Protontherapy in Orsay
Current status and future developments

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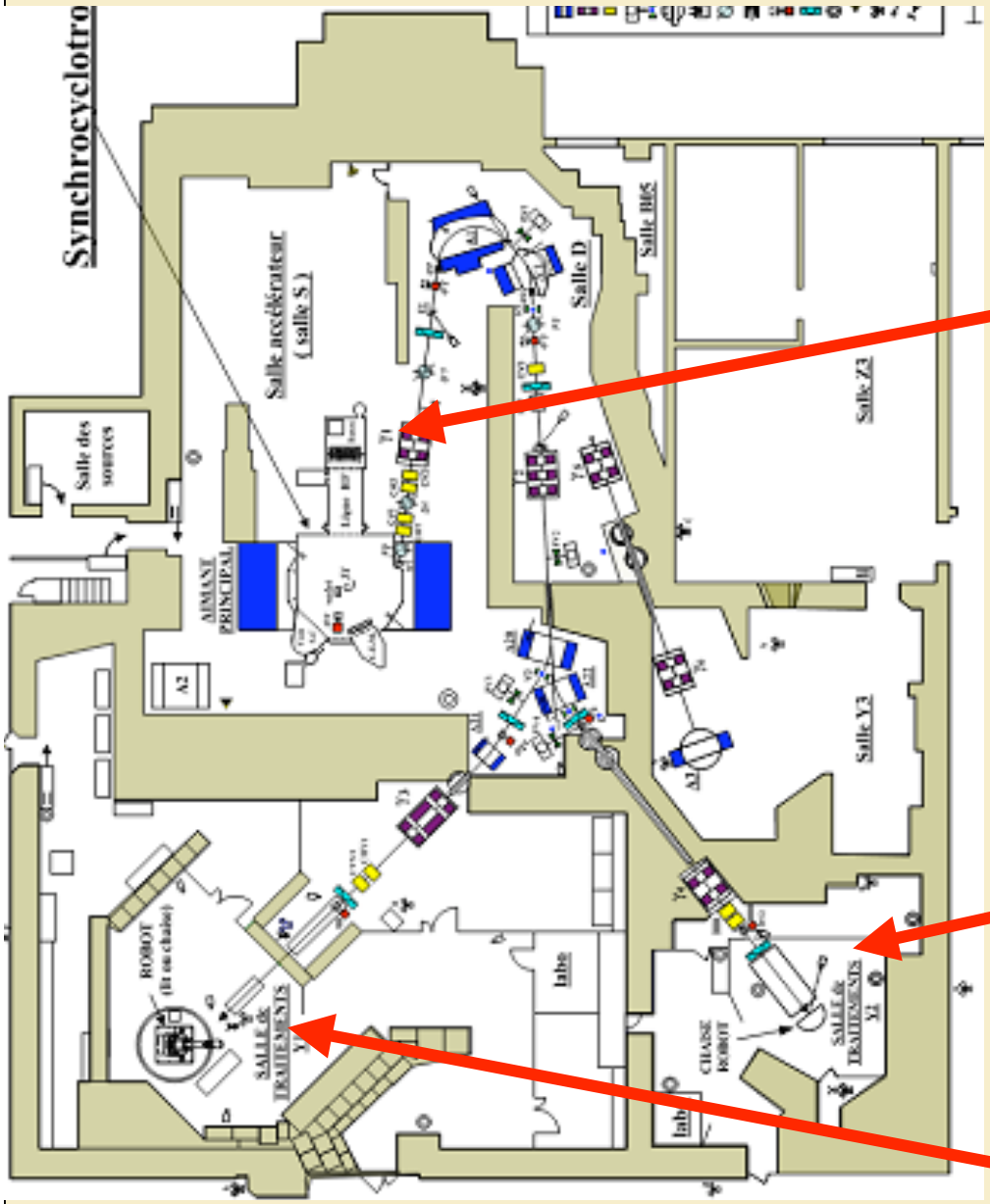
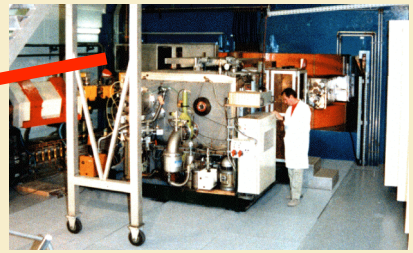
Centre De Protonthérapie de l'Institut Curie à Orsay (ICPO),France

Centre de Protonthérapie d'Orsay (1958-1977-1991): > 4000 patients



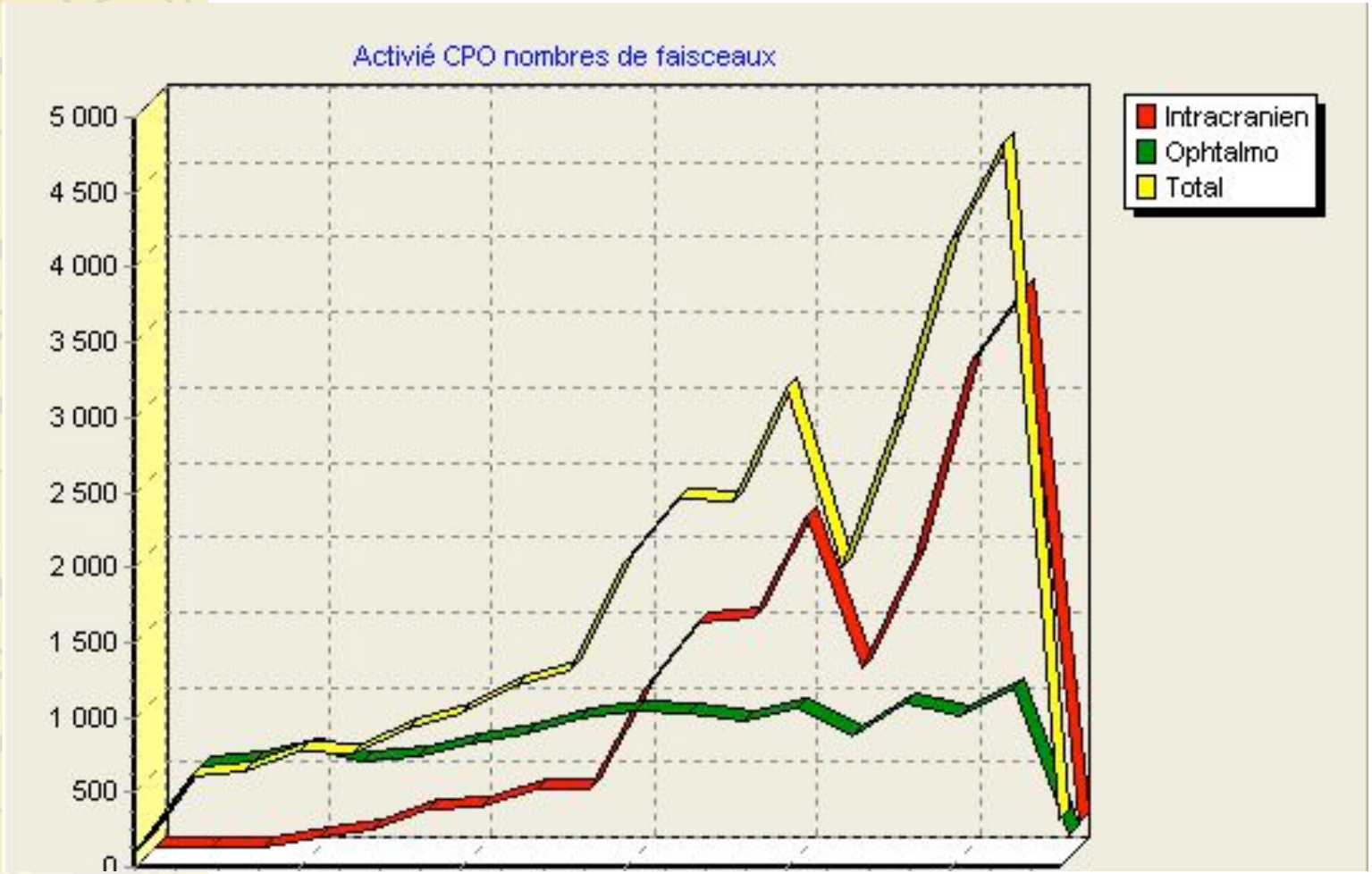
Synchrocyclotron
200 MeV
1000 tons



2 treatment rooms

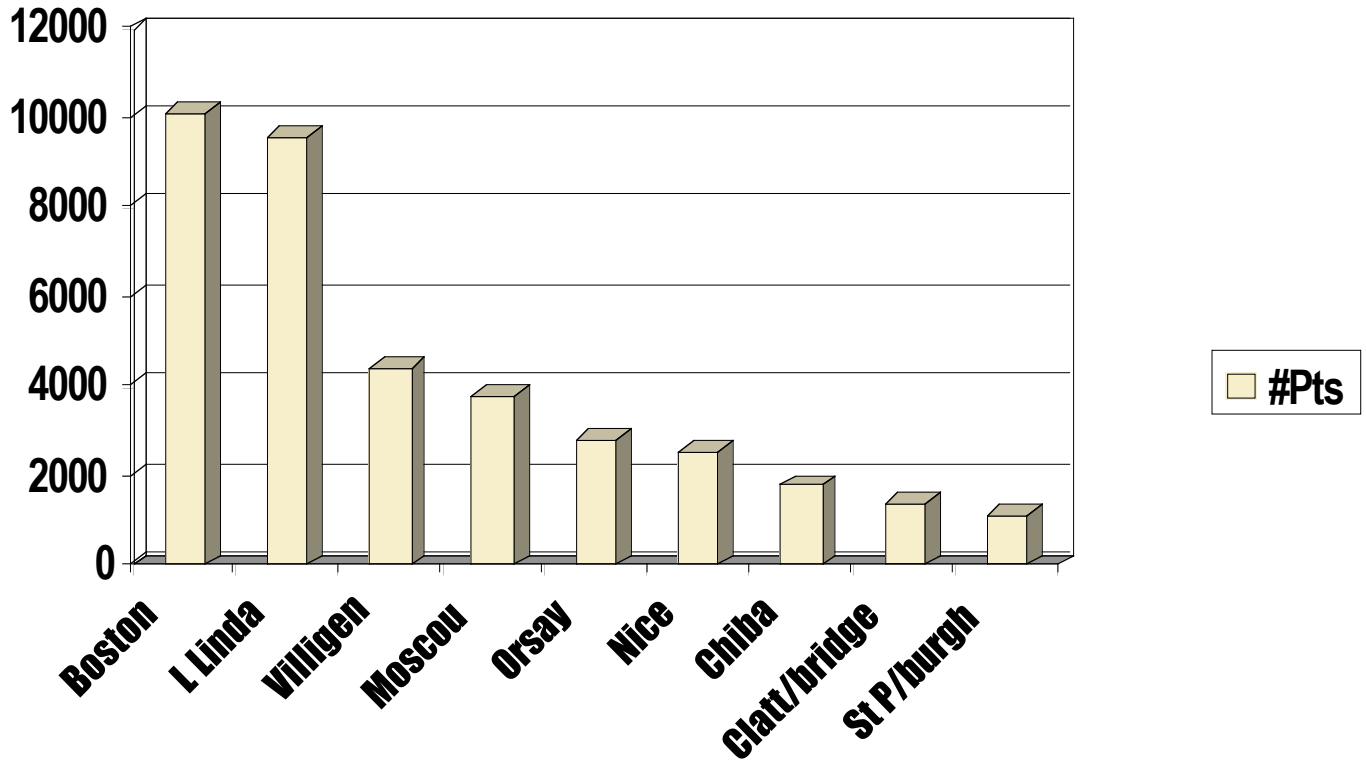
Chair + couch ps

Patient throughput : still increasing with new indications



CPO: which place ?
Which technology?

Centers with >1,000 pts treated



THE CENTRE DE TONTHERAPIE D 'ORSAY UNTIL 2003: A PARISIAN CONSORTIUM !

Institut Gustave-Roussy Villejuif

Institut Curie Paris

CPO Orsay

Assistance Publique -Hopitaux de Paris

Centre René Huguenin Saint-Cloud

THE CENTRE DE TONTHERAPIE D 'ORSAY SINCE 2003…

Institut Gustave-Roussy
Villejuif

Assistance Publique
-Hopitaux de Paris

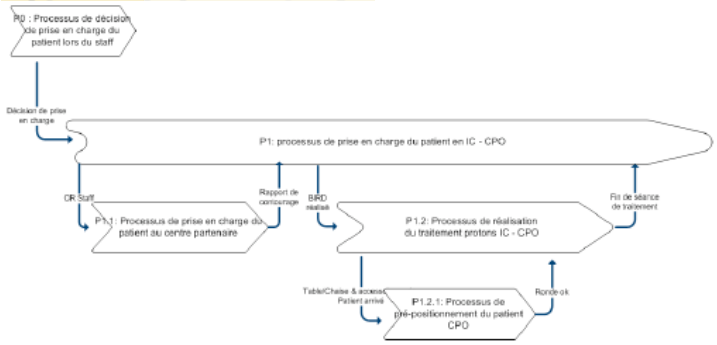
Centre de Protonthérapie
Institut Curie
Paris

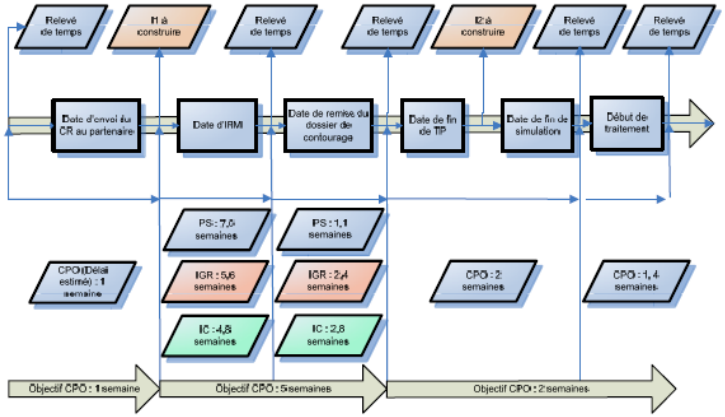
Optimization of existing rooms and facility

- 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) :

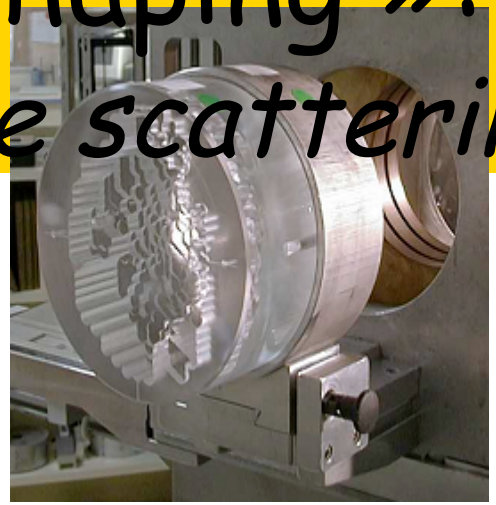


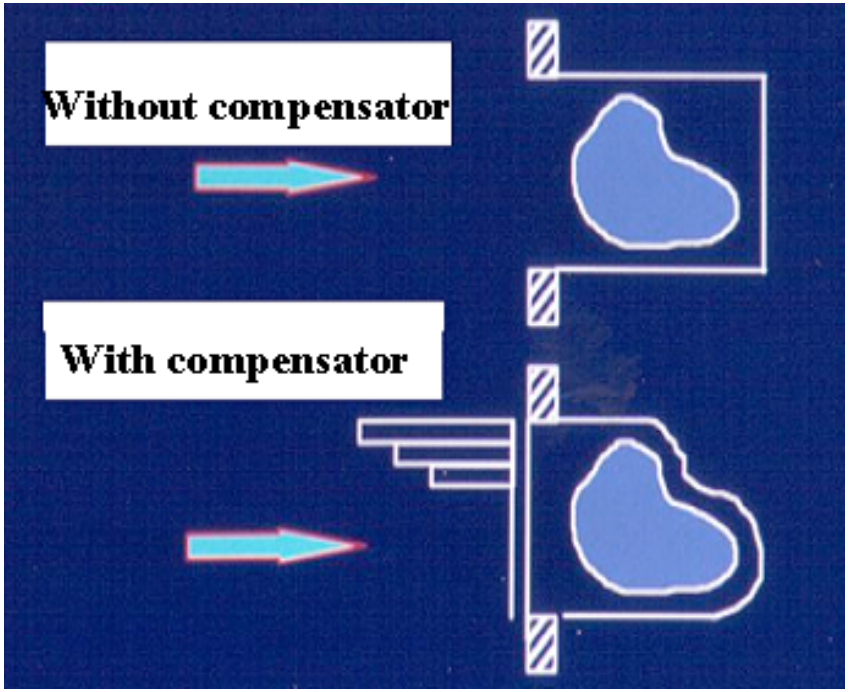


Main goals :

- Throughput optimization
- Fluid process
- Patient care (comfort, delays…)

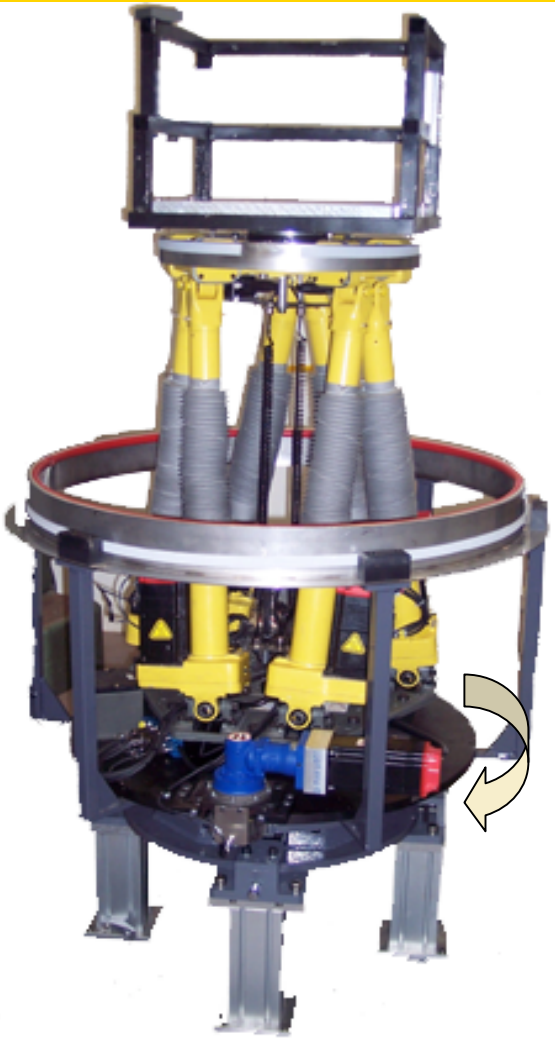
Beam's « shaping »: *passive double scattering*





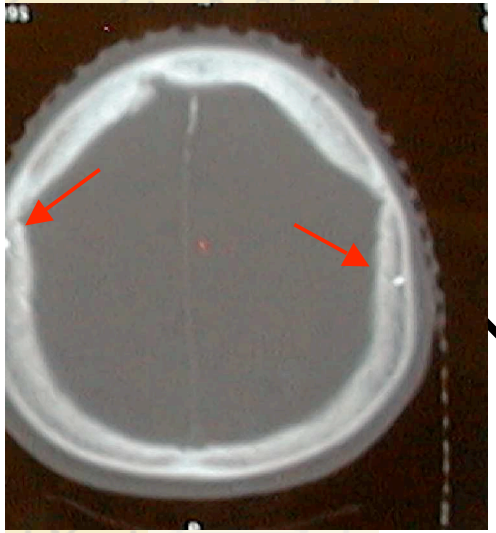
Patient's set-up :
fixed beam : supine + seated

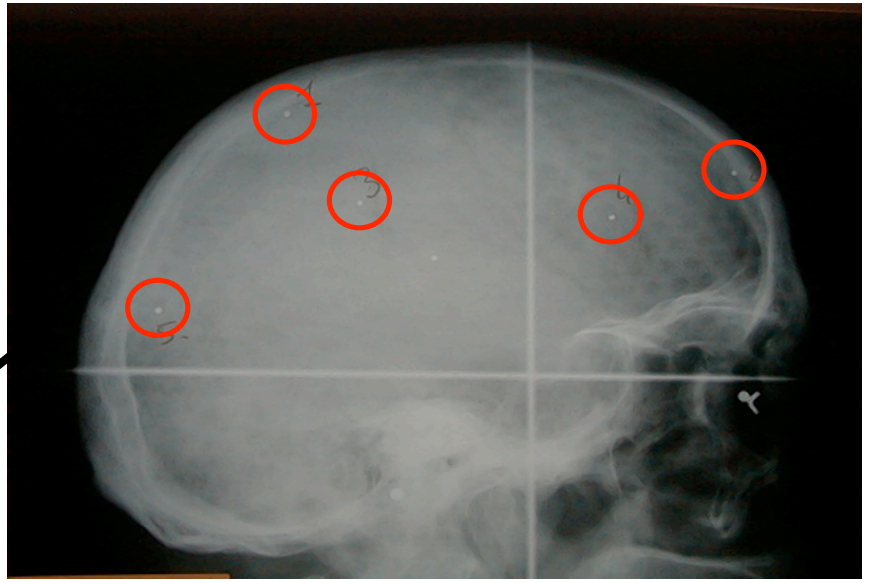
Patient's positioning : *fixed beam : isocentric*

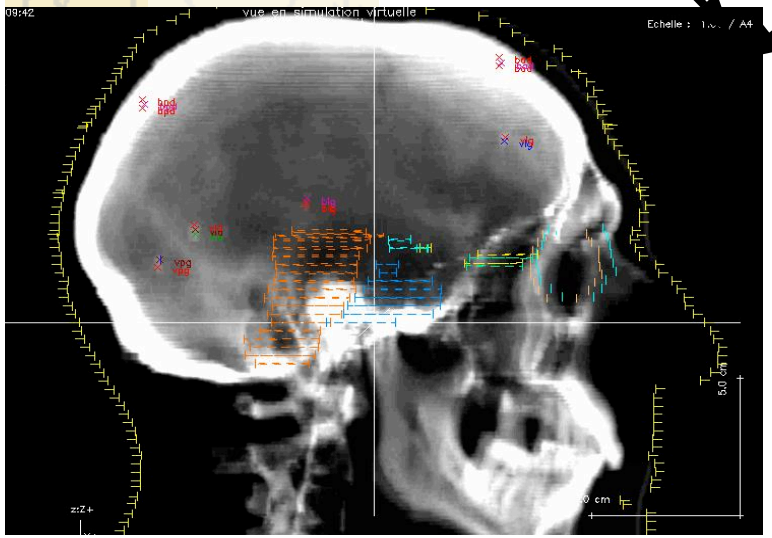


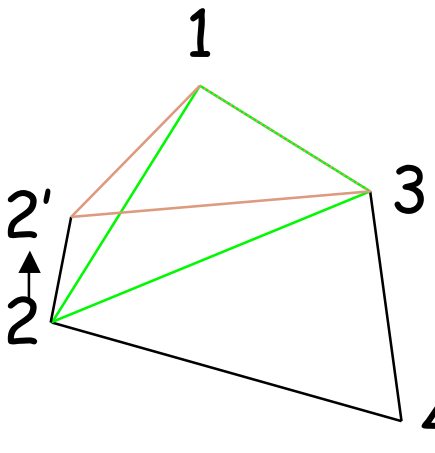
Stereotactic alignment : invasive fiducial markers

Stereotactic alignment: daily set-up







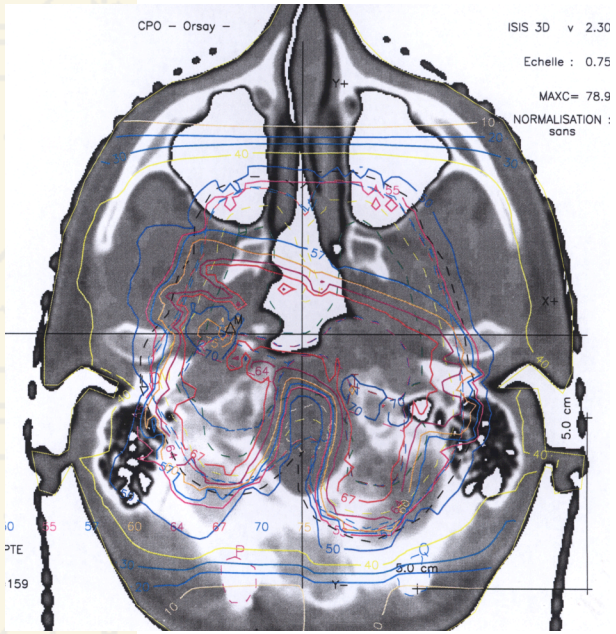


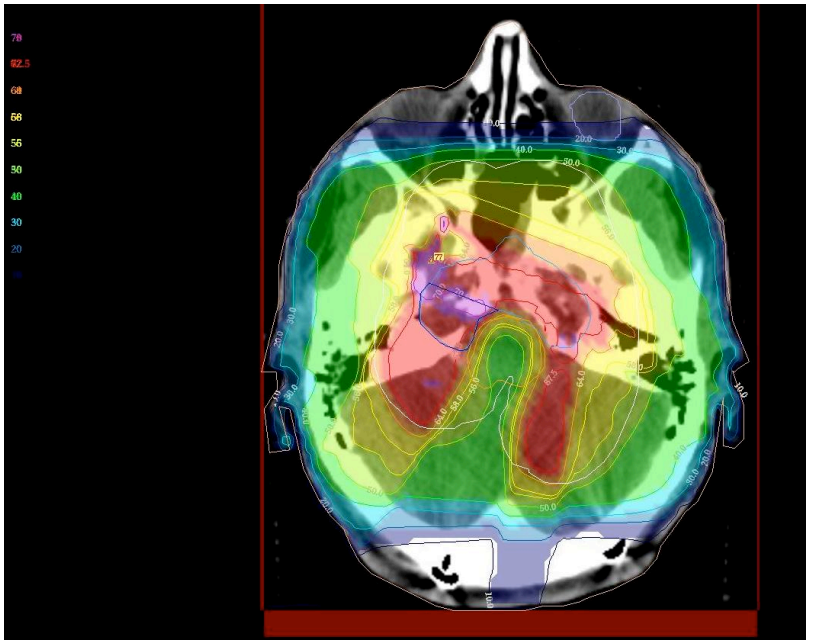
« Rotaplus » program:

-Virtual triangles between gold seeds (DRRs)...

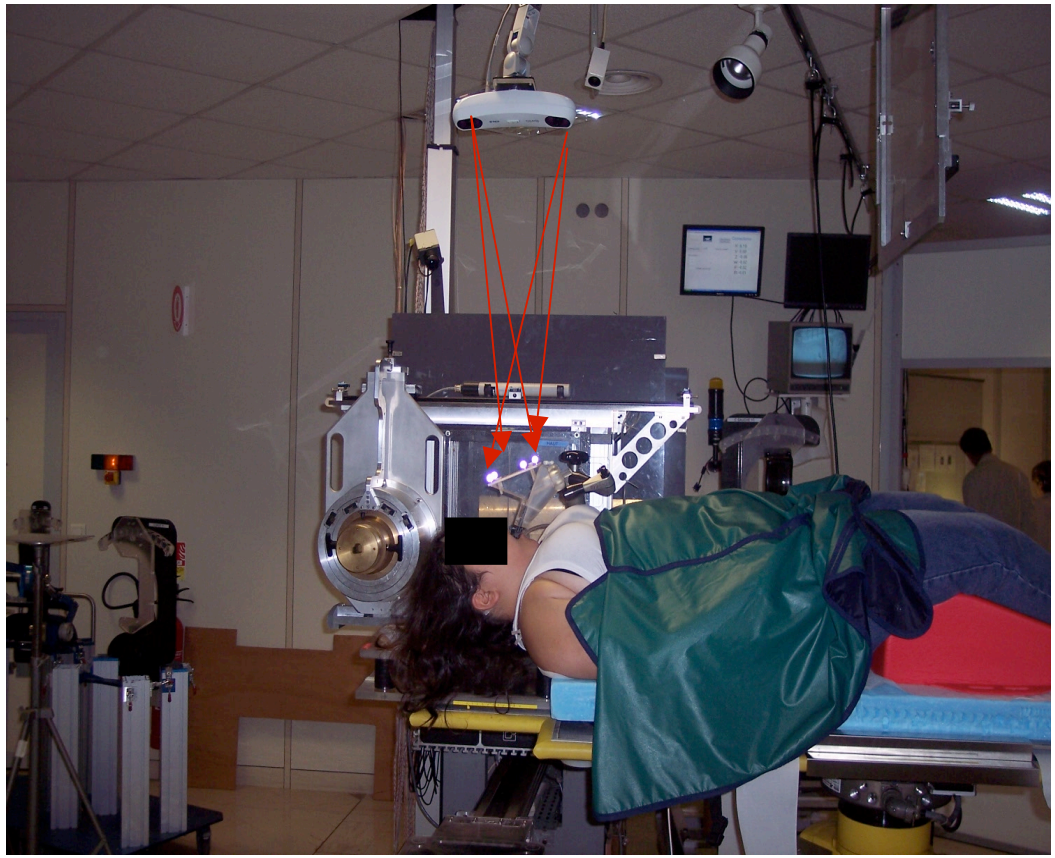
-Compared with actual position on orthogonal X-Rays

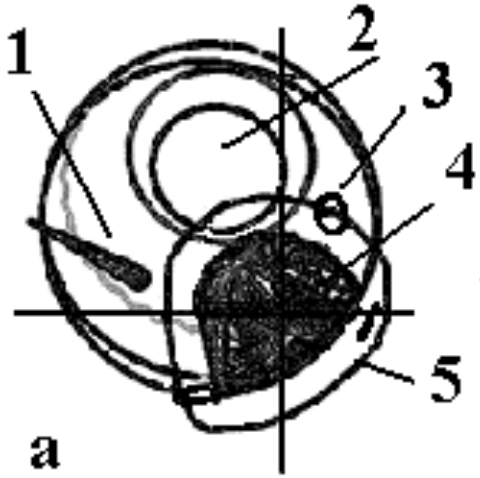
New treatment planning (Dosisoft)

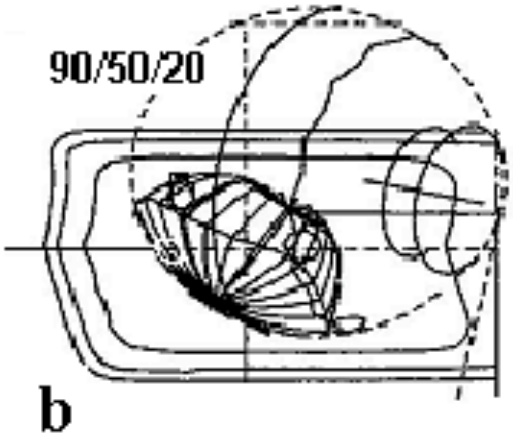


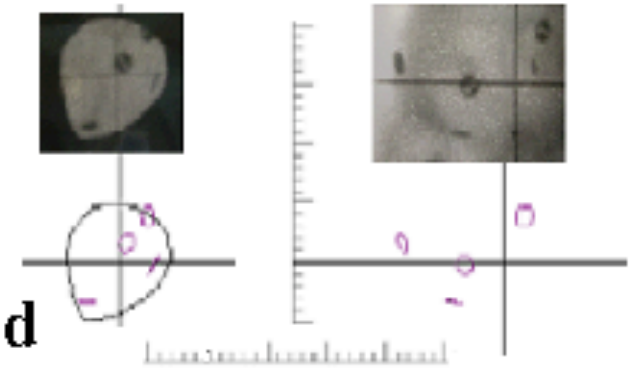


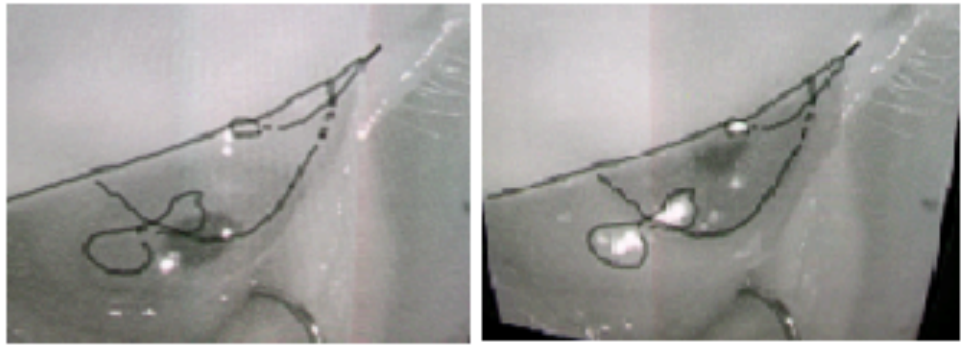
Infra red stereoscopic camera (Polaris)











→ **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…

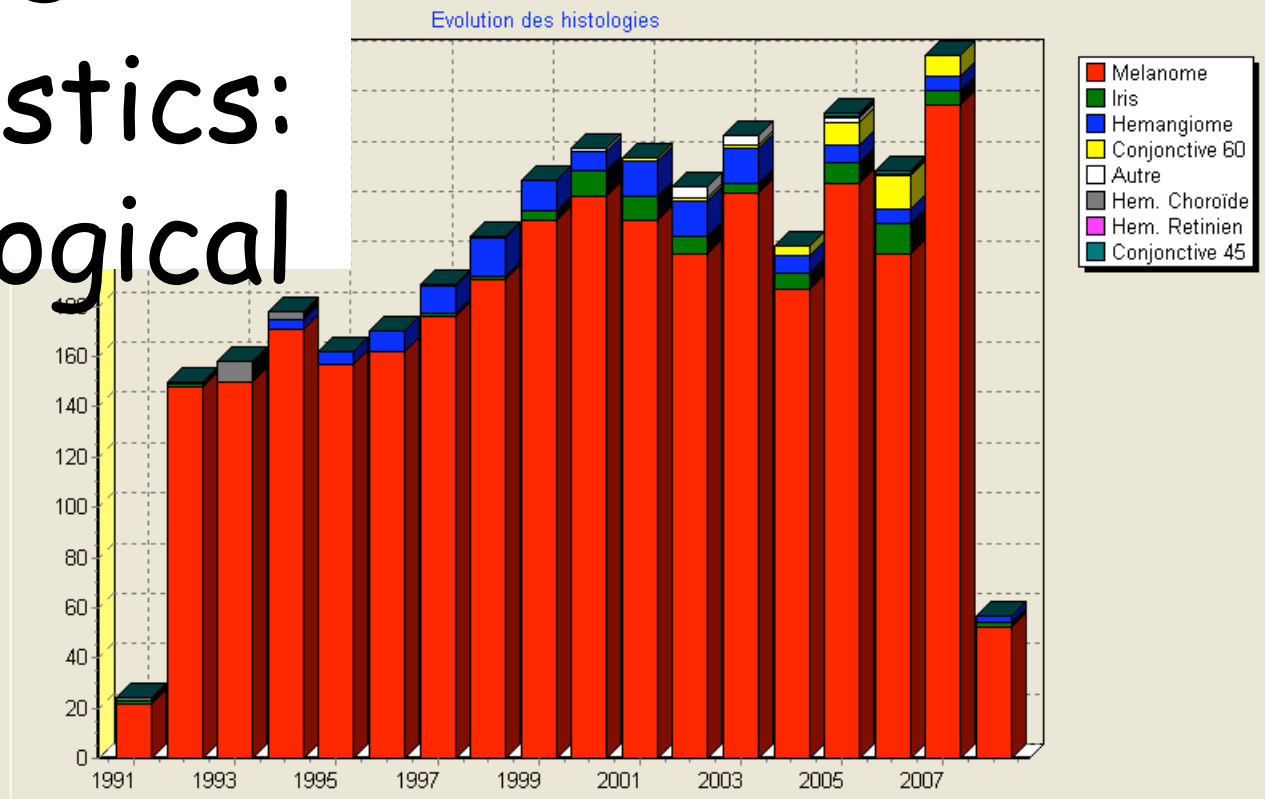
Patients' characteristics: Ophtalmological

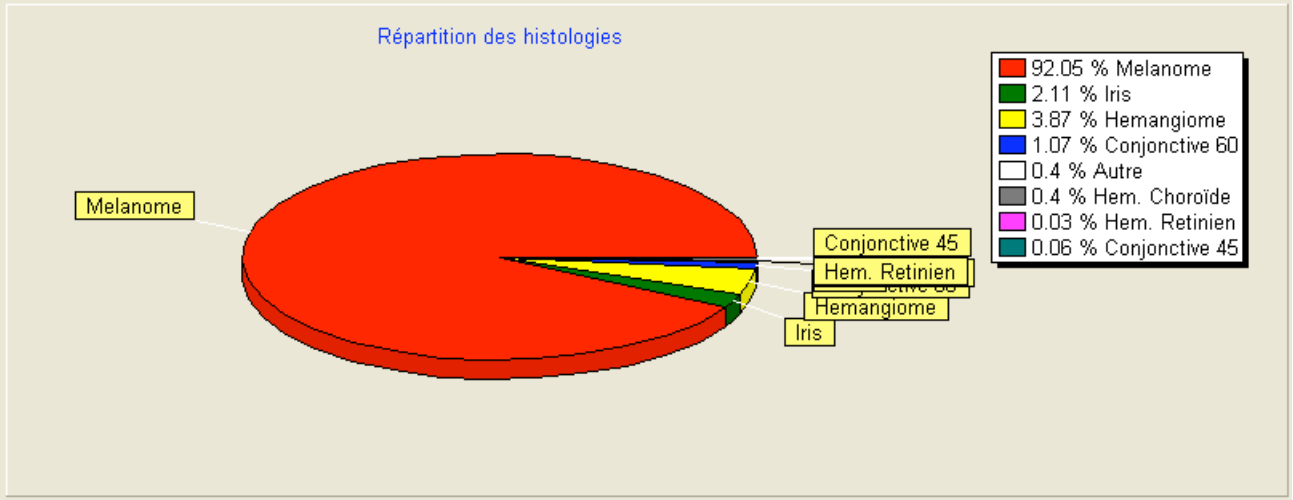
Autre	4		
Hemangiome Choroïde	14	4	30
Hemangiome Retinien	1	8	30
Conjonctive 45	2	8	45

Répartition par année

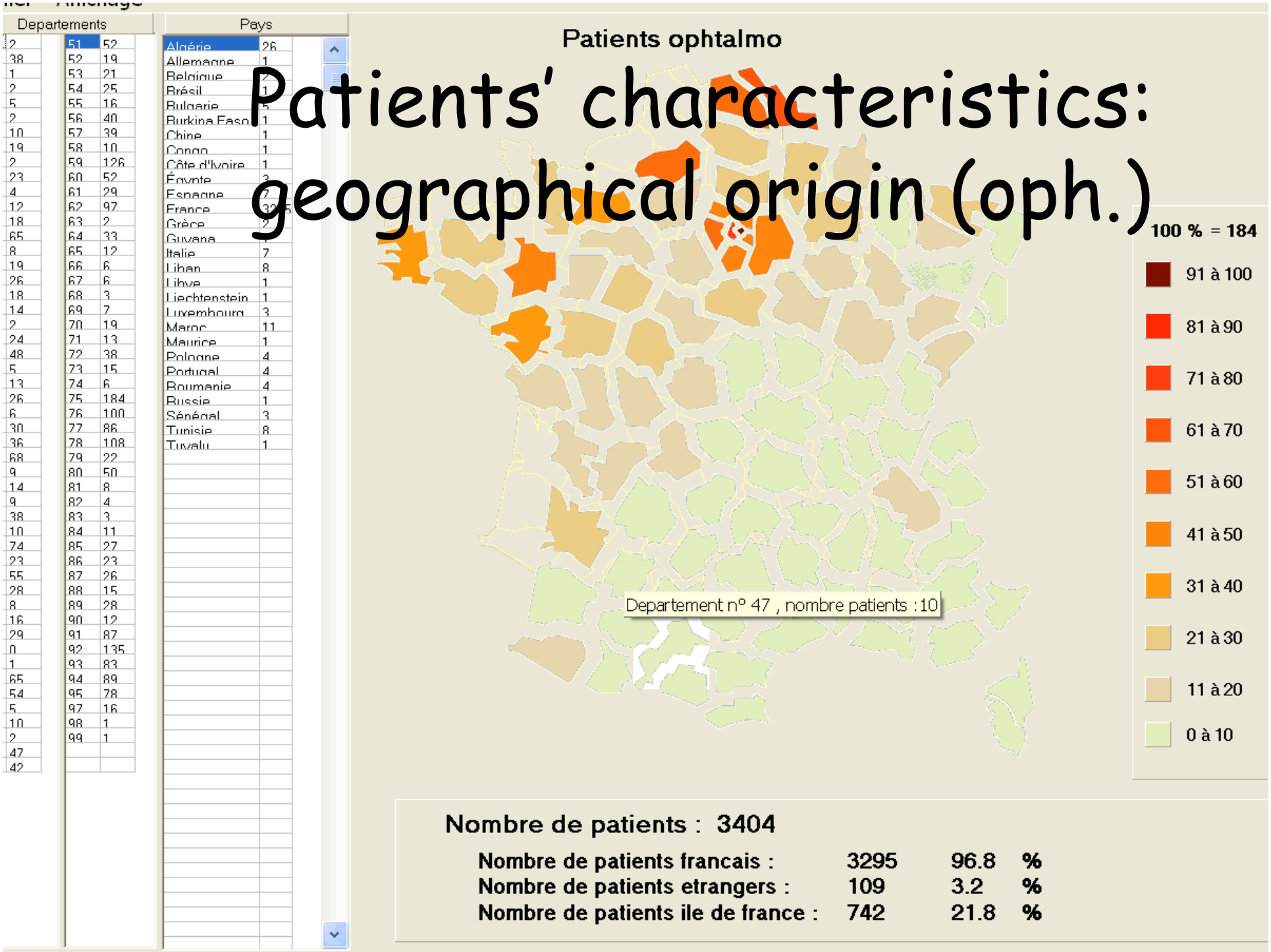
nee	H1	H2	H3	H4	H5	H6	H7	H8
91	22	1	0	0	0	1	0	0
92	148	1	0	0	0	1	0	0
93	150	0	0	0	0	8	0	0
94	171	0	4	0	0	3	0	0
95	157	0	5	0	0	0	0	0
96	162	0	8	0	0	0	0	0
97	176	1	11	0	1	0	0	0
98	191	1	15	0	0	1	0	0
99	214	4	12	0	0	0	0	0
00	224	10	8	0	1	0	0	0
01	214	10	14	1	0	0	0	0
02	201	7	14	1	5	0	0	0
03	225	4	14	1	4	0	0	0
04	187	6	7	4	0	0	0	0
05	229	8	7	9	2	0	1	1
06	201	12	6	13	1	0	0	1
07	260	6	6	8	0	0	0	0
08	52	2	3	0	0	0	0	0

Total : 3459

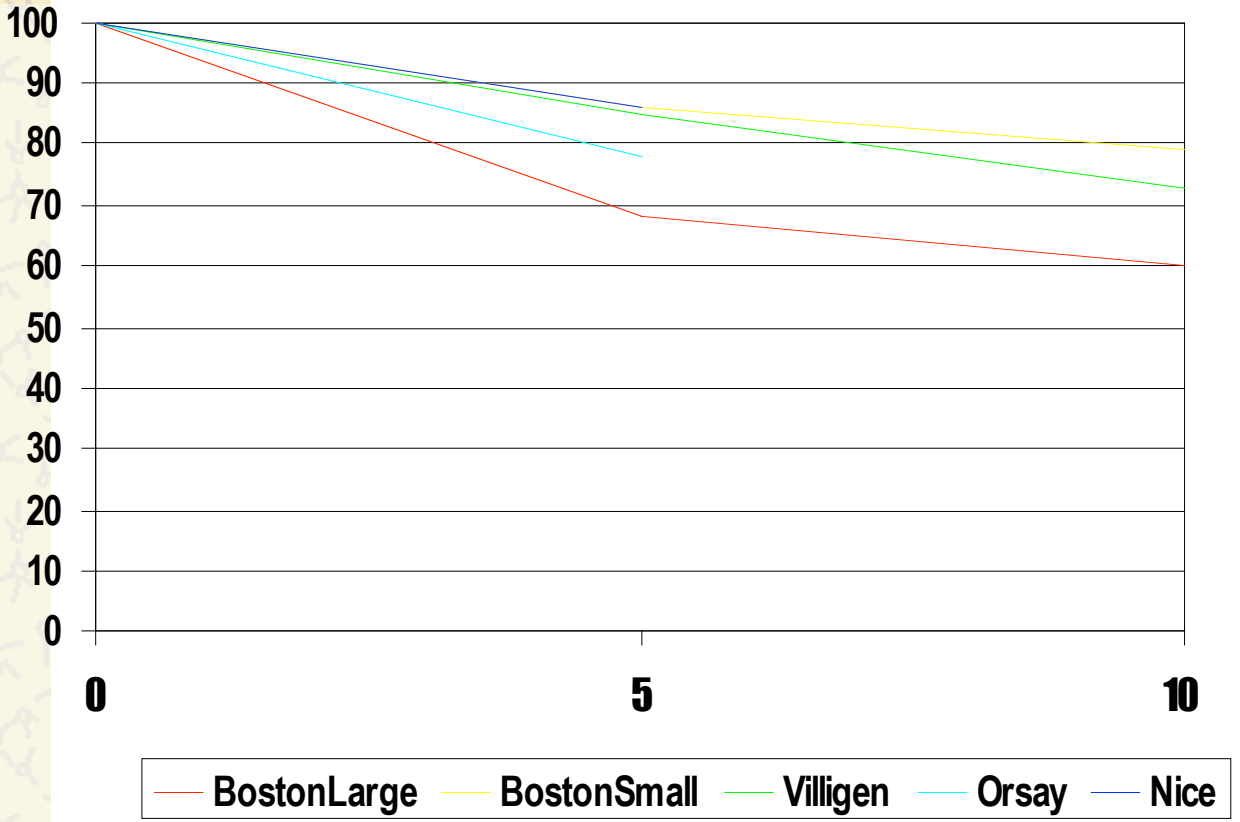




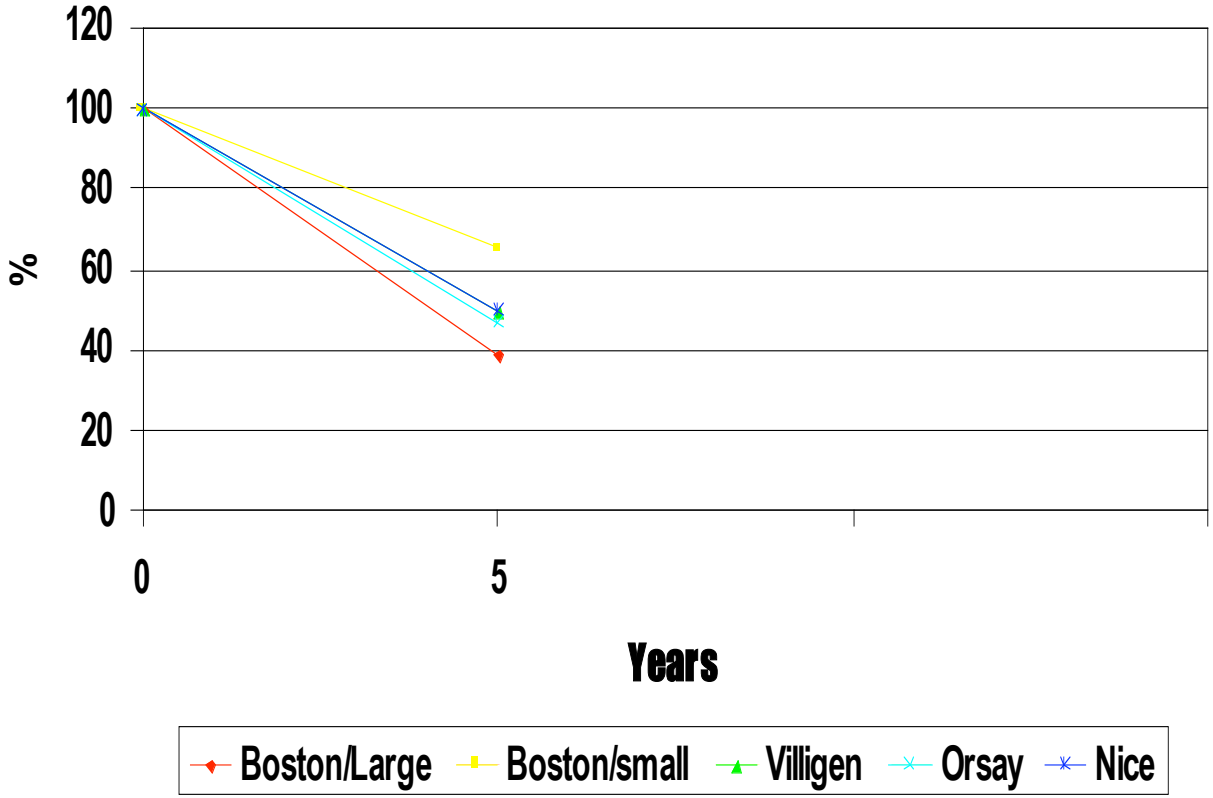
Patients' characteristics: geographical origin (oph.)



Protons in choroidal melanomas: DFS

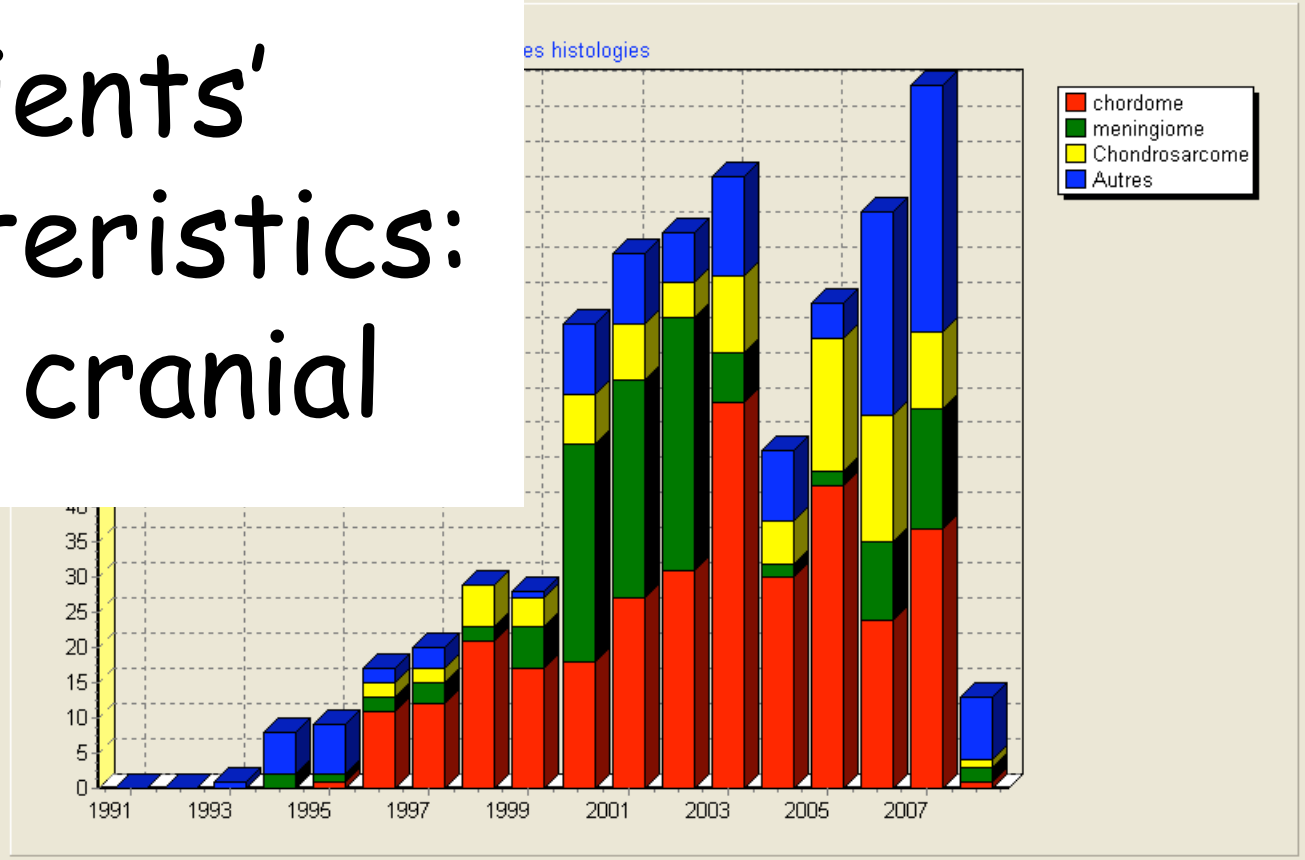


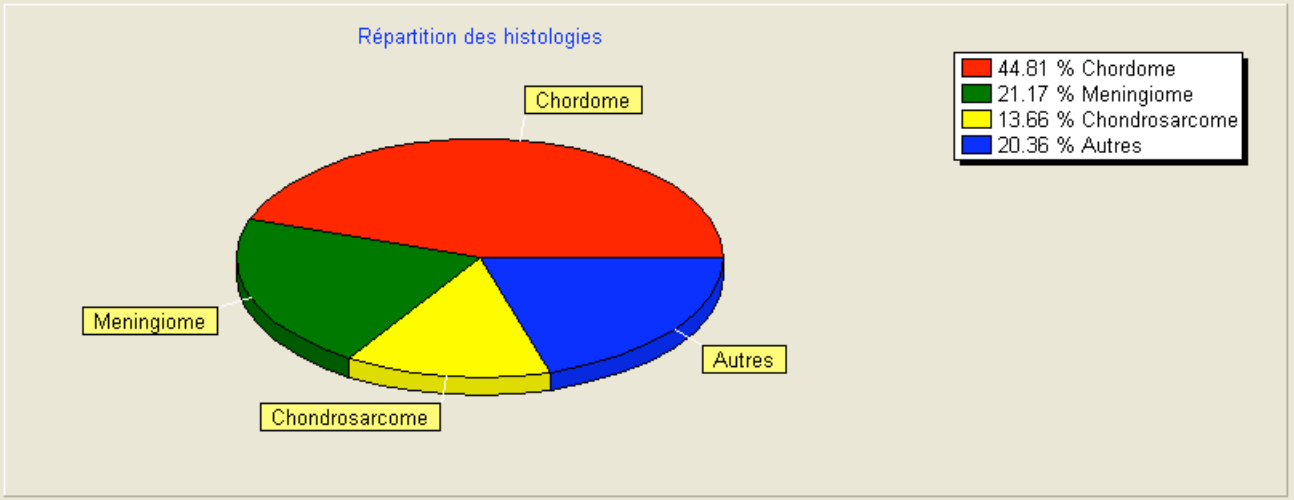
Visual outcome (5,500 pts)



Patients' characteristics: Intra cranial

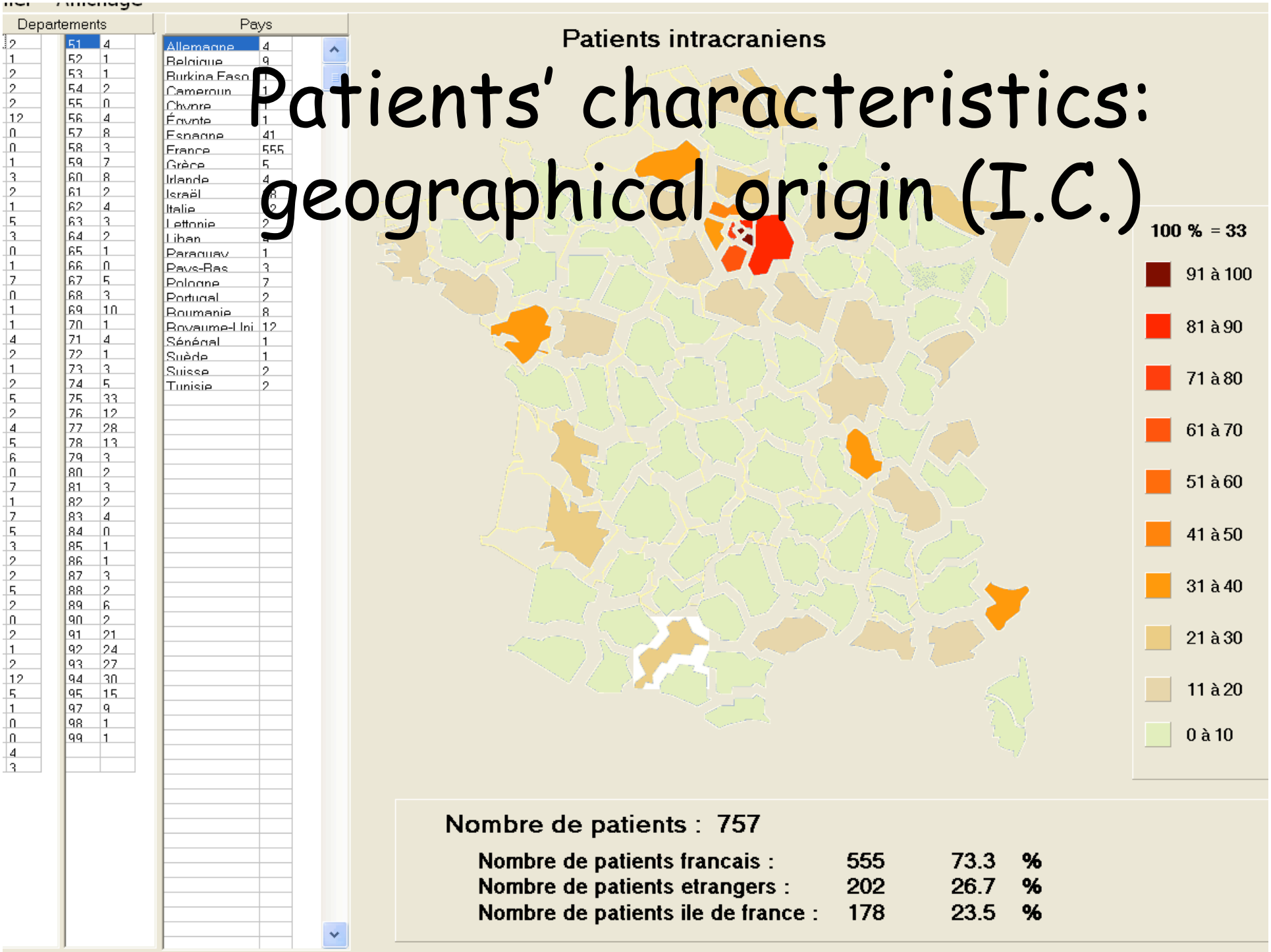
ıodendrogliome	4
ıéaloblastome	3
et	2
tinoblastome	1
ıabdomyosarcome	9
ırcome	3
novialosarcome	1
lénocarcinome	1
thésioneuroblastome	1
ɔrome	1
ɔrosarcome	0
téosacrome	1
meur à cellules géar	2
meur fibreuse solitair	3
hwanome	1





Total : 732

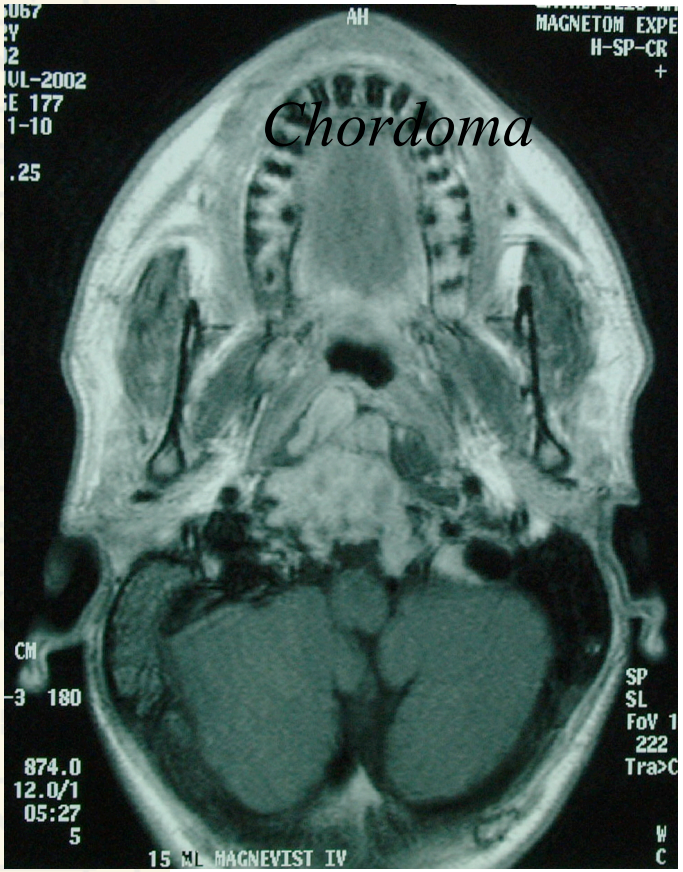
Patients' characteristics: geographical origin (I.C.)

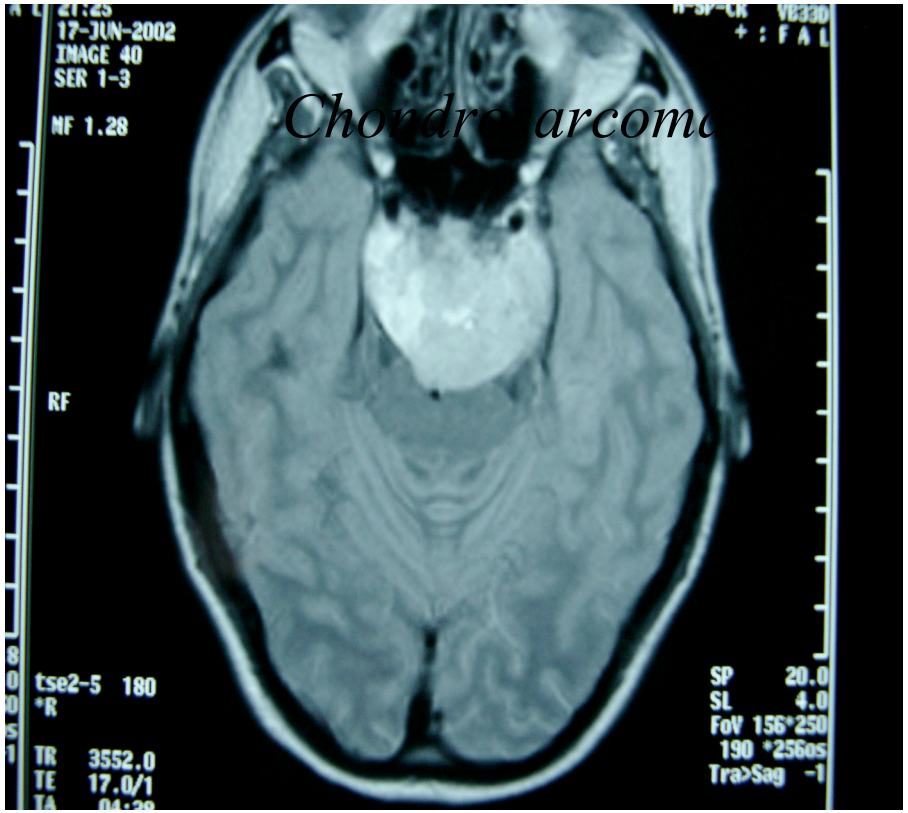


The network

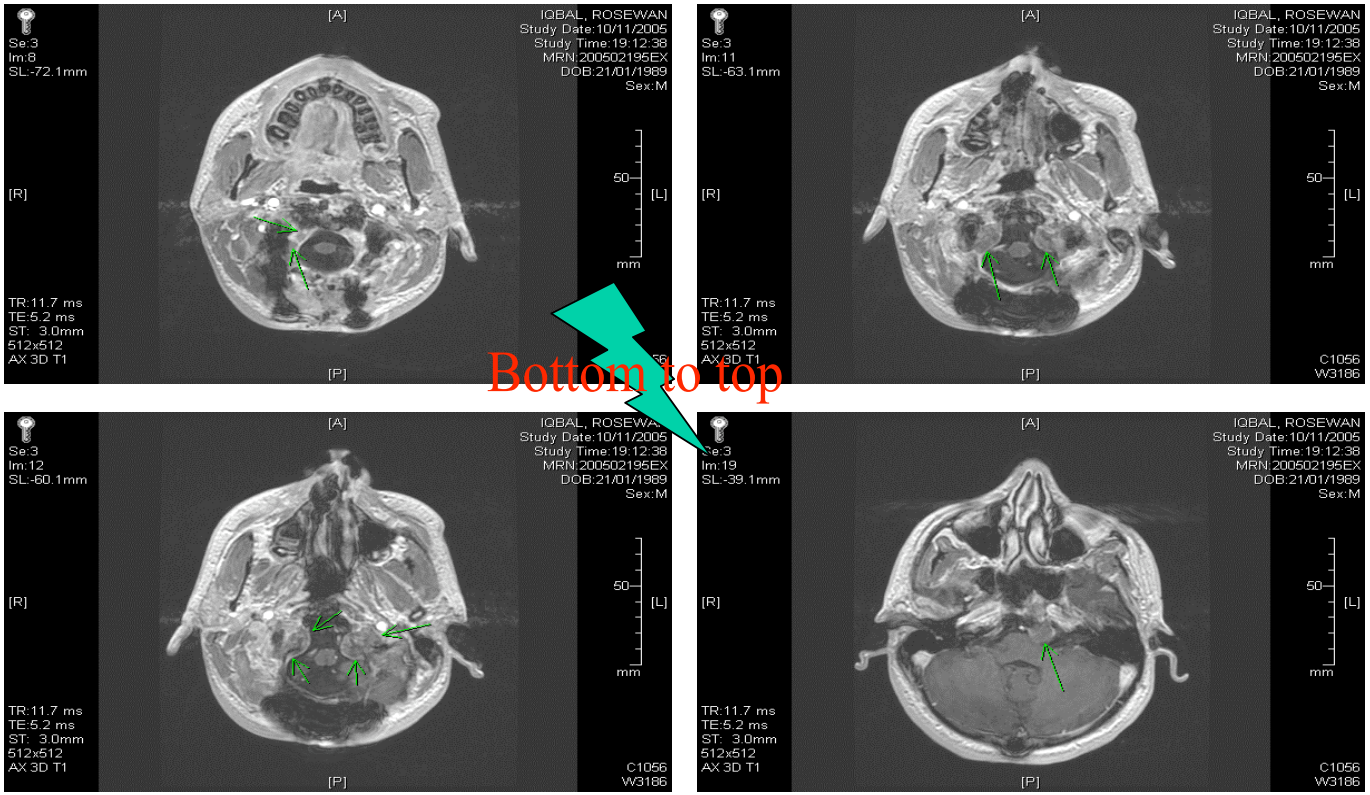
- « Historical » network between Institut Curie, IGR, AP-HP for the treatment process
- Extension of the network to other partner hospitals (Lyon,…)
- To be extended for the coordination of hadrontherapy in France (ions, protons…) :
  - - selection of tumor types
  - easy access to treatment (referral, housing,…)

Radiological aspects, skull base sarcomas

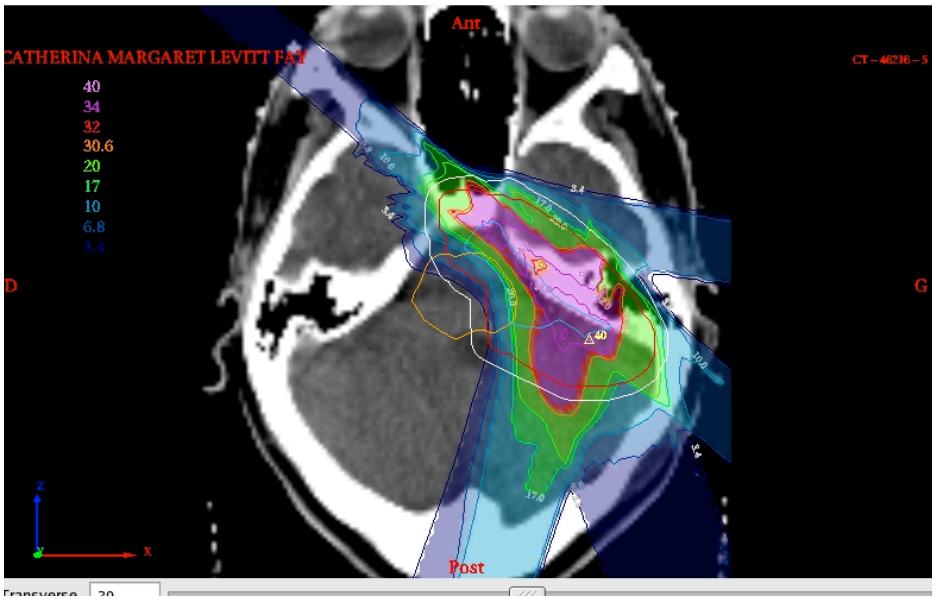




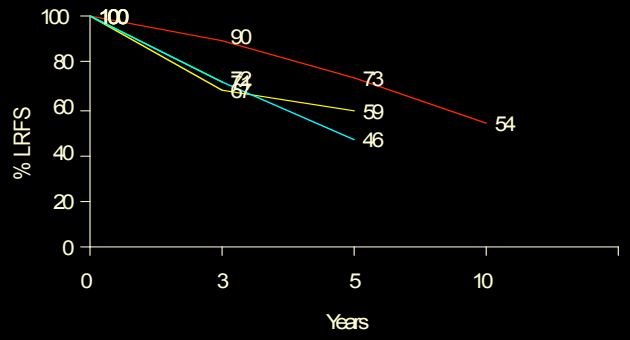
I.R: 16 Y CH, post op imaging

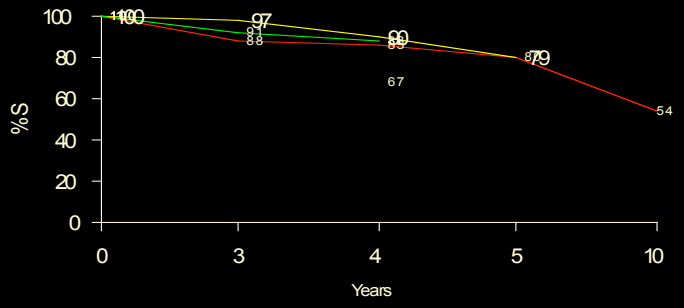


Protons to CTV (Axial)

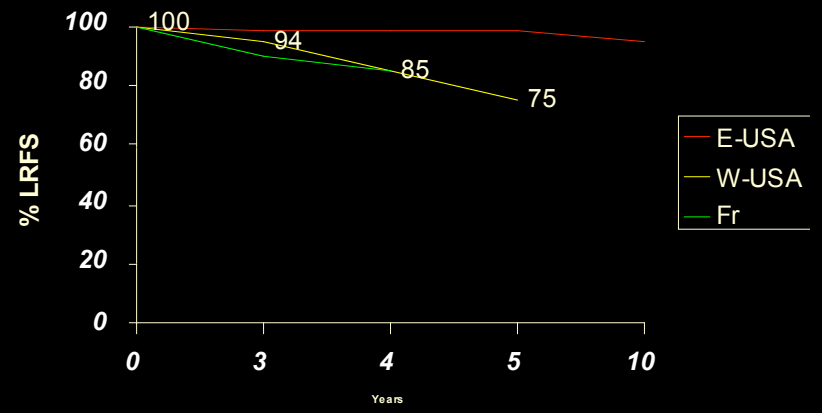


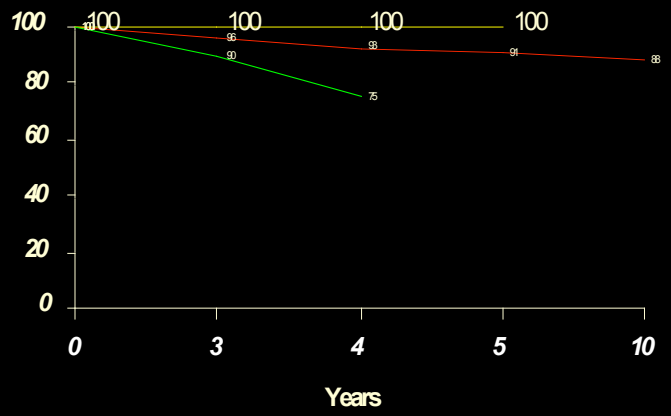
Protontherapy :
Skull Base - Cervical Chordomas :
Literature





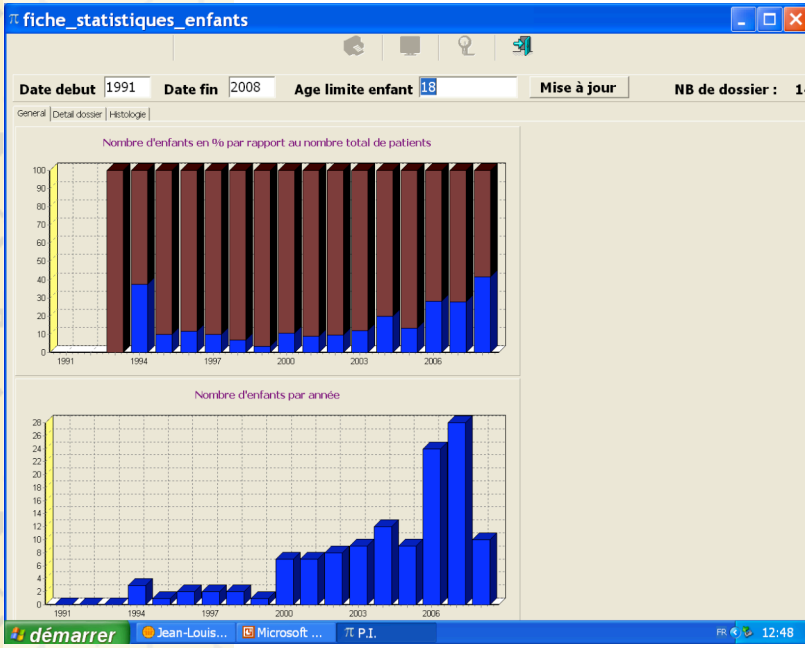
Protontherapy Skull Base - Cervical Chondrosarcomas : Literature

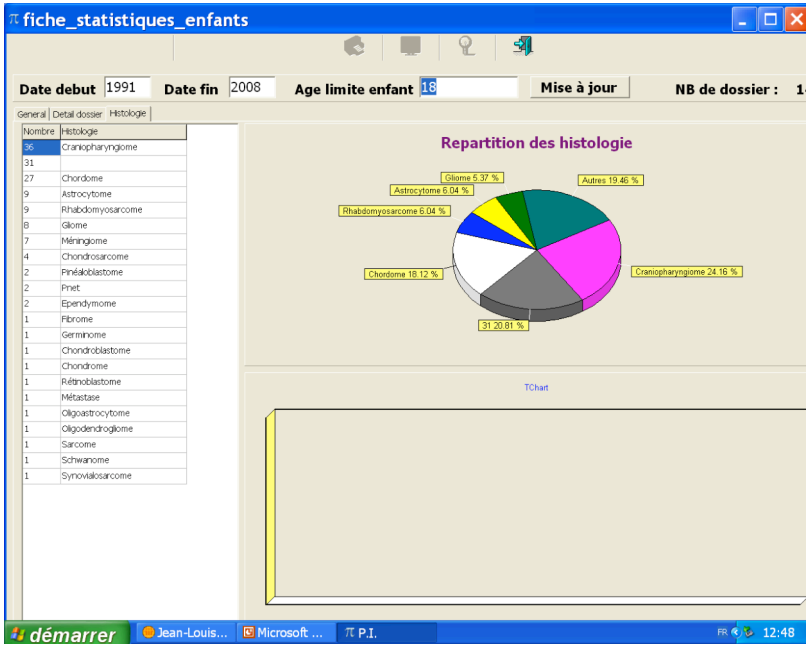




Exploring new indications…

Patients' characteristics: pediatrics





Med Pediatr Oncol 2003;40:309–315

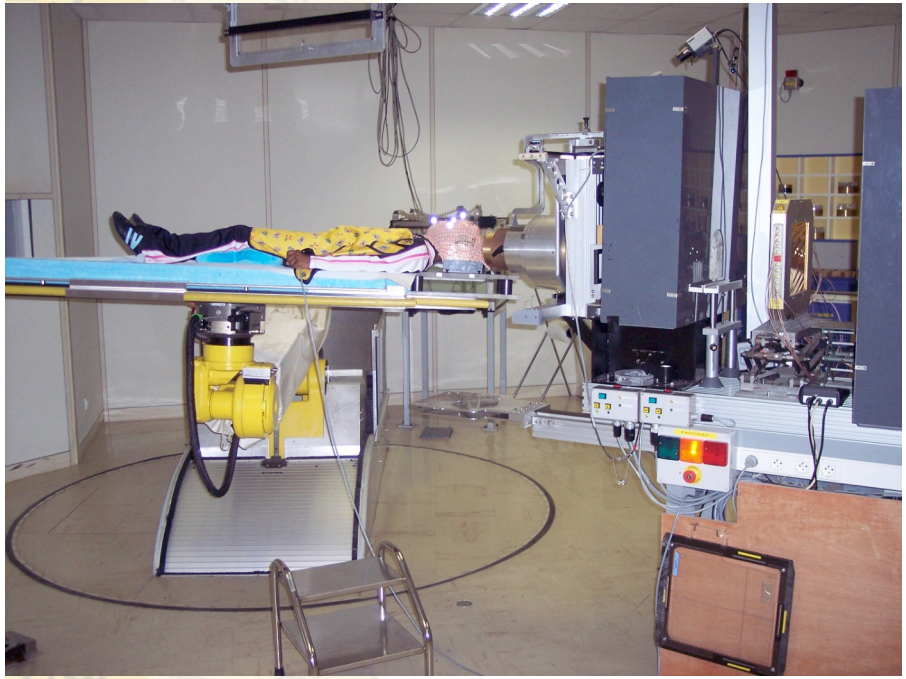
Proton Beam Therapy in the Management of Central Nervous System Tumors in Childhood: The Preliminary Experience of the Centre de Protonthérapie d'Orsay

Georges Noel, MD,[1]* Jean-Louis Habrand, MD,[2] Sylvie Helfre, MD,[3] Hamid Mammar, MD,[1] Chantal Kalifa, MD,[2] Régis Ferrand, PhD,[1] Anne Beaudre, PhD,[2] Geneviève Gaboriaud, PhD,[3] and Jean-Jacques Mazeron, MD, PhD[1,4]

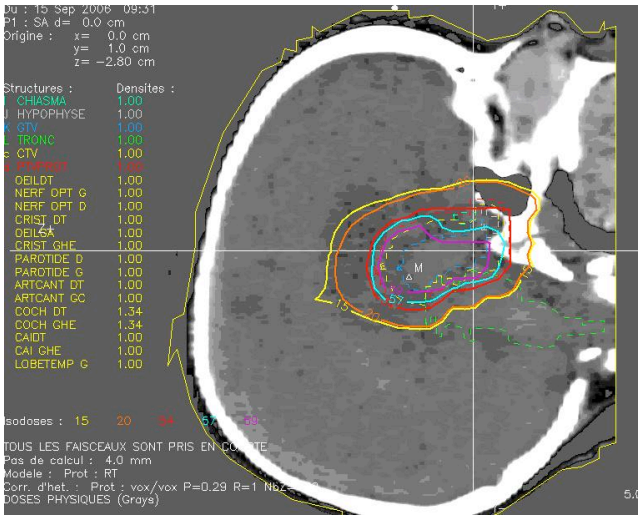
Background. The purpose of the study was to evaluate clinical results and complications of a combination of proton and photon irradiation administered to 17 children with selected central nervous system (CNS) tumors. ***Procedure.*** Between July 1994 and September 2000, 17 children, aged from 5 to 17 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 upto 69 CGE and with an excellent local control rate. Med Pediatr Oncol 2003;40:309–315.

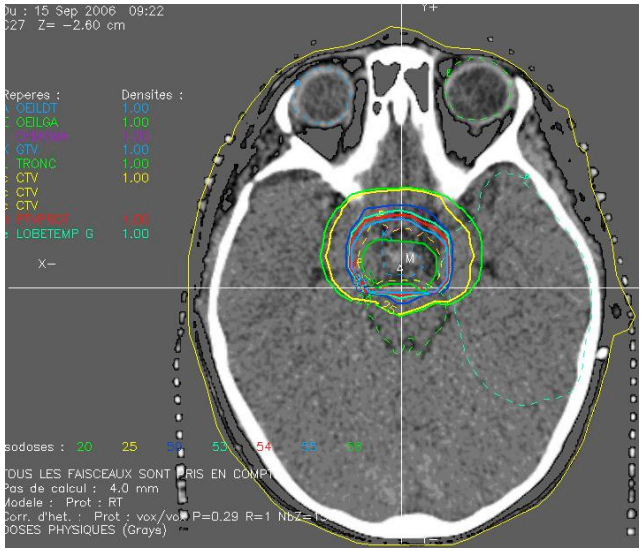
Key words: protontherapy; central nervous system tumor; childhood tumor

General anesthesia : *Children < 4Y*

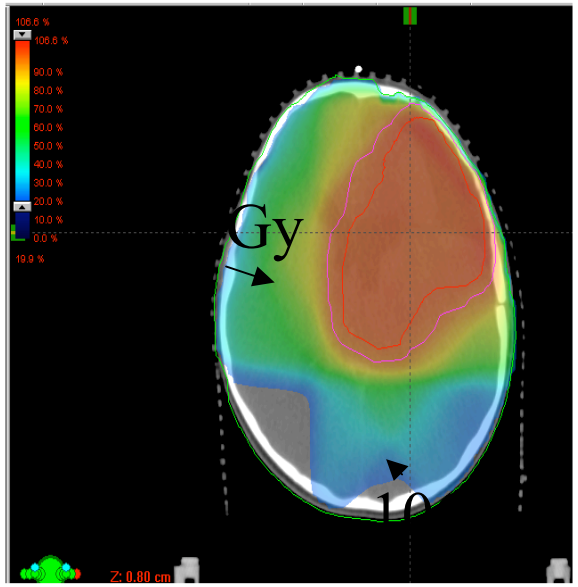


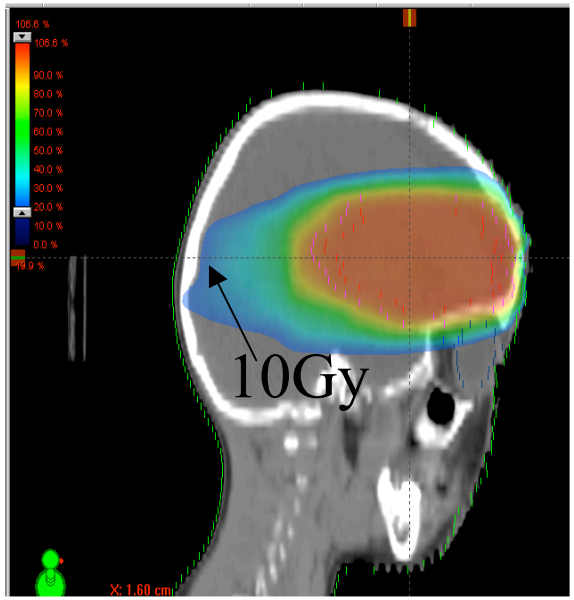
Craniopharyngioma case



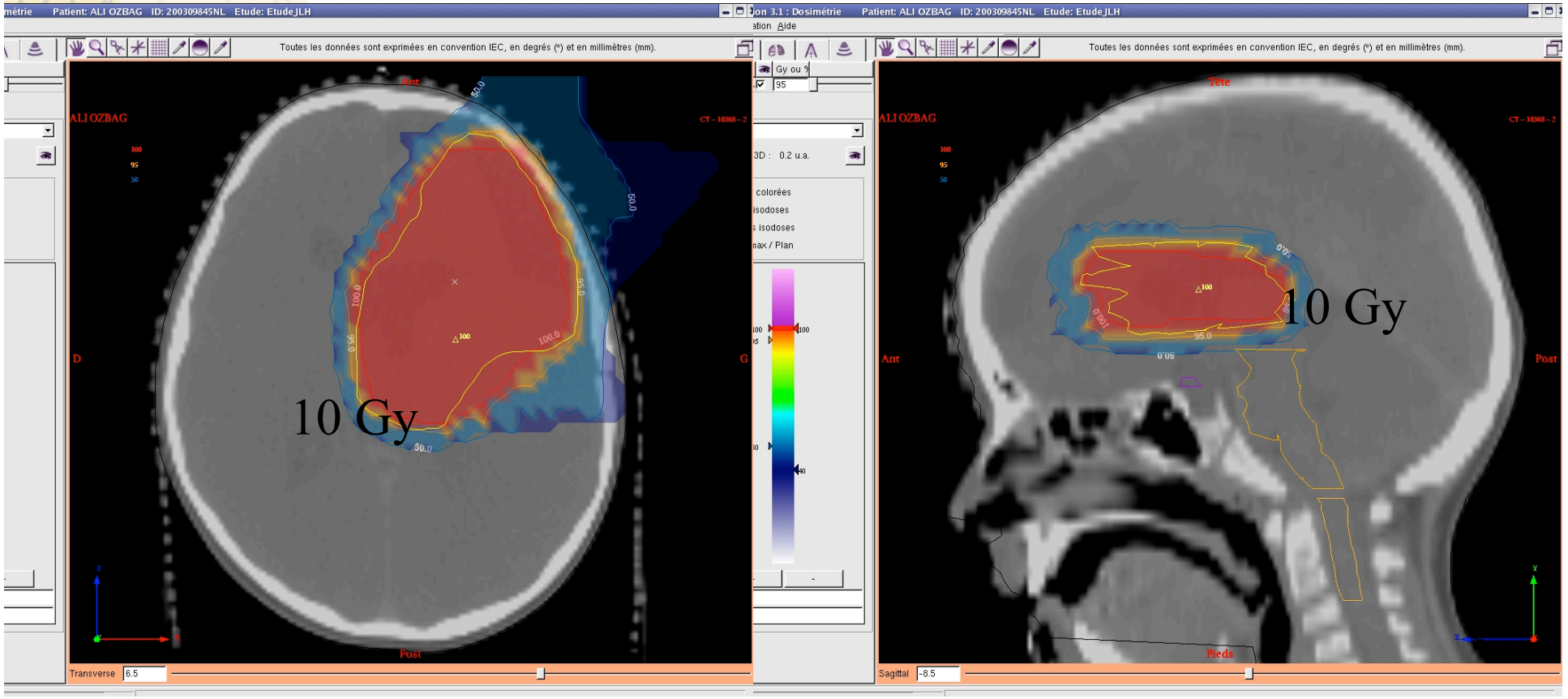


Ependymoma. : IMRT photon planning vs…

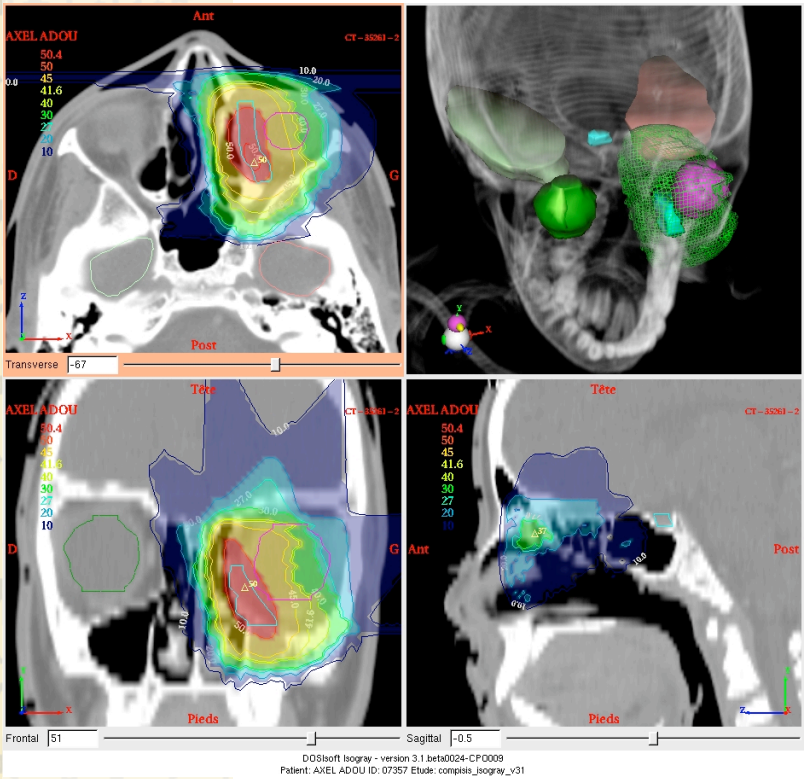


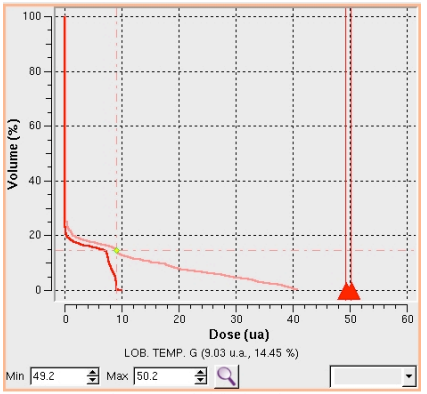


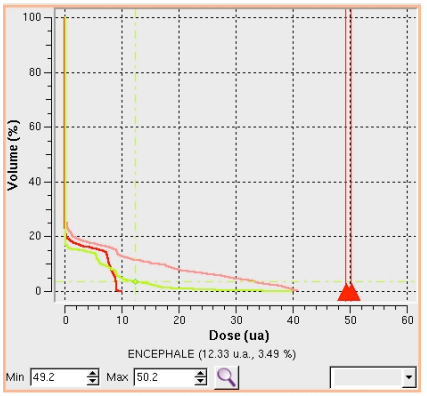
Same patient: protons



First Parameningeal RMS





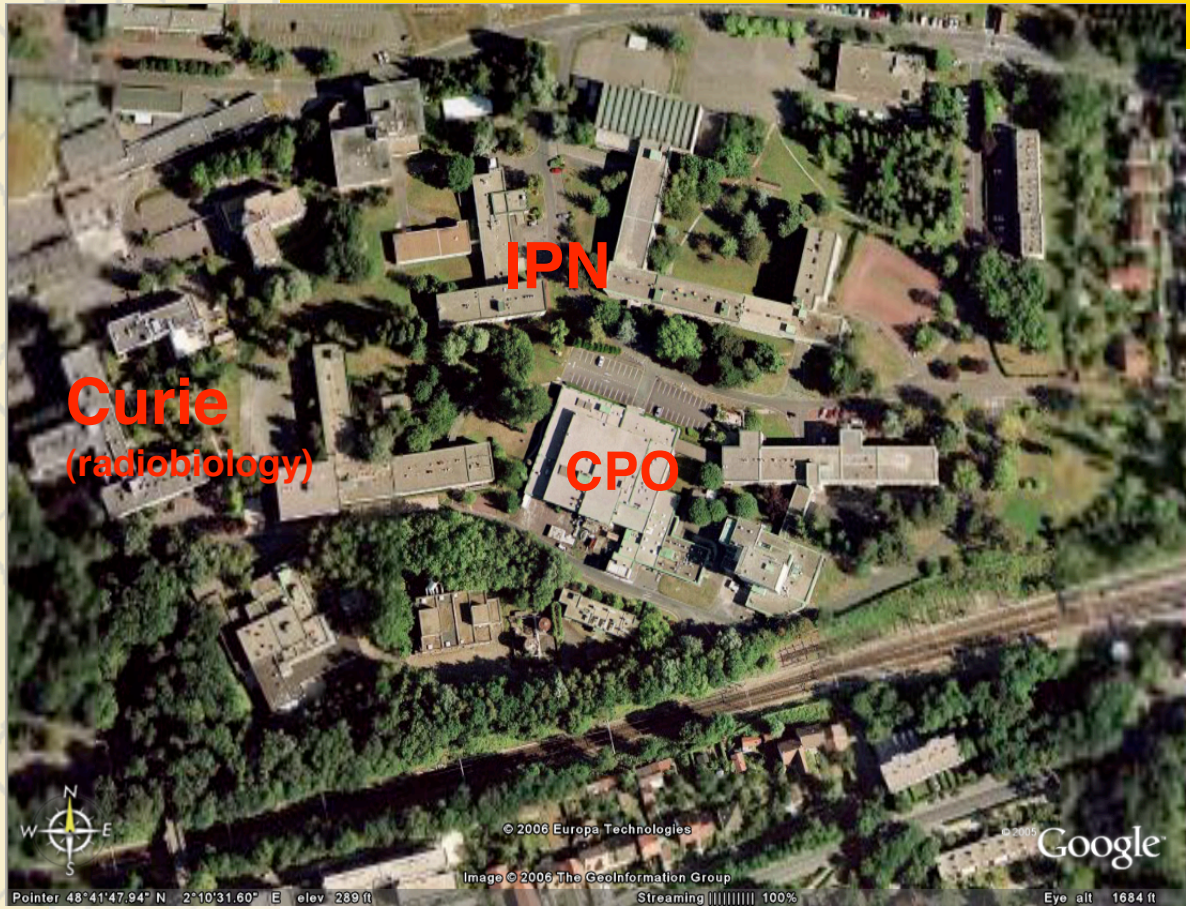


institutCurie

CPO and the new project

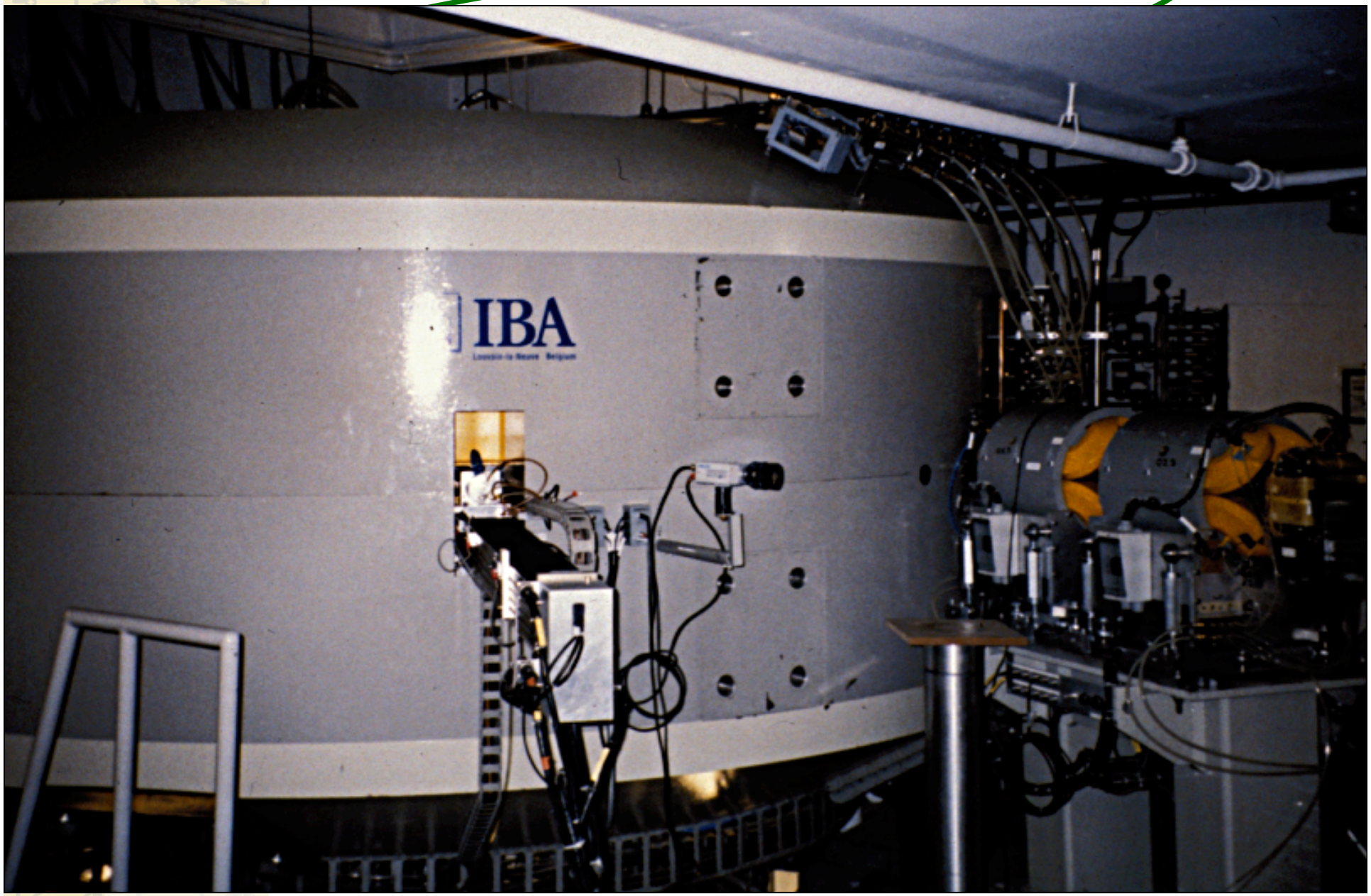
R.Ferrand, P. Grig, S. Meyroneinc, JL Habrand, S. Delacroix

Research and development

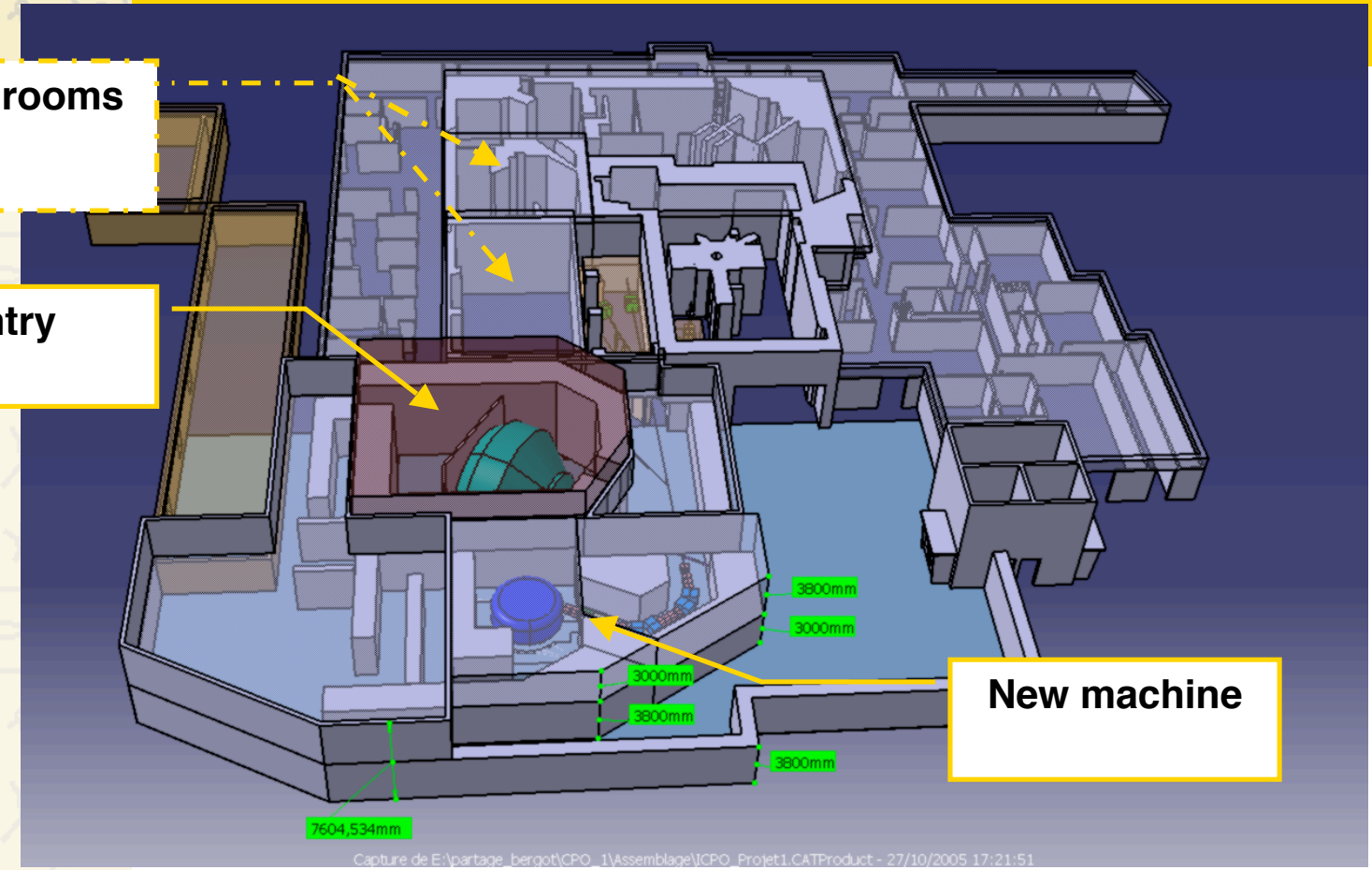


- Curie R&D cluster : hospital + research labs
- Network within University
- National Hadrontherapy program

PNRH
Programme National de Recherche en Hadronthérapie


IBA

New CPO Center



The Project

I CURIE-CPO :

S Bolle

C Alapetite

S Helfre

R Ferrand

P Bey

…

IGR :

F Dhermain

A Beaudré, PhD

…

Necker-E Malades:

C Sainte-Rose

S Puget

M Zerah

Thank you !

iba
Particle
Therapy