

# Understanding the decision process

Who is proton beam therapy  
suitable for?



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## Who is proton beam therapy suitable for?

It is important to keep in mind that proton beam therapy is not suitable for treating every type of tumour. In fact, Cancer Research UK estimates that only 1% of people with cancer are suitable for proton beam therapy.<sup>1</sup>

Proton beam therapy is considered to be particularly beneficial to children and young adults, as it avoids damaging healthy developing tissues 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 would 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

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<sup>1</sup> Cancer Research UK. (2013). Proton therapy is coming to the UK, but what does it mean for patients? [online] Available at: [scienceblog.cancerresearchuk.org/2013/09/16/proton-therapy-is-coming-to-the-uk-but-what-does-it-mean-for-patients/](http://scienceblog.cancerresearchuk.org/2013/09/16/proton-therapy-is-coming-to-the-uk-but-what-does-it-mean-for-patients/) [Accessed 3 Sep. 2018].

for proton beam therapy because the tumour cells do not extend beyond the tumour. In other words, the tumour cells are usually sharply delineated.<sup>2</sup>

At the other end of the scale are cases where the whole brain and spine require treatment, often called craniospinal irradiation (CSI). Tumours typically requiring CSI 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, rather than continuing throughout the whole body, as it does in conventional X-ray radiotherapy. This means that, despite the large area of treatment, the patient is not getting doses of radiation to other organs, such as the lungs, heart or intestines, which can cause high levels of toxicity both during the treatment and for many years afterwards. In cases of CSI, 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

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<sup>2</sup> MD Anderson Cancer Center. (2011). What Brain Tumors Are Best Treated with Proton Beam Therapy? [online] Available at: [www.mdanderson.org/transcripts/cancer-newsline/2011/what-brain-tumors-are-best-treated-with-proton-therapy-10-31-11.htm](http://www.mdanderson.org/transcripts/cancer-newsline/2011/what-brain-tumors-are-best-treated-with-proton-therapy-10-31-11.htm) [Accessed 3 Sep 2018].

- gastrointestinal tumours
- lung tumours
- lymphoma
- sarcoma
- head and neck tumours
- prostate tumours.

These types of cancer make up a very small proportion of all cancer diagnoses. Even if there was 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).

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## The decision process

Access to proton beam therapy is guided by NHS England national commissioning policies, as well as 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.

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) discuss each case and review medical data to confirm a diagnosis and determine a course of treatment. This medical data includes any scans or biopsy

results. If this MDT decides there is a strong case for proton beam therapy, the case is referred on to the National PBT Clinical Panel. This panel assesses the application for proton beam therapy against the NHS clinical commissioning policy. It is a national panel because proton beam therapy is commissioned by NHS England only, not local Clinical Commissioning Groups. If the panel considers proton beam therapy to be appropriate, it is then referred on to one of the NHS-commissioned PBT centres for the centre's site-specific MDT to review. This MDT will be either at The Christie in Manchester or the University College London Hospital in London, and these are the healthcare specialists who actually provide the proton beam therapy.

At this point, the proton beam therapy centre may not confirm acceptance on clinical or technical grounds, but that doesn't necessarily preclude treatment, as the case goes back to the local MDT for review. Then, it may pass through this process again. The proton beam therapy centre must explain the reasons for treatment withdrawal with both the patient and the referring centre (the local MDT team), and detail any actions the patient and/or referring centre need to take.

If the proton beam therapy centre MDT does confirm treatment, then the patient travels to the centre for assessment and treatment. Accommodation for these two centres is provided if required.

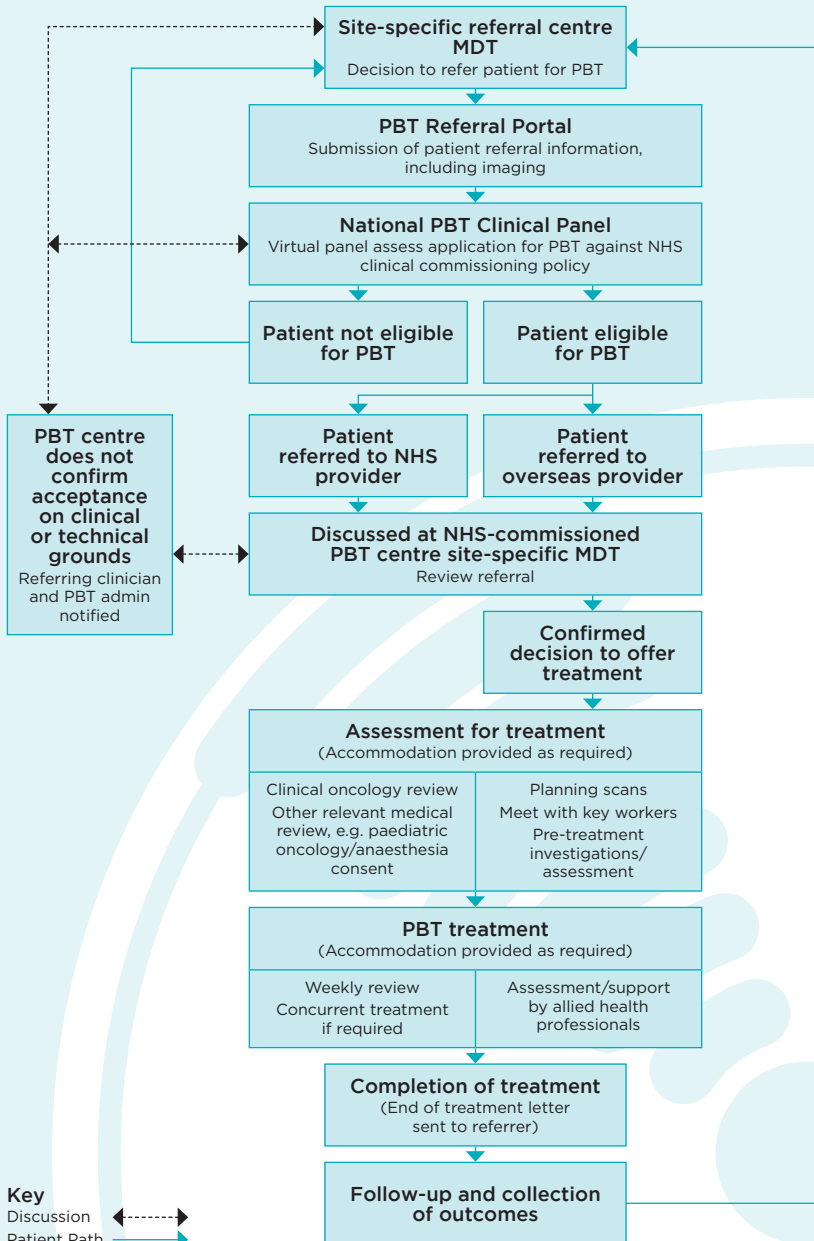
Up until 2020, some patients may still be referred abroad for treatment before the two centres in the UK are able to accommodate the full demand from NHS referrers.

Overseas proton beam therapy centres currently used by NHS England are in Germany and Florida, USA.

Patients who are to receive treatment abroad will follow Pathway 1. Patients treated in an NHS centre in England will follow Pathway 2. Pathways 1 and 2 may run concurrently depending on available capacity, demand for conditions, and indications during the transitional ramp-up period of the NHS facilities. It is anticipated that by 2020 all patients will be able to receive treatment in England.

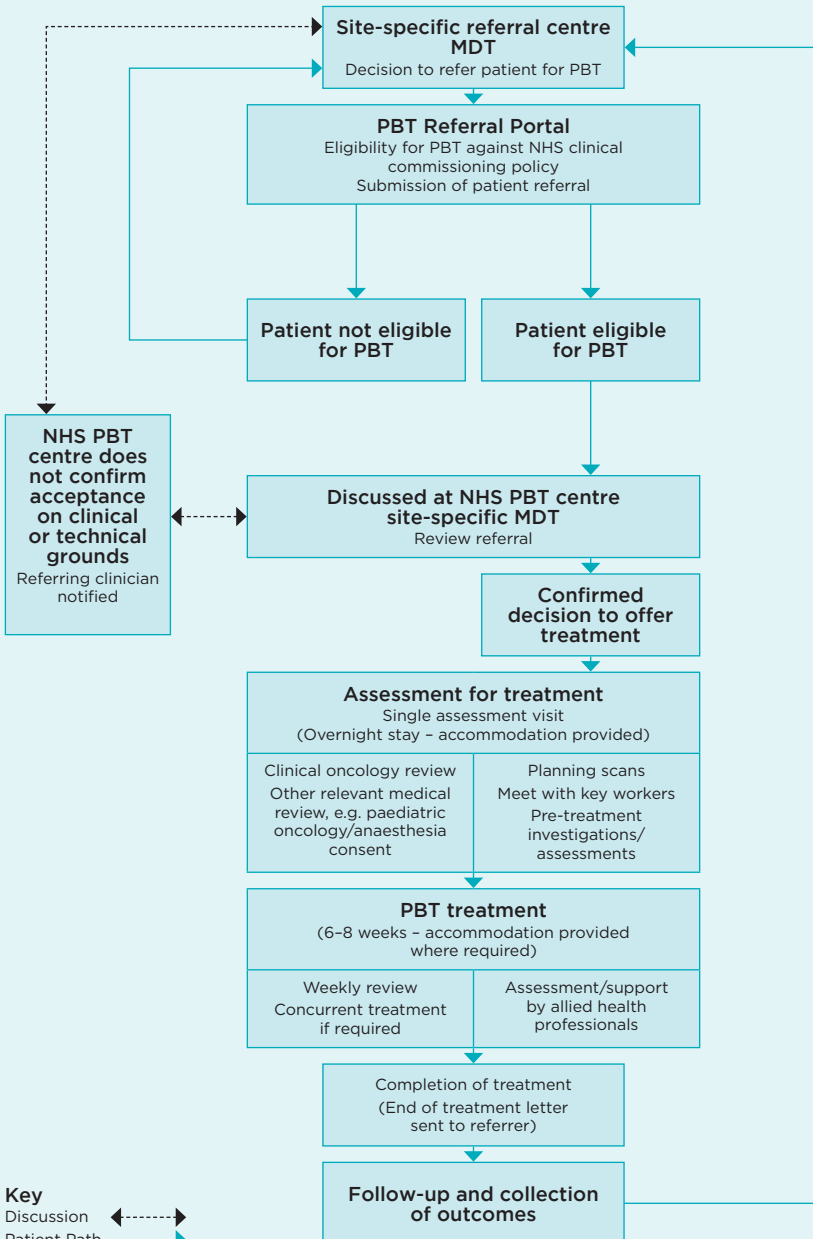
# Care Pathway and Clinical Dependencies

Referral and Care Pathway 1 (NHS and overseas)



# Care Pathway and Clinical Dependencies

Referral and Care Pathway 2 (NHS only)





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## Sources

Cancer Research UK. (2013). *Proton therapy is coming to the UK, but what does it mean for patients?* [online] Available at: [scienceblog.cancerresearchuk.org/2013/09/16/proton-therapy-is-coming-to-the-uk-but-what-does-it-mean-for-patients/](https://scienceblog.cancerresearchuk.org/2013/09/16/proton-therapy-is-coming-to-the-uk-but-what-does-it-mean-for-patients/) [Accessed 3 Sep. 2018].

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# Notes

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**Mike, Tom, Rebecca, Charlie & Sophie**