

Treatment of the future.....today

Proton Beam Radiation Therapy

Agenda

- A personal view
- Traditional radiotherapy
- Proton therapy
 - The science
 - The planning
 - The treatment
 - The benefits
- During proton therapy
- After proton therapy
- What types of cancer can it treat?
- The future
- Questions????

A personal view

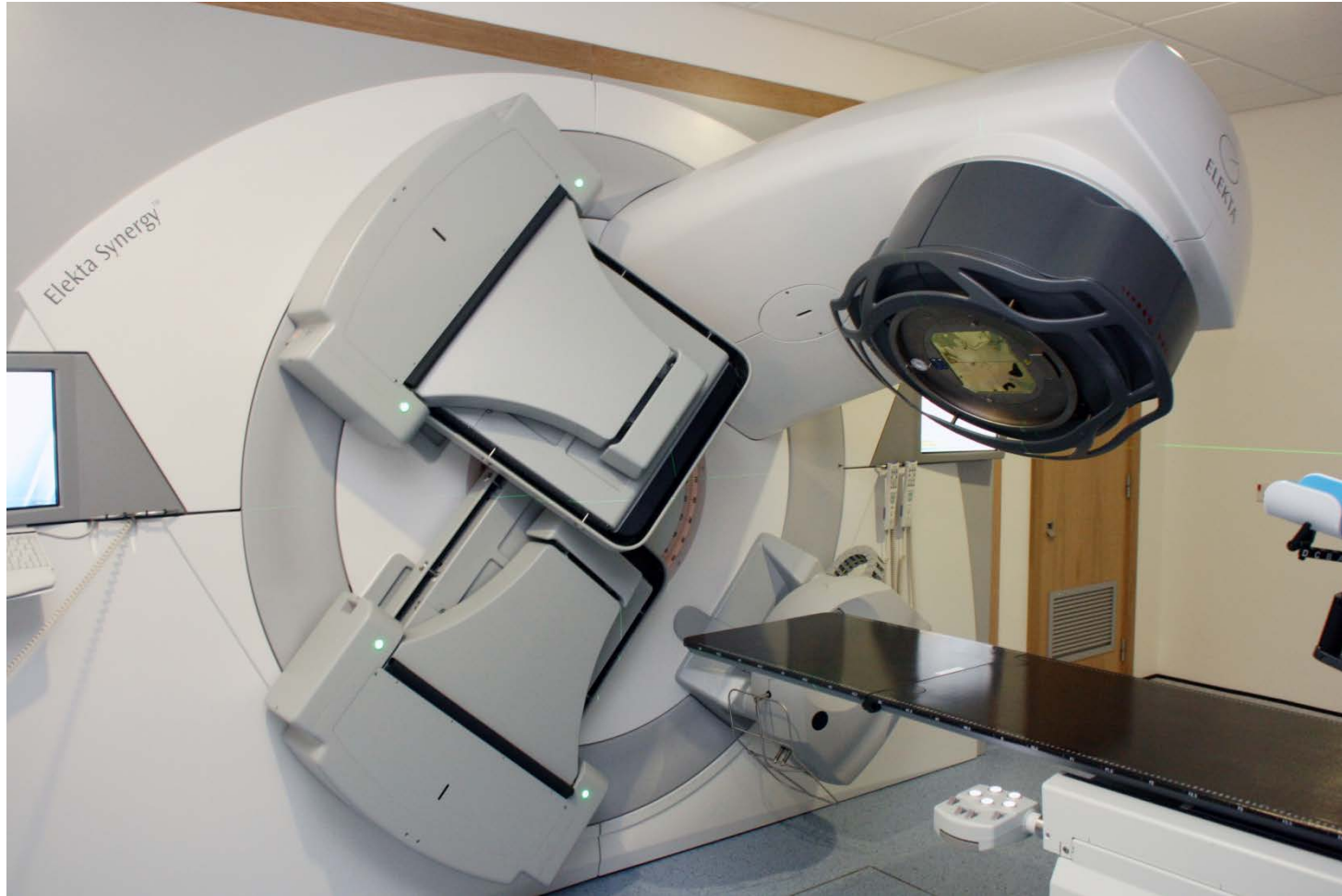




Traditional radiotherapy

- Approximately 4 out of 10 cancer patients will require radiotherapy
 - Can shrink tumours to make them amenable to surgery (neo-adjuvant)
 - Destroy residual tumours left behind after surgery (adjuvant)
- High energy beam of radiation, usually x-rays
- Damages the tumour DNA directly or creates charged particles called free radicals that damage the DNA that stops them from dividing or proliferate (grow)
- Nearby healthy tissues also suffer temporary cell damage from radiation but are usually able to repair the DNA damage and continue growing normally over time.
- External and Internal radiotherapy available depending on the site of the cancer
- Can be used in conjunction with other methods of treatment i.e. chemotherapy

Traditional radiotherapy

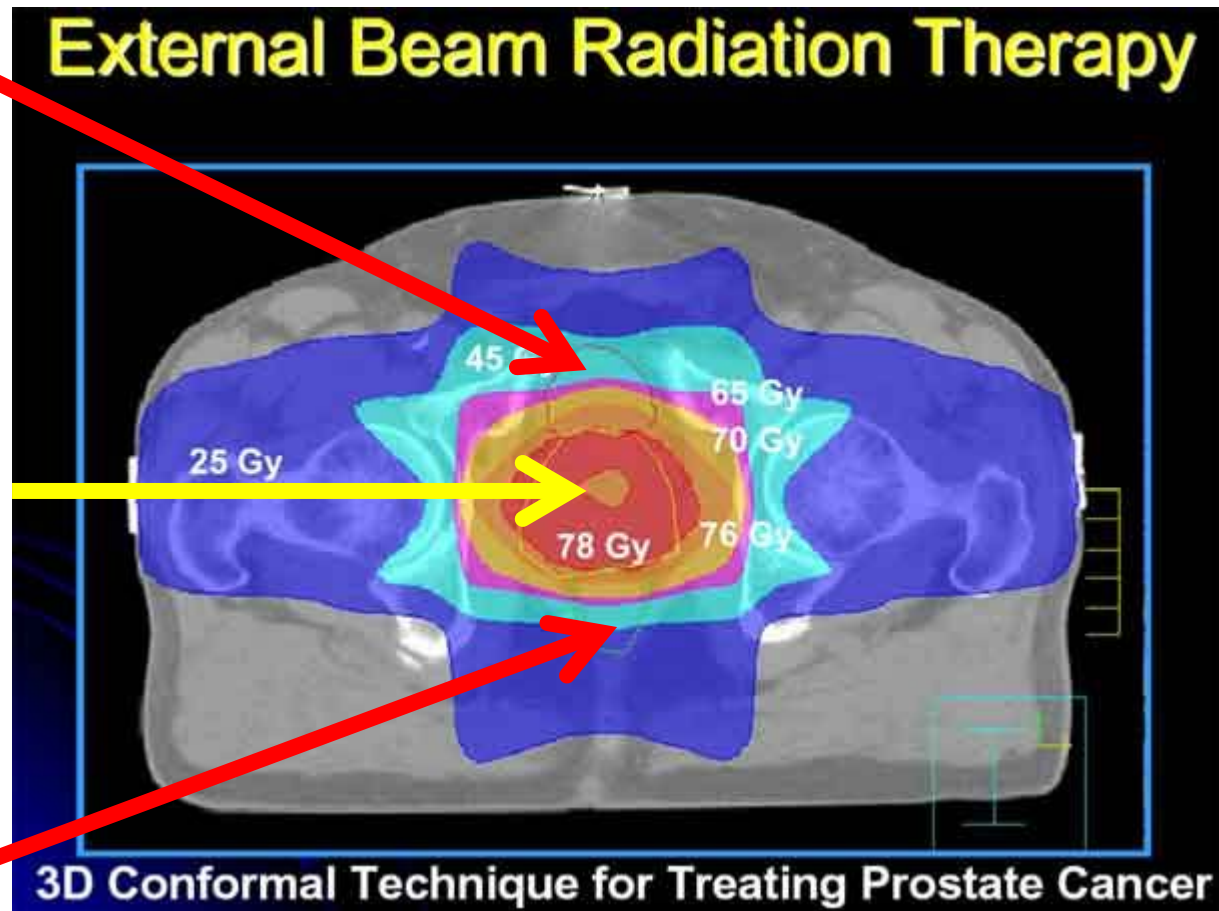


Traditional radiotherapy

Bladder

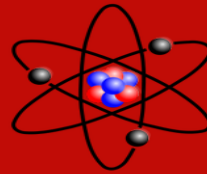
Prostate

Rectum





Proton therapy – *the science*

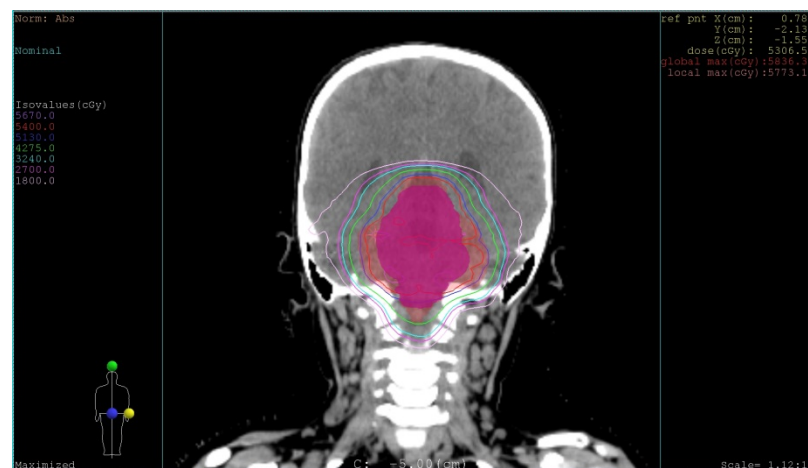
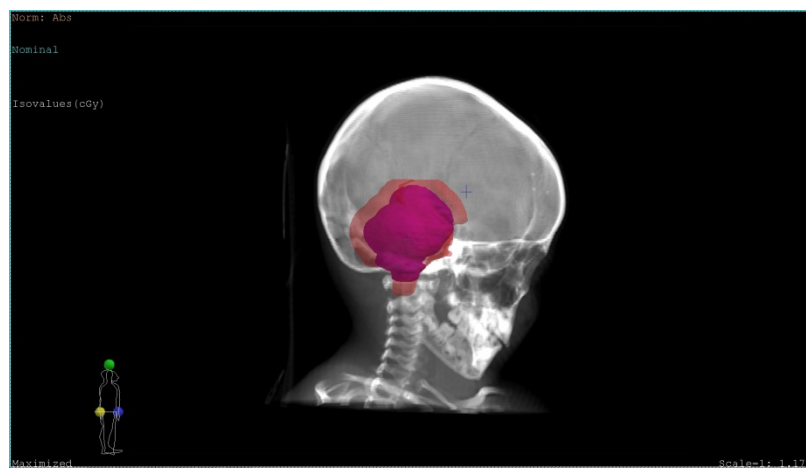
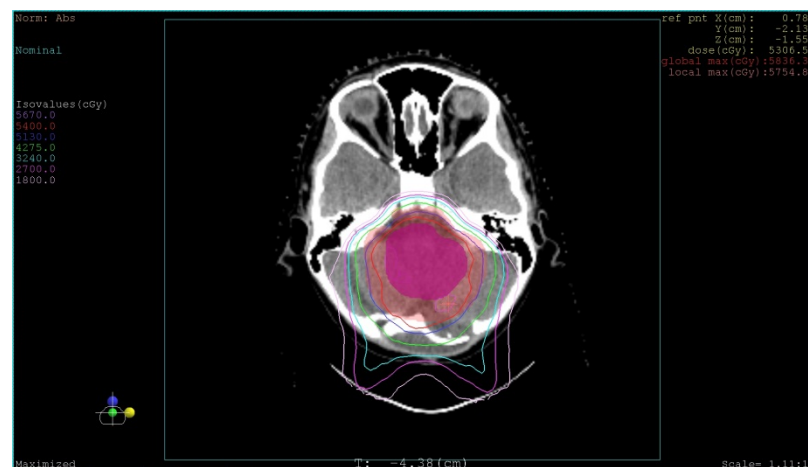


**THINK
LIKE A PROTON
AND
STAY
POSITIVE**

Proton therapy – *the science*



Proton therapy – *the planning*



Proton therapy – *the planning*

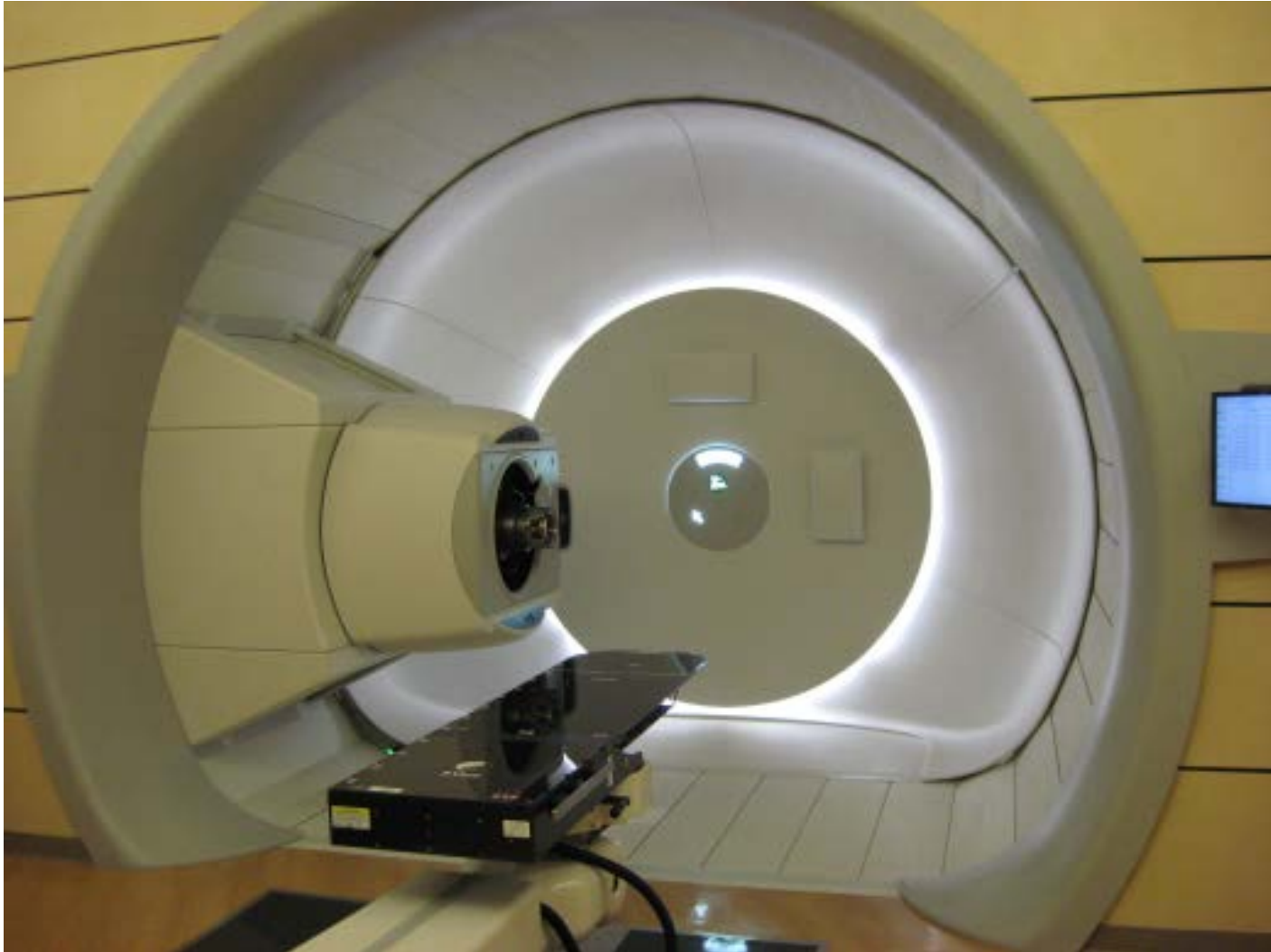


Proton therapy – *the planning*



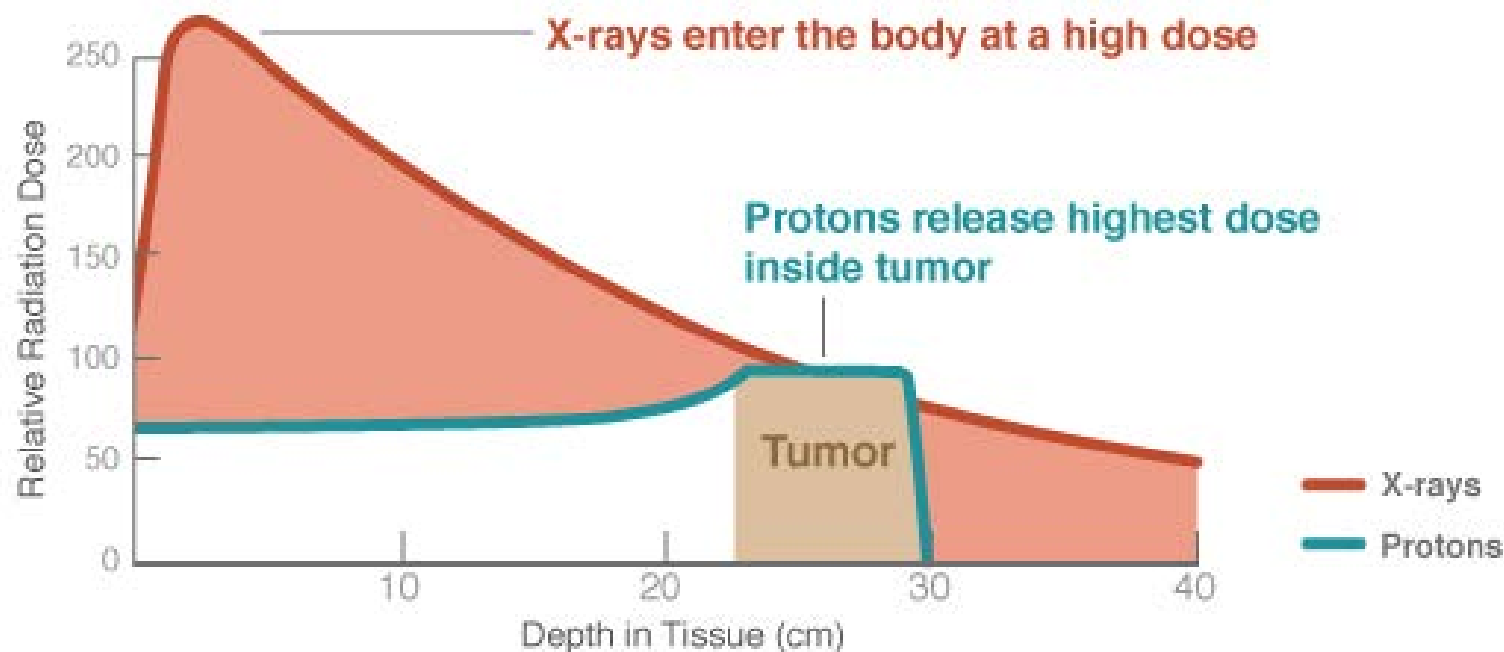


Proton therapy – *the treatment*



Proton therapy – *the benefits*

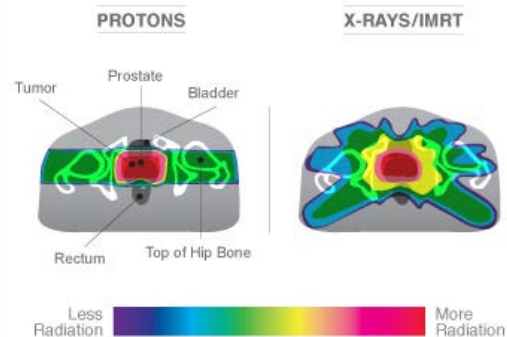
Proton therapy precisely targets tumors, reducing the radiation dose to healthy tissue compared with X-rays¹



Source: ProCure Training and Development Center

Proton therapy – *the benefits*

Prostate Cancer: Proton therapy delivers significantly less radiation to the bladder and rectum than X-rays, reducing the likelihood of side effects^{3,5}

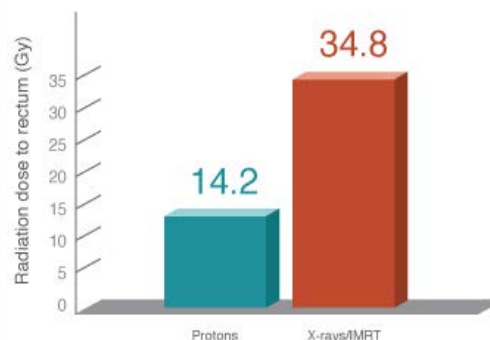


These images show the areas around the prostate exposed to radiation during treatment.

IMRT= intensity modulated radiation therapy (a type of X-ray therapy)

Source: ProCure Training and Development Center

Prostate Cancer: Proton therapy was estimated to deliver less than half the amount of radiation to the rectum than treatment with IMRT³

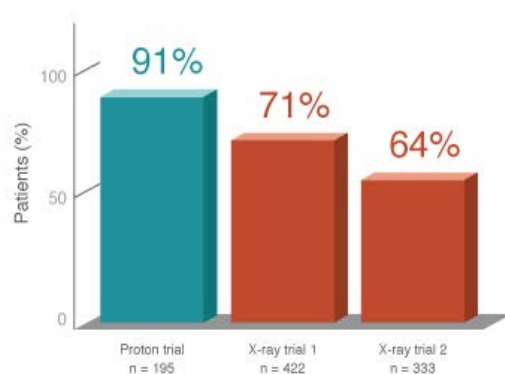


This graph compares the average dose of radiation delivered to the rectum during treatment.

Data shown are from a study that compared treatment plans.

N = 20 plans
Gy = Gray, the standard measure of absorbed radiation
IMRT= intensity modulated radiation therapy (a type of X-ray therapy)

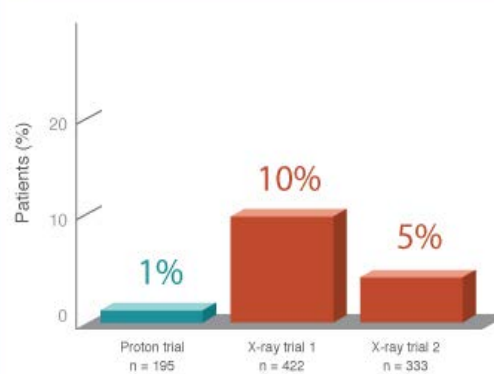
Prostate Cancer: Proton therapy shows better PSA control than X-rays⁷⁻⁹



This graph compares the percentage of patients whose PSA levels remained within a desirable range for 5 years after treatment with high-dose radiation.

Proton trial included patients with stage T1b to T2b cancer. X-ray trial 1 included patients with stage T1b through T3b cancer. X-ray trial 2 included patients with stage T1b through T4 cancer.

Prostate Cancer: Patients treated with proton therapy have fewer severe* GI side effects⁷⁻⁹



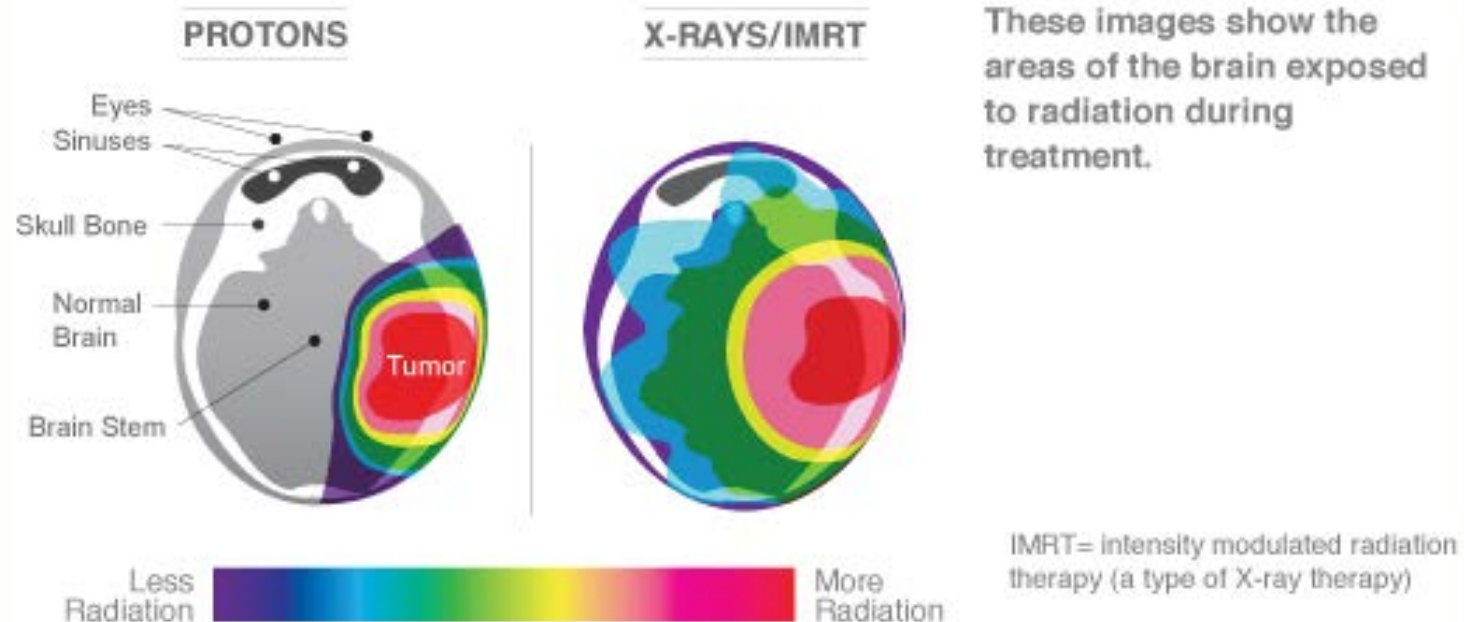
This graph compares the percentage of patients who experienced severe GI side effects after treatment with high-dose radiation.

Proton trial included patients with stage T1b to T2b cancer. X-ray trial 1 included patients with stage T1b through T3b cancer. X-ray trial 2 included patients with stage T1b through T4 cancer.

GI = gastrointestinal
* ≥ grade 3

Proton therapy – *the benefits*

Brain Tumor: Proton therapy delivers less radiation to the brain stem, eyes, and healthy tissue than X-rays, reducing the likelihood of side effects^{2,3}



Source: ProCure Training and Development Center

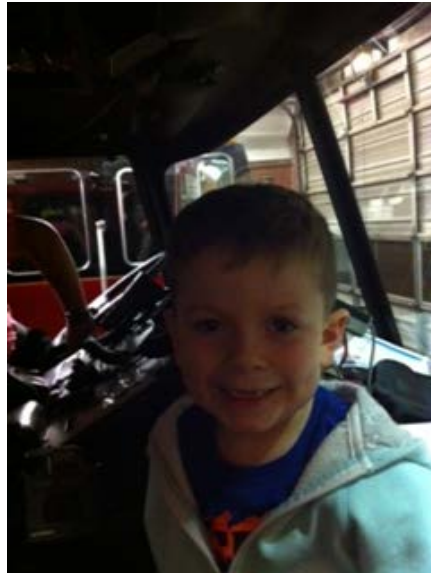


During proton therapy





During proton therapy



SCOR

After proton therapy





What type of cancer can it treat?

- Base-of-Skull Tumours
- Brain Tumours
- Breast Cancer
- Gastrointestinal Cancers
- Head and Neck Tumours
- Lung Cancer
- Melanoma of the Eye
- Paediatric Cancer
- Prostate Cancer
- Tumours near the Spine

The future?

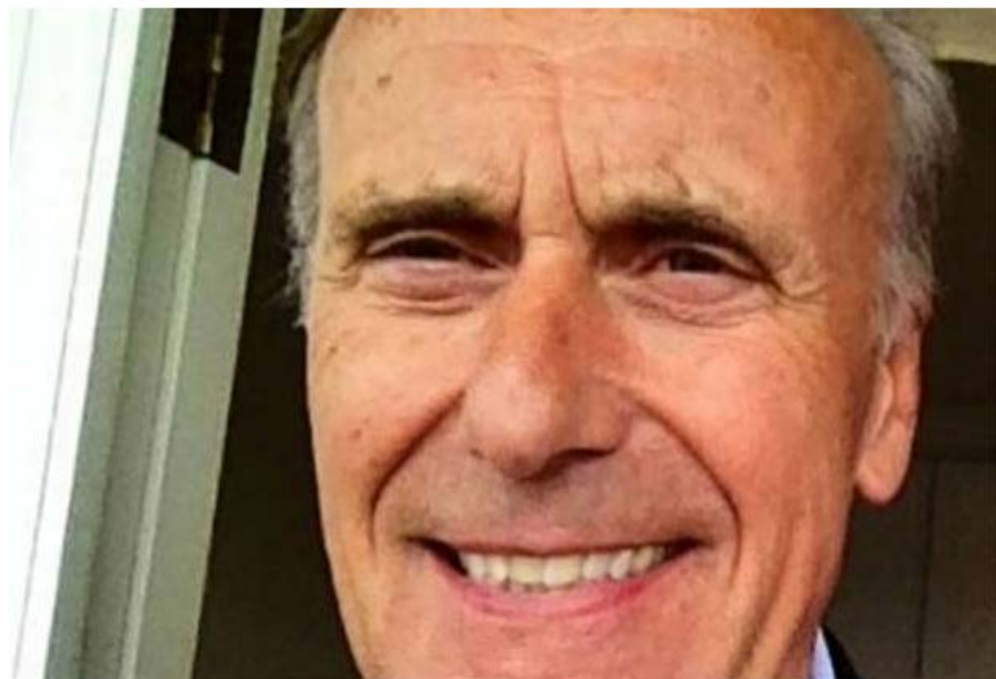


SCOR

The future?

London
**Evening
Standard**

**'I went abroad for prostate cancer therapy...
and I'm sending the NHS my £17,000 bill'**



SCOR

A patient who had life-saving treatment for prostate cancer in Prague told today how he plans to send his £17,000 bill to the NHS.

Retired banker Peter Kysel had proton-beam therapy in the Czech capital to eradicate a tumour.

The treatment — the most advanced form of radiotherapy — will not be available in the UK until 2017 when £250 million proton-beam units are opened at UCLH in Bloomsbury and the Christie Hospital in Manchester.

Proton-beam therapy is unique in cancer treatment because it can be targeted at tumours without damaging surrounding organs — a particular benefit for prostate cancer patients, who risk being left impotent and incontinent after conventional treatment.

Mr Kysel, 69, from Maida Vale, believes he will be able to recoup some or all of the £17,000 cost by taking advantage of a European Union directive on cross-border healthcare, which came into effect in England last October. "I understand that within the EU they have passed legislation which gives us the right to be treated in any country of the EU," he said.

"I'm going to test whether this works to see whether it's political hot air, or whether the country is going to do what it signed up to do."

Last August, he was told that his cancer had reached an "intermediate" stage and required treatment after three years of "active surveillance".

The Royal Marsden in Chelsea offered him six months of hormone therapy, followed by two months of standard radiation. But he discovered that proton-beam therapy was available in Prague, where he was born, at far cheaper rates than in the US, where the NHS sends children with cancer. Last year, the NHS sent about 80 cancer patients abroad for treatment.

After initial treatment in Aachen, Germany, where three gold "grains" were fixed to his prostate to allow the proton beams to be targeted, he had 21 days of treatment at the Proton Therapy Centre in Prague.

"I had a completely active, normal life. I played golf, I played tennis, I went to the gym, I went swimming," said Mr Kysel. "For the first two weeks there were no side effects. I was absolutely delighted with the treatment."

