Greetings from CERN

European Network for Light Ion Therapy
ENLIGHT

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CERN in Numbers

• 2300 staff
• 700 Fellows and Associates
• 10000 users

CERN, Austria, Belgium, Bulgaria, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Netherlands, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

Romania*

Observers to Council:
India, Israel, Japan, the Russian Federation, the United States of America, Turkey, the European Commission and Unesco

The Large Hadron Collider (LHC)

Proton-Proton Collider

7 TeV + 7 TeV

1,000,000,000 collisions/second

Total energy over 14,000 proton masses

Primary targets:
• Origin of mass
• Nature of Dark Matter
• Primordial Plasma
• Matter vs Antimatter
Radiotherapy in the 21st Century

- RT is, nowadays, the least expensive cancer treatment method
- There is no substitute for RT in the near future
- The rate of patients treated with RT will likely increase in the years to come

Present Limitation of RT: 30% of patients still fail locally after curative RT

How to overcome failures?

- Physics & treatment technology: dose escalation
- Imaging: MRI, PET, image registration
- Biology: altered fractionation, radiosensitization

Numbers of potential patients

From studies in Austria, France, Germany and Italy
- X-ray therapy
  - every 10 million inhabitants 20,000 pts/year
- Proton therapy
  - 12% of X-ray patients 2,400 pts/year
- Therapy with Carbon ions for radio-resistant tumour
  - 3% of X-ray patients 600 pts/year
- TOTAL for hadron therapy for 10 M 3,000 pts/year

Hadrontherapy vs. radiotherapy

- Tumours close to critical organs
- Tumours in children
- Radio-resistant tumours

Photons and Electrons vs. Hadrons

- Physical dose high near surface
- DNA damage easily repaired
- Biological effect lower
- Need presence of oxygen
- Effect not localised
- Dose highest at Bragg Peak
- DNA damage not repaired
- Biological effect high
- Do not need oxygen
- Effect is localised

The PIMMS Collaboration

- Collaboration was formed in 1996 following an agreement between Med-AUSTRON (A) and TERA (I)
- CERN agreed to host and support the study in PS-Division
- The study was later joined by ONKOLOGY 2000 (CZ)
- Close contacts were kept with GSI (D)
- Work started in January 1996 and continued for 4 years.
- Final report is now available (CD ROM/CERN Yellow Report)
PIMMS at CERN in 1996 - 2000
CERN–TERA–MedAustron Collaboration for optimized medical synchrotron

HIT at Heidelberg

CNAO = Centro Nazionale di Adroterapia
Pavia (near Milan)
Medical Director: Roberto Orecchia
Technical Director: Sandro Rossi

The Darmstadt GSI 'pilot project' (1997-2008)
G. Kraft
J. Debus

CERN Colloquium - 5.2.09 - UA
In 2007 MedAustron has been approved for Wiener Neustadt

Approved in 2007 by the Government of Lower Austria

MedAustron will build a centre based on the CNAO construction drawings [CERN-CNAO-INFN Agreement]

European Network for Light Ion Hadron Therapy (ENLIGHT)

Hadrontherapy goals

• Provide the irradiation technologies and the detection systems to optimally use the advantages of charged particles
• Optimize the dose to the tumour by beam scanning and adaptation of the delivery e.g. organ motion, respiration
• Treat 1000 patients per year and perform clinical trials using low-LET (p, He) and high-LET (C, O) beams
• Conduct technical, physical and clinical R+D

Questions?

Why did we need a network?
Why the timing 2001?
What was necessary for a network?
Which activities were needed to catalyse ENLIGHT?
Which were the key starting points?
ENLIGHT

Hadrontherapy complex undertaking, therefore ENLIGHT established to
- Create common multidisciplinary platform
- Share knowledge
- Share best practices
- Harmonise data
- Provide training, education
- Identify challenges
- Innovate

The ENLIGHT network opened the discussion on
- Clinical studies
- Epidemiological studies
- Cancer incidence
- Economical dimensions
- ...

Funded as a network by the European Commission until 2005

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ENLIGHT provides a powerful multidisciplinary European collaboration amongst partners interested in hadrontherapy
- ENLIGHT acts as a platform for defining research needs
- Developing projects and securing funding and collaboration
- ENLIGHT is a useful resource for communities interested in hadron therapy
Points to consider for hadron therapy in Greece

• Establish a multidisciplinary (accelerator physicists, detector specialists, doctors,… ) dialogue
• Get champions (medical doctors, key personalities,…?)
• Get the physicians involved from the outset
• Get involved in existing infrastructures outside Greece, e.g. ENLIGHT, PTOC
Rapid increase of hadrontherapy in the last decade!

- 1997: 22,000 patients treated (18,000 protons)
- 2008: 63,000 patients treated (55,000 protons)
- 1st patient treated (Berkeley)

Manjit Dosanjh, February 27th - March 1st, Predeal, Romania 2009