

“ AS MORE EXPERIENCE WITH PROTON BEAM THERAPY IS ACCUMULATED, OTHER TUMOURS – SUCH AS MEDICALLY INOPERABLE LUNG TUMOURS – MAY PROVE TO BE EFFECTIVELY TREATED WITH PROTONS ”

Precision

Arab Health Magazine spoke to *Dr Thomas DeLaney* medical director of the Northeast Proton Therapy Center about the advantages of using Proton Beam Radiation Therapy (PBRT) when treating certain cancers

ONE OF THE GREAT challenges of radiation oncology has been the need to balance the amount of radiation delivered to the tumour site with the amount affecting the healthy surrounding tissues. As many of the side effects of cancer therapy are caused by radiation's interaction with healthy tissues, the issue of dose is a crucial one. Another technique, called Proton Beam Radiation Therapy (PBRT) has however been shown to result in a more precise elimination of certain cancers and reduced side effects from radiation, due to its ability to deliver radiation to a more specific area.

The technology was originally developed in the 1940s for applications in nuclear physics. It wasn't until the 1970s that it was applied to the treatment of cancer. Today only a handful of hospitals in the world offer this type of therapy to patients. Among them is Massachusetts General (MGH) whose Northeast Proton Therapy Center is one

millimetre precision, they are able to deliver a more uniform dose of radiation within the target, while sparing the surrounding normal tissues and organs.

Proton therapy is said to be most effective in treating tumours in the head and neck region, including brain tumours, tumours in or near the eye; tumours involving the spine, liver tumours, prostate tumours, and tumours in children. Dr DeLaney says that developing tissues in children such as in the brain and bones are particularly susceptible to the harmful effects of radiation therapy so it important to minimise the dose to these areas.

"Because our cure rates for paediatric cancers are quite high, we are increasingly focused on reducing treatment side effects. For example, one particularly devastating complication of radiation treatment can be a second cancer that is induced by the radiation itself. Recent studies comparing proton therapy with conventional radiation therapy

expanding the range of malignancies that can be treated. "Recently proton therapy has proven beneficial in the treatment of paediatric malignancies, including craniospinal radiation for medulloblastoma, as well as cancer of the nasopharynx," says DeLaney. "As more experience with proton beam therapy is accumulated, other tumours, such as medically inoperable lung tumours, may prove to be effectively treated with protons." He adds that they are also actively experimenting with intensity modulated proton radiation therapy, which involves a narrow proton beam that is 'painted' across the tumour. "This technique is similar in nature to the way electrons are scanned across a TV screen, and it reduces the entrance dose by 50%. If successful, this new technique could be beneficial in the treatment of the tumours mentioned above, as well as tumours that are recurrent after prior radiation therapy."

A typical treatment cycle at the centre is currently five to eight weeks, although Dr DeLaney says that occasionally benign tumours can be treated in a single appointment and some liver and lung lesions can be treated in three weeks. "Whenever possible, it is important for cancer patients to be evaluated by appropriate medical, paediatric, surgical and radiation oncologists prior to the initiation of proton treatment, so that a coordinated plan can be developed."

The centre currently sees around 35 patients a day, many of them from outside the US. "International patients have come to us for treatment both before and after having had surgery in their native countries. Appropriate follow-up arrangements can be coordinated for the patient and the referring physician. In certain situations, telemedicine technology allows us to follow patients at a distance.'

■ Those interested in the treatment options available at the centre can contact Dr DeLaney by submitting a brief history, imaging studies, and other relevant clinical information through the Partners International Program (www.partners.org/international). Dr DeLaney's presentation at the Middle East Oncology Symposium will be on the use of Proton Beam Radiation Therapy (PBRT) to reduce the late effects of cancer treatment. For more information visit www.arabhealthonline.com

targeting

of only two hospital-based proton beam treatment centres in the US.

Dr Thomas F DeLaney is medical director of the centre and will be discussing both the advantages and advances in PBRT at Arab Health's first oncology symposium. He says that when it comes to sparing normal tissue, protons have a physical advantage over photon beams, such as x-rays and gamma rays. "When photon rays are directed at tissue, the radiation dose is most intense near the point of entry. Although progressively less radiation is delivered to the tissue as the beam passes more deeply into it, unwanted exit dose is given to tissues beyond the tumour. With protons, less radiation dose is given to the tissues in front of the tumour and no dose is given beyond the target depth." He adds that because proton energy can be controlled with

suggest that the risks of second malignancies are significantly reduced with protons," adds DeLaney.

Proton therapy has also been shown to reduce many other side-effects of cancer treatment. Early side effects may include irritation of the throat, mouth, esophagus, bowel or bladder. In patients who are also receiving chemotherapy, less bone marrow is irradiated with proton therapy and therefore low blood counts are less common. In terms of late side effects effects, proton therapy is less likely to cause growth impairment, infertility, or injury to visual structures or the spinal chord.

The protons are delivered using a cyclotron. Early machines were inhibited by the fact that the beam's direction was fixed, limiting treatment to certain areas. Today rotational gantries can focus the beam on any site in the body,