INTRODUCTION:

Proton beam therapy (PBT) is a type of external beam radiotherapy that uses charged particles. These particles have unique characteristics, including limited lateral slide, scatter and tissue in a defined range, going for maximum dose delivery over the last few millimeters of the particles’ range. The maximum is called the Bragg peak. Proton beam irradiation, when applied to treating cancer, uses different proton energy with Bragg peaks at various steps, enabling dose escalation to the tumor, minimizing excess dose to normal surrounding tissue. Over the years, proton beam irradiation has been applied to treating tumors that require dose escalation to achieve a higher probability of care, as well as tumors requiring increased precision in dose deposition while protecting normal surrounding tissue. Proton therapy has an over 40-year history in treating cancer, yet to date, there have been few studies that show superiority to conventional photon beam irradiation, especially with modern techniques.

MEDICALLY NECESSARY INDICATIONS FOR PROTON BEAM THERAPY:

- **Uveal Melanoma**
  Proton beam therapy is considered an effective treatment for uveal melanoma, dependent on size, location and extension. Local control rates, eye preservation, and vision retention have been well documented with this treatment. However, other forms of irradiation, including brachytherapy and stereotactic radiosurgery (SRS) are also established treatment options. To date, there is insignificant evidence to support one form of treatment over the other. However, given the published excellent data on proton therapy, PBT is considered an appropriate use of this technology when confined to the globe (no evidence of metastasis or extrascleral extension).

- **Chordomas or Chondrosarcomas Arising at the Base of the Skull**
  As postoperative therapy, evidence suggests that proton beam therapy is at least as effective, and may be superior to, conventional radiation therapy in the treatment of chordomas or chondrosarcomas of the skull. There is no data that shows proton beam therapy as clinically superior to conventional radiotherapy, including intensity modulated radiation therapy, 3-dimensional radiation therapy, or stereotactic radiation therapy. However, based on these tumors being located adjacent to critical CNS structures and the documented efficacy PBT treatment would be considered medically necessary.

- **Arterial Venous Malformation (AVM)**
An AVM is an abnormal vascular structure that usually develops as a congenital defect. Multiple treatment options exist for AVM’s, including microsurgery, embolization, or radiosurgery. Surgery is generally considered a treatment of choice, with the majority of patients undergoing this procedure. Those considered poor candidates for surgery are typically treated with embolization or radiosurgery. Proton beam therapy is an option for patients not amenable to surgery or stereotactic radiosurgery.

- **Treatment of pediatric central nervous system tumors (less than 21 years of age)**

**TREATMENT OPTIONS REQUIRING ADDITIONAL CLINICAL REVIEW:**

- Central nervous system lesions adjacent to the brain stem, spinal cord, or optic nerve. A treatment plan with a comparison to conventional IMRT/SRS may be required.

**NOT MEDICALLY NECESSARY INDICATIONS FOR PROTON BEAM THERAPY:**

Proton beam therapy has not been proven to be superior to conventional radiation therapy for all other indications including, but not limited to:

- Prostate cancer
- Breast cancer
- Lung cancer
- Colorectal cancer
- Cervical cancer
- Metastasis
- Gliomas
- Soft tissue sarcoma
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