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Electron Beam Therapy and Proton Beam Therapy

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1-Electron beam radiation therapy

Electron beam radiation therapy (EBT) is a type of external radiation therapy that treats tumors by directing electrons to them.

The beams of high-energy photons and electrons used in the treatment are produced by a medical linear accelerator, and the energy of the rays can be controlled and tuned to penetrate tissues to a certain depth.

Treatment of skin cancer and diseases of the extremities (melanoma or lymphoma) and nodal irradiation after surgery.

It is also used to enhance the dose of radiation after a mastectomy or removal of part of the breast .

2-Proton Beam Therapy

Proton therapy is a very precise and less invasive form of cancer treatment. Protons are positively charged subatomic particles that can be manipulated and controlled to stop and deliver radiation directly at the tumor, and move no further than the tumor's outer wall. This is especially useful for those who are exposed to radiation or have previously received radiation either to or right next to the area that needs treatment.

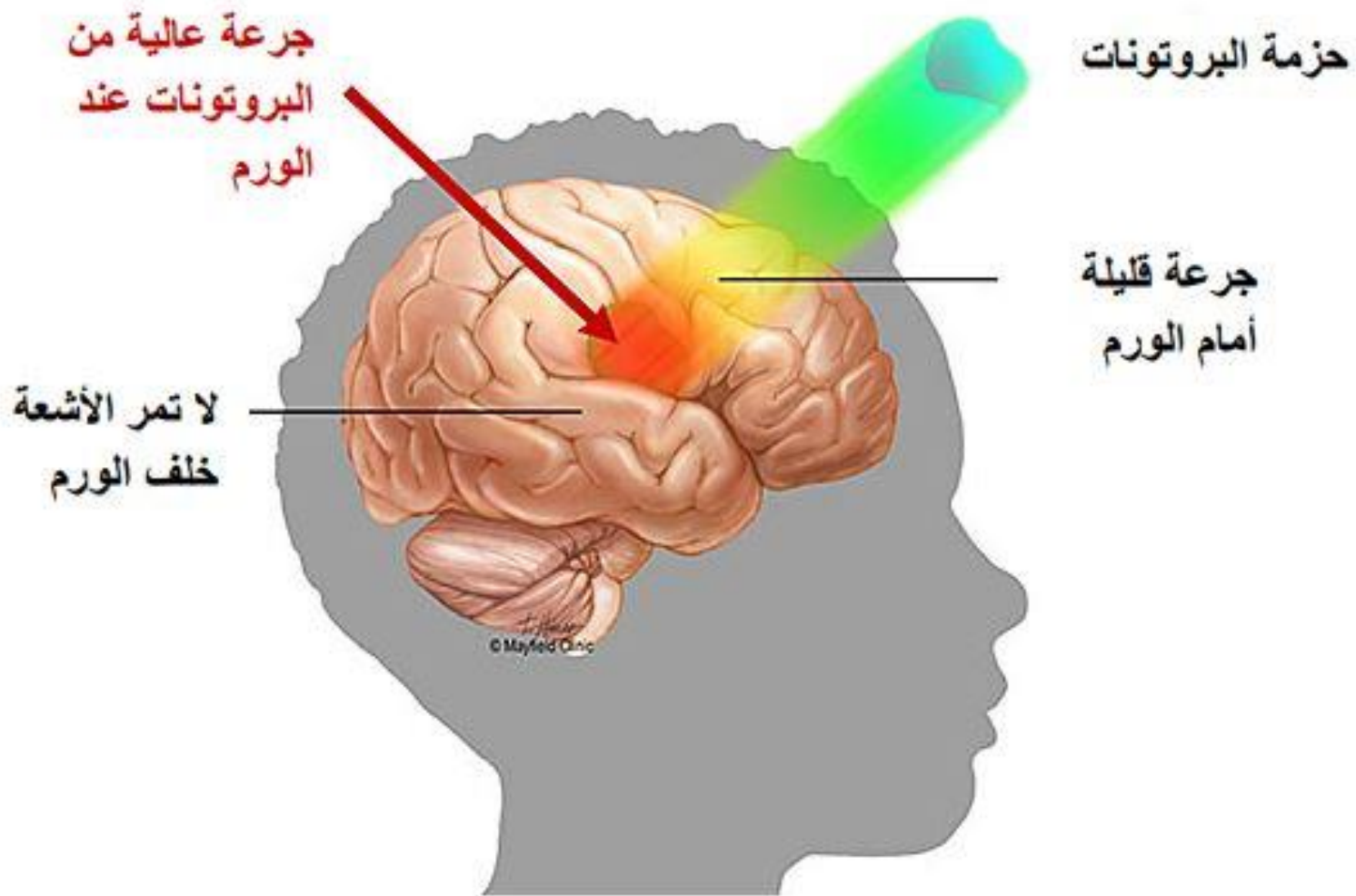
It is a type of radiation therapy used to treat cancer and malignant tumors. The fast protons are produced in a cyclic accelerator or synchronous cyclic accelerator and then directed to the tumor to eliminate cancer cells.

What is a proton

A proton is one of the subatomic particles found in the nucleus of every atom . Protons have unique properties that: It is highly effective in treating patients with tumors. For example, protons can be controlled very precisely so that it matches the location and shape of the tumor. Nor does it emit the entire radiation dose instantaneously as it travels through the body. But when it enters the body, it moves at a very high speed, emitting low levels of radiation at first. As the beam of protons advances, its speed decreases gradually. When the protons hit the tumor, they deliver the maximum dose of radiation to kill the tumor, and then stop completely. And nothing passes X-ray behind the tumor site. This reduces its effect on the normal tissue surrounding the tumor and reduces the risk of side effects associated with treatment

What is the mechanism of action of proton therapy

there is an amazing amount of technology working behind the scenes to make proton therapy possible. While he is lying down on the treatment table , a special device called a cyclotron is operating at full capacity at another location in the building. and this A cyclotron (sometimes called a "ray path" - an atomic accelerator) activates protons. Protons are transferred It is a complex system of metal tubes that are roughly the same length as a football field. Magnetic fields act on in the treatment vault). sometimes called Directing the protons through the path of the rays to the treatment room) which Then the protons exit the path of the rays through a nozzle directed to the patient's body . There is a large metal frame called a cylinder X-ray", which rotates the nozzle around the patient during treatment .



How is proton therapy different from conventional radiotherapy

Both types of radiation therapy have the same goal: to destroy the genetic code of cancer cells so that they do not grow and spread. and both Both types of treatment direct the rays through the skin without any pain from a device located outside the body .

The main difference between proton therapy and conventional radiotherapy is the type of **energy used** in each. Conventional radiotherapy uses photons (also called X-rays) to treat tumors

As for proton therapy, it uses protons (particles smaller than an atom that are found in the nucleus of every atom.)

It is less common, but it has been used for decades in a few establishments. Recent advances in proton beam technologies have led to an increase in this treatment, which is more effective than ever in reducing the short- and long-term effects of treatment.

What conditions can be treated with proton therapy?

Proton therapy is used to treat solid tumors that are well-defined and that have not spread to other parts of the body.

It is not used to treat blood cancers such as leukemia and bone marrow tumors.

Proton therapy can be used to treat:

- brain tumors
- Neuroblastoma
- Osteosarcoma
- Wilms' tumor (kidney tumor)
- Proton therapy can sometimes be used to destroy a tumor that may be resistant to conventional radiotherapy.

Therefore, proton therapy is an excellent alternative to conventional radiotherapy , because it limits the exposure of healthy and developing tissues and organs to radiation.

What are the short and long term side effects of proton therapy?

The short-term side effects are very limited. They may include skin irritation, nausea, and fatigue. Patients receiving other forms of cancer treatment at the same time may experience additional side effects associated with these treatments.

Long-term side effects from proton therapy vary. In general, however, they are considered to be a smaller number of the long-term effects of conventional radiotherapy.