ERIT for BNCT

(Energy/Emittance Recovery Internal Target)

- Accelerator based neutron source for BNCT -

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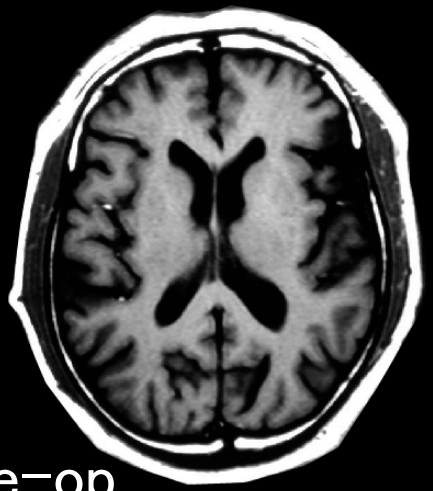
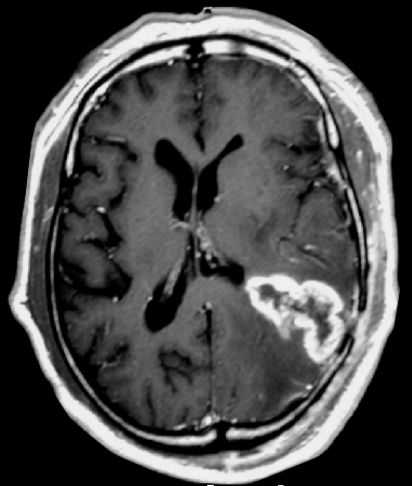
Progression
Gliobrastoma

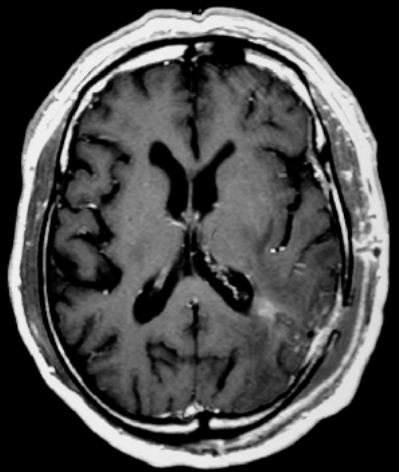
Need high dose
90-100Gy
(ordinary:60-64Gy)



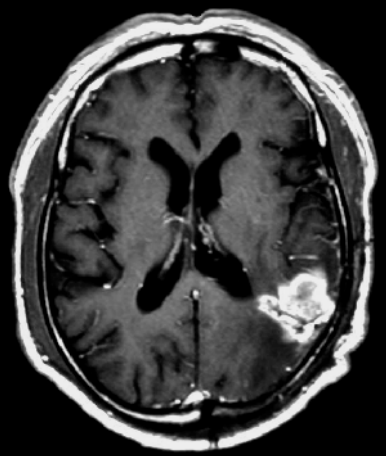
pre-op.
6monyh before



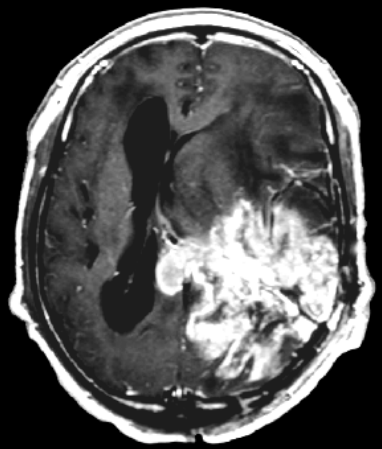
発症時



post-op.
99,12.27



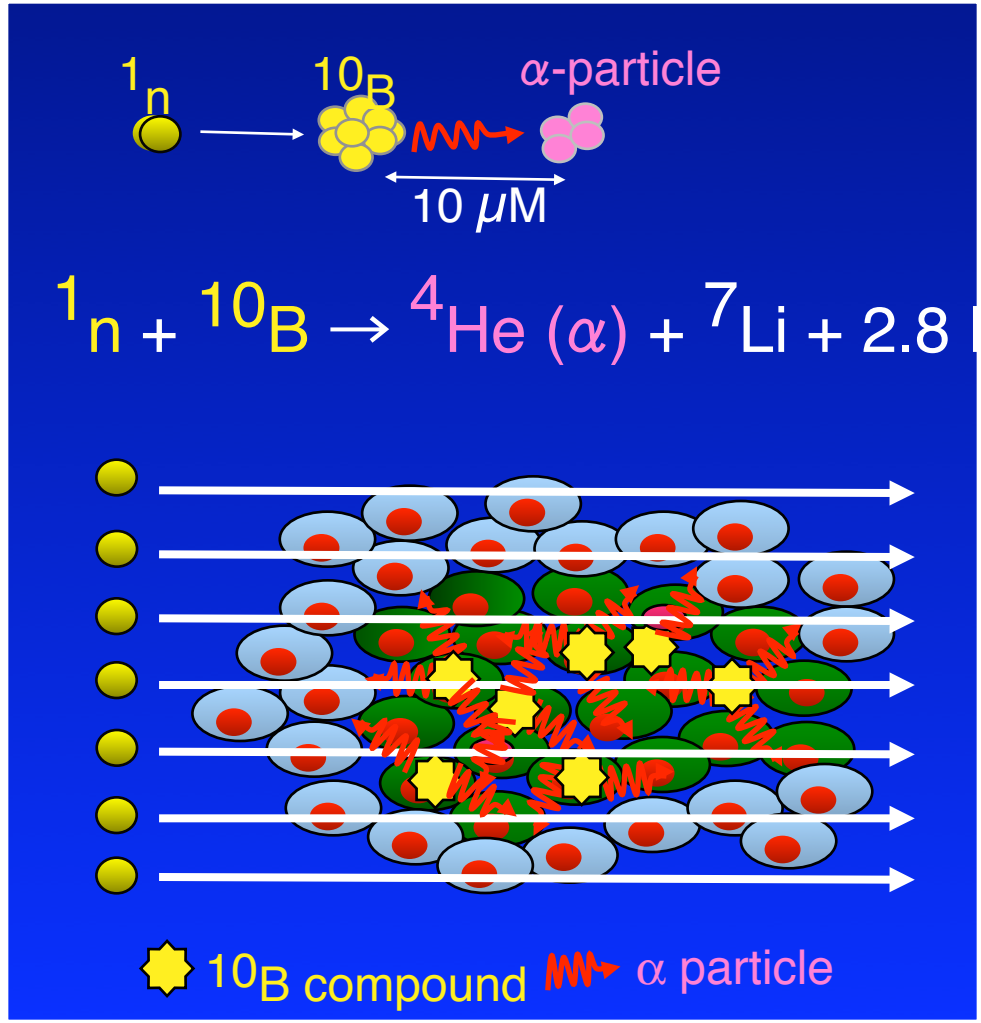
65Gy_chemoTx.
00,7.27



35Gy+CTL
01.5.25

Neutron Source for BNCT

- ***Requirements***
  - *Large neutron flux*
    > 1x10^9 n/cm^2/sec at patient
  - *Low energy spectrum*
    thermal/epi-thermal neutron



Nuclear reactor only can provide these neutrons.

Limited to extend the use of BNCT widely in society.

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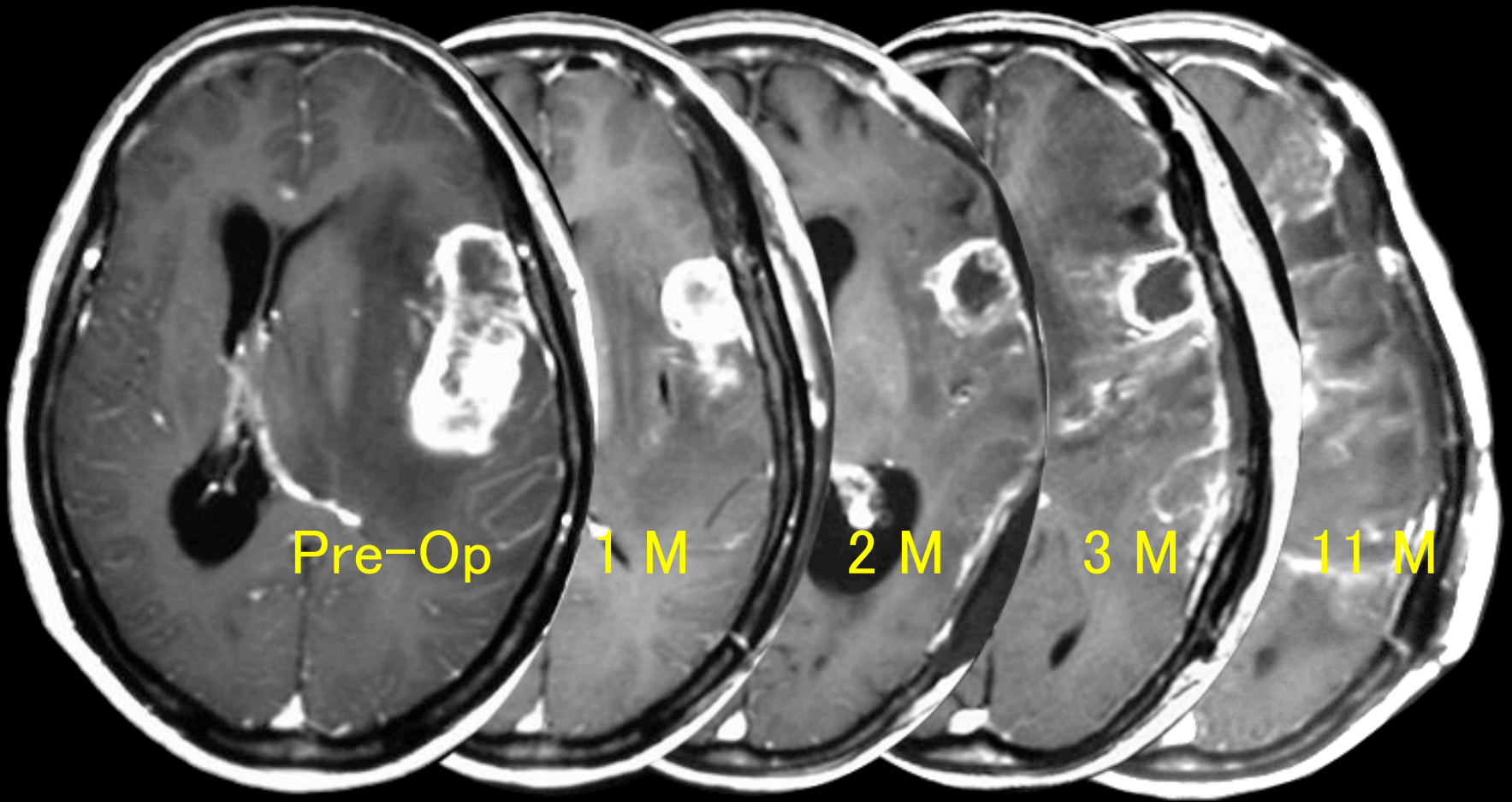
Case1 GM



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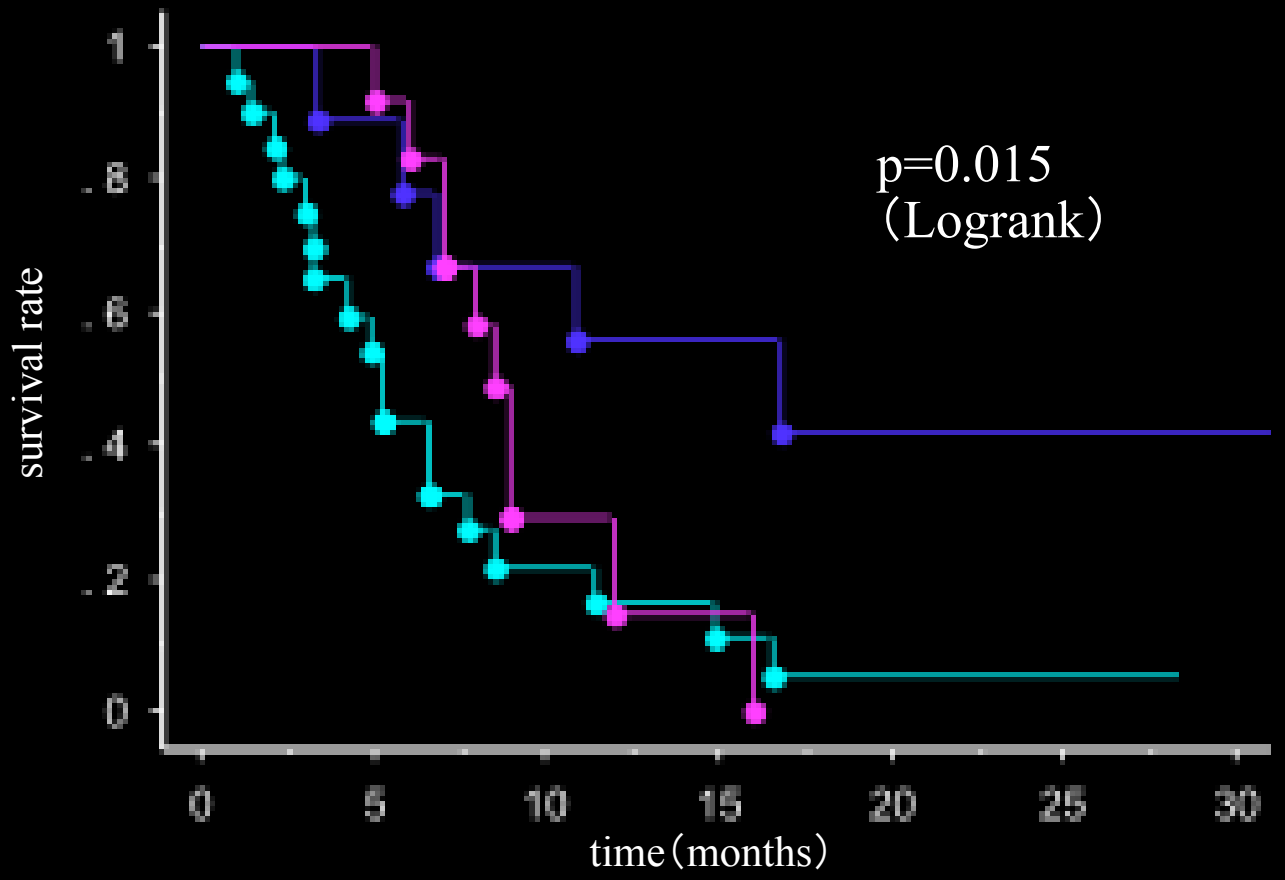
Progression-Free Survival

gliobrastomer



	BNCT	Proton	X-radiation
PFMST	13.4m	8.5m	5.1m

BNCT : parotid gland tumor

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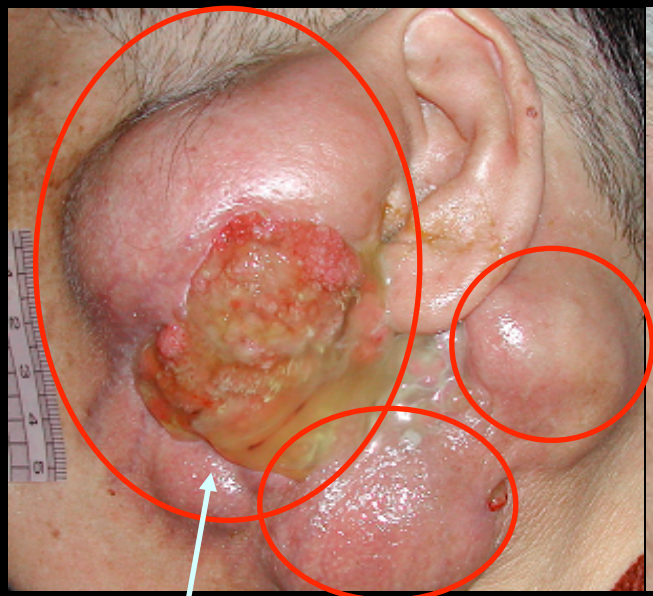
大阪大学　歯学部

照射前



著しいがん細胞の
成長により体内に
止まらず皮膚をも
破りさらに増大

二回照射直後

絶大なるがん細胞縮小の
効果を得ただけでなく
他の放射線治療では
成し得ない、
皮膚の再生を確認。

三回照射五ヵ月後

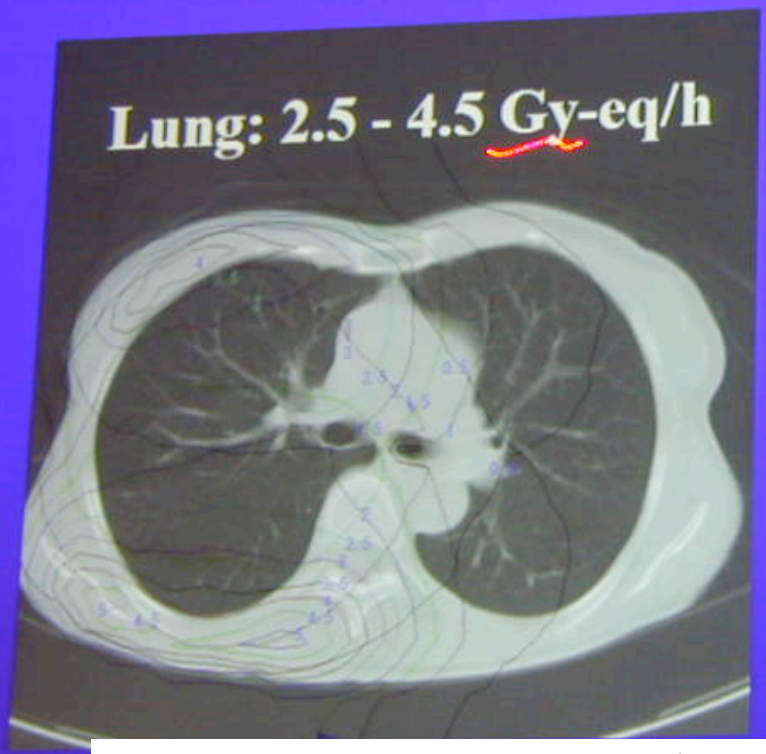
腫瘍はほぼ完全に縮退。

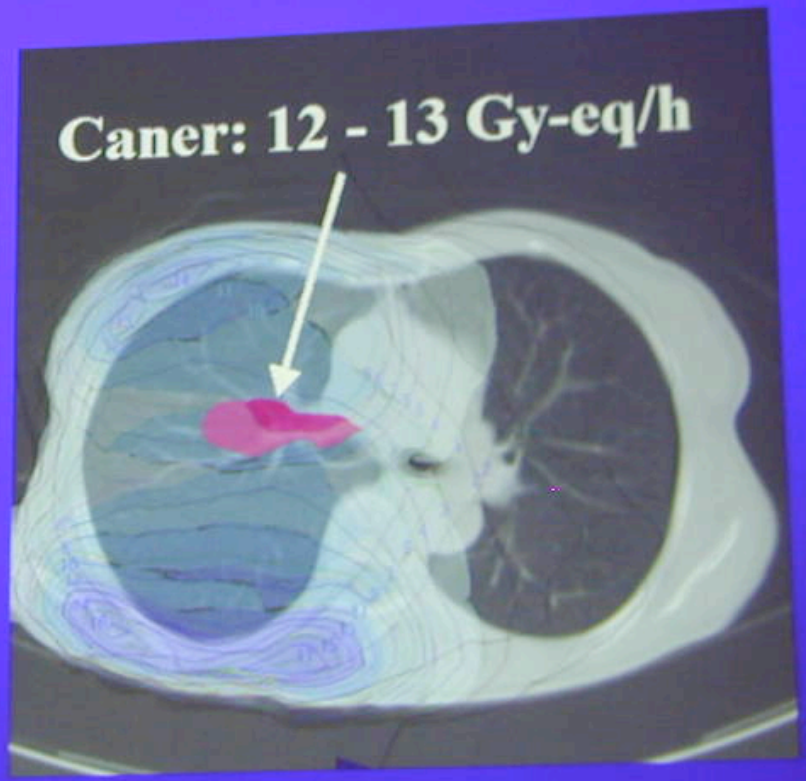
高いQOLを達成。

lung , liver etc.

SKY PerfecTV!
サイエンス　チャンネル
‘03，3月2日　18:00　放映
Japan Science and Technology Corporation（JST）

Total amount of the dose





重粒子や陽子線より優れた線量分布

^{10}B-concentration: normal lung ;11.4ppm, Lung cancer; 38.8ppm

ABNS with internal target

FFAG-ERIT

FFAG Accelerator with Emittance/Energy Recovery Internal Target

Y.Mori, Nucl. Instr. Meth., PRS, A562(2006) 591-595.

- Proton storage ring
  - Large acceptance
  - High intensity (circulat. beam)
  - Beam lifetime
- Target
  - thickness
  - beam energy loss at target
  - heat load for target
- Neutron production
  - Ionization cooling
- Injector
  - small beam current
  - negative hydrogen ion

Scheme: Emittance/energy recovering ring with internal target placed in the proton storage ring where the beam emittance and energy are cooled by ionization cooling.