans, then compared predicted dose distributions within the target and in adjacent organs at risk. Results of such planning studies show that IMRT improves on 3D-CRT with respect to conformality to, and dose homogeneity within, the target. Dosimetry using stationary targets generally confirms these predictions. Thus, radiation oncologists hypothesized that IMRT may improve treatment outcomes compared with those of 3D-CRT by one or more of the following mechanisms.

Increased conformality may permit escalated tumor doses without increasing normal tissue toxicity, and may thus improve local tumor control. Better dose homogeneity within the target may also improve local tumor control by avoiding underdosing (cold spots) within the tumor and may decrease toxicity by avoiding overdosing (hot spots). Finally, enhanced conformality for standard doses may reduce dose outside the target volume and thus decrease toxicity.

However, IMRT aims radiation at the tumor from many more directions, and thus subjects more normal tissue to low-dose radiation than occurs with CRT or 3D-CRT. This method may increase late effects of radiation therapy. In addition, because most tumors move as patients breathe, dosimetry with stationary targets may not accurately reflect doses delivered within target volumes and adjacent tissues in patients. Furthermore, treatment planning and delivery are more complex, time consuming, and labor intensive for IMRT than for 3D-CRT. Thus, clinical studies must test whether IMRT improves tumor control or reduces acute and late toxicities, when compared with 3D-CRT. Testing this hypothesis requires direct comparative data on outcomes for separate groups of similar patients treated with each method.

This policy addresses IMRT for central nervous system (CNS) tumors only. CNS tumors include those of the brain, brain stem, and spinal cord.

IMRT for prostate cancer, IMRT for head and neck tumors, IMRT for cancer of the breast and lung, and IMRT for abdominal and pelvic tumors are considered in separate policies.

******Note: This Medical Policy is complex and technical. For questions concerning the technical language and/or specific clinical indications for its use, please consult your physician.***

Policy

BCBSNC will provide coverage for Intensity Modulated Radiation Therapy (IMRT) for malignant (primary and secondary) and benign neoplasms of the Central Nervous System (CNS), including brain, brain stem, and spinal cord, when those lesions are in close proximity to the optic nerve or brain stem.

Benefits Application

This medical policy relates only to the services or supplies described herein. Please refer to the Member's Benefit Booklet for availability of benefits. Member's benefits may vary according to benefit design; therefore member benefit language should be reviewed before applying the terms of this medical policy.

When Intensity-Modulated Radiation Therapy for Tumors of the Central Nervous System is covered

Intensity Modulated Radiation Therapy (IMRT) may be considered medically necessary for the treatment of malignant (primary and secondary) and benign neoplasms of the Central Nervous System (CNS), including brain, brain stem, and spinal cord, when those lesions are in close proximity to the optic nerve or brain stem.

When Intensity-Modulated Radiation Therapy for Tumors of the Central Nervous System is not covered

Intensity Modulated Radiation Therapy (IMRT) is considered **investigational** and therefore not covered when above criteria are not met.

Policy Guidelines

Because IMRT maximizes radiation dose distributions to the target while reducing exposure of adjacent non-target structures, it is more commonly utilized when there is particular concern about damage to an adjacent organ or vital tissue. A potential advantage to IMRT is its ability to limit dose to surrounding normal tissues of the central nervous system, such as the optic nerve, chiasm, lens, and brainstem, thereby possibly minimizing radiation morbidity.

Billing/Coding/Physician Documentation Information

This policy may apply to the following codes. Inclusion of a code in this section does not guarantee that it will be reimbursed. For further information on reimbursement guidelines, please see Administrative Policies on the Blue Cross Blue Shield of North Carolina web site at www.bcbsnc.com. They are listed in the Category Search on the Medical Policy search page.

Applicable codes: *77301, 77338, 77418, 0073T*

BCBSNC may request medical records for determination of medical necessity. When medical records are requested, letters of support and/or explanation are often useful, but are not sufficient documentation unless all specific information needed to make a medical necessity determination is included.

Scientific Background and Reference Sources

National Institutes of Health (NIH) Using Intensity Modulated Radiation Therapy (IMRT) for Brain Metastases. Retrieved on October 1, 2010 from http://clinicaltrials.gov/ct2/show/NCT00328575

Minniti G, Amichetti M, Enrici RM. Radiotherapy and radiosurgery for benign skull base meningiomas. Radiat Oncol. 2009 Oct 14;4:42. Retrieved on October 1, 2010 from http://www.ro-journal.com/content/4/1/42

Specialty Matched Consultant Advisory Panel 8/2011

Policy Implementation/Update Information

10/26/10 New policy implemented. Intensity Modulated Radiation Therapy (IMRT) may be considered medically necessary for the treatment of malignant (primary and secondary) and benign neoplasms of the Central Nervous System (CNS), including brain, brain stem, and spinal cord, when those lesions are in close proximity to the optic nerve or brain stem.

9/13/11 Specialty Matched Consultant Advisory Panel review 8/31/2011. No changes to policy statement. (lpr)