Clinical Policy: Proton and Neutron Beam Therapy

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Last Review Date: 03/19
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Coding Implications
Revision Log

Description

Proton beam therapy (PBT) is a form of external beam radiation therapy (EBRT) that utilizes protons (positively charged subatomic particles) to precisely target a specific tissue mass. Proton beams can penetrate deep into tissues to reach tumors, while delivering less radiation to surrounding tissues. This may make PBT more effective for inoperable tumors, or for those areas in which damage to healthy tissue would pose an unacceptable risk.

Neutron beam therapy (NBT) is a less widely available form of EBRT which utilizes neutrons. Its clinical use is very limited due to difficulties in the delivery of this treatment modality.

Policy/Criteria

I. It is the policy of PA Health & Wellness (PHW)® that proton and neutron beam therapy is **medically necessary** for the following indications:

- **A.** Ocular tumors with no distant metastasis. Fiducial markers (tantalum clips) are permitted to allow eye and tumor position verification; or
- **B.** Primary or metastatic tumors of the spine where the spinal cord tolerance may be exceeded with conventional treatment or where the spinal cord has previously been irradiated; or
- **C.** Tumors that approach or are located at the base of the skull, including but not limited to: chordoma or chondrosarcoma; or
- **D.** Primary hepatocellular cancer treated in a hypofractionated regimen; or
- **E.** Primary or benign solid tumors in members ≤ 18 years old; or
- **F.** Members with genetic syndromes making total volume of radiation minimization crucial such as but not limited to NF-1 patients and retinoblastoma; or
- **G.** Malignant and benign primary CNS tumors; or
- **H.** Advanced (eg,T4) and/or unresectable head and neck cancers, when normal tissue constraints cannot be met by photon-based therapy; or
- **I.** Cancers of the paranasal sinuses and other accessory sinuses, when normal tissue constraints cannot be met by photon-based therapy: or
- **J.** Non-metastatic retroperitoneal sarcomas (i.e., preoperative treatment of resectable disease or primary treatment for those with unresectable disease); or
- **K.** Re-irradiation cases where cumulative critical structure dose would exceed tolerance dose.

II. It is the policy of PHW that NBT **is medically necessary** in the treatment of salivary gland tumors considered surgically unresectable, or for a patient with salivary gland tumors who is medically inoperable.

III. All other indications for PBT and NBT are considered **not medically necessary** as insufficient evidence exists to recommend proton beam therapy as superior to other treatments available.

Background

PBT is an important method of treatment used in managing malignant disease with a well-defined target. Unlike x-rays, protons cause little damage to the tissues they pass through to reach their destination. Their energy is released after traveling a specified distance, thus delivering more radiation to the tumor and doing less damage to the nearby normal tissue. Because of this, PBT may be more useful for tumors with distinct edges rather than those whose edges are mixed with normal tissue.

The American Society of Radiation Oncology (ASTRO) evaluated the evidence of use of PBT up until November 2009. The use of PBT was evaluated for CNS tumors, gastrointestinal malignancies, lung, head and neck, prostate, and pediatric tumors. Data evaluated did not provide sufficient evidence to support PBT for lung cancer, head and neck cancer, GI malignancies, and pediatric non-CNS malignancies. For hepatocellular carcinoma and prostate cancers, evidence supports the efficacy of PBT, but there is no support that it is a superior treatment to other external beam radiation therapy approaches. For pediatric CNS malignancies, PBT appears to be superior to other EBRT approaches, but more data is needed to determine the most appropriate approach. For large ocular melanomas and chordomas, evidence supports there to be a benefit of PBT over other EBRT approaches. Current evidence is limited for PBT indications and more robust clinical trials are needed to determine the appropriate clinical setting for its use.

ASTRO's Proton Beam Model Policy, updated from the previous version in 2014, expanded its recommendations for use. Based on medical necessity requirements and published clinical data, in addition to its previous recommendations, additional disease sites that frequently support the use of PBT include the following:

- Malignant and benign primary CNS tumors
- Advanced (eg,T4) and/or unresectable head and neck cancers
- Cancers of the paranasal sinuses and other accessory sinuses
- Non-metastatic retroperitoneal sarcomas
- Re-irradiation cases (where cumulative critical structure dose would exceed tolerance dose)

ASTRO states there is a need for continued clinical evidence development and comparative effectiveness analyses for the appropriate use of PBT for various disease sites and as such all other indications are suitable for Coverage with Evidence Development (CED). They note that radiation therapy for patients treated under the CED paradigm should be covered by the insurance carrier as long as the patient is enrolled either in an IRB-approved clinical trial or in a multi-institutional patient registry adhering to Medicare requirements for CED. [24]

Head and Neck Cancer

Guidelines from National Comprehensive Cancer Network (NCCN) regarding PBT in the treatment of head and neck cancer state the following. "Achieving high conformal dose

distributions is especially important for patients whose primary tumors are periocular in location and/or invade the orbit, skull base, and/or cavernous sinus; extend intracranially or exhibit extensive perineural invasion; and who are being treated with curative intent and/or who have long life expectancies following treatment. Non-randomized single institution clinical reports and systematic comparisons demonstrate safety and efficacy of PBT in the above-mentioned specific clinical scenarios. Either intensity-modulated radiation therapy (IMRT) or 3D conformal RT is recommended. Proton therapy can be considered when normal tissue constraints cannot be met by photon-based therapies."[12]

Central Nervous System Cancers

NCCN guidelines note that to reduce toxicity from craniospinal irradiation in adults, consider the use of IMRT or protons if available.[19]

Uveal Melanoma

Per NCCN guidelines on uveal melanoma, "Tumor localization for PBT may be performed using indirect ophthalmoscopy, transillumination, and/or ultrasound (intraoperative and/or preoperative), MRI and or/CT. For intraocular tumors, fiducial markers (tantalum clips) are encouraged to permit eye and tumor position verification for image-guided radiotherapy delivery."[21]

A practice parameter on PBT from the American College of Radiology/ASTRO also notes that in the most common systems, the ophthalmologist will guide patient selection with tumor/target definition through techniques such as funduscopic examination, fluorescein angiogram, ultrasound, and direct tumor measurements intraoperatively. Most commonly but not imperatively, radio-opaque fiducial markers are sutured to the sclera and used as references for tumor definition. Treatment planning for ocular tumors has been most frequently performed with a treatment planning algorithm and software system developed specifically for treatment of ocular tumors. This requires multiple measurements that are obtained by the ophthalmologist, both from clinical examination and from surgical evaluation at the time of fiducial clip placement.[20]

Non-metastatic Retroperitoneal Sarcomas

Per NCCN guidelines on soft tissue sarcoma (STS), surgical resection of a localized tumor with negative margins is the standard, potentially curative treatment for patients with retroperitoneal/intra-abdominal STS. Radiation therapy (RT) can be administered as preoperative treatment for patients with resectable disease or as a primary treatment for those with unresectable disease. Post-operative RT is discouraged, but may be considered in rare instances. Newer RT techniques such as IMRT and 3D conformal RT using protons or photons may allow tumor target coverage and acceptable clinical outcomes within normal tissue dose constraints to adjacent organs at risk. When EBRT is used, sophisticated treatment planning with IMRT, tomotherapy and/or proton therapy can be used to improve therapeutic effect. However, the safety and efficacy of adjuvant RT techniques have yet to be evaluated in a multicenter RCT. RT is not a substitute to definitive surgical resection with negative margins, and re-resection to negative margins is preferable.

Hepatobiliary Cancer

Per NCCN guidelines on hepatocellular carcinoma (HCC), EBRT is a treatment option for patients with unresectable disease, or for those who are medically inoperable due to comorbidity. All tumors irrespective of the location may be amenable to RT [3D conformal RT, IMRT, and stereotactic Body Radiation therapy (SBRT)]. Image-guided radiotherapy is strongly recommended when using EBRT, IMRT, and SBRT to improve treatment accuracy and reduce treatment-related toxicity. Hypofractionation with photons or protons is an acceptable option for intrahepatic tumors, though treatment at centers with experience is recommended. PBT may be appropriate in specific situations.[18] In a phase II study, 94.8% of patients with unresectable HCC who received high-dose hypofractionated PBT demonstrated >80% local control after 2 years, as defined by RECIST criteria.[25] Several ongoing studies are continuing to investigate the impact of hypofractionated PBT on HCC outcomes, including randomized trials comparing PBT to radiofrequency ablation.

Prostate Cancer

ASTRO recommends coverage of PBT for the treatment of non-metastatic prostate cancer when enrolled in an institutional review board (IRB)–approved study or a multi-institutional registry that adheres to Medicare requirements for Coverage with Evidence Development (CED).[24] NCCN guidelines note that there lacks clear evidence to support a benefit or decrement to proton therapy over IMRT for either treatment efficacy or long-term toxicity. Firm conclusions regarding differences in toxicity or effectiveness of proton and photon therapy cannot be drawn because of the limitations of the available studies.[24]

Neutron Beam Therapy

NBT utilizes neutrons, rather than photons, to destroy tumor cells. Neutrons are much heavier than photons and appear to be more effective at causing damage to very dense tumors. It is however more clinically difficult to generate neutron particles, so it has not gained wide acceptance for treatment. It has most commonly been studied in salivary gland tumors which are either unable to be removed completely or for recurrent disease.

NCCN states NBT was historically considered a promising solution for unresectable salivary gland cancer, however, they no longer recommend NBT as a general solution for salivary gland cancers due to the diminishing demand, concerns regarding the methodologic robustness of available randomized trial data, and closure of all but one center in the U.S. The panel recognizes the potential clinical value of neutron therapy for select patients, particularly those with unresectable disease meeting the RTOG-MRC clinical trial criteria. The NCCN guidelines note that PBT can be considered when normal tissue constraints cannot be met by photon-based therapy.[12]

Coding Implications

This clinical policy references Current Procedural Terminology (CPT®). CPT® is a registered trademark of the American Medical Association. All CPT codes and descriptions are copyrighted 2018, American Medical Association. All rights reserved. CPT codes and CPT descriptions are from the current manuals and those included herein are not intended to be all-inclusive and are included for informational purposes only. Codes referenced in this clinical policy are for informational purposes only. Inclusion or exclusion of any codes does not guarantee coverage.

Providers should reference the most up-to-date sources of professional coding guidance prior to the submission of claims for reimbursement of covered services.

CPT Codes for proton beam therapy considered medically necessary for indications listed in this policy

CPT Codes	Description
77423	High energy neutron radiation treatment delivery; 1 or more isocenter(s) with coplanar or non-coplanar geometry with blocking and/or wedge, and/or compensator(s)
77520	Proton treatment; simple, without compensation
77522	Proton treatment delivery; simple, with compensation
77523	Proton treatment delivery; intermediate
77525	Proton treatment delivery; complex

HCPCS Codes	Description
S8030	Scleral application of tantalum ring(s) for localization of lesions for proton beam therapy

ICD-10-CM diagnosis codes that support coverage criteria for proton beam therapy

+ Indicates a code requiring an additional character

ICD-10-CM Code	Description
C06.9	Malignant neoplasm of mouth, unspecified site (minor salivary gland, unspecified site)
C08.0-C08.9	Malignant neoplasm of other and unspecified major salivary glands
C11.0-C11.9	Malignant neoplasm of nasopharynx
C22.0 – C22.8	Malignant neoplasm of liver and intrahepatic ducts
C31.0-C31.9	Malignant neoplasm of accessory sinuses
C41.0	Malignant neoplasm of bones of skull and face
C41.2	Malignant neoplasm of vertebral column
C48.0	Malignant neoplasm of retroperitoneum
C69.00 – C69.92	Malignant neoplasm of eye and adnexa
C70.0 – C70.9	Malignant neoplasm of meninges
C71.0 – C71.9	Malignant neoplasm of cerebrum, except lobes and ventricles
C72.0 – C72.9+	Malignant neoplasm of spinal cord
C75.1 – C75.3	Malignant neoplasm of pituitary, craniopharyngeal duct, and pineal gland
C79.31	Secondary malignant neoplasm of brain
C79.4 – C79.49+	Secondary malignant neoplasm of other and unspecified parts of nervous system
D09.20-D09.22	Carcinoma in situ of eye
D31.00-D31.92	Benign neoplasm of eye and adnexa

ICD-10-CM Code	Description
D32.0 – D32.9	Benign neoplasm of meninges
D33.0 – D33.9	Benign neoplasm of brain and other parts of central nervous system
D35.2	Benign neoplasm of pituitary gland
D42.1	Neoplasm of uncertain behavior of spinal meninges
D43.4	Neoplasm of uncertain behavior of spinal cord
D44.3	Neoplasm of uncertain behavior of pituitary gland
D44.4	Neoplasm of uncertain behavior of craniopharyngeal duct

Reviews, Revisions, and Approvals	Date	Approval Date
Added fiducial markers (tantalum clips) as medically necessary when treating ocular tumors.	09/18	
Removed NBT from initial statement in I. Added the following as medically necessary indications for PBT: malignant and benign primary CNS tumors; advanced (eg,T4) and/or unresectable head and neck cancers; cancers of the paranasal sinuses and other accessory sinuses; non-metastatic retroperitoneal sarcomas and re-irradiation cases where cumulative critical structure dose would exceed tolerance dose. Background and codes updated.	01/19	02/19
Removed 77422, as it is no longer a valid code.	02/19	03/19
Clarified in II that neutron beam therapy is medically necessary for a patient who is medically inoperable **and** has salivary gland tumors, in addition to the existing criteria of surgically unresectable salivary gland tumors.	03/19	

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