Protontherapy in Orsay
Current status and future developments

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Synchrocyclotron
200 MeV
1000 tons

2 treatment rooms
Eye + head/Chair
Chair + couch

synchrocyclotron
Patient throughput: still increasing with new indications
CPO: which place?
Which technology?
Centers with >1,000 pts treated
THE CENTRE DE TONATHERAPIE D'ORSAY UNTIL 2003: A PARISIAN CONSORTIUM!
THE CENTRE DE TONTHERAPIE D’ORSAY SINCE 2003...
Optimization of existing rooms and facility

- Continuous upgrade of the equipment
  - Machine
  - Beamlines
  - Treatment rooms

- Continuous Research and Development:
  - Patient positioning
  - Beam control and dosimetry
  - Treatment planning
  - Workflow

- Optimization and operability studies
New project: several technical features

Optimisation: (ongoing lean 6σ since 2006):

Main goals:
- Throughput optimization
- Fluid process
- Patient care (comfort, delays...)
Beam’s «shaping»:

\textit{passive double scattering}
Patient's set-up: 
fixed beam: supine + seated
Patient’s positioning: fixed beam: isocentric
Stereotactic alignment: invasive fiducial markers
Stereotactic alignment: daily set-up

« Rotaplus » program:
- Virtual triangles between gold seeds (DRRs)...
- Compared with actual position on orthogonal X-Rays
New treatment planning (Dosisoft)
Infra red stereoscopic camera (Polaris)
Image guided radiation therapy
Clinical program in Orsay

- Aims at validating currently recognized clinical indications, on highly selected malignancies
- Also at developing new protocols to explore new avenues esp. in pediatrics
- Along with necessary technological innovations
Validating current clinical indications...
Patients' characteristics: Ophthalmological
Patients' characteristics: geographical origin (oph.)

Nombre de patients : 3404

Nombre de patients français : 3295 96.8 %
Nombre de patients étrangers : 109 3.2 %
Nombre de patients ile de france : 742 21.8 %
Protons in choroidal melanomas: DFS
Visual outcome (5,500 pts)
Patients’ characteristics: Intra cranial

Total: 732
Patients’ characteristics: geographical origin (I.C.)

Nombre de patients : 757

Nombre de patients français : 555  73.3 %
Nombre de patients étrangers : 202  26.7 %
Nombre de patients île de France : 178  23.5 %
The network

« Historical » network between Institut Curie, IGR, AP-HP for the treatment process

Extension of the network to other partner hospitals (Lyon,…)

To be extended for the coordination of hadrontherapy in France (ions, protons…) :
  – selection of tumor types
  – easy access to treatment (referral, housing,…)

Network improvement:
  - Visionconferencing (patient staff)
  - easy transfer of patient data, images,…
Radiological aspects, skull base sarcomas

Chordoma

Chondrosarcoma
I.R: 16 Y CH, post op imaging
Protons to CTV (Axial)
Proton therapy:
Skull Base - Cervical Chordomas:
Literature
Protontherapy Skull Base - Cervical Chondrosarcomas : Literature

![Graph showing % LRFS over years for different regions and countries]
Exploring new indications...
Patients' characteristics: pediatrics
Proton Beam Therapy in the Management of Central Nervous System Tumors in Childhood: The Preliminary Experience of the Centre de Protonthérapie d'Orsay

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**Background.** The purpose of the study was to evaluate clinical results and complications of a combination of proton and photon irradiation administered to 17 children with selected central nervous system (CNS) tumors. **Procedure.** Between July 1994 and September 2000, 17 children, aged from 5 to 17 years (median: 12 years) with intracranial benign (6 cases) or malignant (11 cases) tumors, were treated with photons (median dose: 40 Gy; 24–54) and protons (median dose: 20 CGE; 9–31) at the Centre de Protonthérapie d'Orsay (CPO). **Results.** Mean follow-up was 27 months (3–81). Two patients recurred locally (one marginal and one in situ). Fifteen patients are alive and doing well. Overall, 12, 24, and 36-month local control rate was 92 ± 8% and, 12, 24, and 36-month overall survival rates were 93 ± 6%, 83 ± 11%, and 83 ± 11%, respectively. Clinical initial symptoms remained stable or subsided in all patients. Early toxicities were in the expected range. **Conclusions.** With a mean 27 months follow-up, protontherapy was well tolerated for doses up to 69 CGE and with an excellent local control rate. Med Pediatr Oncol 2003;40:309–315. © 2003 Wiley-Liss, Inc.

**Key words:** protontherapy; central nervous system tumor; childhood tumor
General anesthesia: *Children* < 4Y
Craniopharyngioma case
Ependymoma: IMRT photon planning vs...
Same patient: protons

10 Gy

10 Gy
First Parameningeal RMS
CPO and the new project

R. Ferrand, P. Grig, S. Meyrone inc, JL Habrand, S. Delacroix
Research and development

- Curie R&D cluster: hospital + research labs
- Network within University
- National Hadrontherapy program
New CPO Center

2 more rooms

Gantry

New machine
The Project
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Thank you!