Geisinger

Geisinger Health Plan Policies and Procedure Manual

Policy: MP084

Section: Medical Benefit Policy

Subject: Stereotactic Radiosurgery and Stereotactic Body Radiation Therapy

Applicable Lines of Business

Commercial	**X**	**CHIP**	**X**
Medicare	**X**	**ACA**	**X**
Medicaid	**X**		

I. Policy: Stereotactic Radiosurgery (SRS) and Stereotactic Body Radiation Therapy (SBRT)

II. Purpose/Objective:
To provide a policy of coverage regarding Stereotactic Radiosurgery (SRS) and Stereotactic Body Radiation Therapy (SBRT)

III. Responsibility:
A. Medical Directors
B. Medical Management

IV. Required Definitions

1. Attachment – a supporting document that is developed and maintained by the policy writer or department requiring/authoring the policy.
2. Exhibit – a supporting document developed and maintained in a department other than the department requiring/authoring the policy.
3. Devised – the date the policy was implemented.
4. Revised – the date of every revision to the policy, including typographical and grammatical changes.
5. Reviewed – the date documenting the annual review if the policy has no revisions necessary.

V. Additional Definitions
Medical Necessity or Medically Necessary means Covered Services rendered by a Health Care Provider that the Plan determines are:

a. appropriate for the symptoms and diagnosis or treatment of the Member's condition, illness, disease or injury;
b. provided for the diagnosis, and the direct care and treatment of the Member's condition, illness disease or injury;
c. in accordance with current standards of good medical treatment practiced by the general medical community.
d. not primarily for the convenience of the Member, or the Member's Health Care Provider; and
e. the most appropriate source or level of service that can safely be provided to the Member. When applied to hospitalization, this further means that the Member requires acute care as an inpatient due to the nature of the services rendered or the Member's condition, and the Member cannot receive safe or adequate care as an outpatient.

Medicaid Business Segment
Medically Necessary — A service, item, procedure, or level of care that is necessary for the proper treatment or management of an illness, injury, or disability is one that:

- Will, or is reasonably expected to, prevent the onset of an illness, condition, injury or disability.
- Will, or is reasonably expected to, reduce or ameliorate the physical, mental or developmental effects of an

illness, condition, injury or disability.
- Will assist the Member to achieve or maintain maximum functional capacity in performing daily activities, taking into account both the functional capacity of the Member and those functional capacities that are appropriate for Members of the same age

DESCRIPTION:
Stereotactic radiosurgery and Stereotactic Body Radiation Therapy are a non-invasive method of delivering high doses of ionizing radiation utilizing three-dimensional planning of stereotactic and convergent beam technologies to small intracranial, some extracranial lesions, and tissues or lesions that may be inaccessible or unsuitable for open surgery. Stereotactic radiosurgery entails delivering highly focused convergent beams in a single session or multiple sessions (fractionated stereotactic radiotherapy) so that only the desired target is radiated, sparing adjacent structures. Four main methods of this technology exist: gamma-ray radiosurgery (e.g. Cyberknife or Gamma Knife®), linear accelerator radiosurgery (Linac), helium–ion radiosurgery, and neutron-beam radiosurgery. The four radiation delivery devices differ technically in several ways: source of radiation, size and shape of the radiation field, and range of radiation dosages. Other frameless systems involve the use of image-guided robotics, including Cyberknife, Neuromate and Mehrkoordinaten Manipulator (MKM), which recognizes the treatment sites by integrating images from preoperative CT and MRI techniques with intraoperative target localization tactics.

INDICATIONS:
Stereotactic radiosurgery or stereotactic body radiation therapy for treatment of the following lesions may be considered medically necessary:

- Angiographically visible arteriovenous malformations that because of their location, cannot be excised without a significant risk of serious neurological sequelea
- Acoustic neuromas (Schwannoma)
- Pituitary adenomas (e.g. Cushing's disease or acromegaly)
- Pineal tumors
- Non-resectable, residual, or recurrent meningiomas less than 4 cm in diameter
- Solitary or multiple brain metastases associated with good performance status and no active systemic disease
- Intracranial tumors that are not amenable to surgical excision or other conventional forms of treatment, for local tumor control, or for non-operative skull base sarcomas
- High-grade gliomas (primary or recurrent less than 4 cm in diameter) or Oligodendrogliomas
- Craniopharyngiomas
- Nasopharyngeal or parasinus tumors
- Spinal and paraspinal tumors
- Trigeminal neuralgia refractory to aggressive pharmacological medical management
- Ocular melanoma
- Chordomas
- Mediastinal tumors
- Pulmonary tumors
- Retroperitoneal metastases
- Hepatic tumors
- Pancreatic tumors
- Paragangliomas
- Essential tremor coverage is limited to patients who cannot be controlled with medication, has major systemic disease or coagulopathy, and who is unwilling or unsuited for open surgery or Deep Brain Stimulation. Coverage is limited to unilateral thalamotomy
- Renal cell carcinoma
- Non- small cell lung cancer (NSCLC) or pulmonary metastasis
- Refractory mesial temporal lobe epilepsy if standard surgery is contraindicated or not an option

*For information regarding Proton Beam Radiation, please see MP226 – Proton Beam Radiation.

EXCLUSIONS:
Stereotactic radiosurgery by any method for treatment of the following lesions is considered experimental, investigational or unproven:

- Intractable pain (except for tic douloureux/trigeminal neuralgia)
- Psychoses and psychiatric illness

- Seizures other than noted under Indications

Note: A complete description of the process by which a given technology or service is evaluated and determined to be experimental, investigational or unproven is outlined in MP 15 - Experimental Investigational or Unproven Services or Treatment.

Medicaid Business Segment:

Any requests for services, that do not meet criteria set in the PARP, may be evaluated on a case by case basis.

CODING ASSOCIATED WITH: Stereotactic Radiosurgery (SRS) and Stereotactic Body Radiation Therapy (SBRT)

The following codes are included below for informational purposes and may not be all inclusive. Inclusion of a procedure or device code(s) does not constitute or imply coverage nor does it imply or guarantee provider reimbursement. Coverage is determined by the member specific benefit plan document and any applicable laws regarding coverage of specific services. Please note that per Medicare coverage rules, only specific CPT/HCPCS Codes may be covered for the Medicare Business Segment. Please consult the CMS website at www.cms.gov ***or the local Medicare Administrative Carrier (MAC) for more information on Medicare coverage and coding requirements.***

20660	Application of cranial tongs, caliper, or stereotactic frame including removal
61796	Stereotactic Radiosurgery (particle beam, Gamma Ray, or Linear Accelerator); 1 Simple Cranial Lesion
61797	Stereotactic Radiosurgery (particle beam, Gamma Ray, or Linear Accelerator); each additional Cranial Lesion, simple
61798	Stereotactic Radiosurgery (particle beam, Gamma Ray, or Linear Accelerator); 1 complex Cranial Lesion
61799	Stereotactic Radiosurgery (particle beam, Gamma Ray, or Linear Accelerator); each additional Cranial Lesion, complex
61800	Application of stereotactic headframe for stereotactic radiosurgery
63620	Stereotactic radiosurgery (particle beam, gamma ray, or linear accelerator); 1 spinal lesion
63621	Stereotactic radiosurgery (particle beam, gamma ray, or linear accelerator); each additional spinal lesion
77331	Special dosimetry only when prescribed by the treating physician
77370	Special medical radiation physics consultation
77371	Radiation treatment delivery, stereotactic radiosurgery (SRS), complete course of treatment of cerebral lesion(s) consisting of 1 session, mulit-source Cobalt 60 based
77372	Radiation treatment delivery, stereotactic radiosurgery (SRS), complete course of treatment of cerebral lesion(s) consisting of 1 session, linear accelerator based
77373	Radiation treatment delivery, stereotactic radiosurgery (SRS), treatment delivery, per fraction to 1 or more lesions, including image guidance, entire course not to exceed 5 fractions
77435	Radiation treatment delivery, stereotactic radiosurgery (SRS), treatment management, per treatment course, to one or more lesions, including image guidance, entire course not to exceed 5 fractions
77432	Stereotactic radiation treatment management of cerebral lesion(s) (complete course of treatment consisting of one treatment)
C9728	Placement of interstitial device(s) for radiation therapy/surgery guidance (eg, fiducial markers, dosimeter), other than prostate (any approach), single or multiple
G0173	Stereotactic radiosurgery, complete course of therapy in one session.
G0242	Multi-source photon stereotactic radiosurgery plan
G0243	Multi-source photon stereotactic radiosurgery delivery
G0251	Linear accelerator based stereotactic radiosurgery, delivery including collimeter changes and custom plugging, fractionated treatment, all lesions, per session, maximun five sessions per course of treatment.
G0338	Linear accelerator based stereotactic radiosurgery plan including dose volume histograms for target and critical structure tolerances, plan optimization performed for highly conformal distributions, plan positional accuracy and dose verification, all lesions
G0339	Image guided robotic linear accelerator based stereotactic radiosurgery, complete course of therapy in one session, or first session of fractionated treatment
G0340	Image guided robotic linear accelerator based stereotactic radiosurgery, delivery including collimeter changes and custom plugging, fractionated treatment, all lesions, per session, second through fifth sessions, maximum five sessions per course of treatment

LINE OF BUSINESS:

Eligibility and contract specific benefits, limitations and/or exclusions will apply. Coverage statements found in the line of business specific benefit document will supersede this policy. For Medicare, applicable LCD's and NCD's will supercede this policy. For PA Medicaid Business segment, this policy applies as written.

REFERENCES:

General Reference

Health Technology Assessment Information Service, Executive Briefings. "Stereotactic Radiosurgery for Intracranial Tumors and Arteriovenous Malformations." February 1996:1-13

Winfred B. Hayes, Hayes Inc. Online, Hayes Medical Technology Directory, Proton Beam Therapy, Feb.6, 2002. Updated May 2004.

Winifred B. Hayes, Hayes Inc. Online, Hayes Medical Technology Directory, Stereotactic Radiosurgery, Feb 26, 2001.

Schwartz M, "Stereotactic Radiosurgery: Comparing Different Technologies", *CMAJ*, 158(5):625-628, Mar 1998

Pollock BE, et. al., "The Mayo Clinic Gamma Knife Experience: Indications and Initial Results", *Mayo Clinic Proceedings*, 74(1):5-13, Jan 1999

Zachenhofer I, Wolfsberger S, Aichholzer M, Bertalanffy A, Roessler K, Kitz K, Knosp E. Gamma-knife radiosurgery for cranial base meningiomas: experience of tumor control, clinical course, and morbidity in a follow-up of more than 8 years. Neurosurgery. 2006 Jan;58(1):28-36

Aoyama H, Shirato H, Tago M, Nakagawa K, Toyoda T, Hatano K, Kenjyo M, Oya N, Hirota S, shioura H, Kunieda E, Inomata T, Hayakawa K, katoh N, Kobashi G. Steroetactic Radiosurgery Plus Whole-Brain Radiation Therapy versus Stereotactic Radiosurgery alone for treatment of brain metastases. JAMA 7 June 2006;295(21):2483-2491.

Henzel M, Gross MW, Hamm K, Surber G, Kleinart G, Failing T, Strassmann G, Engenhart-cabillic R. Significant tumor volume reduction of meningiomas after stereotactic radiotherapy: results of a prospective multicenter study. Neurosurgery 2006;59:1188-1194.

McClelland S, Tendulkar RD, Barnett GH, Neyman G, Suh J. Long-term results of radiosurgery fro refractory cluster headache. Neurosurgery 2006; 59:1258-1263.

Solitary, Multiple or Recurrent Metastases

Technology Evaluation Center, TEC Evaluation. "Stereotactic Radiosurgery for multiple or recurrent brain metastases." May 1995; 10 (7): 1-13.

Sansur CA, et.al., "Gamma Knife Radiosurgery for the Treatment of Brain Metastases", *Stereotactic & Functional Neurosurgery*, 74(1):37-51, 2000.

"Stereotactic Radiosurgery: Neurological Applications, Health Technology Advisory Committee, June 1995 http://www.health .state.mn.us/htac/srna.htm

Nakagawa K, et. al., "A Single Institutional Outcome Analysis of Gamma Knife Radiosurgery for Single or Multiple Brain Metastases, *Clinical Neurology & Neurosurgery*, 102(4):227-232, Dec 2000.

Serizawa T, et. al., "Gamma Knife Treatment for Multiple Metastatic Brain Tumors Compared with Whole Brain Radiation Therapy", *Journal of Neurosurgery*, 93 Suppl 3:32-36, Dec 2000.

ACR Appropriateness Criteria for Solitary Brain Metastasis, Revised 2012

ACR Appropriateness Criteria for Multiple Brain Metastases, Revised 2014

ACR Appropriateness Criteria for Follow Up and Retreatment of Brain Metastases, Radiology, 215 Suppl:1129-1135, June 2000.

Chang EL, Wefel JS, Maor MH, Hassenbusch SJ, Mahajan A, Lang FF, Woo SY, Mathews LA, Allen PK, Shiu AS, Meyers CA. A Pilot Study of Neurocognitive function in patients with one to three new brain metastases initially treated with stereotactic radiosurgery alone. Neurosurgery 2007 60;285-292.

DeLaney TF, Trofimov AV, Engelsman M, Suit H. Advanced-technology radiation therapy in the management of bone and soft tissue sarcomas. Cancer Control 2005;12(1):27-35.

Noel, G, Feuvret L, Calugaru V, Dhermain F, Mammar H, Haie-meder C, Ponvert D, Hasboun D, Ferrand R, Nauraye C, Boisserie G, Beaudre A, Gaboriaud G, Mazal A, Habrand JL, JJ Mazeron. Chordomas of the base of the skull and upper cervical spine. one hundred patients irradiated by a 3-D conformal technique combining photon and proton beams. Acta Oncologica, 2005;44:700-708.

Noel G, Habrand JL, Mammar H, Pontvert D, Haie-Meder C, Hasboun D, Moisson P, Ferrand R, Beaudre A, Boisserie G, Gaboriaud G, Mazal A, Kerody K, Schlienger M, Mazeron JJ. Combination of photon and proton radiation therapy for chordomas and chondrosarcomas of the skull base: the Centre de Protontherapie D'Orsay experience. Int J Radiat Oncol Biol Phys. 2001 Oct 1;51(2):392-8.

Noel G, Feuvret L, Ferrand R, Boisserie G, Mazeron JJ, Habrand JL. Radiotherapeutic factors in the management of cervical-basal chordomas and chondrosarcomas. Neurosurgery. 2004 Dec;55(6):1252-60

Hug EB, Slater JD. Proton radiation therapy for chondromas and chondrosarcomas of the skull base. Neurosurg Clin N Am. 2000 Oct.;11(4):627-38.

Bui TT, Lagman C, Chung LK, et al. Systematic analysis of clinical outcomes following stereotactic radiosurgery for central neurocytoma. Brain Tumor Res Treat. 2017;5(1):10-15.

Zhong J, Patel K, Switchenko J, et al. Outcomes for patients with locally advanced pancreatic adenocarcinoma treated with stereotactic body radiation therapy versus conventionally fractionated radiation. Cancer. 2017;123(18):3486-3493

National Comprehensive Cancer Network. Clinical practice guideline: Hepatobiliary Cancers. Version 1.2023

National Comprehensive Cancer Network. Clinical practice guideline: Kidney Cancer. Version 3.2024

National Comprehensive Cancer Network. Clinical practice guideline: Cervical cancers. Version 2.2024

National Comprehensive Cancer Network. Clinical practice guideline: Pancreatic Adenocarcinoma. Version 2.202

National Comprehensive Cancer Network. Clinical practice guideline: Small Cell Lung Cancer. Version 2.2024

Safavi AH, Mak DY, Boldt RG, et al. Stereotactic ablative radiotherapy in T1-2N0M0 small cell lung cancer: A systematic review and meta-analysis. Lung Cancer. 2021;160:179-186

Reshko LB, Baliga S, Crandley EF, et al. Stereotactic body radiation therapy (SBRT) in recurrent, persistent or oligometastatic gynecological cancers. Gynecol Oncol. 2020;159(3):611 to 617.

Grishchuk D, Dimitriadis A, Sahgal A, et al. ISRS Technical Guidelines for Stereotactic Radiosurgery: Treatment of Small Brain Metastases (≤1 cm in Diameter). Pract Radiat Oncol. 2023; 13(3): 183-194

Trigeminal Neuralgia

Technology Evaluation Center, TEC Evaluation. "Stereotactic radiosurgery for functional disorders." January 1998; 12 (24): 1-15.

Winifred B. Hayes, Hayes Inc. Online, Hayes Medical Technology Directory, “Stereotactic Radiosurgery for Trigeminal Neuralgia and Movement Disorders”, July 25, 2002. Updated 7/16/04, 6/20/07, Feb 14,2018

Kondziolka D, et.al., “Gamma Knife Radiosurgery for Trigeminal Neuralgia: Results and expectations”, *Archives of Neurology*, 55(12):1524-1529, Dec 1998.

Chang JW, et.al., “ Gamma Knife Radiosurgery for Idiopathic and Secondary Trigeminal Neuralgia”, *Journal of Neurosurgery*, 93 Suppl 3:147-151, Dec 2000.

Brisman R, “Gamma Knife Radiosurgery for Primary Management for Trigeminal Neuralgia”, *Journal of Neurosurgery*, 93 Suppl 3:159-161, Dec 2000.

Rogers CL, et. al.,”Gamma Knife Radiosurgery for Trigeminal Neuralgia: Initial Experience of the Barrow Neurological Institute”, *International Journal of Radiation Oncology, Biology, Physics*, 47(4):1013-1019, July 2000.

Young RF, et.al., “Gamma Knife Radiosurgery for the Treatment of Trigeminal Neuralgia”, *Stereotactic & Functional Neurosurgery*, 70 Suppl 1:192-199, Oct 1998.

Maesawa S, et.al., “Clinical Outcomes After Stereotactic Radiosurgery for Idiopathic Trigeminal Neuralgia”, *Journal of Neurosurgery*, 94(1):14-20, Jan 2001.

Donnet A, Tamura M, Valade D, Regis J. Trigemnial nerve radiosurgical treatment in intractable chronic cluster headache: unexpected high toxicity. neurosurgery 59:1252-1257, 2006.

Acoustic Neuroma

Varlotto JM, et.al., “Fractionated Stereotactic Radiotherapy for the Treatment of Acoustic Neuroma: Preliminary Results”, *International Journal of Radiation Oncology, Biology, Physics*, 36(1):141-145, Aug 1996.

Poen JC, et.al.,”Fractionated Stereotactic Radiosurgery and preservation of Hearing in Patients with Vestibular Schwannoma: A Preliminary Report”, *Neurosurgery* 45(6):1299-1305, Dec 199.

Wiet RJ, et.al.,” Long Term results of the First 500 Cases of Acoustic Neuroma Surgery”, *Otolaryngology – Head & Neck Surgery*, 124(6):645-651, June 2001.

Briggs RJ, et.al.,” Current Management of Acoustic Neuroma: Review of Surgical Approaches and Outcomes, *Journal of Clinical Neuroscience*, 7(6):521-526, Nov 2000.

Battista RA, Wiet RJ,”Stereotactic Radiosurgery for Acoustic Neuromas: A Survey of the American Neurotology Society”, American Journal of Otology, 21(3):371-381, May 2000.

Kaylie DM, et.al.,”A Meta-Analysis Comparing Outcomes of Microsurgery and Gamma Knife Surgery”, *Laryngoscope*, 110(11):1850-1856, Nov 2000.

Selch MT, Pedroso A, Lee SP, Solberg TD, Agazaryan N, Cabatan-Awang C, DeSalles AA. Stereotactic radiotherapy for the treatment of acoustic neuromas. J Neurosurg. 2004 Nov;101 Suppl 3:362-72.

Arteriovenous Malformations

Coffey RJ, et. al., “Stereotactic Radiosurgical Treatment of Cerebral Arteriovenous Malformations” *Mayo Clinic Proceedings*, 70(3):214-222, Mar 1995

Shigeno T, et.al.,”Surgery or Gamma Knife for the Treatment of Arteriovenous Malformations?”, *Journal of Clinical Neuroscience*, 7 Suppl 1:19-23, Sept 2000.

Vymazal J, et. al.,” The Role of Gamma Knife Radiosurgery in Arteriovenous Malformation with Aneurysms”, *Stereotactic & Functional Neurosurgery*, 72 Suppl 1:175-184, 1999.

Winifred B. Hayes, Hayes Inc. Online, Hayes Medical Technology Directory, “Stereotactic Radiosurgery for Arteriovenous Malformations and Intracranial Tumors”, Aug. 16, 2002. Updated 7/27/04 Reviewed Feb 8, 2014

Primary Brain Tumors

Technology Evaluation Center, TEC Evaluation. "Stereotactic radiosurgery for meningiomas." May 1995; 10 (6): 1-12.

Technology Evaluation Center, TEC Evaluation. "Stereotactic radiosurgery for high grade gliomas. May 1995; 10 (5): 1-19.

Kida Y, et.al.,” Gamma Knife Radiosurgery for Low Grade Astrocytomas: Results of Long Term Follow-up”, *Journal of Neurosurgery*, 93 Suppl 3:42-46, Dec 2000.

Pendl G, et.al.,”Radiosurgery as an Alternative Treatment for Skull Base Memingiomas”, *Journal of Clinical Neuroscience* 8 Suppl 1:12-14, May 2001.

Ojemann SG, et.al.,”Radiosurgery for Malignant Meningioma: Results in 22 Patients”, *Journal of Neurosurgery*, 93 Suppl 3:62-67, Dec 2000.

Hartford AC, Loeffler JS,"Radiosurgery for Benign Tumors and Artereovenous Malformations of the Central Nervous System", *Frontiers of Radiation Therapy & Oncology*, 35:30-47, 2001.

Cohen-Inbar O, Lee CC, Sheehan JP. The contemporary role of stereotactic radiosurgery in the treatment of meningiomas. Neurosurg Clin N Am. 2016;27(2):215-228.

Soliman H, Das S, Larson DA, Sahgal A. Stereotactic radiosurgery (SRS) in the modern management of patients with brain metastases. Oncotarget. 2016;7(11):12318-12330.

National Comprehensive Cancer Network. Clinical practice guideline: Central Nervous System Cancers Version: 1.2023

Qiu J, Cai D, Yang F, et al. Stereotactic radiosurgery for central nervous system hemangioblastoma in von Hippel-Lindau disease: A systematic review and meta-analysis. Clin Neurol Neurosurg. 2020;195:105912.

Loi M, Caini S, Scoccianti S, et al. Stereotactic reirradiation for local failure of brain metastases following previous radiosurgery: Systematic review and meta-analysis. Crit Rev Oncol Hematol. 2020;153:103043.

Chen WC, Baal UH, Baal JD, et al. Efficacy and Safety of Stereotactic Radiosurgery for Brainstem Metastases: A Systematic Review and Meta-analysis. JAMA Oncol. 2021;7(7):1033 to 1040

Thalamotomy

Young RF, et.al.,"Gamma Knife Thalamotomy for Treatment of Tremor: Long Term Results", *Journal of Neurosurgery* 93 Suppl 3:128-135, Dec 2000.

Niranjan a, et.al."A Comparison of Surgical Approaches for the Management of Tremor:Radiofrequency Thalamotomy, Gamma Knife Thalamotomy and Thalamic Stimulation", *Stereotactic & Functional Neurosurgery*, 72(2-4):178-184, 1999.

Friedman DP, et.al.,"Stereotactic Raiosurgical Pallidotomy and Thalamotomy with the Gamma Knife: MR Imaging Findings with Clinical Correlation – Preliminary Experience", *Radiology* 212(1):143-150, July 1999.

Technology Evaluation Center, TEC Evaluation. "Stereotactic radiosurgery for functional disorders." January 1998; 12 (24): 1-15.

Kondziolka D, Ong JG, Lee JY, Moore RY, Flickinger JC, Lunsford LD. Gamma Knife thalamotomy for essential tremor. J Neurosurg. 2008 Jan;108(1):111-7.

Young RF, Li F, Vermeulen S, Meier R. Gamma Knife thalamotomy for treatment of essential tremor: long-term results. J Neurosurg. 2010 Jun;112(6):1311-7.

Lim SY, Hodaie M, Fallis M, Poon YY, Mazzella F, Moro E. Gamma knife thalamotomy for disabling tremor: a blinded evaluation. Arch Neurol. 2010 May;67(5):584-8.

Elaimy AL, Demakas JJ, Arthurs BJ, Cooke BS, Fairbanks RK, Lamoreaux WT, Mackay AR, Greeley DR, Lee CM. Gamma knife radiosurgery for essential tremor: a case report and review of the literature. World J Surg Oncol. 2010 Mar 22;8:20.

Luo G, Cameron BD, Wang L, et al. Targeting for stereotactic radiosurgical thalamotomy based on tremor treatment response J Neurosurg. 2021;1 to 8.

Ocular Applications

Vladyka V, et.al.,"Initial Experience with Gamma Knife Radiosurgery for Advanced Glaucoma" *Journal of Neurosurgery*, 93 Suppl 3:180-183, Dec 2000.

Haas A, et.al.,"Gamma Knife Treatment of Subfoveal, Classic Neovascularization in Age Related Macular Degeneration: A Pilot study", *Journal of Neurosurgery*, 93 Suppl 3:172-176, Dec 2000.

Schwartz M, "Stereotactic Radiosurgery: Comparing Different Technologies", *CMAJ*, 158(5):625-628, Mar 1998

Pollock BE, et. al., "The Mayo Clinic Gamma Knife Experience: Indications and Initial Results", *Mayo Clinic Proceedings*, 74(1):5-13, Jan 1999

“Stereotactic Radiosurgery: Neurological Applications, Health Technology Advisory Committee, June 1995 http://www.health .state.mn.us/htac/srna.htm

Winifred S. Hayes, Hayes Inc. Online. Proton Beam Therapy for Ocular Tumors, Hemangiomas and Macular Degeneration. July 2004.

Seizures

Technology Evaluation Center, TEC Evaluation. "Stereotactic radiosurgery for functional disorders." Jan 1998; 12 (24): 1-15.

Winifred S. Hayes, Hayes Inc. Onling. Hayes Alert. Stereotactic Radiosurgery for Epilepsy. Vol. 4 (3) March 2003.

Regis J, Bartolomei F, Rey M, et al. Gamma knife surgery for mesial temporal lobe epilepsy. J Neurosurg. Dec 2000;93 Suppl 3:141-146

Feng ES, Sui CB, Wang TX, et al. Stereotactic radiosurgery for the treatment of mesial temporal lobe epilepsy. Acta Neurol Scand. Dec 2016;134(6):442-451

Barbaro NM, Quigg M, Ward MM, et al. Radiosurgery versus open surgery for mesial temporal lobe epilepsy: The randomized, controlled ROSE trial. Epilepsia. Jun 2018;59(1):119801207.

Robotically Assisted Stereotactic Surgery

Gerszten PC, Burton SA, Ozhasoglu C, Vogel WJ, Welch WC, Baar J, Friedland DM. Stereotactic radiosurgery for spinal metastases from renal cell carcinoma. J Neurosurg Spine. 2005 Oct;3(4):288-95.

Winifred S. Hayes, Hayes INC.Online. Hayes Directory. Robotically Assisted Sterotactic Surgery. October 5, 2004. Updated November 28, 2005.

Willems PW, Noordmans HJ, Ramos LM, Taphoorn MJ, Berkelbach van der Sprenkel JW, Viergever MA, Tulleken CA. Clinical evaluation of stereotactic brain biopsies with an MKM-mounted instrument holder.Acta Neurochir (Wien). 2003 Oct;145(10):889-97

Varma TR, Eldridge PR, Forster A, Fox S, Fletcher N, Steiger M, Littlechild P, Byrne P, Sinnott A, Tyler K, Flintham S. Use of the NeuroMate stereotactic robot in a frameless mode for movement disorder surgery. Stereotact Funct Neurosurg. 2003;80(1-4):132-5.

Extracranial Indications

ECRI Institute, HTAIS Hotline, Stereotactic Radiotherapy for Primary Liver Cancer and Liver Metastases. 9/2007.

ECRI Institute, HTAIS Hotline, Stereotactic Radiotherapy for Primary Lung Cancer and Lung Metastases. 9/2007.

ECRI Institute, HTAIS Hotline, Stereotactic Radiotherapy for Pancreatic Cancer. 9/2007.

Fuss M, Thomas CR, Stereotactic Body Radiation Therapy: An Ablative Treatment Option to Primary and Secondary Liver Tumors. *Annals of Surgical Oncology;* Volume 11, No. 2, pp.130-138, 2004.

Schefter TE, Kavanagh BD, Timmerman RD, et al. A phase I trial of stereotactic body radiation therapy (SBRT) for liver metastases. Int J Radiat Oncol Biol Phys. 2005;62(5):1371-1378.

Hoyer M, Roed H, Sengelov L, et al. Phase-II study on stereotactic radiotherapy of locally advanced pancreatic carcinoma. Radiother Oncol. 2005;76(1):48-53

Hernandez-Duran S, Hanft S, Komotar RJ, Manzano GR. The role of stereotactic radiosurgery in the treatment of intramedullary spinal cord neoplasms: A systematic literature review. Neurosurg Rev. 2016;39:175.

All other indications

Kano H, Niranjan A, Khan A, Flickinger JC, Kondziolka D, Lieberman F, Lunsford LD. Does radiosurgery have a role in the management of oligodendrogliomas? J Neurosurg. 2009 Mar;110(3):564-71.

Tate DJ, Adler JR Jr, Chang SD, Marquez S, Eulau SM, Fee WE, Pinto H, Goffinet DR. Stereotactic radiosurgical boost following radiotherapy in primary nasopharyngeal carcinoma: impact on local control. Int J Radiat Oncol Biol Phys. 1999 Nov 1;45(4):915-21.

American Cancer Society. Nasopharyngeal cancer. Last reviewed 8/8/12. http://www.cancer.org/cancer/nasopharyngealcancer/detailedguide/nasopharyngeal-cancer-treating-radiation-therapy

Pai PC, Chuang CC, Wei KC, et al.: Stereotactic radiosurgery for locally recurrent nasopharyngeal carcinoma. Head Neck 24 (8): 748-53, 2002

National Cancer Institute. Childhood Craniopharyngioma Treatment (PDQ®) This policy will be revised as necessary and reviewed no less than annually. http://www.cancer.gov/cancertopics/pdq/treatment/child-cranio/patient/page4

Kobayashi T. Long-term results of gamma knife radiosurgery for 100 consecutive cases of craniopharyngioma and a treatment strategy. Prog Neurol Surg. 2009;22:63-76.

S. M. Chiou, L. D. Lunsford, A. Niranjan, D. Kondziolka, and J. C. Flickinger Stereotactic radiosurgery of residual or recurrent craniopharyngioma, after surgery, with or without radiation therapy. Neuro Oncol. 2001 July; 3(3): 159–166.

Tatsuya K., et al. PROGNOSTIC FACTORS FOR TUMOR RECURRENCE AFTER GAMMA KNIFE RADIOSURGERY OF PARTIALLY RESECTED AND RECURRENT CRANIOPHARYNGIOMAS. Nagoya J. Med. Sci. 74. 141 ~ 147 2012

Sachdev S, Dodd RL, Chang SD, Soltys SG, Adler JR, Luxton G, Choi CY, Tupper L, Gibbs IC. Stereotactic radiosurgery yields long-term control for benign intradural, extramedullary spinal tumors. Neurosurgery. 2011 Sep;69(3):533-9

Benzil, DL, et al. Safety and efficacy of stereotactic radio surgery for tumors of the spine. J Neurosurg (Suppl 3) 101:413-418, 2004

Wahl DR, Stenmark MH, Tao Y, et al. Outcomes after stereotactic body radiotherapy or radiofrequency ablation for hepatocellular carcinoma. J Clin Oncol. 2016; 34(5):452-459

Brand DH, Tree AC, Ostler P, et al. Intensity-modulated fractionated radiotherapy versus stereotactic body radiotherapy for prostate cancer (PACE-B): acute toxicity findings from an international, randomised, open-label, phase 3, non-inferiority trial. Lancet, Sept. 17, 2019

This policy will be revised as necessary and reviewed no less than annually.

Devised: 12/96

Revised: 7/97, 2/03, 2/04, 2/05, 2/06, 2/07 (coding);2/08 (Add'l indications added) ; 3/09 (wording,coding); 4/11 (indication revision), 4/12 (essential tremor indication added); 6/12 (add stereotactic body radiation therapy), 6/13 (added indications); 5/15 (removed auth); 5/20(add indication, exclusion)

Reviewed: 4/10, 6/14, 6/15, 6/16, 5/17, 5/18, 5/19, 5/21, 5/22, 5/23, 5/24

CMS UM Oversight Committee Approval: 12/23, 7/24

without the prior written consent of Geisinger Health Plan. Additionally, the above medical policy does not confer any endorsement by Geisinger Health Plan, Geisinger Quality Options, Inc. and Geisinger Indemnity Insurance Company regarding the medical service, medical device or medical lab test described under this medical policy.