CASE STUDY

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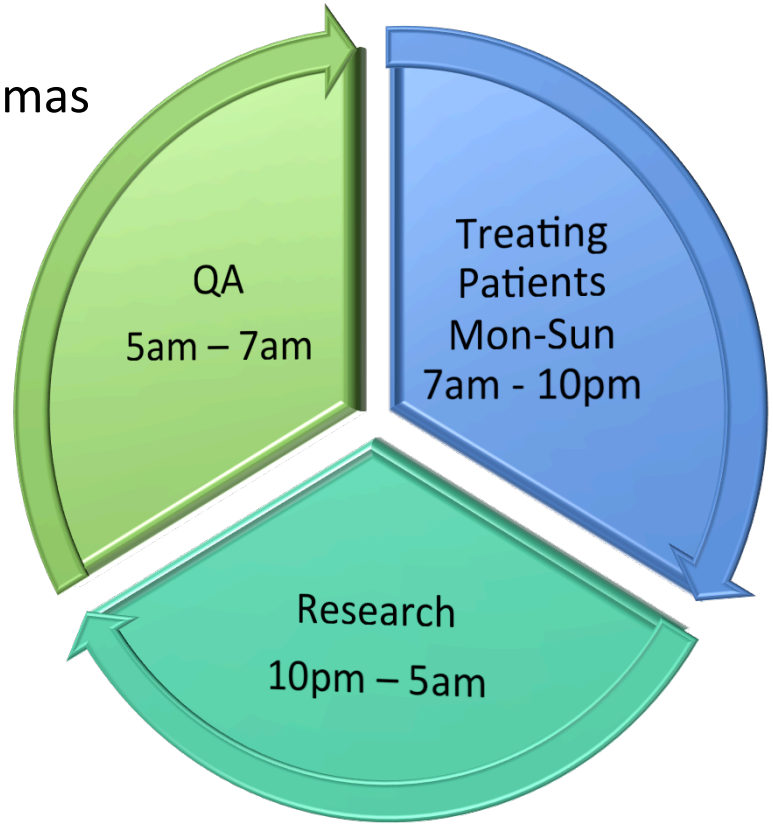
AWESOMELAND

- Centre Open 24/7
- Maintenance Closures
  - Friday 6am – Monday 10pm every 8 weeks
  - 2 weeks annually over Christmas



Aims:

- Prolong good quality life
- Maximise patient throughput
- Quality cancer research output

OPTIONS

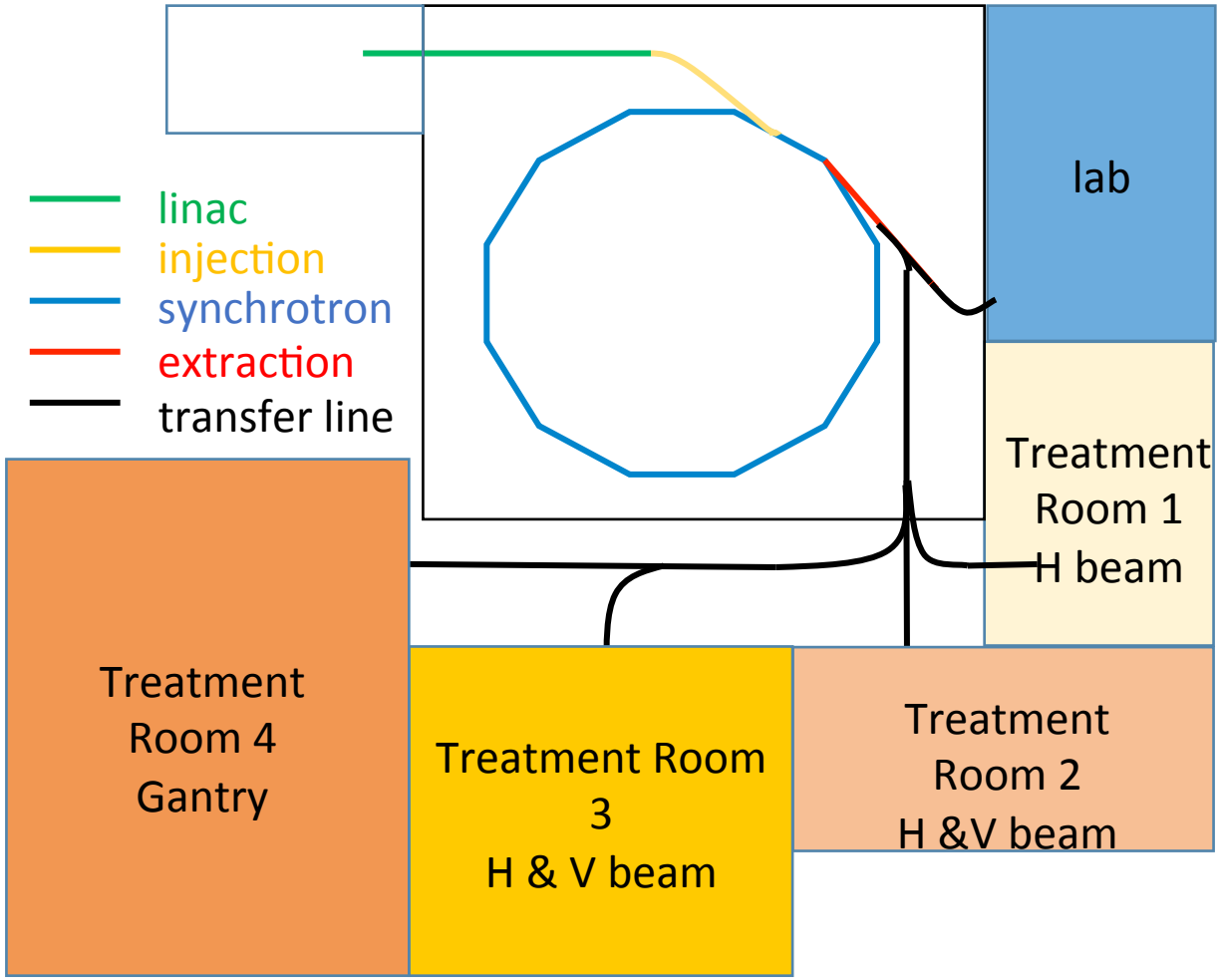
	Particles	Energy Variation	Availability	Size
LINAC	p or C	Active	Not yet	Medium
SYNCHROTRON	p & C	Active	Yes	Large
CYCLOTRON	p	Passive	Yes	Medium

We want a facility that can provide:

- Both proton (60 to 230 MeV/u) and C-ion (120 to 400 MeV/u) beams
- Possibility to treat ~ 3000 patients/year
- Lab & beam time for research
- Active energy variation & pencil beam scanning

ALCATRAS

Awesome Land CAncer Treatment, Research And Studies



4 treatment rooms + 1 lab for research

7days/week ,15hrs/day time for treatment
Night time for research

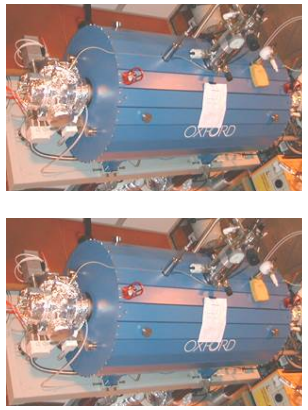
Maintenance: 4 days every 8 weeks
+ 2 weeks/year

21 min on average for a treatment
Of which 5 min of beam time

20 fraction/patient on average

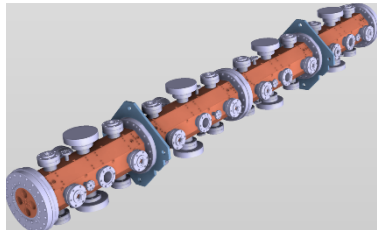
~ 2600 patients/year

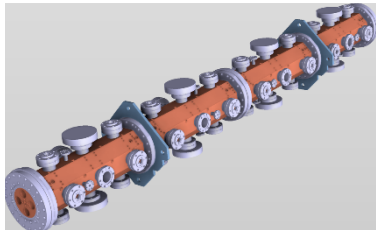
Accelerator



2 EBIS sources for
H2+ & C6+

40 keV/u

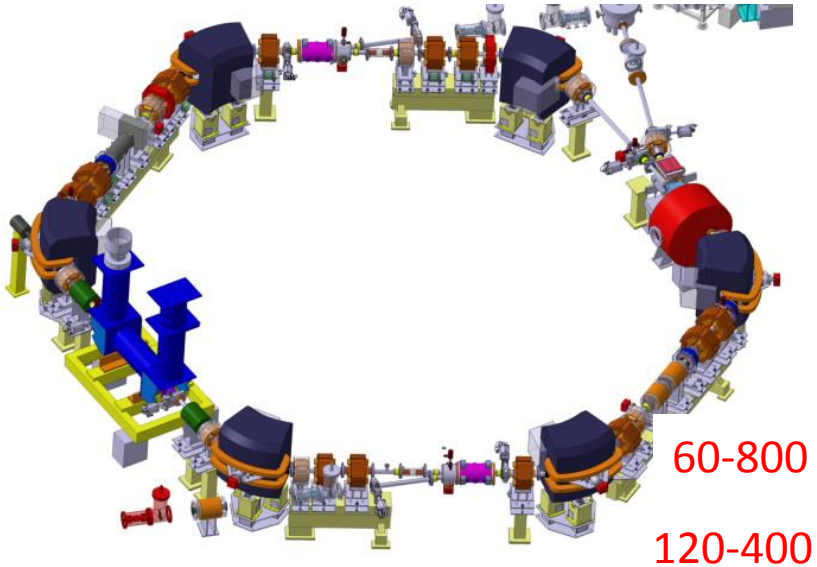




2 HF (750Hz) RFQ

Powered by 1 MW Klystron
3.2 m length

8 MeV/u



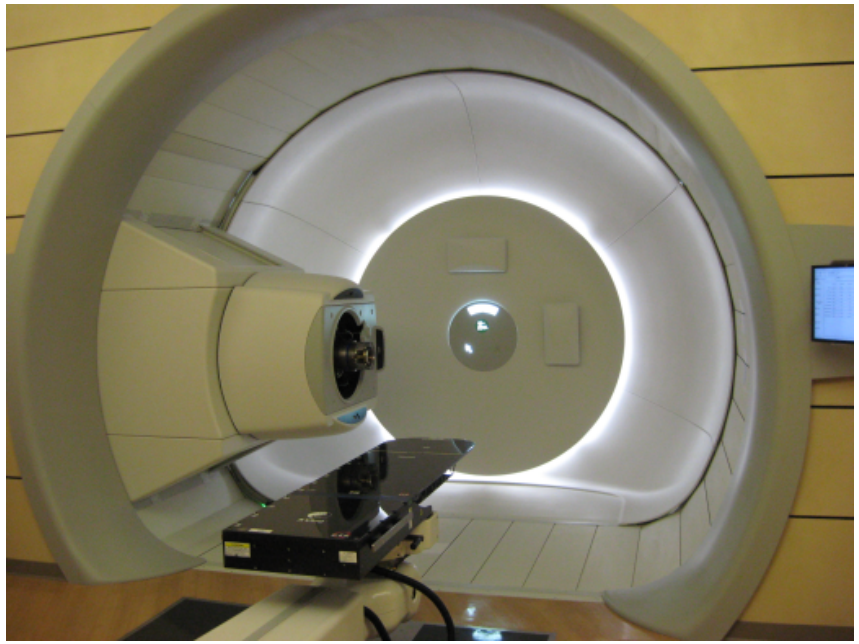
SYNCHROTRON

16 Dipoles
25m diameter

60-800 MeV/u (p)

120-400 MeV/u (C)

Treatment rooms



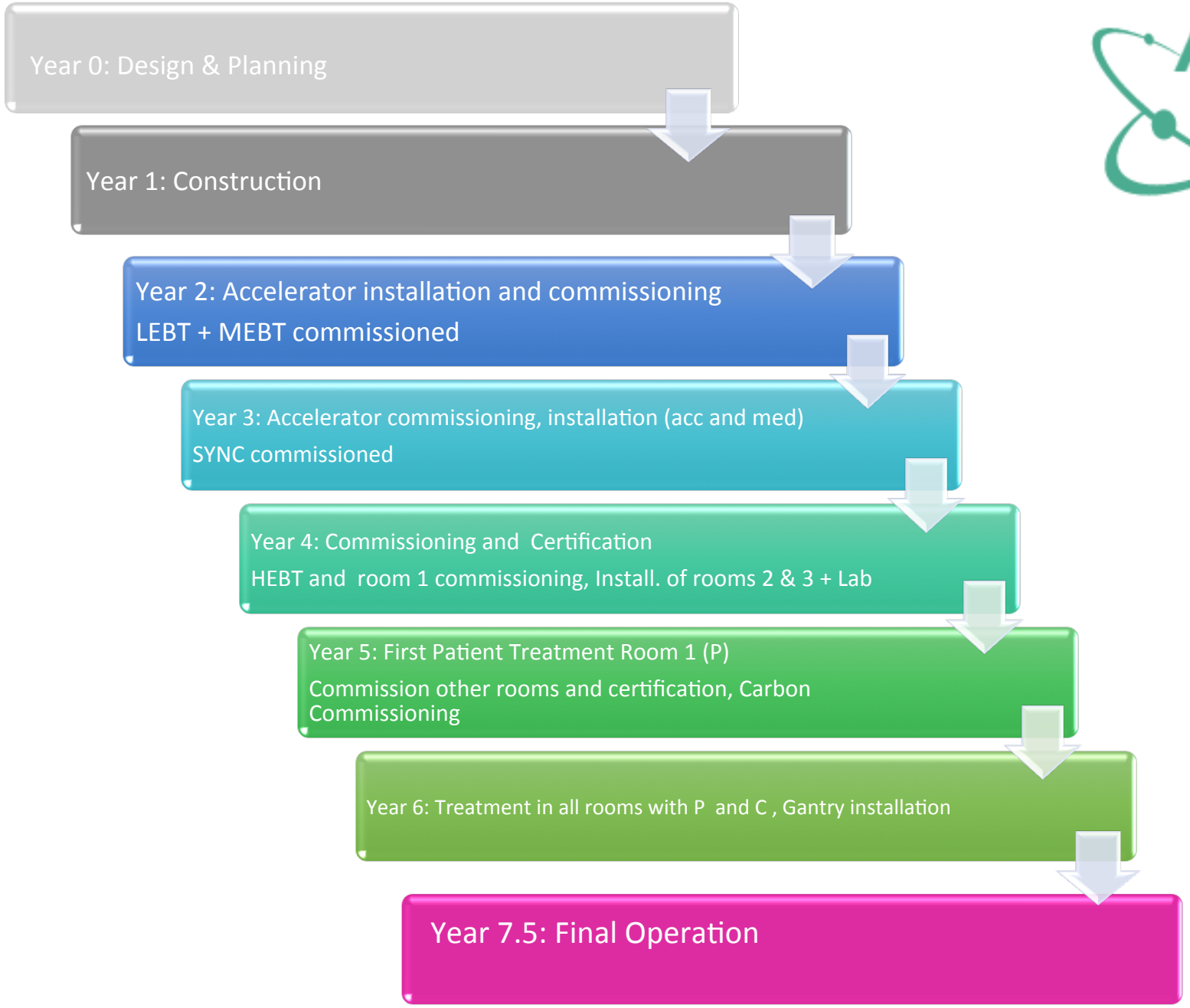
- 200º angle rotating gantry
- 6DOF robotic arm beds

Imaging

Fixed Beam Room 1 H & V	PET-CT	Fixed Beam Room 2 H & V	PET-CT	Fixed Beam Room 3 H

- Mobile PET-CT between treatment rooms
- Position verification before treatment
- Dose verification after treatment

Timeline


Year 0: Design & Planning
Year 1: Construction
Year 2: Accelerator installation and commissioning
LEBT + MEBT commissioned
Year 3: Accelerator commissioning, installation (acc and med)
SYNC commissioned
Year 4: Commissioning and Certification
HEBT and room 1 commissioning, Install. of rooms 2 & 3 + Lab
Year 5: First Patient Treatment Room 1 (P)
Commission other rooms and certification, Carbon Commissioning
Year 6: Treatment in all rooms with P and C , Gantry installation
Year 7.5: Final Operation

Risks and advantages

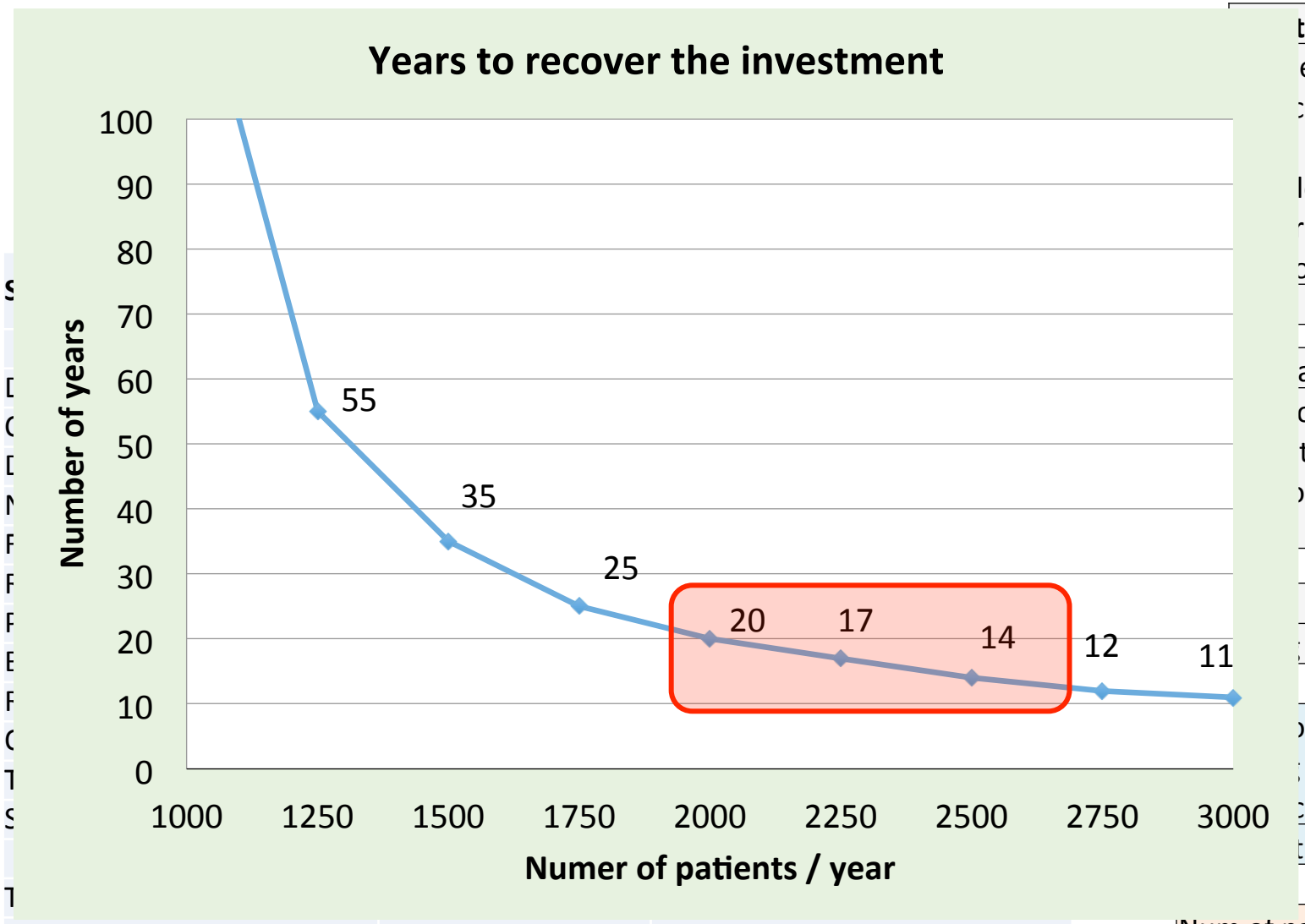
Risks

- Time
  - Supplier delay
  - Installation/commissioning
- Financial
  - longer ROI due to…

Advantages:

- Direct
  - Health to people
  - Longer lifetime
  - Employments
  - Collaborations (institutes, companies…)
- Indirect
  - Regional growth
  - Knowledge income and spread to industry
  - Recognition

Economical Study



truction costs	Cost (M€)
erator	80.0
construction	30.0
Instrumentation	30.0
le	56.0
ries	25.0
orizations	3.0
	224.0

ational Costs	Cost (M€)
of operation/year (1)	5.0
tenance (and renewable costs)/year	6.0
onnel/year	7.4
	18.4

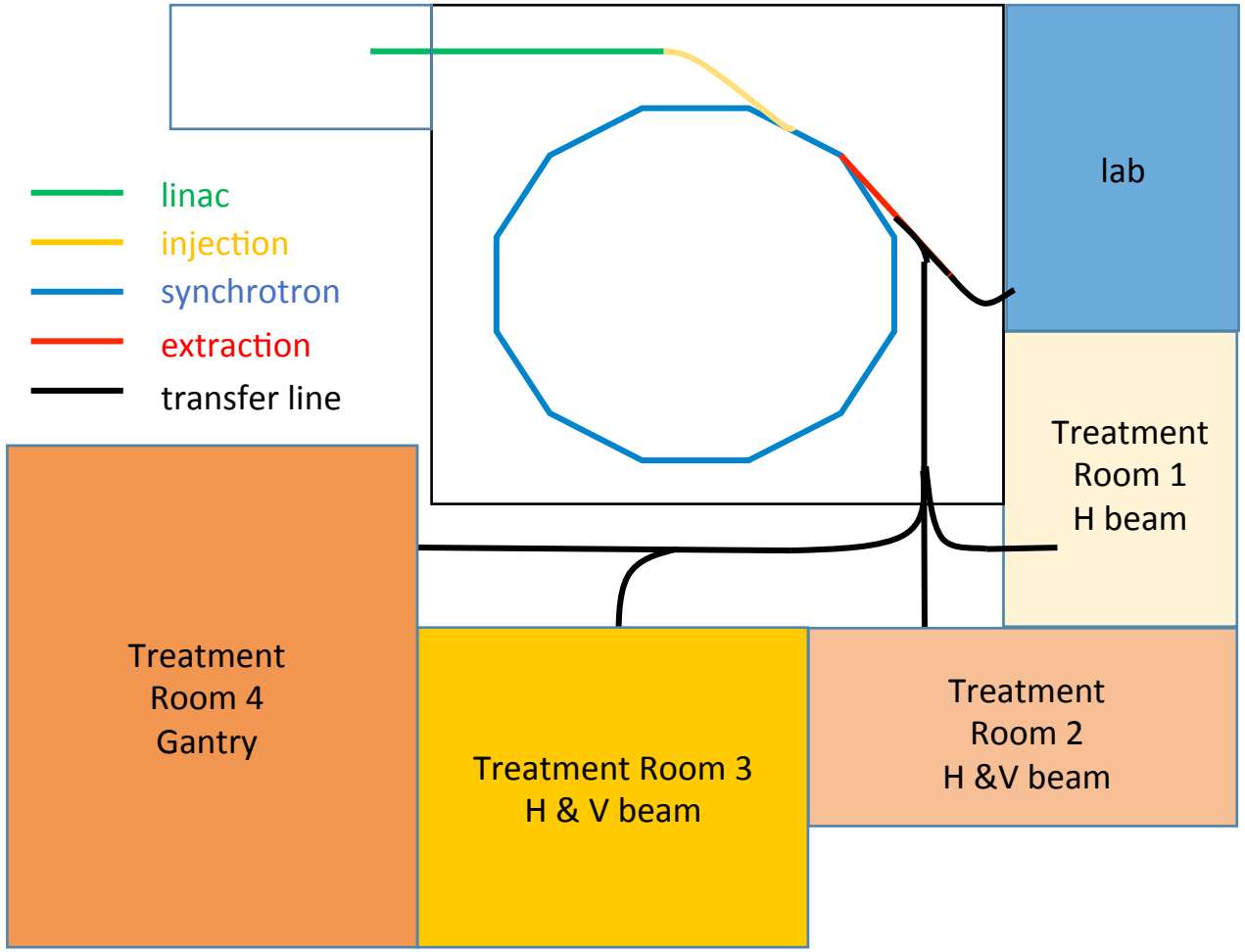
	14.0
time	25.0

onstruction	224.0
costs (5%)	280.0
costs	258.2
t along lifetime	762.2

Num of patients	2500
Cost per treatment	22000
Total income	770

(An interest rate of 5% on the original initial funding, paid over 25 years)

Summary



A hadron therapy Centre based on

- Synchrotron
- Reliable design validated for clinical
- Both proton (60 to 230 MeV) and C-ion (120 to 400 MeV) beams
- 1 Carbon Gantry.
- Research just for clinical
- 7 years construction
- ~ 2600 patients/year
- Return of investment in 20 yrs in an scenario of 2000 patients/y.

Thank you!

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Additional information – staff requirements

Staff Required personnel	Required personnel particle facility (FTE)
Director	1.0
Co-directors	2.0
Doctors	20.0
Nurses	30.0
Financial Aspects	4.0
Research fellow	0.0
Physicist and engineers	20.0
Biologist	5.0
Radiation protection	5.0
Operators	15.0
Technician	15.0
Secretary	5.0
Total	122.0