Clinical Policy: Proton and Neutron Beam Therapy

Reference Number: WA.CP.MP.70
Last Review Date: 01/20

See Important Reminder at the end of this policy for important regulatory and legal information.

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 that 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 Coordinated Care of Washington, Inc., in accordance with the Health Care Authority’s Health Technology Assessment, that proton beam therapy is medically necessary for the following indications:
   A. Malignant primary or benign solid tumors in members ≤ 20 years old; or
   B. Primary cancer of the esophagus, head or neck; or
   C. Primary tumors of the skull, including but not limited to chordoma or chondrosarcoma; or
   D. Primary hepatocellular cancer treated in a hypofractionated regimen; or
   E. Primary tumors of the brain and spine; or
   F. Primary ocular tumors. Fiducial markers (tantalum clips) are permitted to allow eye and tumor position verification; or
   G. Other primary cancers where all other treatment options are contraindicated after review by a multidisciplinary tumor board.

II. It is the policy of Coordinated Care of Washington, Inc., that neutron beam therapy 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 are not covered. All other indications for NBT are considered not medically necessary as insufficient evidence exists to recommend NBT 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. 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).

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.

**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.

**Coding Implications**
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<tr>
<th>CPT® Codes</th>
<th>Description</th>
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<tr>
<td>77423</td>
<td>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)</td>
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<tr>
<td>77520</td>
<td>Proton treatment; simple, without compensation</td>
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CPT® Codes | Description
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77522 | Proton treatment delivery; simple, with compensation
77523 | Proton treatment delivery; intermediate
77525 | Proton treatment delivery; complex

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

Reviews, Revisions, and Approvals

| Date | Approval Date |
--- | ---
Policy developed. | 10/19 | 01/20
Annual review. Updated references. Reordered criteria to exactly mirror HTA language. | 01/20 | 03/20

References

**Important Reminder**
This clinical policy has been developed by appropriately experienced and licensed health care professionals based on a review and consideration of currently available generally accepted standards of medical practice; peer-reviewed medical literature; government agency/program approval status; evidence-based guidelines and positions of leading national health professional organizations; views of physicians practicing in relevant clinical areas affected by this clinical policy; and other available clinical information. The Health Plan makes no representations and accepts no liability with respect to the content of any external information used or relied upon in developing this clinical policy. This clinical policy is consistent with standards of medical practice current at the time that this clinical policy was approved. “Health Plan” means a health plan that has adopted this clinical policy and that is operated or administered, in whole or in part, by Centene Management Company, LLC, or any of such health plan’s affiliates, as applicable.

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