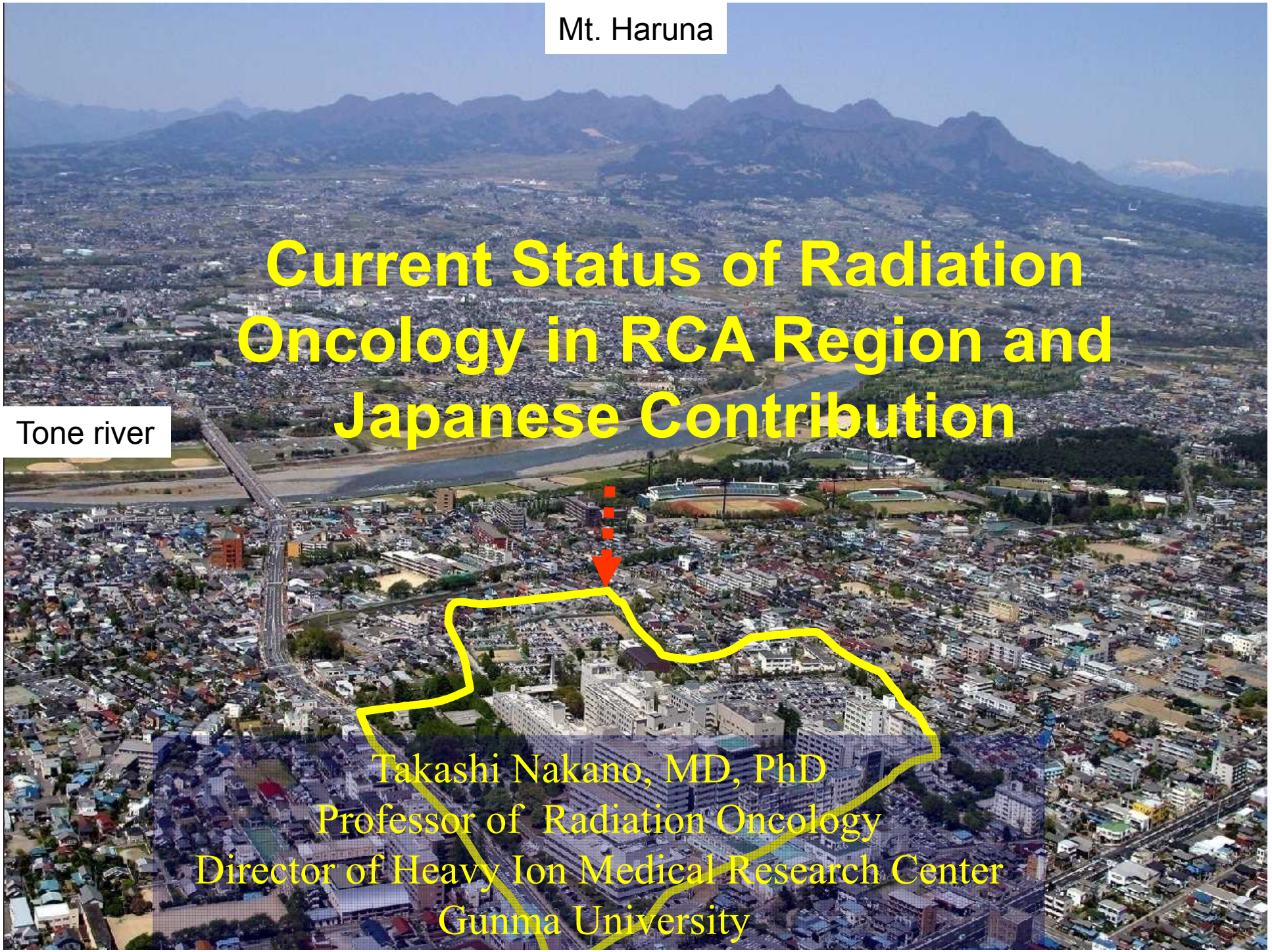
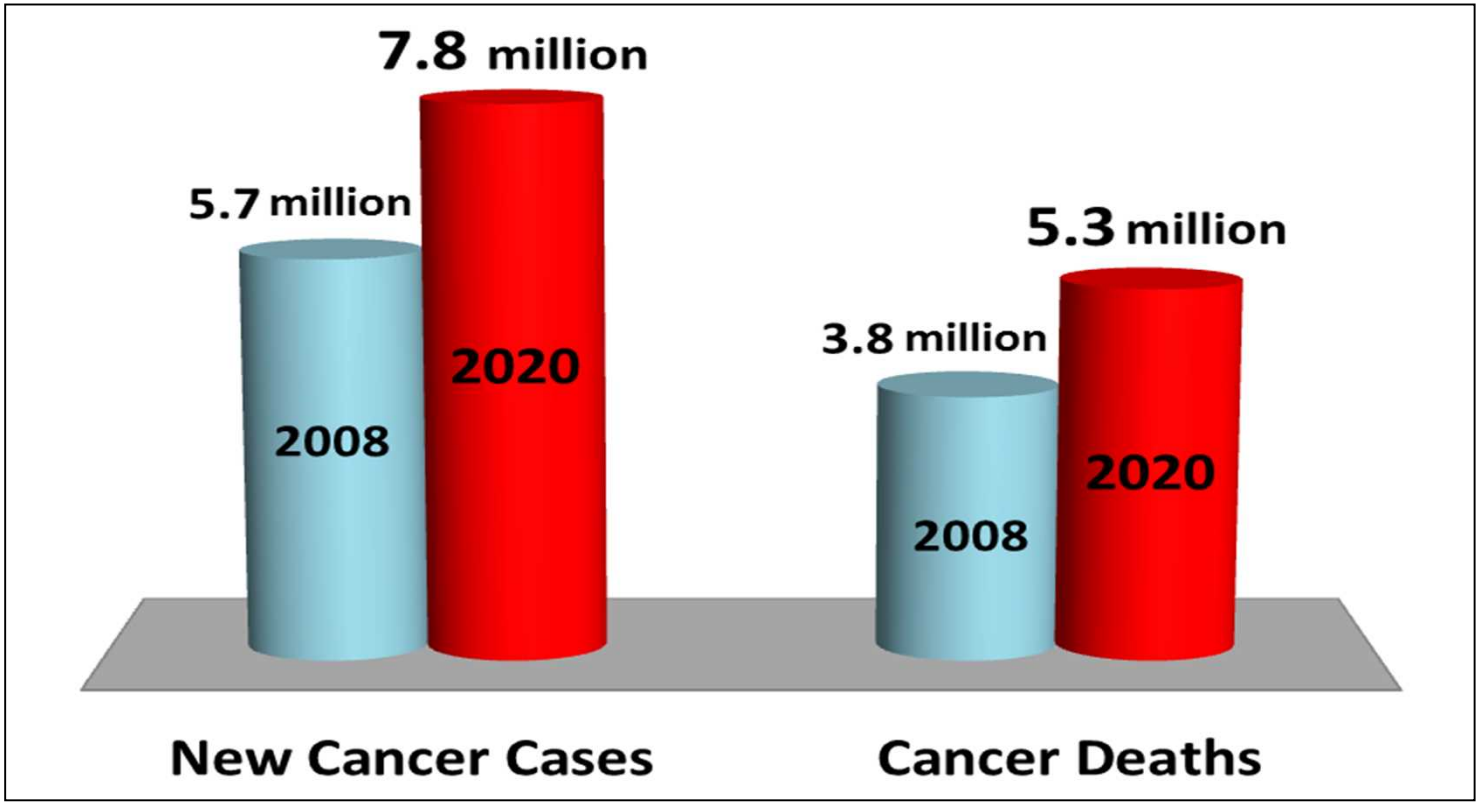


Current Status of Radiation Oncology in RCA Region and Japanese Contribution

Takashi Nakano, MD, PhD
Professor of Radiation Oncology
Director of Heavy Ion Medical Research Center
Gunma University

Cancer in RCA Member States



In 2008, globally, 12.4 million new cancer cases
7.6 million cancer deaths

Source data: GLOBOCAN 2008, Cancer Incidence and Mortality Worldwide: International Agency for Research on Cancer; 2010.

Radiotherapy for Cancer

The role of radiotherapy is substantial because…

Radiotherapy can be used for early disease to cure it as radical treatment and for in-operable advanced disease to relieve symptoms as palliative treatment and cheep treatment per paient.

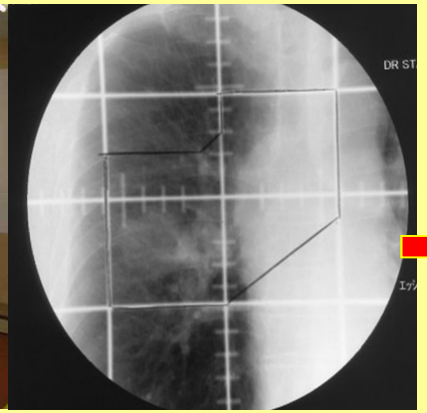
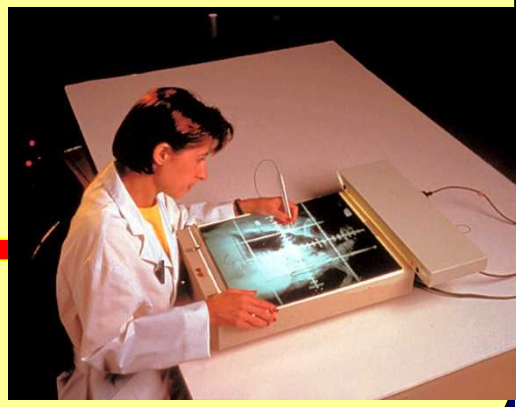
The goal of radiotherapy is to deliver enough irradiation dose to the target (cancer) as little dose as possible to normal organs.

This results in BETTER CURE of the cancer, and LESS COMPLICATION in normal tissues.

Conventional 2D RT to 3D Image Based RT

2D RT



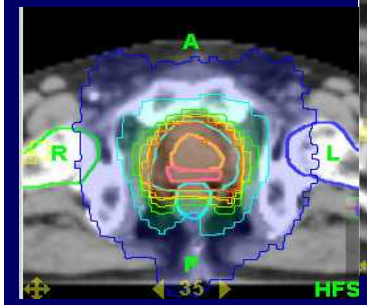



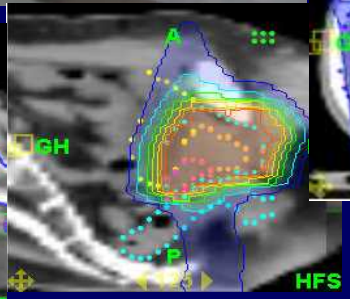
In most of Asian countries, still lot of hospitals use conventional 2D radiation therapy, which is performed only using X-ray simulation system and simple fields.

High Precision External Beam Radiotherapy

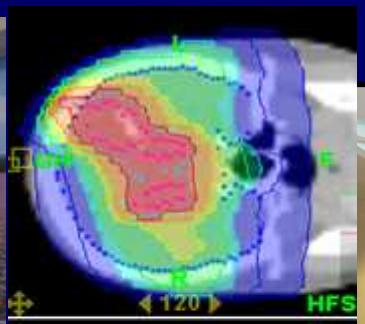
Intensctiy Modulated Radiation Therapy (IMRT)

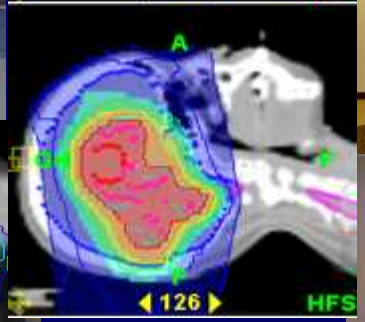
Tomotherapy





Ventricular RT



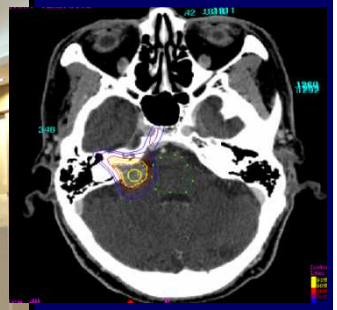


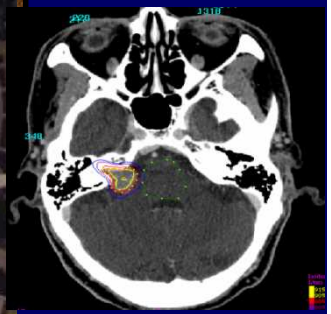
Prostate Ca. irradiation sparing rectum

Stereotactic Radiation therapy (SRS, SRT)

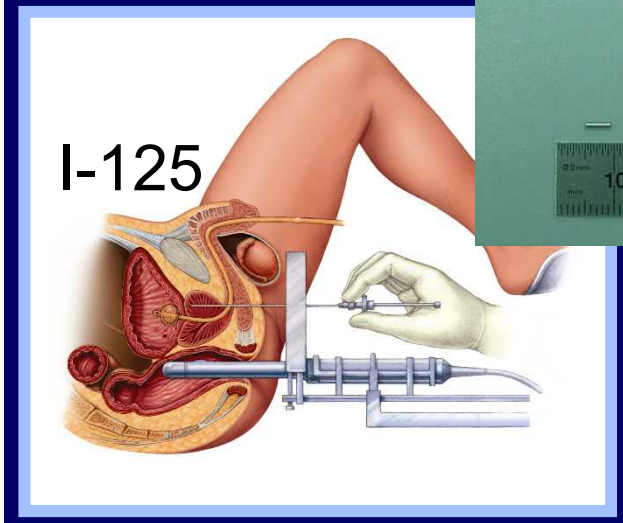
Cyber Knife

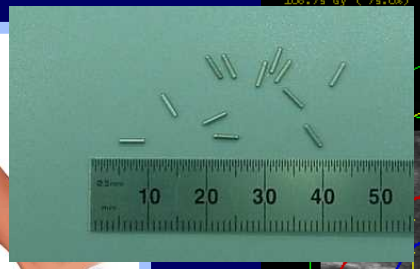
Acoustic neuroma





I-125 Needle RT for Pancreas Ca.





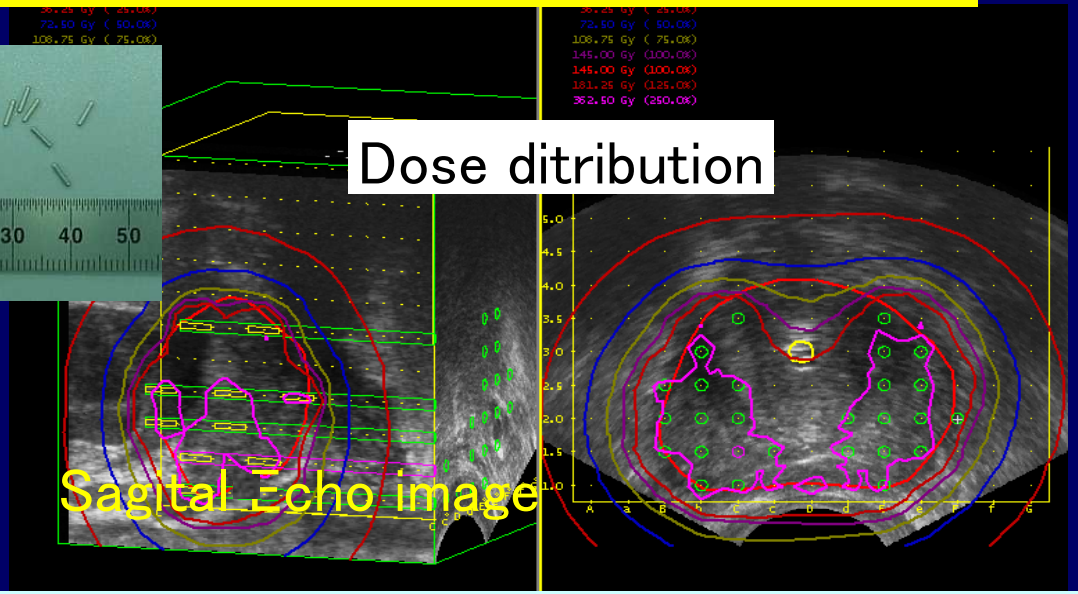
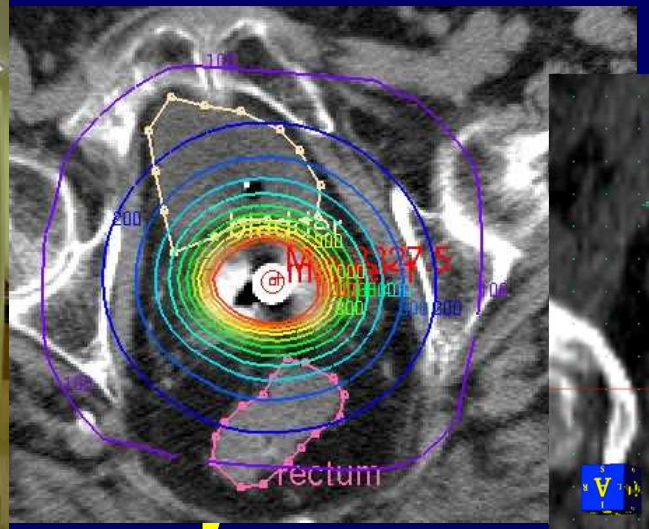
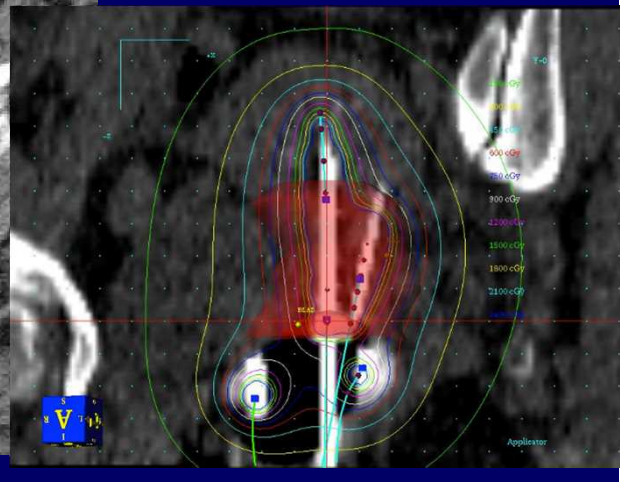
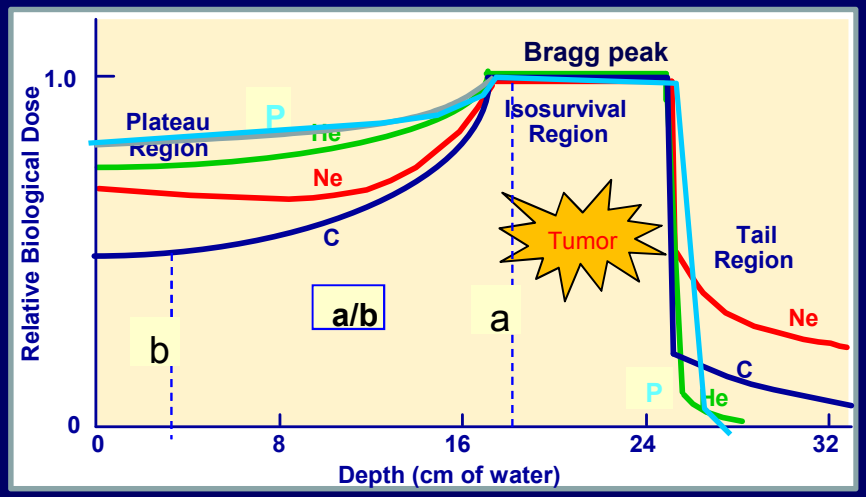


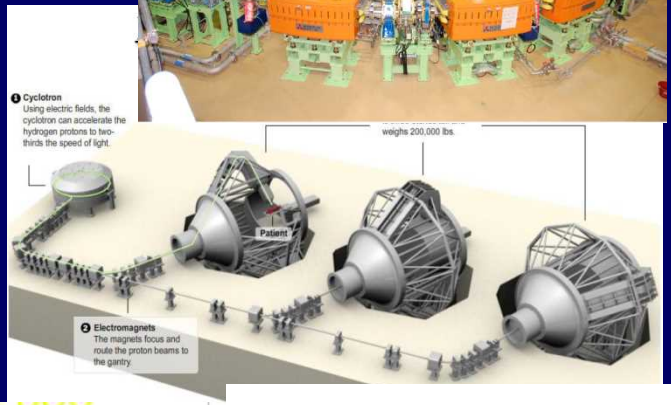
Image Guided Brachytherapy for Cervical Ca.

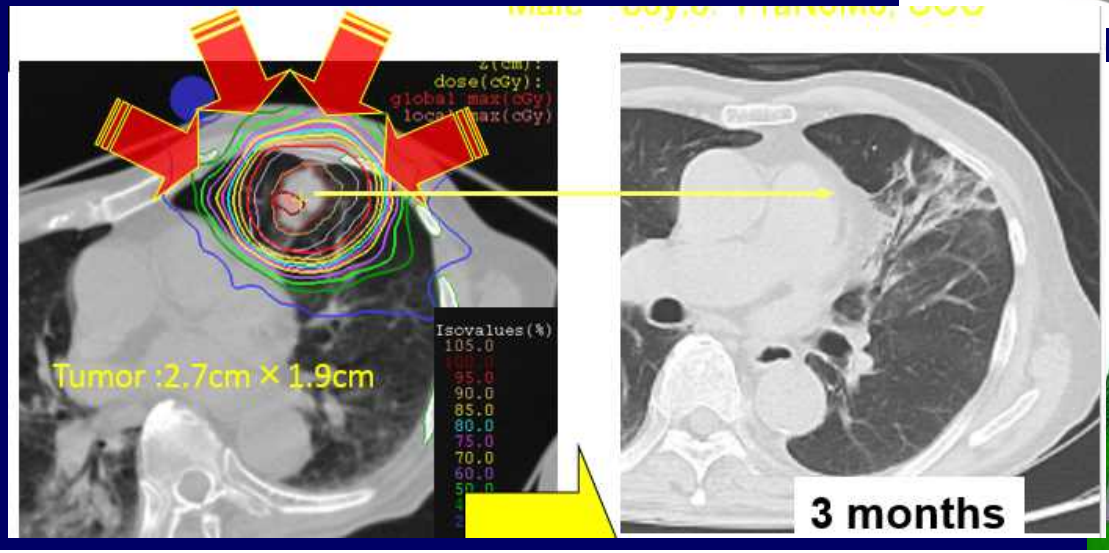




Particle therapy for Cancers (Protons ,Carbons)

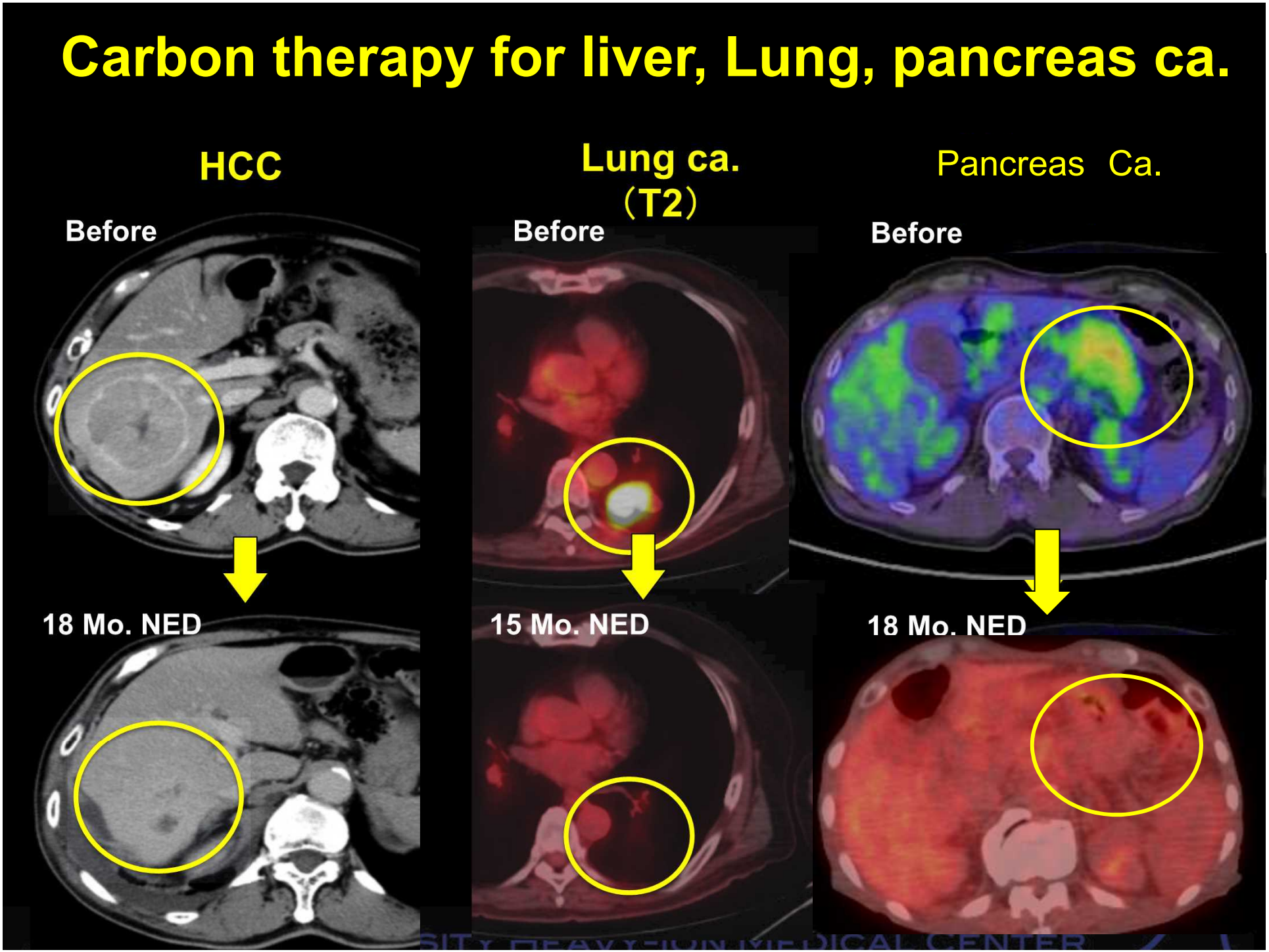






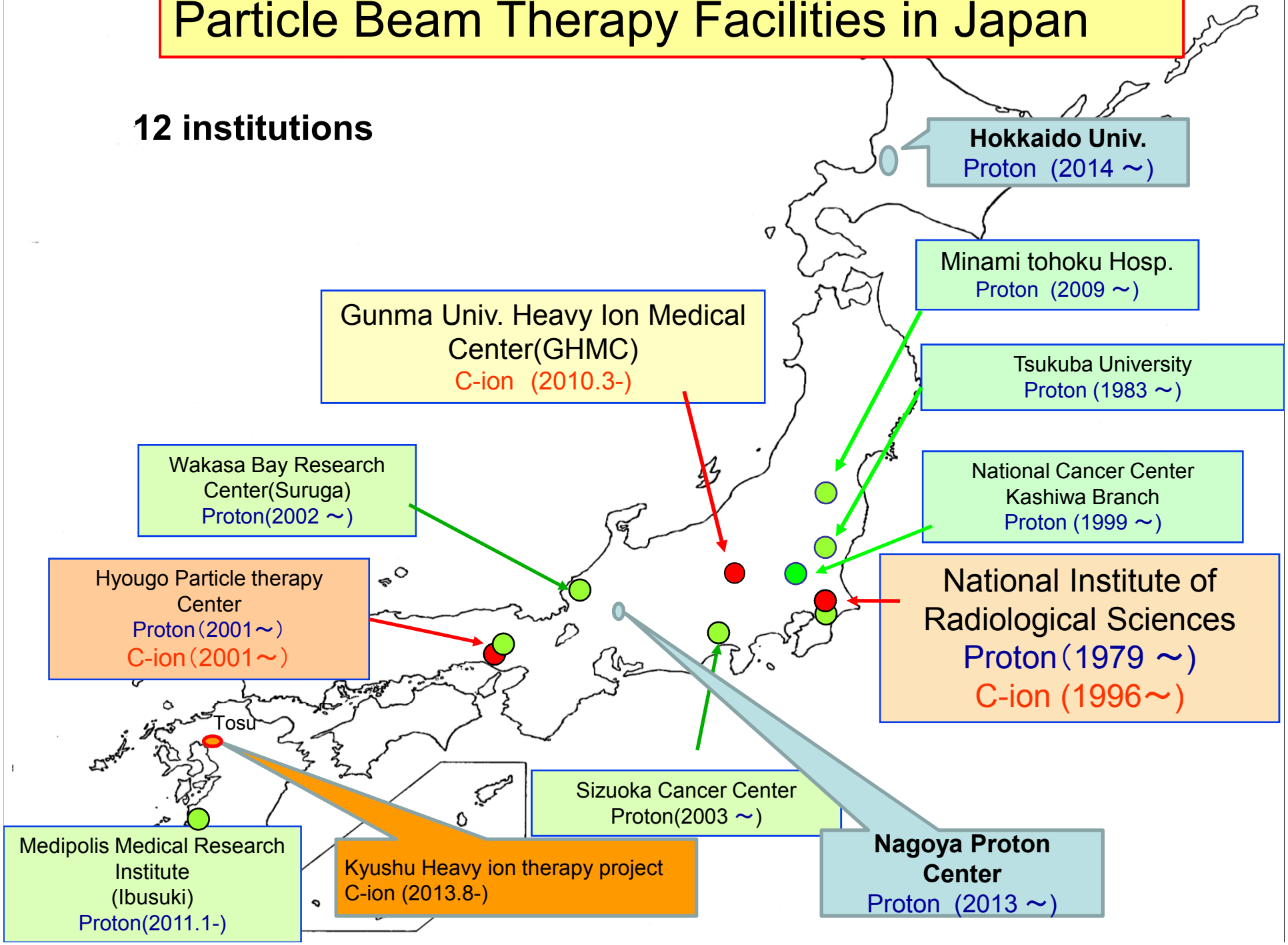
Gunma University Heavy ion Medical Center

Carbon therapy for liver, Lung, pancreas ca.



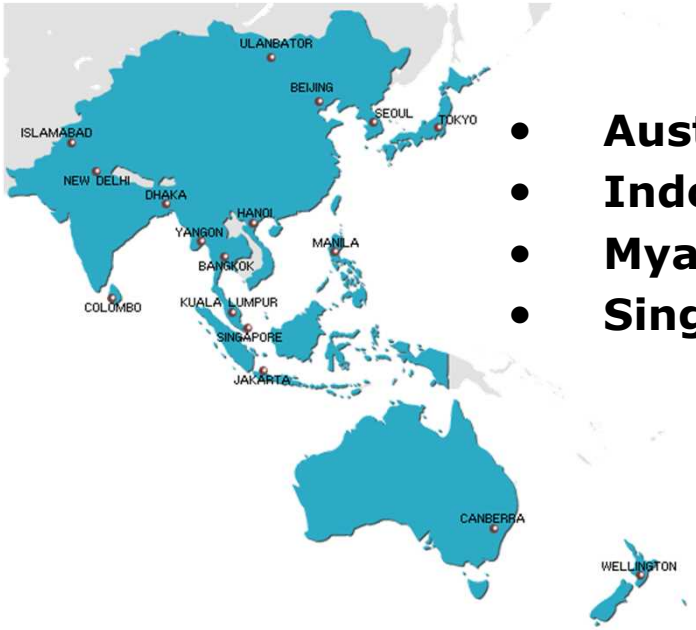
Particle Beam Therapy Facilities in Japan

12 institutions



Radiation Therapy Projects in IAEA/RCA

- **RCA: R**egional **C**ooperative **A**greement for Research, Development and Training Related to Nuclear Science and Technology
- Inter-governmental agreement **established in 1972**
- **17countries in Asia and the Pacific region**
- **Purpose**: to promote regional cooperation in the peaceful utilization of nuclear technology for national development in the region



- **Australia, Bangladesh , China , India**
- **Indonesia , Japan, Korea, Malaysia, Mongolia**
- **Myanmar, New Zealand, Pakistan, Philippines**
- **Singapore, Sri Lanka, Thailand, Vietnam**

Transfer of Radiotherapy Technique

- **2D Radiotherapy**

↓ (RAS6048) (2007-09、2010-14)

- **3D Image Based Radiotherapy**

↓ (RAS6053)

Now, there are strong needs from MSs for commencing the IMRT , SBRT and IGBT project as early as possible.

Image guided brachytherapy(IGBT)
(RAS6062)
Intensity Modulated Radiotherapy (IMRT)
(RAS6072)
Stereotactic Radiation therapy（SBRT)
(RAS 6067)

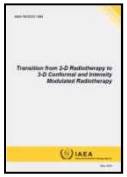
Strategy of RAS6053

Technological transfer

Radiation Oncologist

Medical Physicist

Regional Training Courses **Quality audits**



Train trainers
Provide training materials
(Textbooks, educational CD

Dissemination of tech.

National level

National Project Team

Country A

NTC NTC NTC

Academic Organization

Country B

NTC NTC NTC

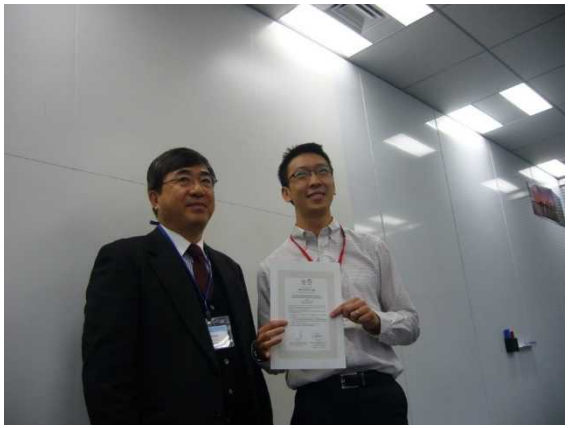
Country C

NTC NTC NTC

NTC:National training course

IAEA/RCA TRAINING COURSE ON IMAGE BASED RADIOTHERAPY (URO-GENITAL)

- Gunma University Graduate School of Medicine
- GUNMA, JAPAN
- 5 - 9 MARCH in 2012



Mr. Norio Hattori Former JPN Embassador to Vietnam

Mr. Takashi Hatori JPN RCA Representativ

Hands-on training for Cervical Ca./Prostate Ca.

- Target/organ-at-risk delineation, treatment planning, and plan evaluation of 3D CRT
- Using delineation protocols of Gunma University
- Using JCOG guidelines for CTV primary and LN

At Elekta Training Center in Tokyo, with 11 work stations

特定非営利活動法人
放射線医療国際協力推進機構
NPO Japanese Organization for International Cooperation in Radiation Medicine

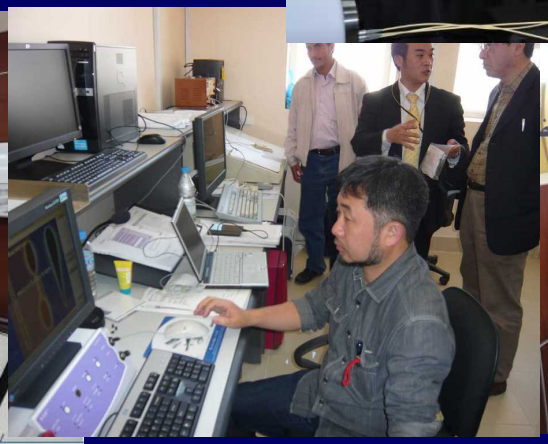
NPO Japanese Organization for International cooperation in Radiation Medicine

Grant project to donate used radiation therapy machinery and tools to the developing country (in No.48 hospital in YEMEN in 2011)

Brachytherapy starts in full-scale in the Republic of Yemen in the Middle East from January, 2011!




Opening ceremony（tape- cut）



Yemen radiation oncologists and technician have started to brachytherapy for cervical cancer patients in 2011

Gunma University Global Leader PhD Course In Radiation Oncology

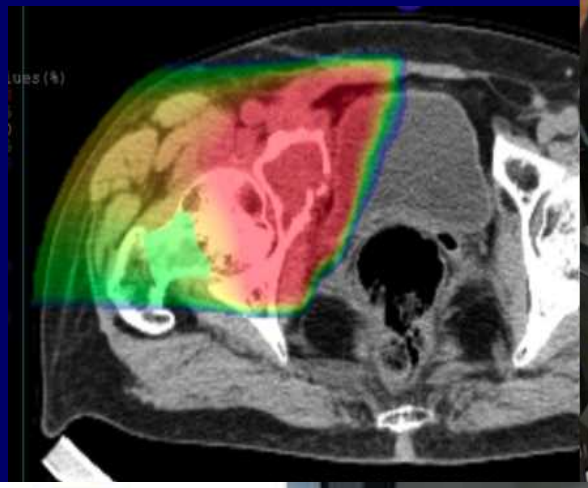
Mongoria

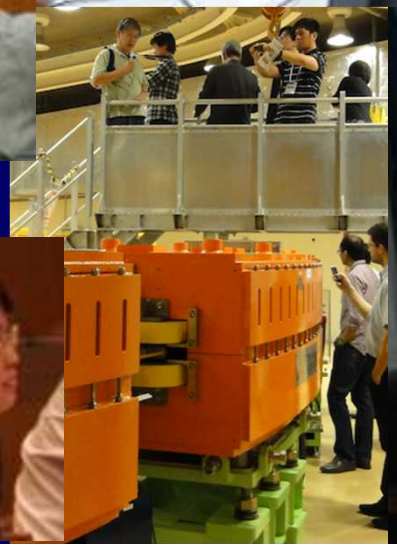
Thailand

China

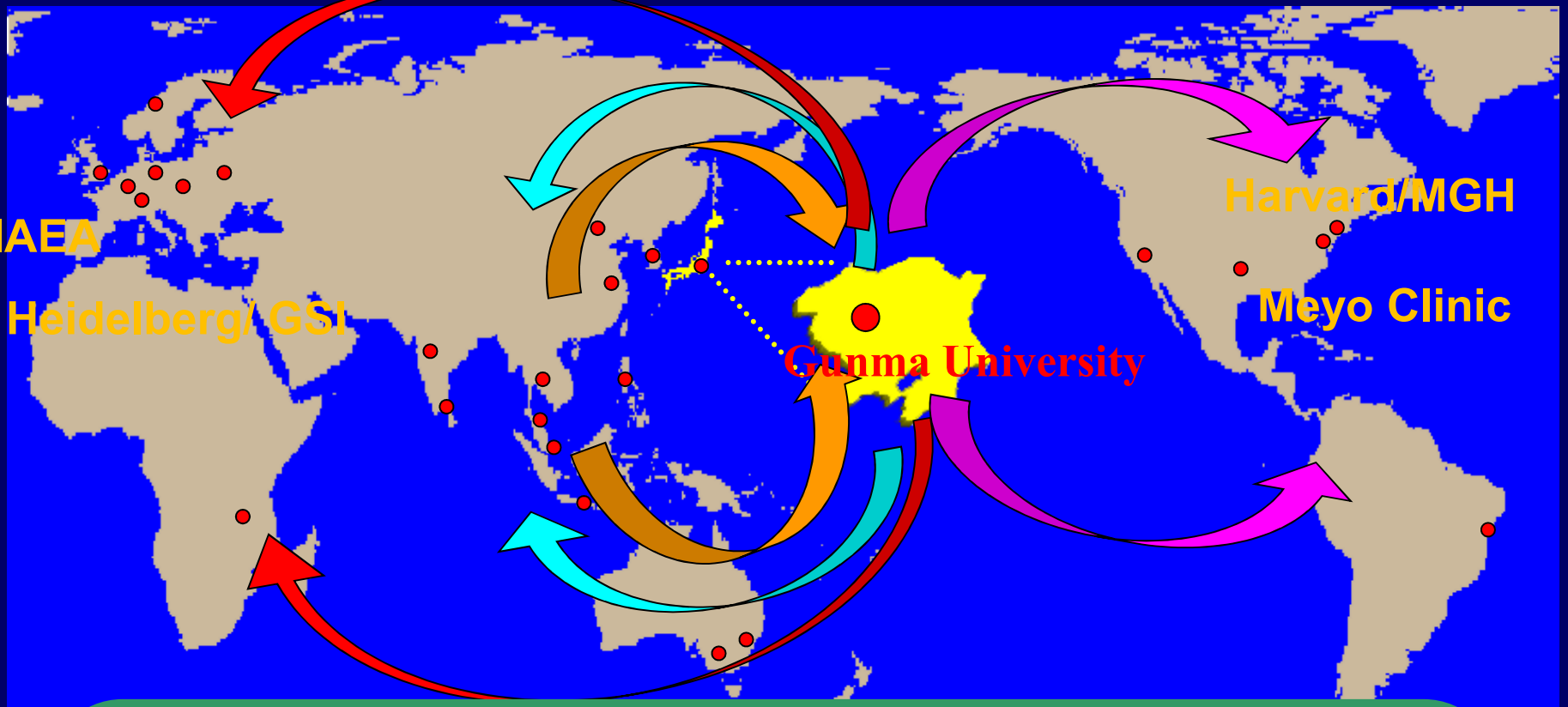
Indonesia

USA





International Hub Center for Education & Research in Radiation Oncology



Thank you for your attention

For contribution to world health and all people in the world living happy lives irrespective of race, religion and economical status

重粒子線治療の特徴と期待される効果

（一般の放射線治療との比較

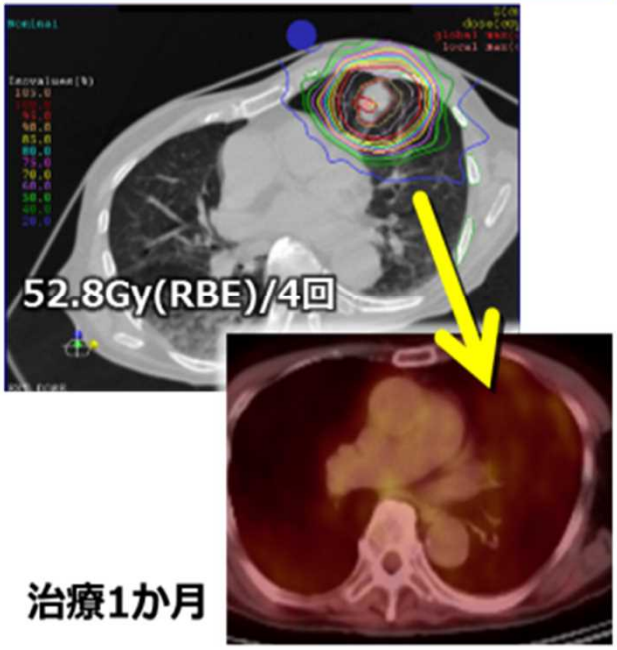
特徴１（物理・生物学的特徴）

・がんに対する**線量集中性が良い。**
・**殺細胞効果が高い**（X線の２－３倍）
　腫瘍の放射線感受性が比較的均一

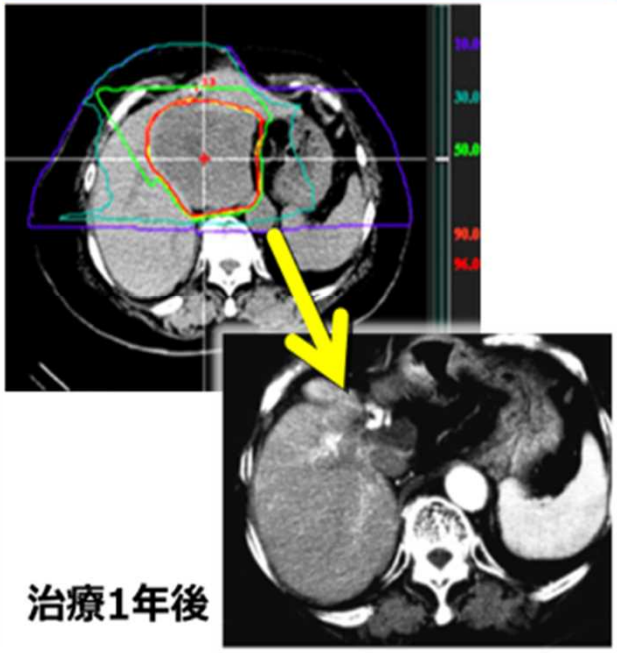
特徴２（医療上の特徴）

・**治療期間が短い**（約半分、平均3週）。
・**身体への負担がより少ない。**
・**高いQOL** (Quality Of Life)が期待できる。

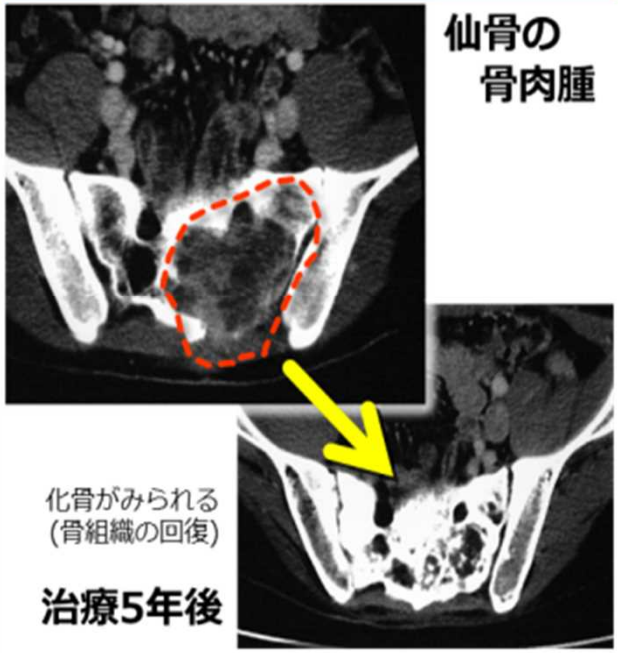
高齢者の肺がん治療例



巨大肝がん治療例



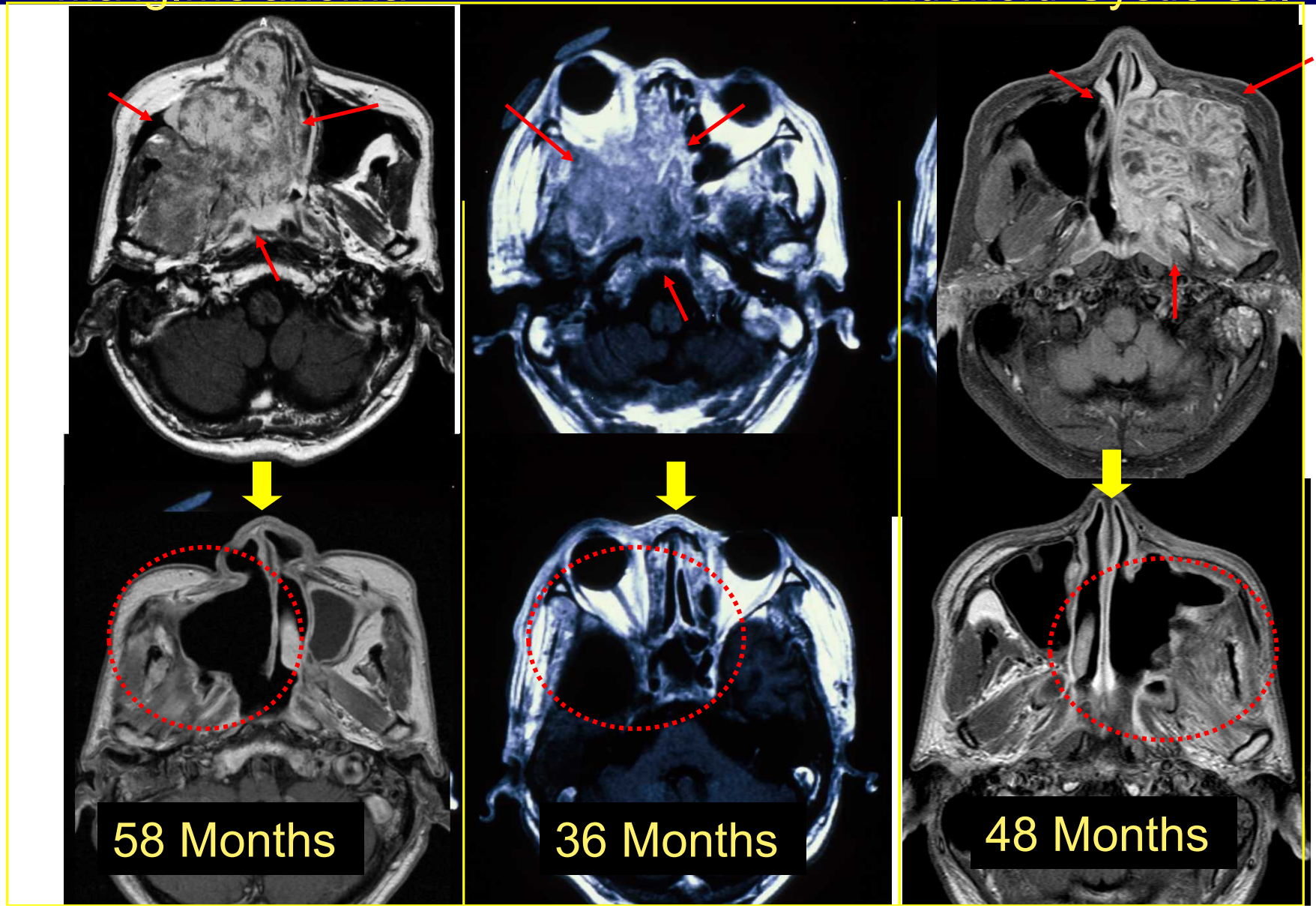
難治とされてきたがんにも有望



日本の治療実績が評価され、世界中で治療施設が建設されつつある

Maxillary Sinus Tumors

By NIRS

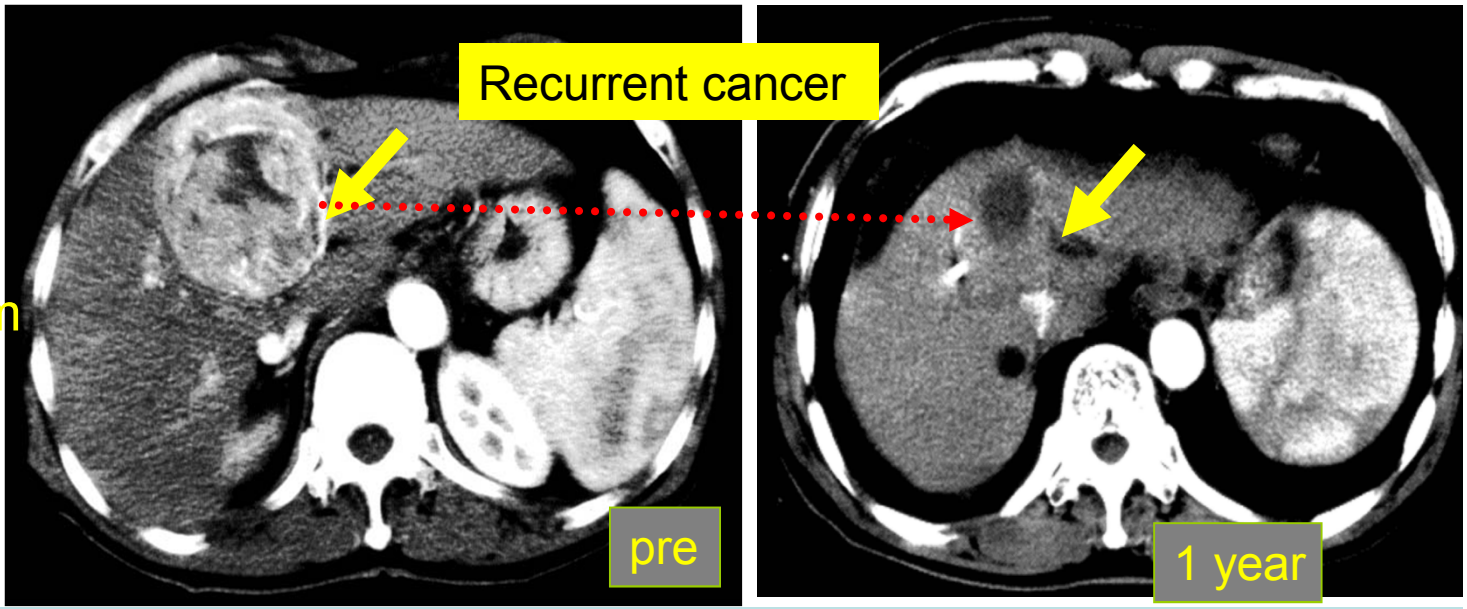


C-ion Therapy for Recurrent Liver Cancer

By NIRS

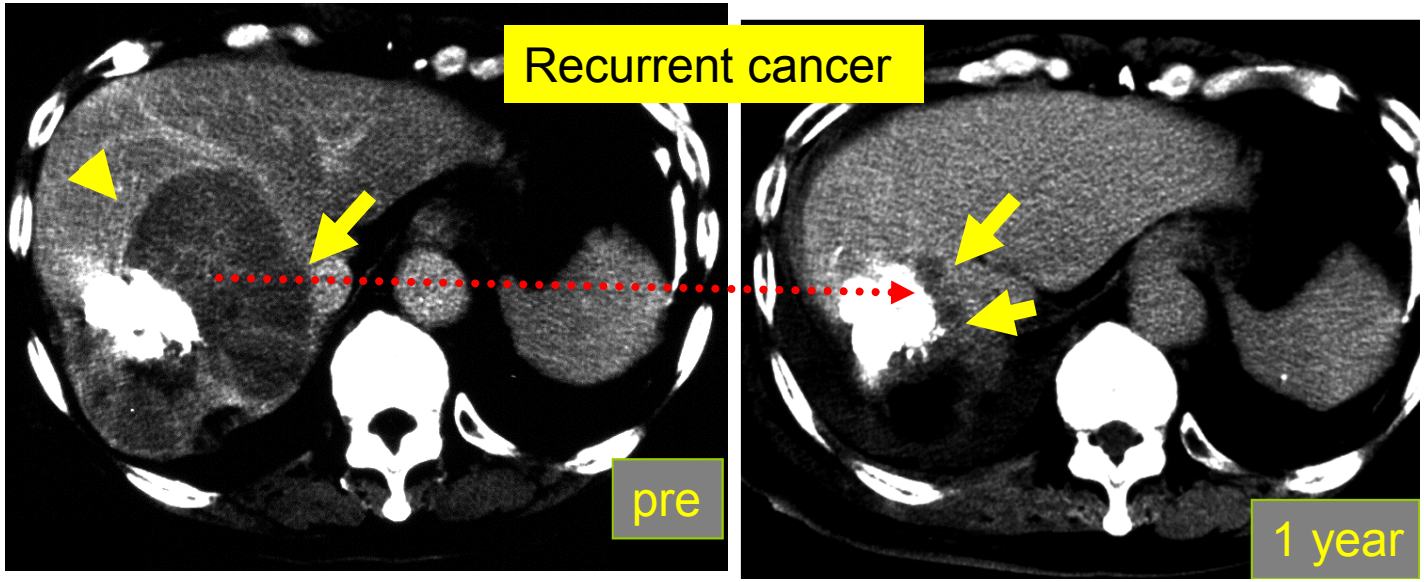
67y.o. male
4A disease,
child A
Tumor 70 x 65cm
5 ys survival

dose
72GyE/24frs.



71 y.o. male
S7, 11.2cm,
5 ys survival

dose:
52.8GyE/4frs.



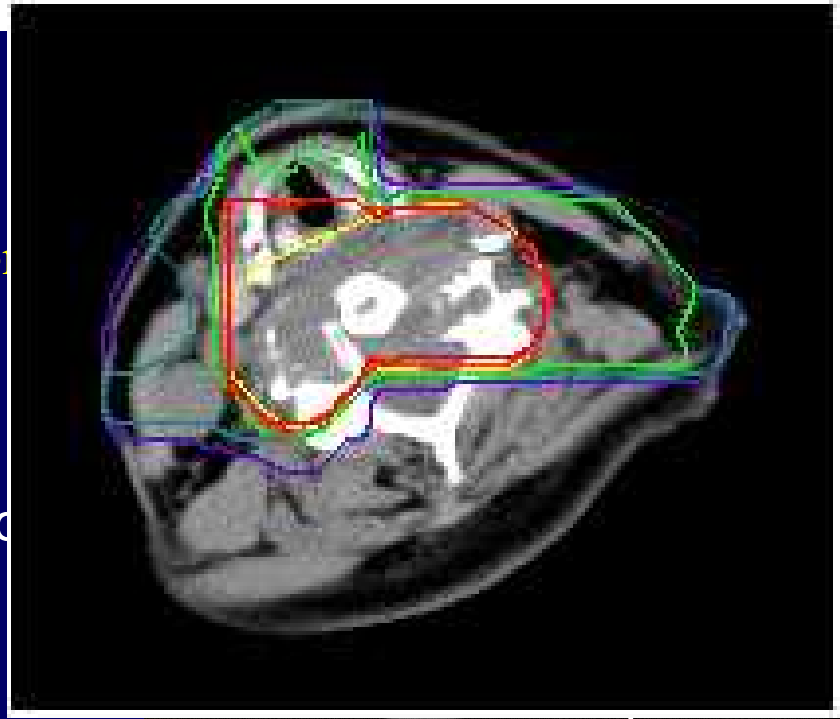
C-ion Beam Therapy for Osteosarcoma

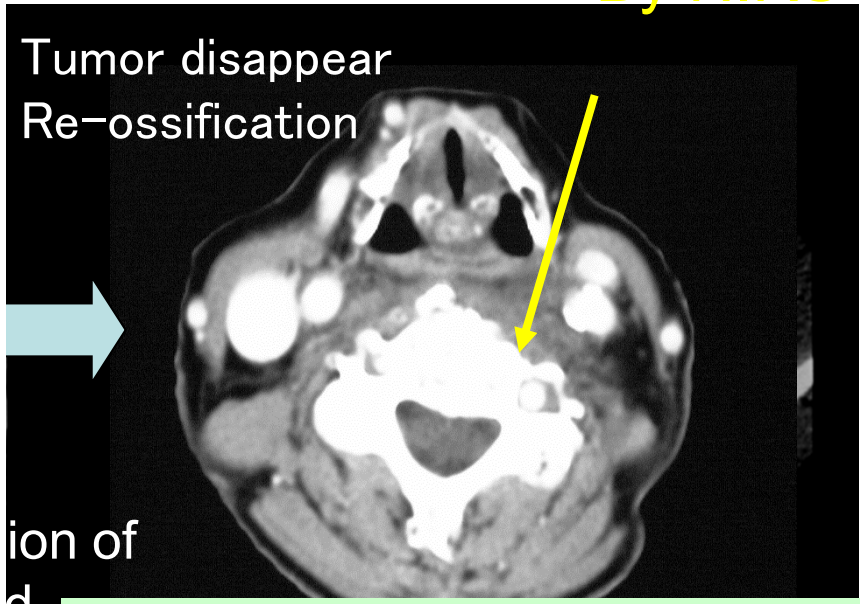
70GyE/16f/4w

By NIRS

C5 vertebr

ny c





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d

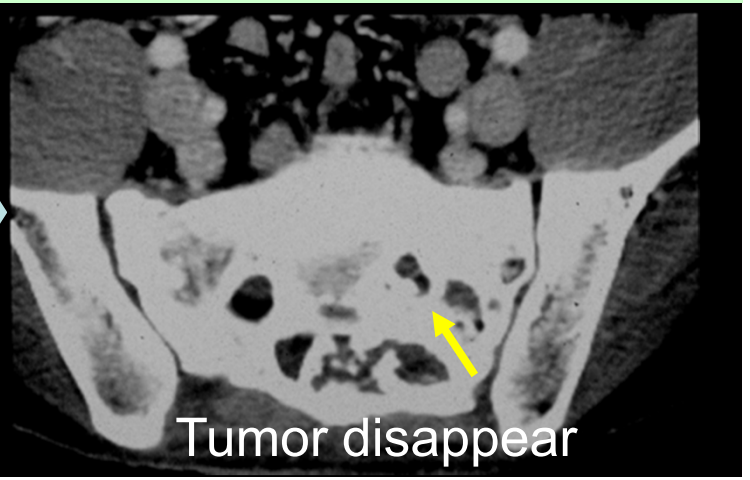
Regeneration of bone!

15 y.o. man

sacrum

y destruction

umor



RCA Activities on Radiation Oncology

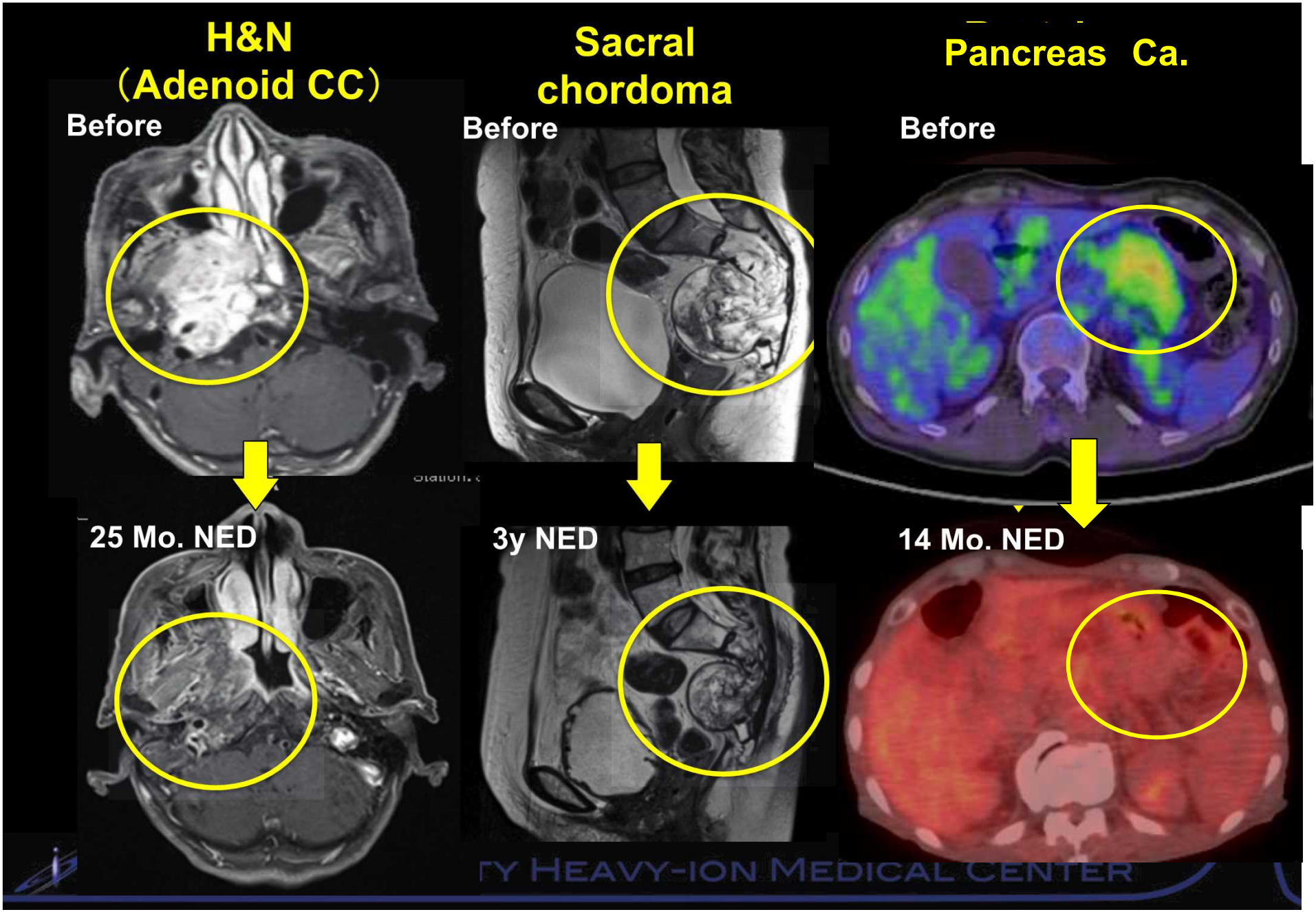
- Major objectives
  - To improve the RT practice in the RCA region by evidence-based approaches and quality standards of 2D-3D radiation therapy
  - Especially, to train ROs, MPs, RTTs to increase RT professionals and improve quality of RT by dissemination of qualified RT technology
- Main activities
  - Regional training course for training trainers for national training courses
  - Sending experts for national training courses
  - Expert mission for search national status on radiation therapy
  - Establishment of training materials
- Major training subjects
  - Training for established 2D radiation therapy
  - Training for 3D radiation therapy
  - Training for IMRT and image guided radiation therapy (IGRT)
  - Training for usage of medical imaging (CT,PET,MRI, etc)

Recent RCA Projects relating the Issue of Cancer Control in the Region

- **RAS/6/040: Improvement in Quality of Brachytherapy for Frequent Cancers in the Region**
  - 2005-2008, 15 Member States; 130 professionals were trained
- **RAS/6/048: Application of 3D Radiotherapy for Predominant Cancers in the RCA region**
  - 2007-2009, 14 Member States; 71 professionals were trained more by National Training Courses
- **RAS/6/053: Improving Image Based Radiation Therapy for Common Cancers in the RCA Region**
  - 2010-2014 (On-going), 17 Member States: Just started
- **RAS/6/042: Tumour Imaging Using Radioisotopes**
  - 2005-2007, 16 Member States: 88 professionals trained in the RTCs, and at least 3340 by National Training Courses.
- **RAS/6/038: Strengthening Medical Physics through Education and Training**
  - 2003-2012 (On-going), 16 Member States; training modules developed

Status of Radiation Oncology in RCA Region

- Incidence of cancer is rapidly increasing worldwide, and in the future it can pose a threat not only to the health and well being of the global population but also to the national economies, especially of countries with limited resources including RCA region.
- Recent developments in the field of radiotherapy has significantly improved its effectiveness as a cure and a palliate for cancer.
- However RCA region is facing remarkable shortage of machinery and trained personnel, and the poor infrastructure and technology in radiation oncology.
- In order to benefit from recent development of radiation oncology, the radiotherapy staff are to adapt evidence-based guidelines and to be trained on the established and new technologies in RCA countries with limited resources.


H&N
（Adenoid CC）
Before
25 Mo. NED
Sacral
chordoma
Before
3y NED
Pancreas Ca.
Before
14 Mo. NED
HEAVY-ION MEDICAL CENTER