



Particle Physics

STFC Rutherford Appleton Laboratory

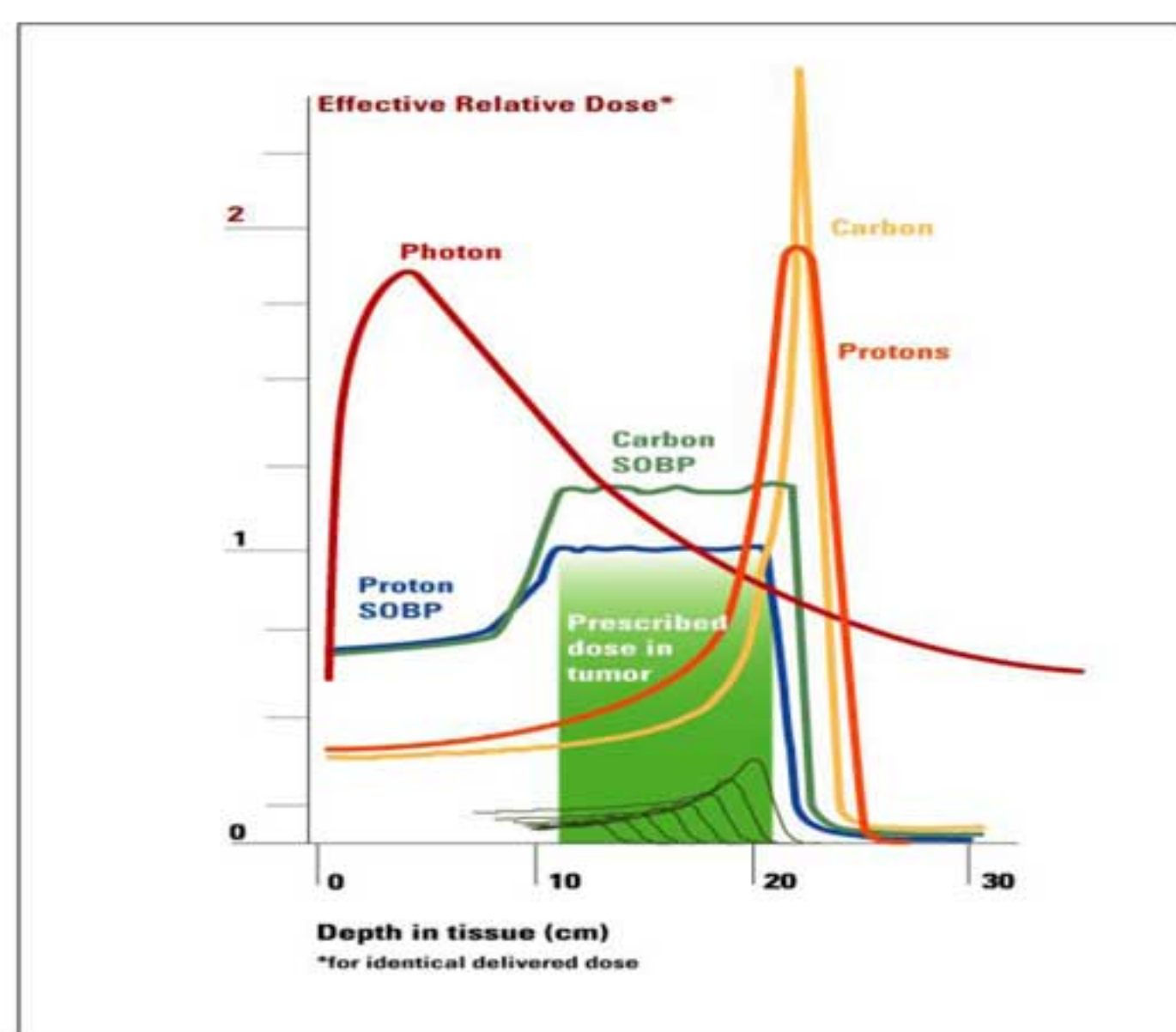


Particle Accelerators: What are they good for? Medical Applications.

In the medical area, accelerators are used to treat cancer with beams of x-rays, protons, neutrons and even light ions and to make radioisotopes for imaging and therapy.

Treating cancer with particle beams

Standard radiotherapy uses x-ray beams created by accelerating electrons to around 10 MeV. This works very well, but there looks to be advantages in using beams of protons or light ions such as carbon instead. However, much larger and more expensive accelerators are required for this.



Dose versus depth in tissue for x-rays (photons), protons and carbon ions. For many tumours, protons and carbon ions can deposit more dose in the tumour rather than surrounding healthy tissue.



Radiotherapy with an x-ray beam.

Treating cancer with neutrons

Neutrons can be used to treat certain very aggressive tumours that are otherwise very difficult to treat. This requires a lot of neutrons and the only sources of these until recently were test nuclear reactors - not ideal for patients!

We are studying how to make the neutrons with an accelerator, with the aim of creating a neutron therapy facility in Birmingham.

Radioisotope production

Radioisotopes are used both for patient imaging and for cancer therapy.

Typical accelerator for radioisotope production



Proton therapy accelerator

We are studying a new type of accelerator that should be much smaller for therapy with light ions.



Carbon therapy accelerator



PET + CT image

Our new type of accelerator will produce more radioisotopes.