

Proton beam therapy

Understanding
the decision
process



Who is proton beam therapy suitable for?

It is important to keep in mind that proton beam therapy (PBT) is not suitable for treating every type of tumour. In fact, original estimates were that only 1.5% of people with cancer would be suitable for proton beam therapy.¹

Proton beam therapy is considered to be particularly beneficial to children and young adults, as it avoids damaging healthy developing tissue and is thought to reduce the risk of secondary malignancies later in life. For adults, it is considered beneficial for tumours in areas where surrounding tissue is highly sensitive to the effects of radiation. Healthy brain cells are a good example of such tissue. Even so, proton beam therapy is not appropriate for all brain tumours, and in many cases, it will be less effective than conventional X-ray radiotherapy. There are many factors involved in determining the best course of treatment for each individual, and the ultimate goal of everyone involved in this decision process is to provide the most effective treatment, whatever that may be.

One consideration is that proton beam therapy is very specific in the area of treatment it targets, so a good candidate for proton beam therapy would be a tumour that resides within a sharply defined area. Non-malignant tumours (such as acoustic schwannomas) are often suitable for proton beam therapy, because the tumour cells do not extend beyond the tumour. In other words, the tumour is usually sharply delineated.²

¹ Alford, J. (2017).

² Hu, M. *et al.* (2018).

At the other end of the scale are cases where the whole brain and spine require treatment, often called craniospinal irradiation (CSI). Cases typically requiring craniospinal irradiation are those where small tumour cells may travel throughout the spinal canal. The advantage when treating the spine is that protons deliver the radiation to a required depth, whereas the X-rays in conventional radiotherapy continue to deliver radiation throughout their journey through the body. This means that despite the large area of treatment, the patient receiving proton beam therapy is not getting doses of radiation to other organs, such as the lungs, heart and intestines, which can cause high levels of toxicity both during the treatment and for many years afterwards. In cases of craniospinal irradiation, it is important to note that in both X-ray radiation therapy and proton beam therapy, the entire brain will require irradiation, so there is no benefit to using protons over X-rays.

Of course, no two tumours are the same, and each case is considered individually to make sure that each and every patient receives the most effective treatment available for their particular case. Some tumour types that have been treated with proton beam therapy include:

- low-grade brain tumours
- skull-based tumours
- gynaecological tumours
- gastrointestinal tumours
- lung tumours
- lymphomas

- sarcomas
- head and neck tumours
- prostate tumours.

These types of cancer make up a very small proportion of all cancer diagnoses. Even if there were unlimited access to proton beam therapy, its use would not be recommended in most cases.

Proton beam therapy is rarely used in cancers that have spread to other parts of the body (metastatic cancer).

The decision process

Access to proton beam therapy is guided by NHS England national commissioning policies and evaluative commissioning schemes or clinical trials. This means that each case is reviewed against a set of clinical indications defined by NHS England, which are supported by research-based evidence, and clinical trials and studies.³

The possibility of proton beam therapy treatment is first discussed in a neuroscience multidisciplinary team (MDT) meeting at the patient's local referring centre. This is a meeting where a large team of medical and healthcare specialists (such as surgeons, radiologists, oncologists and clinical nurse specialists) discusses each case and reviews medical data to confirm a diagnosis and determine a course of treatment. This medical data includes any scans or biopsy results. If this multidisciplinary team decides there is a strong case for proton beam therapy, the case is referred on to the

³ Burnet, N.G. *et al.* (2020).

PBT National Clinical Panel. The panel will individually review the application and supporting documentation.

Panel members will respond via the portal with recommendations about approval and clinical management, including whether the case meets clinical criteria. They will also provide comments about the case and especially on safety of treatment overseas or timing of treatment.

If there is a NO response, further detail on the reasons why is included.

The PBT National Clinical Panel Chair will review the responses from the panel and make the concluding recommendation/decision as to whether or not the patient meets the NHS England commissioning criteria. In the event of a lack of consensus the Chair will facilitate further discussion via email to reach a consensus view. This may include clarifying any misunderstanding on clinical criteria or poor application details. In particularly difficult cases the Chair may wait for or seek more replies before a final decision is made. On occasion, further advice may be sought from proton clinical experts at one or more of NHS England's commissioned providers prior to a final decision being made.

The Chair will send a formal reply to referring clinicians including feedback from panel members especially in the event of a NO decision.

For applications that meet the NHS England commissioning criteria, the PBT National Clinical Panel chair confirms in writing to the clinician making the application that a referral can be made to one of the PBT providers commissioned by NHS England.

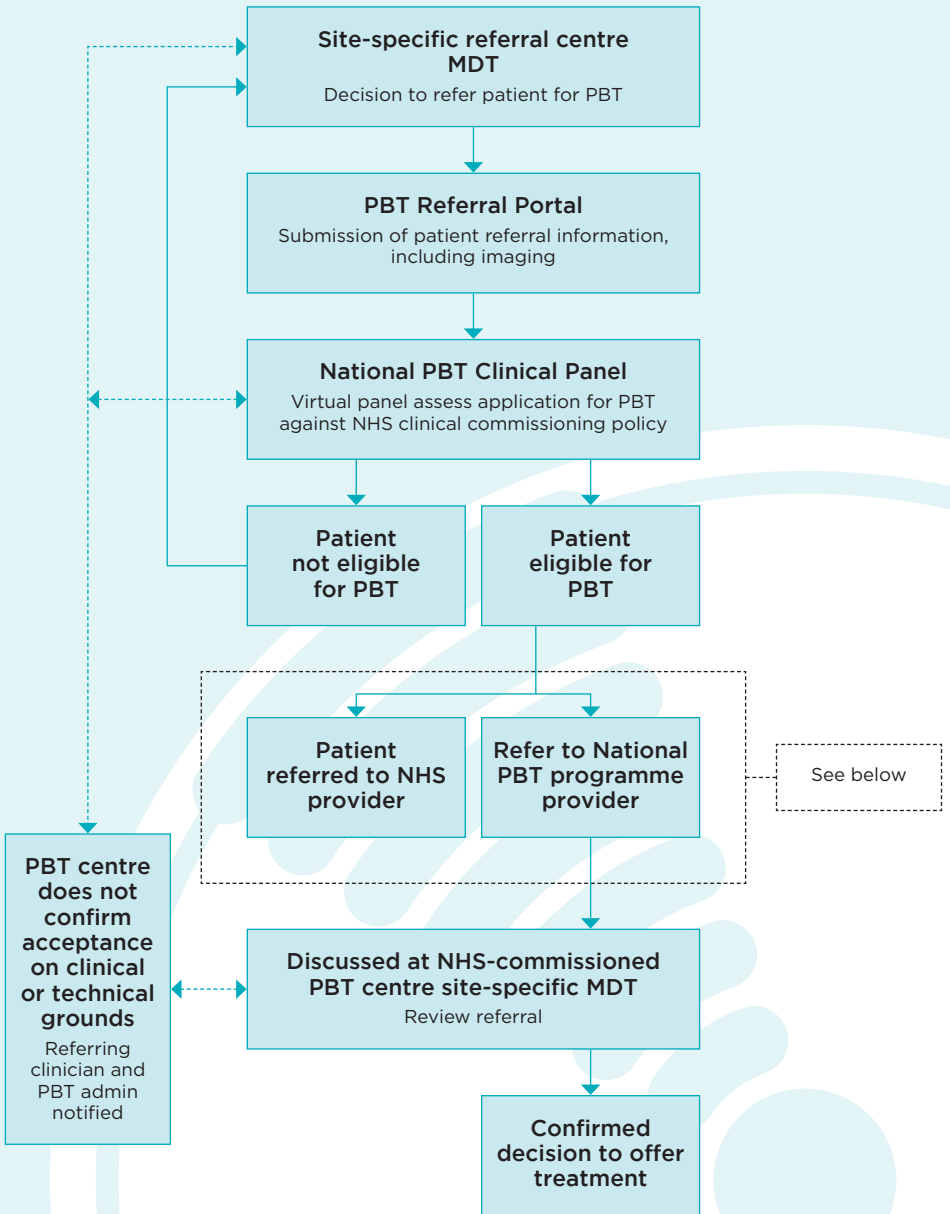
For applications that do not meet the NHS England commissioning criteria, the PBT National Clinical Panel Chair confirms in writing to the clinician making the application that the patient does not meet the eligibility criteria and that a referral for PBT may not be made.

It is the responsibility of the referring clinical team to communicate the commissioning decision and rationale to the patient and family.

Some patients may still be referred abroad for treatment before the two centres in the UK are able to accommodate the full demand from NHS referrers. Overseas proton beam therapy centres currently used by NHS England are in Germany and Florida.

It is anticipated that in the near future, all patients for whom proton beam therapy is an appropriate treatment will be treated in England.

PBT Referral Pathway



Key
 Discussion 
 Patient Pathway 

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Notes

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