



Clinical Review Criteria Proton Radiation Therapy

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Criteria For Medicare Members

Source	Policy
CMS Coverage Manuals	None
National Coverage Determinations (NCD)	None
Local Coverage Determinations (LCD)	None
Local Coverage Article	None
Kaiser Permanente Medical Policy	Due to the absence of an active NCD, LCD, or other coverage guidance, Kaiser Permanente has chosen to use their own Clinical Review Criteria, Proton Beam Therapy , for medical necessity determinations. Refer to the Non-Medicare criteria below.

For Non-Medicare Members

Kaiser Permanente has elected to use the Proton Beam Therapy (KP-0389) MCG* for medical necessity determinations. For access to the MCG Clinical Guidelines criteria, please see the MCG Guideline Index through the provider portal under Quick Access.

***MCG Manuals are proprietary and cannot be published and/or distributed.** However, on an individual member basis, Kaiser Permanente can share a copy of the specific criteria document used to make a utilization management decision. If one of your patients is being reviewed using these criteria, you may request a copy of the criteria by calling the Kaiser Permanente Clinical Review staff at 1-800-289-1363.

If requesting this service, please send the following documentation to support medical necessity:

- Most recent medical oncology notes
- Most recent radiation oncology notes
- Most recent imaging (i.e., CT/MRI)

The following information was used in the development of this document and is provided as background only. It is provided for historical purposes and does not necessarily reflect the most current published literature. When significant new articles are published that impact treatment option, Kaiser Permanente will review as needed. This information is not to be used as coverage criteria. Please only refer to the criteria listed above for coverage determinations.

Background

Proton beam therapy (PBT) is a form of stereotactic radiosurgery that delivers a focused dose of radiation energy to the targeted area while surrounding normal tissue receives minimal radiation. PBT releases its highest percentage of energy at the end of its path (i.e., Bragg peak), depositing 100% of the dosage at the targeted tissue.

Prostate cancer is one of the most common cancers, and the second leading cause of cancer death in men in the US. The standard management options for a localized disease include surgery, radiotherapy, and watchful

waiting. The optimal treatment, however, is not well defined; both surgery and radiation therapy are reported to have equivalent outcomes, and each approach has its advantages and side effects. Researchers have reported that for intermediate and high-risk disease, radical external beam treatment is the standard treatment, and that there is a dose response for biochemical relapse-free survival. The success of radiation therapy depends on the dose delivered to the tumor and the accuracy of delivery. However, dose escalation to >70 Gy is associated with an increase in genitourinary and gastrointestinal side effects. Several techniques have been developed to deliver high doses of radiation to the prostate while sparing surrounding normal tissue. Among these are the three-dimensional conformal radiotherapy external beam radiotherapy (EBRT), intensity modulated radiation therapy (IMRT), brachytherapy, and proton therapy (Vordermark 2006, Hoskin 2007, Rades 2007).

Proton therapy, like other forms of radiotherapy, works by aiming ionizing particles onto the target tumor. Theoretically proton radiation therapy has the benefit of more localized delivery of radiotherapy than that achieved with photons produced by a linear accelerator. Unlike X-ray beams, a single proton beam can be shaped to deliver a homogeneous radiation dose to irregular three-dimensional volumes. Due to their relatively large size, protons scatter less easily in the tissue with very little lateral dispersion. They follow a predetermined track and stop abruptly at any prescribed depth. The proton beam energy is at its minimum at entry to the body, and maximum, known as 'Bragg-peak', near the end of the range of the proton beam. Beyond the Bragg-peak, the dose falls practically to zero. By choosing appropriate proton beam energies, the depth of the Bragg-peak can be adjusted according to the depth and extent of the target volume. The improved dose distribution can potentially allow higher doses of radiotherapy to the tumor without increasing the normal tissue toxicity (Slater 1999, Brada 2007, Olsen 2007). There is a concern however, that proton beam radiotherapy exposes healthy tissue to stray radiation emitted from the treatment unit and secondary radiation produced within the patient. These exposures may potentially increase a patient's risk of developing a radiogenic second cancer (Taddei 2008).

Proton therapy was initially used for the treatment of choroidal malignant melanomas, and tumors of the skull base. Currently there is a growing interest in the use of proton therapy for the treatment of tumors where conventional radiation therapy would damage surrounding radiosensitive tissues to an unacceptable level as brain tumors, lung cancers, and other tumors in the neck, vicinity of the spinal cord, liver, upper abdomen and pelvis. Proton therapy is also favored for pediatric patients where long-term side effects, as occurrence of secondary tumors resulting from overall radiation dose to the body, are of concern.

Some investigators have questioned the ability of proton therapy to limit morbidity, and others have questioned its value relative to the cost. In addition, concerns have been raised about a potential risk for secondary malignancies.

National Cancer Institute Clinical Trials

Two Phase III trials are comparing photon versus carbon ion radiation therapy in patients with low and intermediate grade chondrosarcoma of the skull base ([NCT01182753](#)) and chordoma of the skull base ([NCT01182779](#)).

A Phase III trial is comparing hypo fractionated proton radiation versus standard dose for prostate cancer ([NCT01230866](#)).

National Comprehensive Cancer Network (NCCN) Guidelines

Prostate Cancer: NCCN guidelines for [prostate cancer](#) (v 3.2012) state that "proton beam therapy can be added as an alternative radiation sources. However, proton therapy is not recommended for routine use at this time since clinical trials have not yet yielded data that demonstrates superiority to, or equivalence of, proton beam and conventional external beam for the treatment of prostate cancer". (1)

Bone Cancer: NCCN guideline for [bone cancer](#) (v 2.2012) states that "proton and/or photon beam RT may be useful for patients with chondrosarcomas of the skull base and axial skeleton with tumors in unfavorable location not amenable to resection." (3)

The FDA cleared several medical devices designed to produce and deliver a proton beam for the treatment of patients with localized tumors and other conditions susceptible to treatment by radiation.

Medical Technology Assessment Committee (MTAC)

Proton Radiation Therapy

12/01/2008: MTAC REVIEW

Evidence Conclusion: No randomized clinical trials, to date, have directly compared the efficacy of protons and conventional radiation therapy using photons in the treatment of clinically localized prostate cancer. The only two published RCTs involving proton therapy were evaluating the effect of dose escalation on cancer control. Both studies used protons as a boost to photon irradiation and neither was intended to compare the efficacy of protons versus the conventional photon radiation therapy. Zietman et al's (2005) trial randomized 393 patients with early stage (T1B-T2B) prostate cancer to a proton dose of 19.8 GyE or 28.8 GyE followed by photon irradiation to 50.4 Gy. All patients in the two arms of the study received both photons and protons. The results showed no significant difference in 5-year survival (96% vs. 97%) between the two proton doses, but there was an improvement in 5-year biochemical total control rate from 61.4% for the low-dose group to 80.4% to the high dose group (p<.001). The higher radiation dose was however associated with an increase in acute and late grade 2 rectal toxicity. The largest published case series on proton therapy (Slater 2004) was retrospective, had selection bias, and no comparison or control group. Patients with localized prostate cancer who received proton therapy in the early 1990s were treated with a combination therapy of both protons and photons. Later, after the proton treatment capacity increased, the patients were selected to receive either proton therapy alone or in combination with photon therapy. Therapy was selected based on the patient's risk of lymph node micrometastases as calculated by Partin normogram. The study does not allow making any conclusion on the comparative efficacy of protons versus photon therapy. There is insufficient evidence to determine whether the use of protons for the treatment of patients with localized prostate cancer would improve survival and reduce biochemical failure rate compared with the highly conformal photon therapy currently used. There is insufficient evidence to determine whether the use of protons for treating patients with localized prostate would reduce acute or late rectal and urinary toxicity compared with the highly conformal photon therapy currently used.

Articles: The literature search revealed over 170 published articles on proton therapy for prostate cancer. The majority were review articles on the technical aspects of the therapy. No randomized controlled trials that directly compared proton therapy to any other conventional radiation therapy were identified. There were two published RCTs on dose escalation (Shipley 1995, and Zietman 2005) using a combination of photon and proton therapy for localized prostate cancer, and several case series with historical, or no controls. Shipley's trial (1995) used inadequate photon doses and techniques compared to the current standards. Zietman and colleagues' trial as well as the largest published case series on proton therapy were selected for critical appraisal. Zietman AL, Desilvio ML, Slater JD, et al. Comparison of conventional-dose vs. high-dose conformal radiation therapy in clinically localized adenocarcinoma of the prostate. A randomized controlled trial. JAMA 2005; 294:1233-1239. See [Evidence Table](#). Slater JD, Rossi CJ, Yonemoto LT, et al. Proton therapy for prostate cancer.: The initial Loma Linda University experience Int J Radiat Oncol Biol Phys 2003;59:348-352. See [Evidence Table](#).

The use of Proton radiation therapy for the treatment of prostate cancer does not meet the *Kaiser Permanente Medical Technology Assessment Criteria*.

Applicable Codes

Considered Medically Necessary when criteria in the applicable policy statements listed above are met:

CPT® or HCPC Codes	Description
77520	Proton treatment delivery; simple, without compensation
77522	Proton treatment delivery; simple, with compensation
77523	Proton treatment delivery; intermediate
77525	Proton treatment delivery; complex
S8030	Scleral application of tantalum ring(s) for localization of lesions for proton beam therapy

***Note:** Codes may not be all-inclusive. Deleted codes and codes not in effect at the time of service may not be covered.

****To verify authorization requirements for a specific code by plan type, please use the [Pre-authorization Code Check](#).**

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Date Created	Date Reviewed	Date Last Revised
06/04/2009	05/03/2011 MDCRPC, 08/02/2011 MDCRPC, 06/05/2012 MDCRPC, 03/05/2013MDCRPC,	09/01/2015

	01/07/2014 ^{MPC} , 11/04/2014 ^{MPC} , 09/01/2015 ^{MPC} , 07/05/2016 ^{MPC} , 05/02/2017 ^{MPC} , 03/06/2018 ^{MPC} , 02/05/2019 ^{MPC} , 02/04/2020 ^{MPC} , 02/02/2021 ^{MPC} , 02/01/2022 ^{MPC} , 02/07/2023 ^{MPC}	
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^{MDCRPC} Medical Director Clinical Review and Policy Committee

^{MPC} Medical Policy Committee

Revision History	Description
09/01/2015	Added indication for pediatric central nervous
09/02/2015	Added new link for LCD
02/01/2022	Removed link to retired SRS/SBRT LCD L34151. Adopted KPWA policy for Medicare Advantage members.