



ProtoTera

# The ProtoTera network status

LIP Mini-School on Charged Particle Therapy Applications  
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# What is ProtoTera

- ProtoTera is a not-for-profit association created in December 2019 by the Oncology Institutes (Lisbon, Coimbra, Porto), IST, University of Coimbra, and LIP.
- This association was formed as an initial step in the implementation of the Resolution of the Council of Ministers 28/2018 that approved the strategic orientations to make available proton therapy within the national health system.

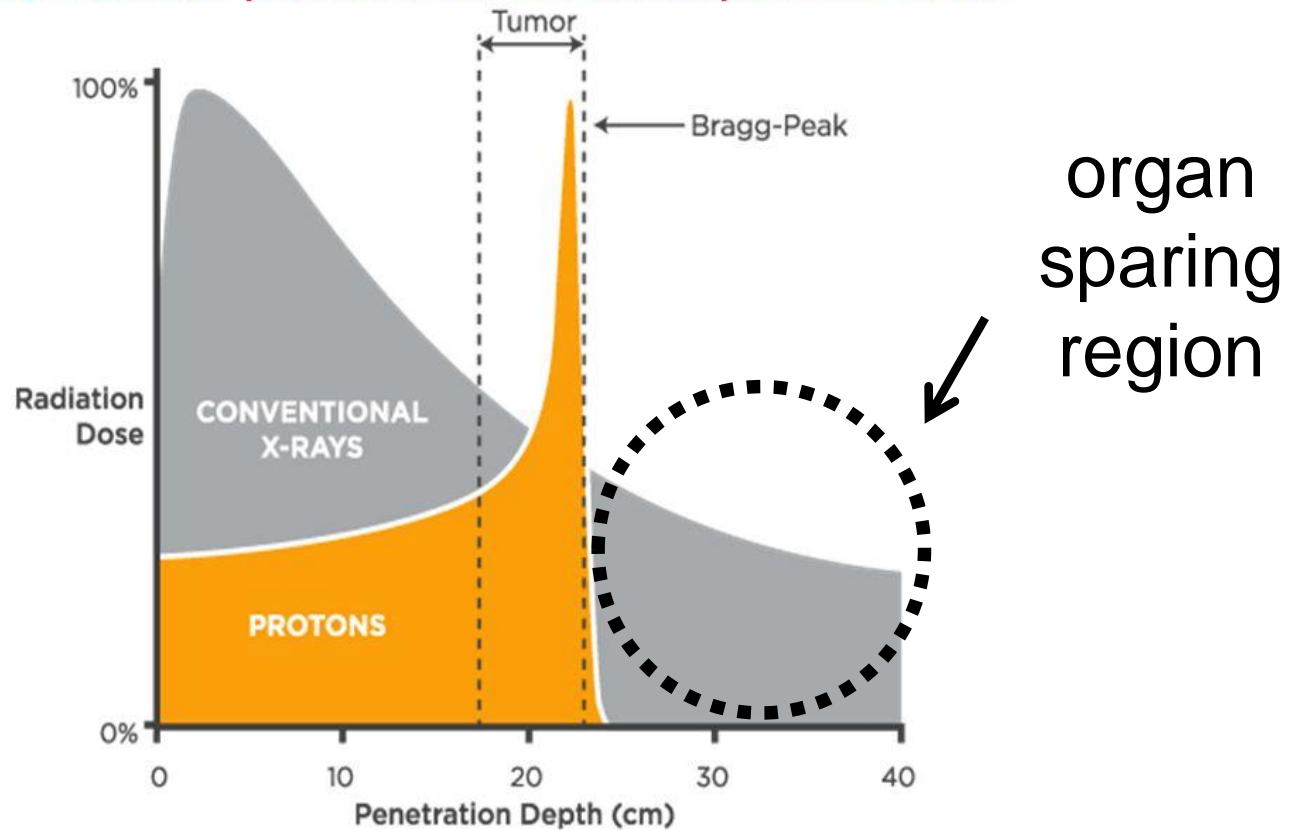
# What is Proton Therapy

Wikipedia says:

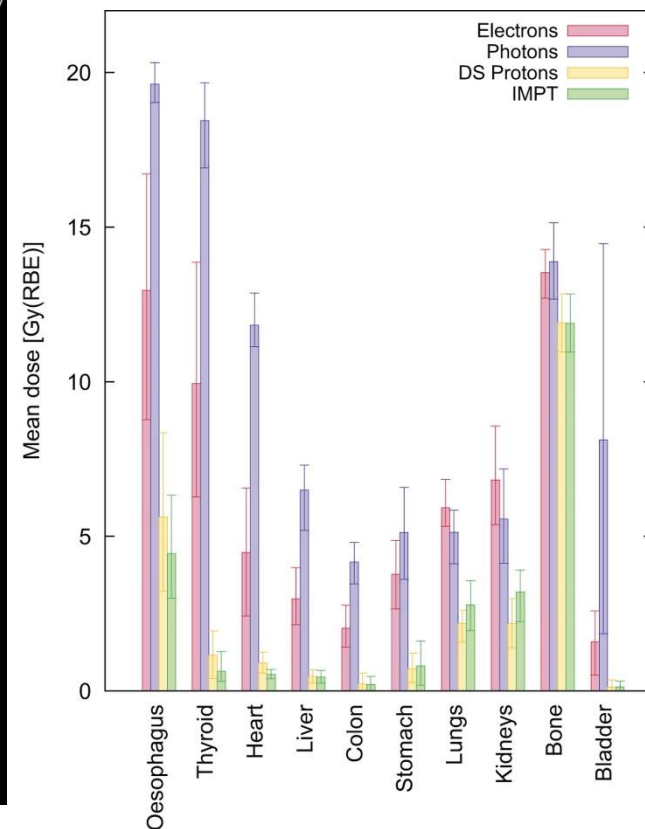
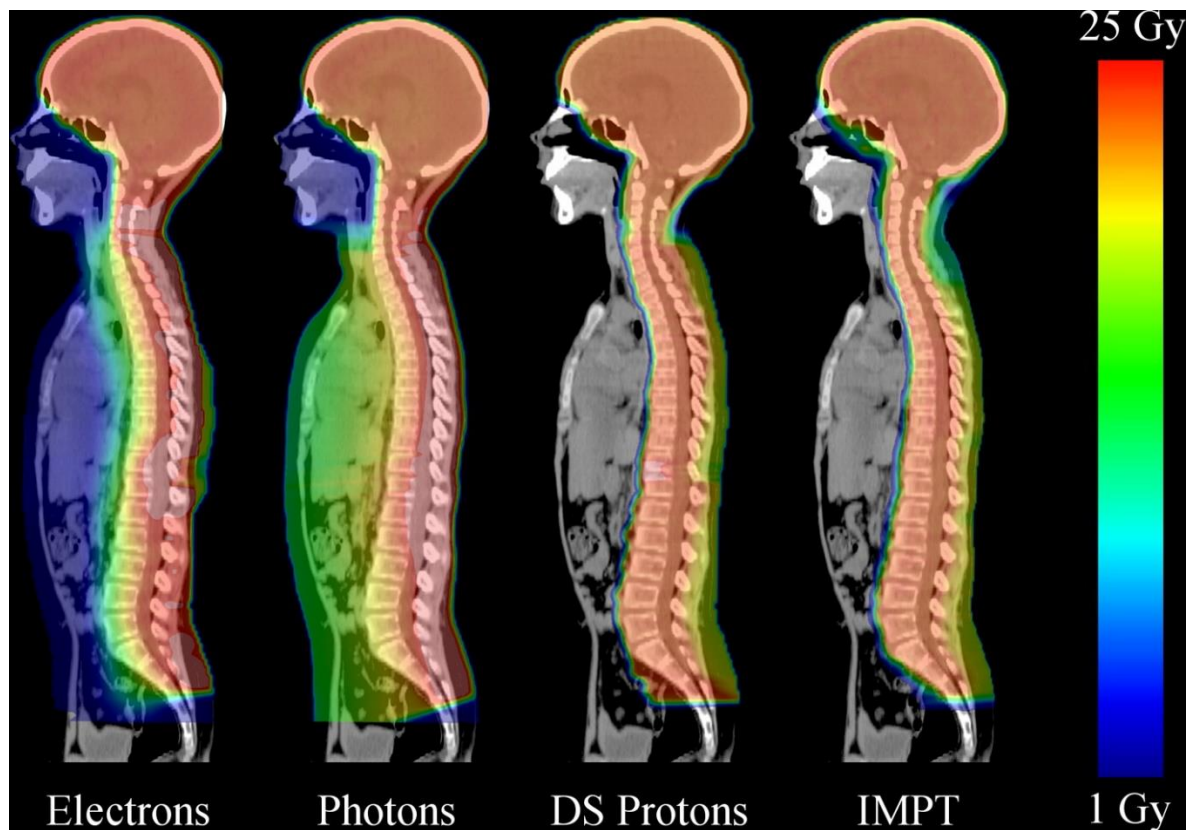
- In the field of medical treatment, proton therapy, or proton radiotherapy, is a type of particle therapy that uses a beam of protons to irradiate diseased tissue, most often to treat cancer.
- The chief advantage of proton therapy over other types of external beam radiotherapy is that the dose of protons is deposited over a narrow range of depth, which results in minimal entry, exit, or scattered radiation dose to healthy nearby tissues.

# What is Proton Therapy

## Particle vs photon beam dose penetration

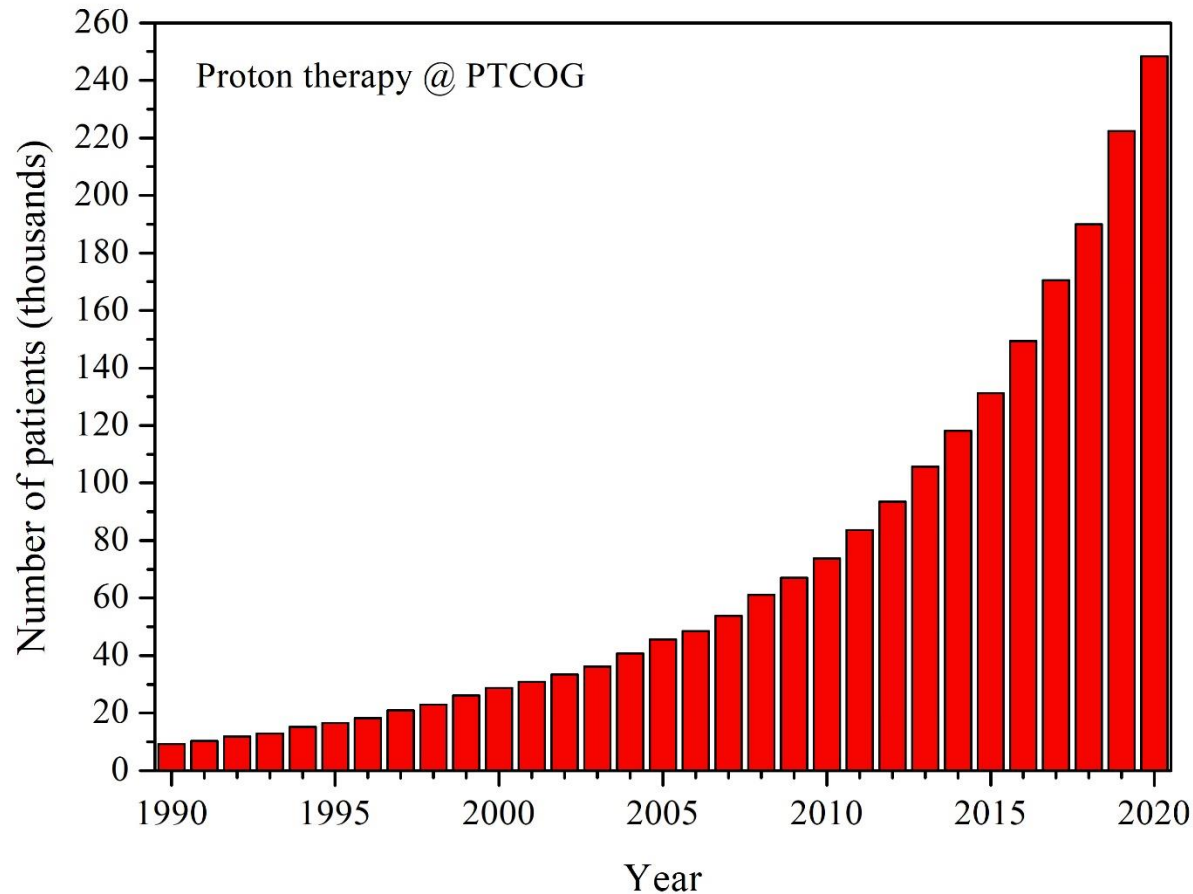


# What is Proton Therapy



*From Stokkevåg et al., Acta Oncol. 53 (2014) 1051*

# Proton therapy in the World



The number of patients treated worldwide with proton therapy is doubling every 6 years (data from PTCOG).

# Proton therapy in the World



proton  
therapy

carbon  
therapy

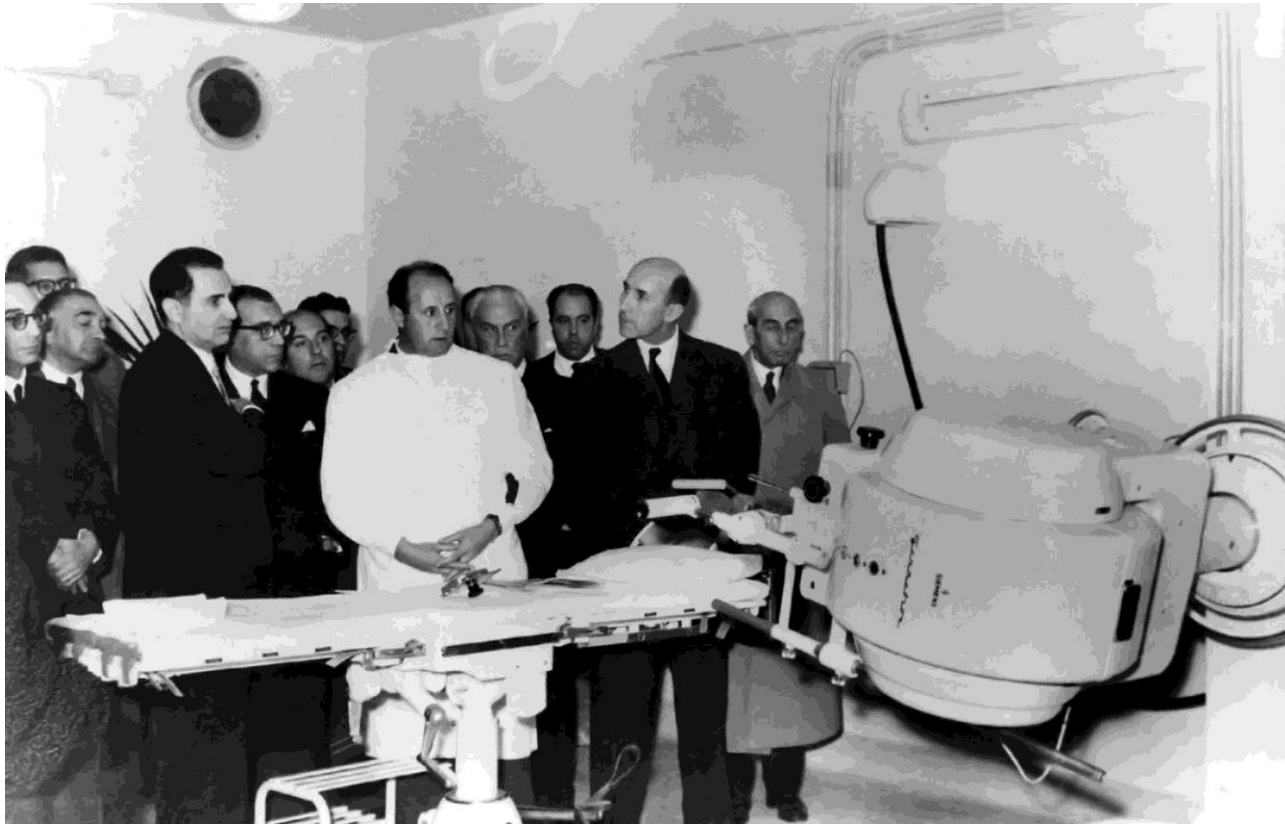
The number of treatment rooms in Europe is increasing (1.8 rooms/10 M) but it is still well below Japan (5.3 rooms/10 M) and the USA (3.9 rooms/10 M).

# Proton therapy in Portugal

- The network for radiation therapy in Portugal has currently about 60 LINAC and 68 brachytherapy units in public and private units.
- Some historical milestones:
  - 1929: Roentgen therapy service;
  - 1933: Radium therapy;
  - 1958: First Co-60 unit;
  - 1974: First LINAC unit.
- The inclusion of a proton therapy unit was already considered in the 2015 revision of the national network for radiation therapy promoted by the General-Directorate of Health.



# Once upon a time...



Inauguration of the first Co-60 therapy unit at IPO-Lisboa in 1958. The physicist António Manuel Baptista is guiding the visitors.

# Proton therapy in Portugal

- Working group established by Ministers for Health and Science in October 2017 (Ministerial Order 9015/2017).
  - Chairs: Gaspar Barreira (LIP) and João Oliveira (IPO);
  - Included representatives from General-Directorate of Health, Central Administration of the Health System, National Council of Clinical Academic Centers and IST.
- Working Group with the support of an International Advisory Panel.
  - Members from CERN, Belgium, Germany, Italy, Spain and USA.

# Proton therapy in Portugal

- Working group charged to identify and plan:
  - the optimal number of treatments required;
  - the necessary clinical support for the operation;
  - the technical and scientific basis in support of fundamental research activities;
  - the necessary support for R&D activities;
  - the development of an effective national network of research, training and health care infrastructures for the treatment of cancer patients using new technologies;
  - the required conditions to stimulate scientific, technical and clinical cooperation at international level;
  - the required human and financial resources.

# Proton therapy in Portugal

- Resolution of the Council of Ministers 28/2018:
  - Proton therapy will be available in the national health system, with initial capacity to treat up 700 patients/year.
  - National network: first unit to be located at the *Campus Tecnológico e Nuclear* of IST, taking advantage of available human and technical infrastructures.
  - Financing conditions to be agreed.
  - Portuguese funding agency for science, research and technology (FCT) allocated 10 M€ for training of physicians and researchers in the period 2018-2023.
  - FCT, IPOs and other hospitals involved in cancer treatment authorized to create a not-for-profit association to install and operate proton therapy unit.<sup>12</sup>

# Proton therapy in Portugal

- What has ProtoTera been doing:
  - Promoting proton therapy;
  - Created a PhD Programme with FCT;
  - Entered the Portuguese Roadmap of Research Infrastructures;
  - Prepared technical specifications of buildings;
  - Prepared technical specifications of equipments.
- Two poles:
  - Loures: 250 MeV accelerator, 2 rooms for therapy, 1 room for research.
  - Coimbra: 30 MeV cyclotron + LINAC acceleration to 70 MeV for treatment of ocular melanoma.

# Proton therapy in Portugal



Typical multi-room configurations units for proton therapy from 2 vendors. These configurations can accommodate 2-3 rooms for patients and 1 room for research.



# Proton therapy in Portugal



3D model of the buildings for Loures.

# 79 years ago...



The first man-made nuclear reactor started operating on 2 December 1942 in an old squash court of the U. Chicago. This was later named CP-1 (Chicago Pile 1) or Fermi's reactor.