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The following content contains images and descriptions of cancer treatment that some people may find upsetting or triggering. Please follow the guidance of your clinical team for information specific to your situation. Some medical terms may not translate accurately when using translation tools.

Particle beam therapy

Particle beam therapy is a type of external beam radiotherapy. It uses beams of neutrons, protons, or other heavier positive ions to target cancer cells. These are all particles found in the middle of atoms.

The most common radiotherapy treatment uses X-rays (photon particles) to treat cancer.

Particle therapy is very focused. The dose can be delivered to an exact location (the tumour or target area) where it causes damage. Little or no radiation dose gets to the healthy tissue beyond the area being targeted.

The benefit of particle therapy is less damage is caused to healthy tissue which can reduce side effects.

The most common particle beam therapy in the UK is proton beam therapy (PBT). This is currently available at two radiotherapy centres:

UCLH, in London

https://www.uclh.nhs.uk/our-services/find-service/cancer-services/proton-beam-therapy-pbt

The Christie, in Manchester.

https://www.christie.nhs.uk/patients-and-visitors/services/proton-beam-therapy

How does proton beam therapy work?

Proton beam therapy uses beams of protons to damage the tumour or tissues in the target area.

As proton beams can be controlled, they can be made to stop at the point where they are needed most. Protons release their energy (which causes damage) at an exact point in the body. This means a high dose of radiation is delivered directly to the tumour or tissues in the target area. This means less radiation dose is given to healthy tissues nearby.

Advantages of proton beam therapy

The most common radiotherapy treatments use X-rays (photons) to deliver the radiation dose.

X-rays enter the body and travel through it causing damage. This can damage healthy tissue close to and behind the tumour, which means side effects become more likely.

Proton beam therapy has a lower chance of causing damage to healthy tissues and therefore reduces chances of side effects. The protons can be controlled to hit the target or tumour.

Because protons are larger and heavier they also don’t scatter as much into other parts of the body. This is another reason why surrounding healthy tissue is less affected. This is very important for young patients as they are still developing and growing.

Proton beam therapy is good for treating harder to reach areas. For example – tumours that are near the spine, vital organs and key areas of the brain. The less damage caused by treatment, the less likely to cause side effects for patients.

About the treatment

An individual session for proton beam therapy can take between 20 and 90 minutes. Each treatment is known as a ‘fraction’.

A typical course of treatment will be one treatment every weekday for several weeks. Proton beam therapy is given on an outpatient basis with treatment usually delivered Monday to Friday. This means you do not usually have to stay in hospital. Instead, you can come in for each treatment and then go home. Some patients may be asked to go for weekend treatments.

Proton beam therapy can be used alongside other cancer treatments such as surgery, chemotherapy, or immunotherapy. Proton beam therapy is not suitable for everyone or every type of cancer. Other types of radiotherapy may be better. Each patient has a treatment team who will decide what is the best treatment for them. The team will include oncology consultants, surgeons and radiologists.