สมาคมพยาบาลโรคมะเร็งแห่งประเทศไทย

การประชุมวิชาการครั้งที่ 2 ประจำปี 2558

เรื่อง

Strengthening Oncology Nursing Practice for Today and Tomorrow

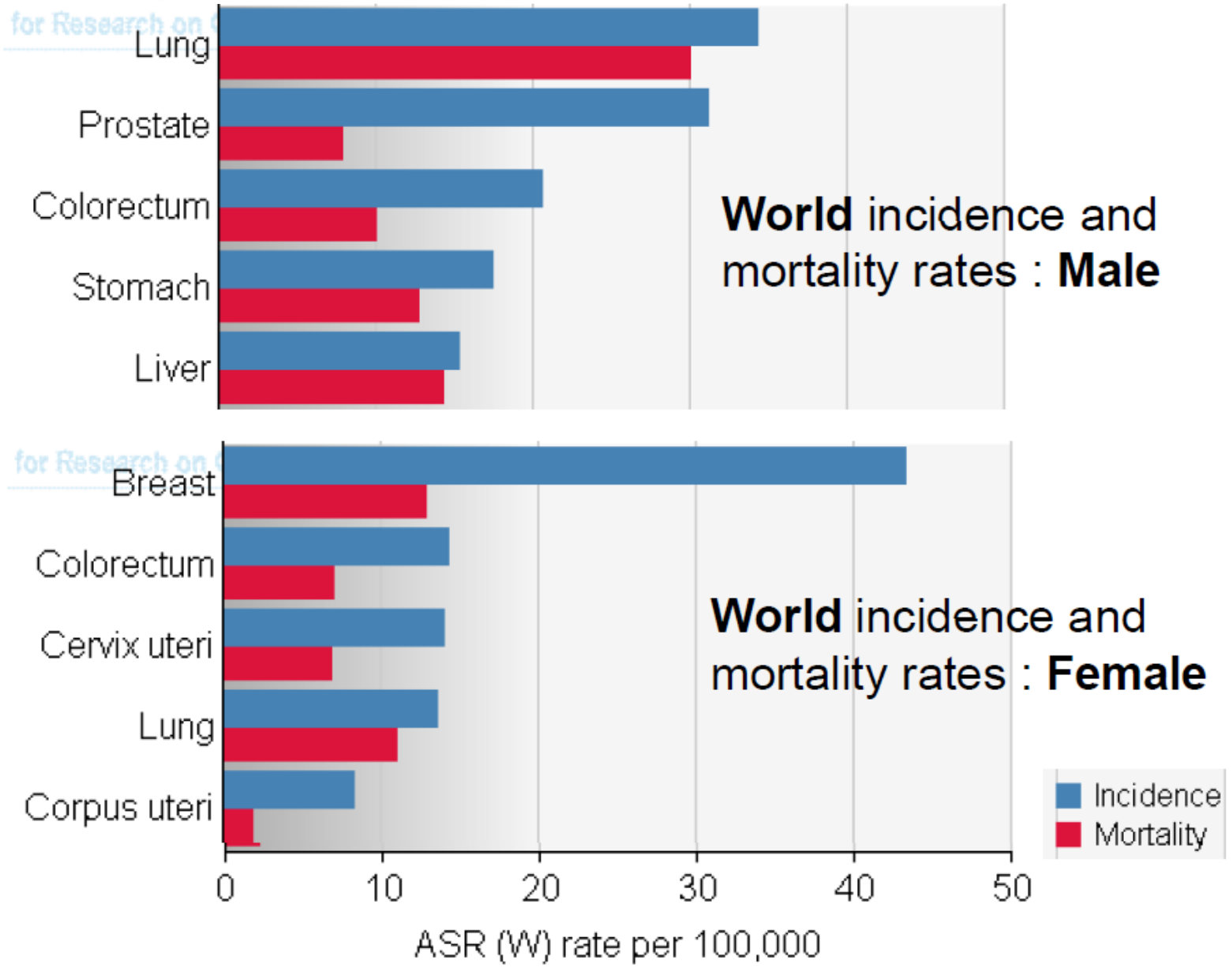
25-27 พฤศจิกายน 2558

ห้องราชาบอลรูม โรงแรมปรินซ์พาเลส มหานาค กทม

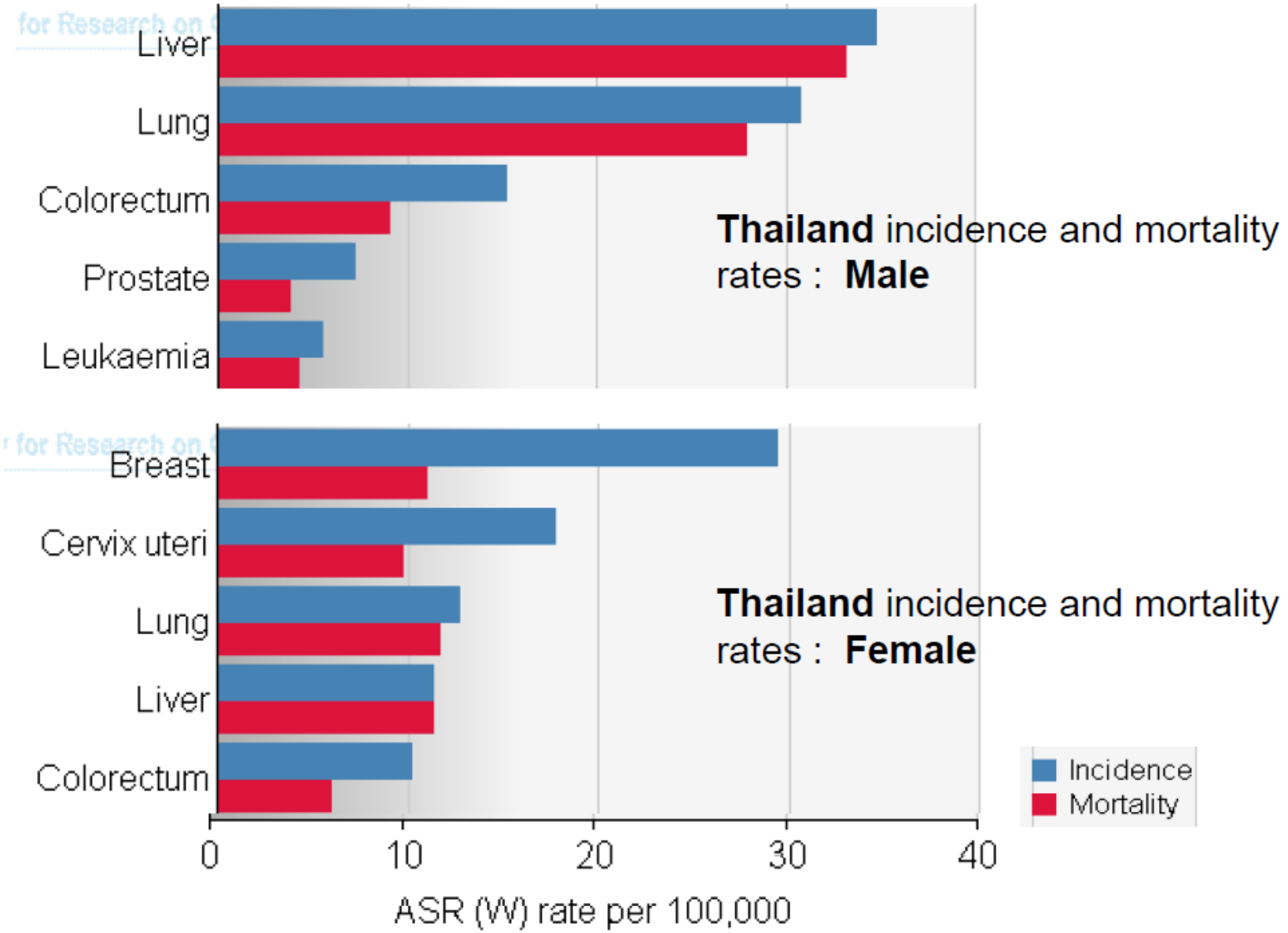
Update in Radiation Therapy

รศ.นพ. ประเสริฐ เลิศสงวนสินชัย

นายกสมาคมรังสีรักษาและมะเร็งวิทยาแห่งประเทศไทย



Globocan 2012



Globocan 2012

GLOBOCAN 2012
12 Dec 2013

	2008	2012	2025
New Cancer Cases	12.7 m	14.1 m	19.3 m
Cancer Deaths	7.6 m	8.2 m	

2008-2012 (5y) estimates 32.6 m people alive with previous cancer diagnosed

Cancer is the leading cause of death worldwide

Estimated Age-standardised Incidence Rates(ASR) per 100,000 for Thai population in 2008

			estimated new cancer
Female	34.4m	ASR (all sites) =146	50,224 cases
Male	32.6m	ASR (all sites) =156.1	50,890 cases
		Total	101,114 cases

Cancer is the first leading cause of death of Thai people since 2001 (พศ 2544)

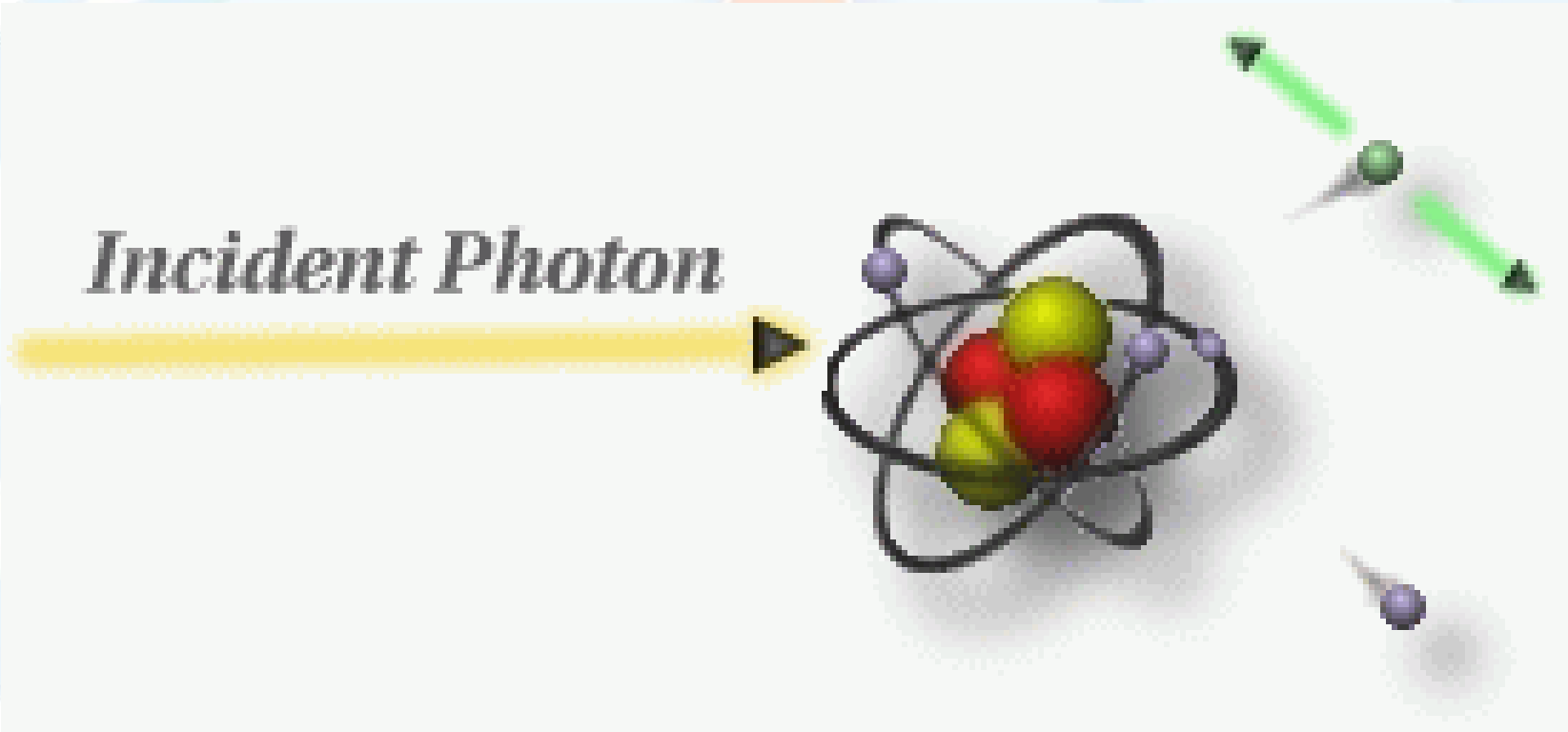
Cancer Management

Need multidisciplinary approach

- Surgery
- **Radiation**
- Systemic treatment (Chemotherapy , Hormonal treatment etc.)
- Targeted Therapy
- Others

Principles of Radiation Oncology

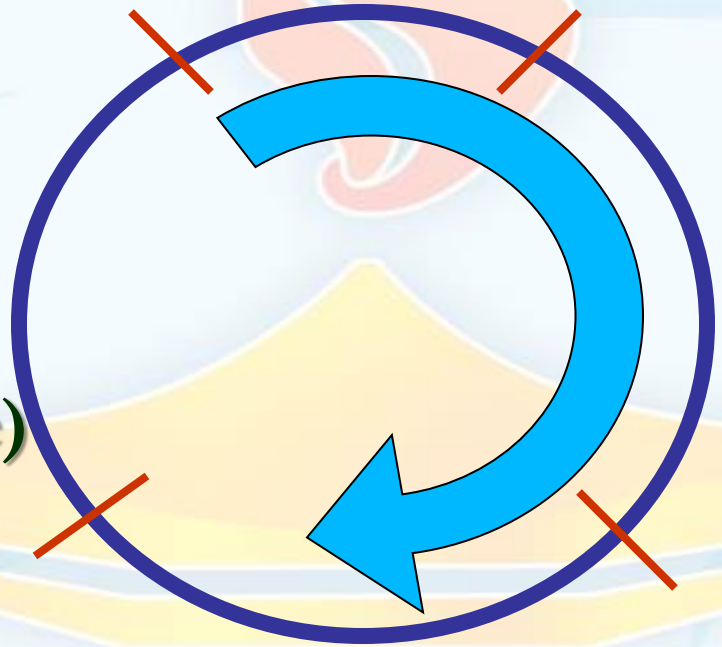
SCATTERED PHOTON



FAST ELECTRON

M-phase (Mitosis)

G2
(Post-DNA
synthetic phase)



G1
Pre-DNA
synthetic phase

S-phase (DNA synthetic phase)

Advance in Radiation Oncology

Needs :- Good quality and accurate imaging system.

- Modern radiation treatment planning.
- Sophisticated radiation treatment machine.
- Experience/ expert team.

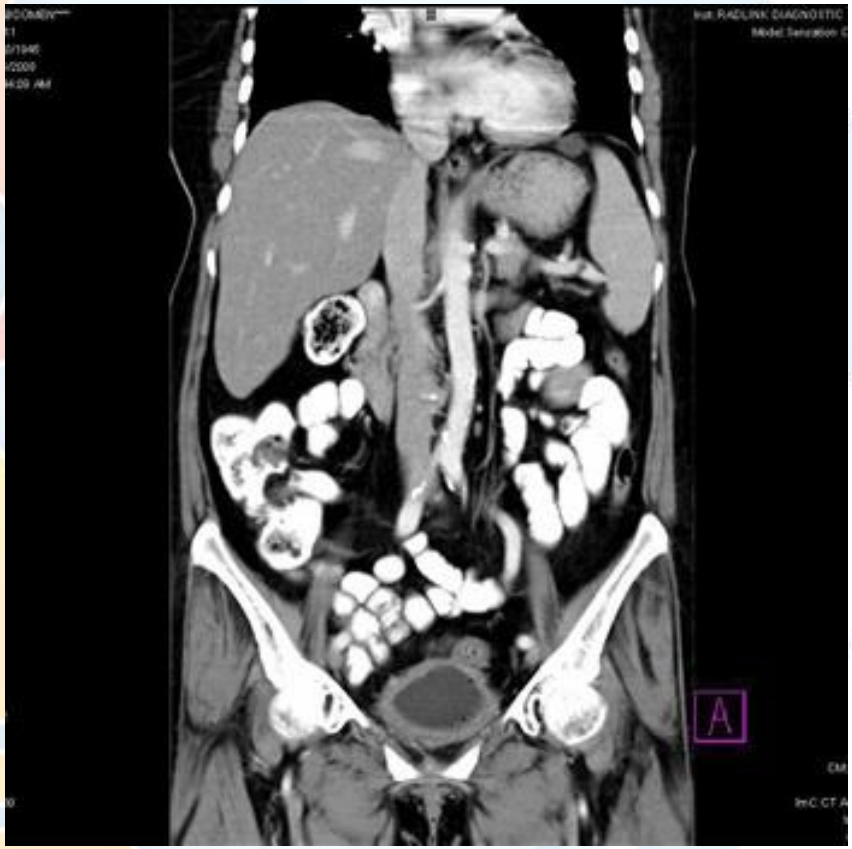
Imaging in Radiation Oncology

CT

MRI

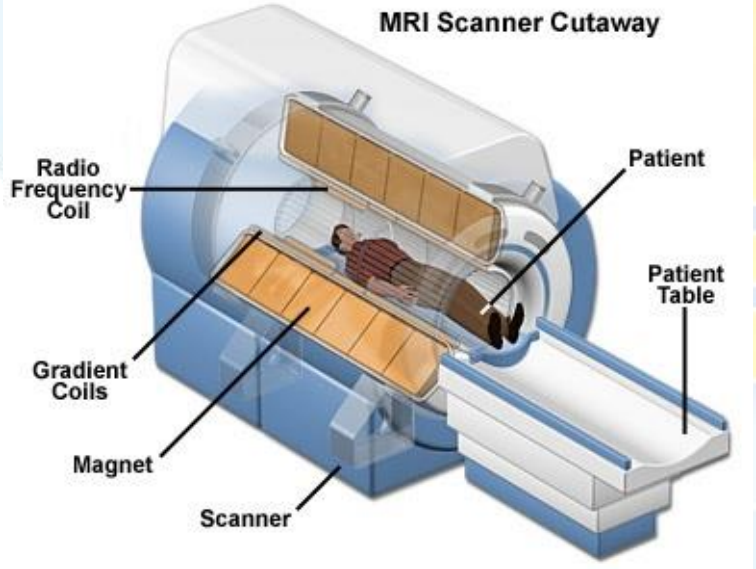
PET/CT

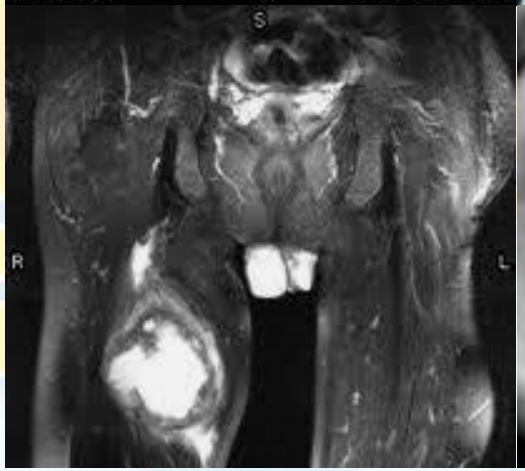
CT scan



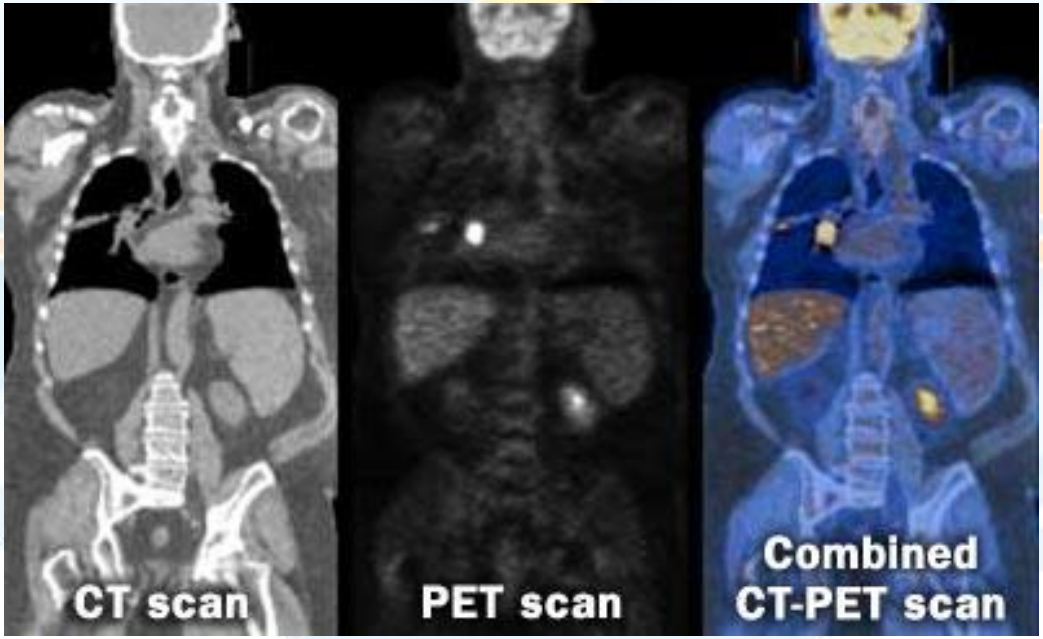
MRI

MRI Images





PET/CT scan (Functional Imaging)



Radiation Facilities

- **SIMULATOR**
  - Conventional Simulator
  - CT Simulator
  - PET/CT Simulator
- **TREATMENT PLANNING SYSTEMS (TPS)**
- **LINEAR ACCELERATORS (LINACs)**
- **Radiation Treatment**
  - **TELETHERAPY**
  - **BRACHYTHERAPY**
  - **-Temporary Brachytherapy**
    -Permanent Brachytherapy

SIMULATOR

For determination of radiation treatment area

Conventional sim

CT SIMULATOR

PET/CT SIMULATOR

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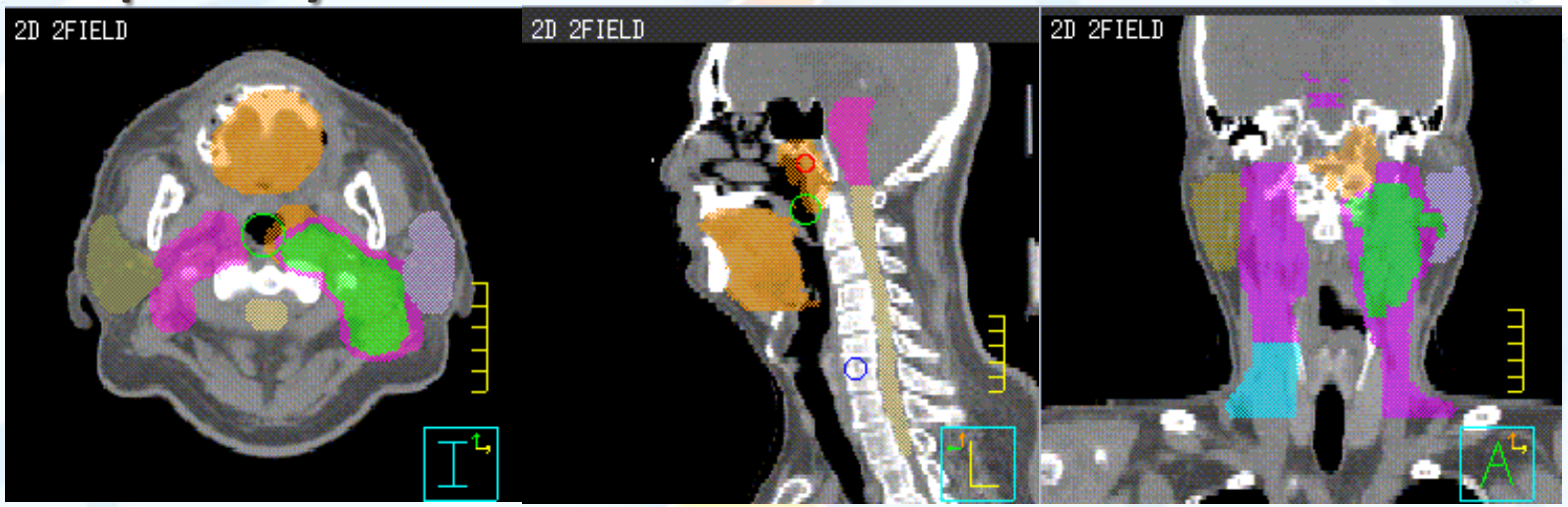
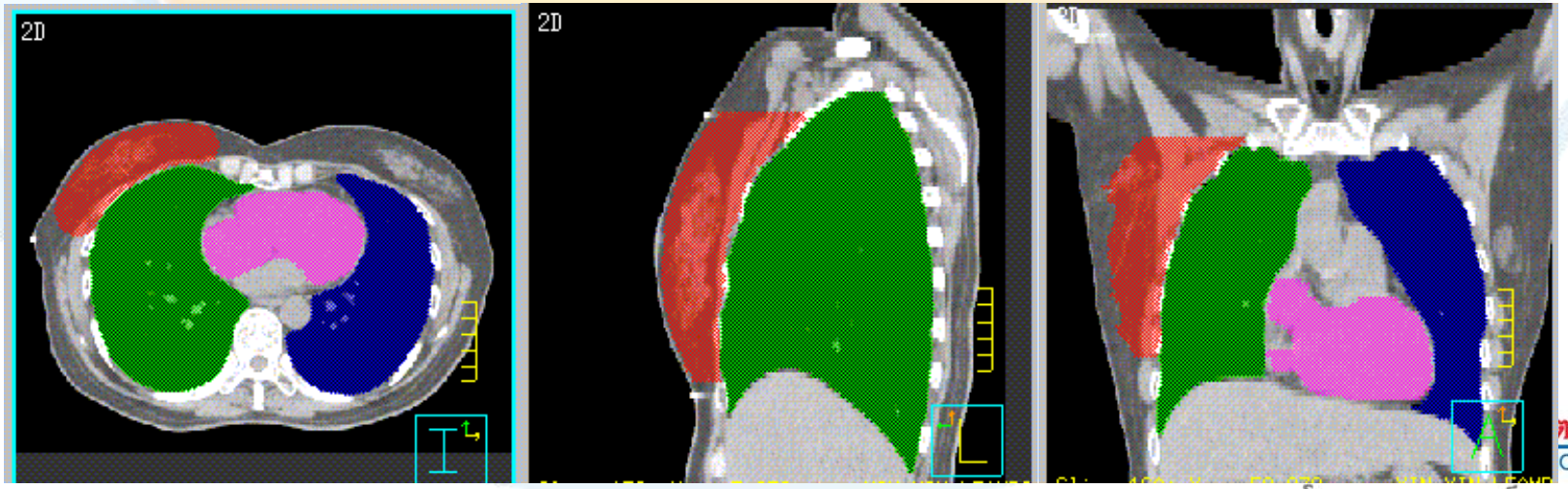
- Radiation Treatment Planning (RTP)

organ delineation

Nasopharynx

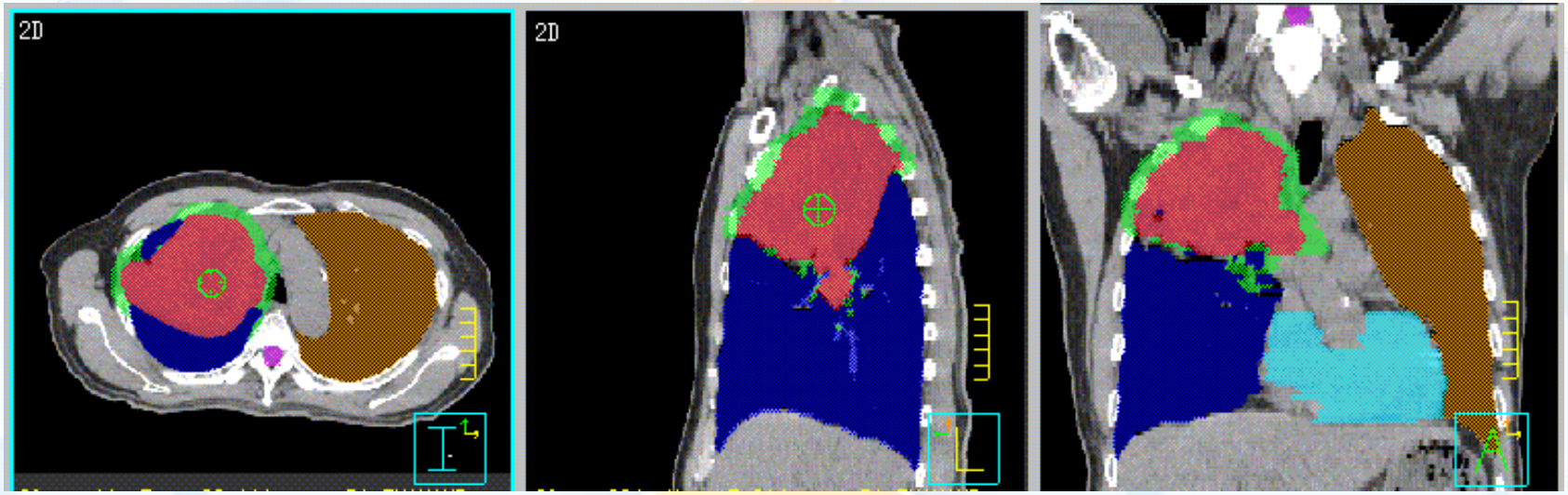


Breast

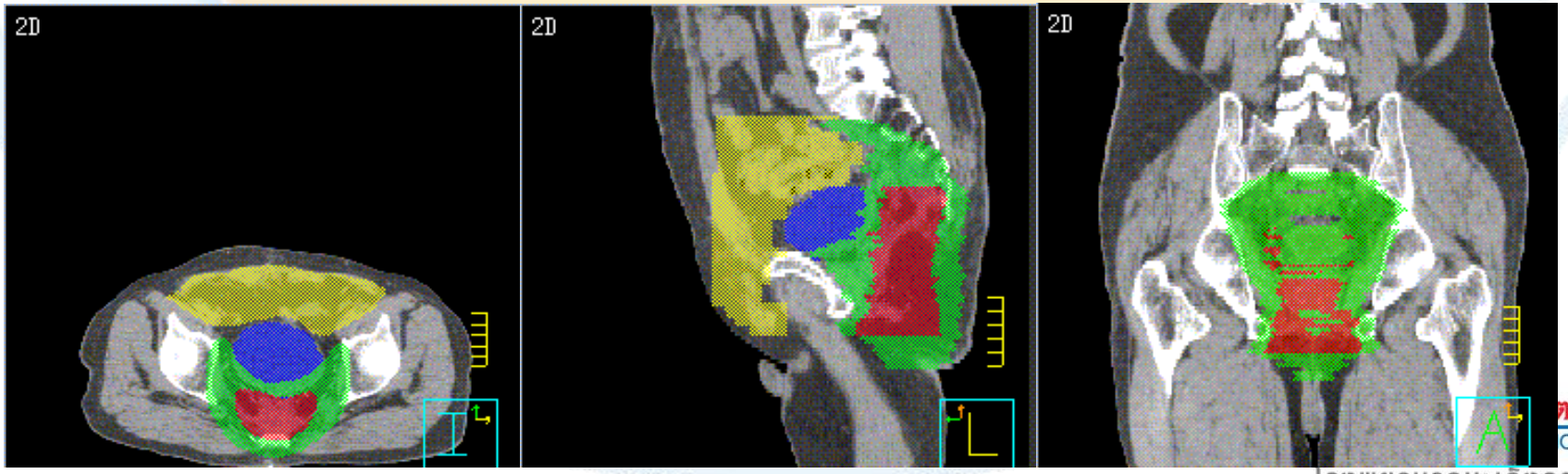


organ delineation

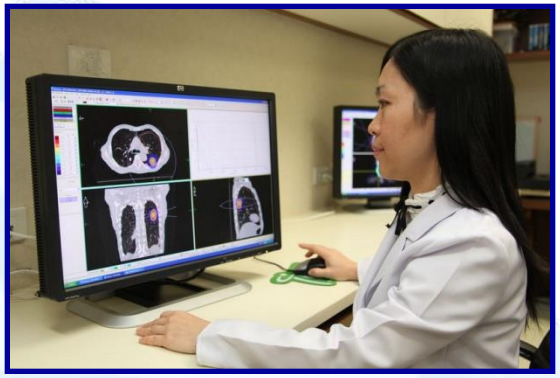
Lung



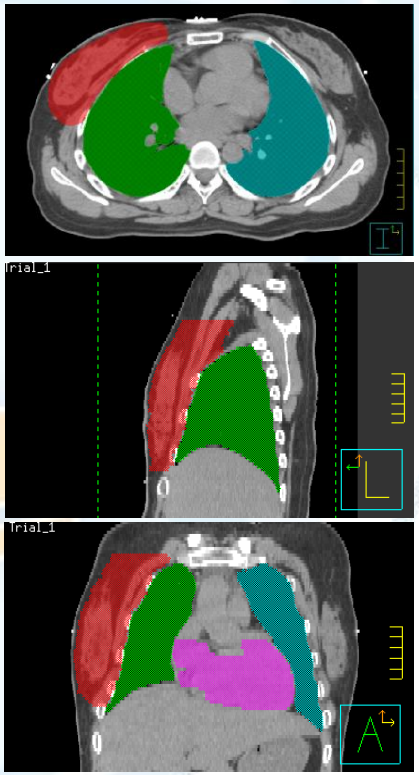
Rectum



Three Dimensional Conformal Radiation Therapy (3D CRT)



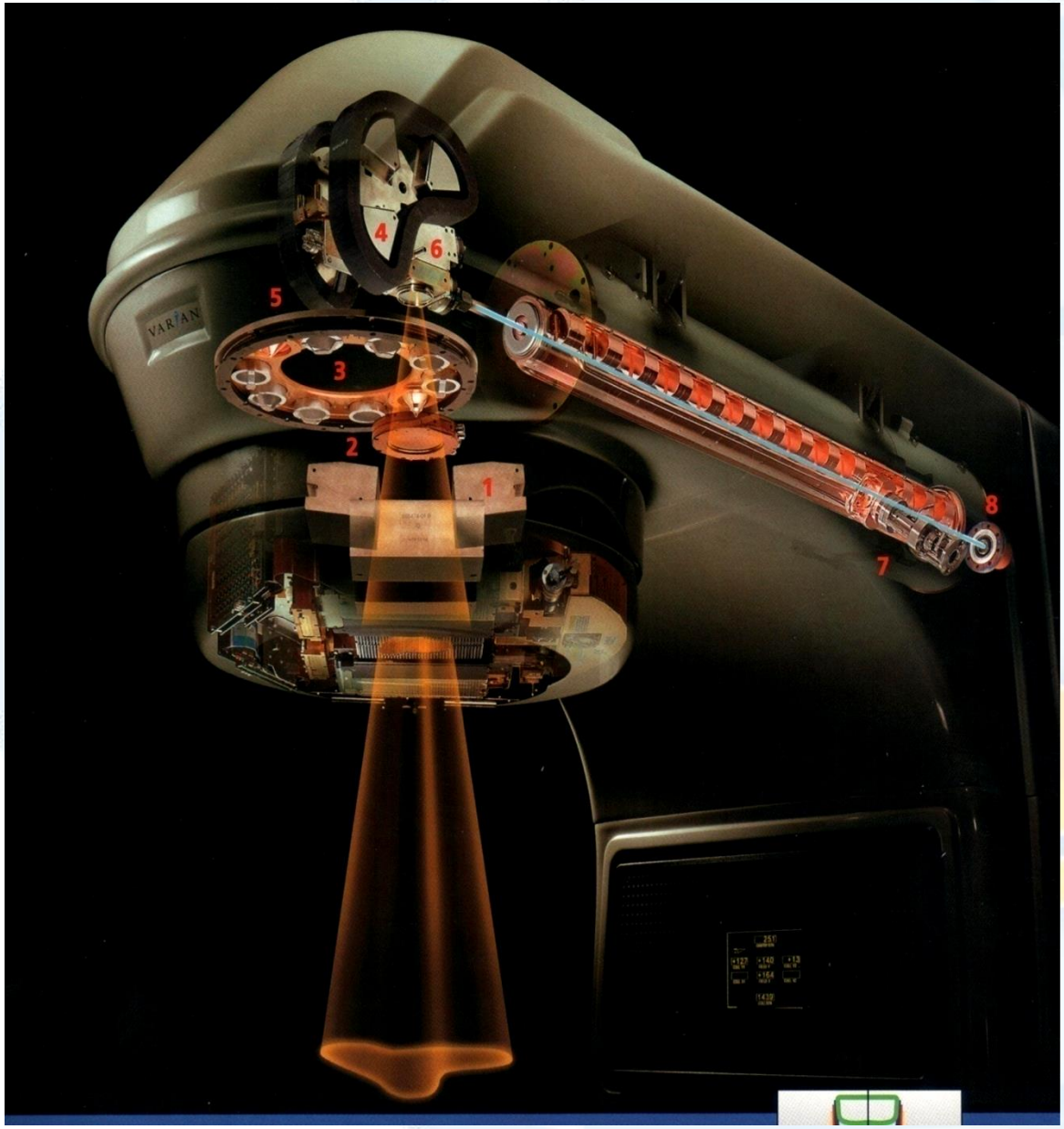
- Advances of computed tomography can now demonstrate three dimensional tissues/organs
- Advances in radiation treatment planning system
- Advance in radiation machine



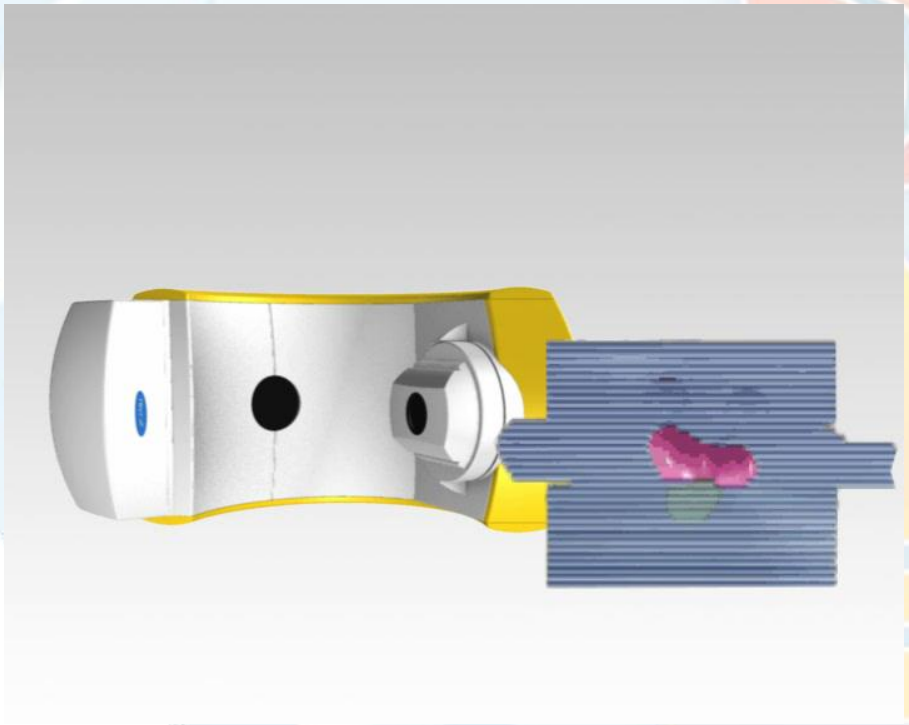
We can now give high radiation doses to the tumor while sparing the normal surrounding tissue

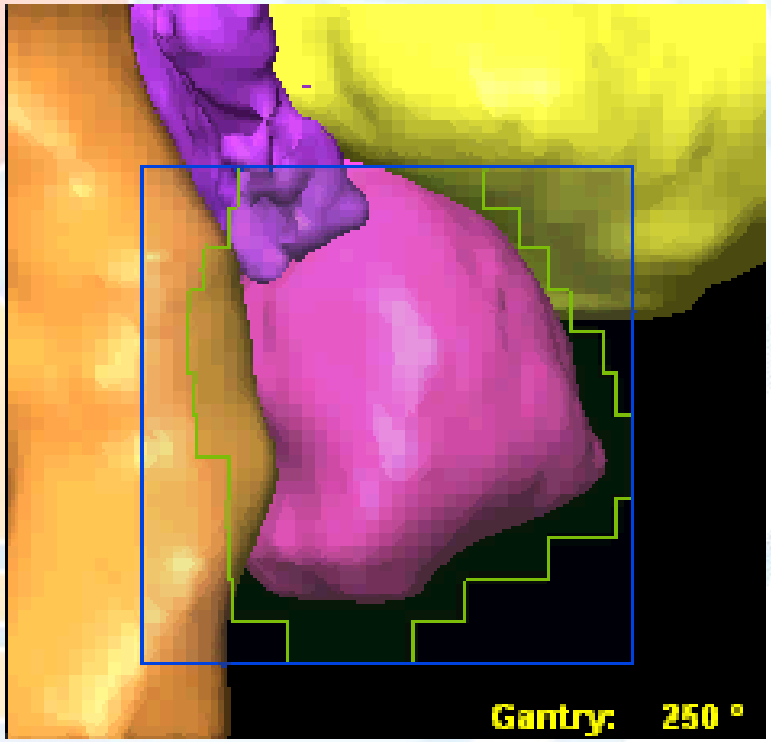
Radiation Treatment Machines

LINAC with MLC



Dynamic Conformal Arc



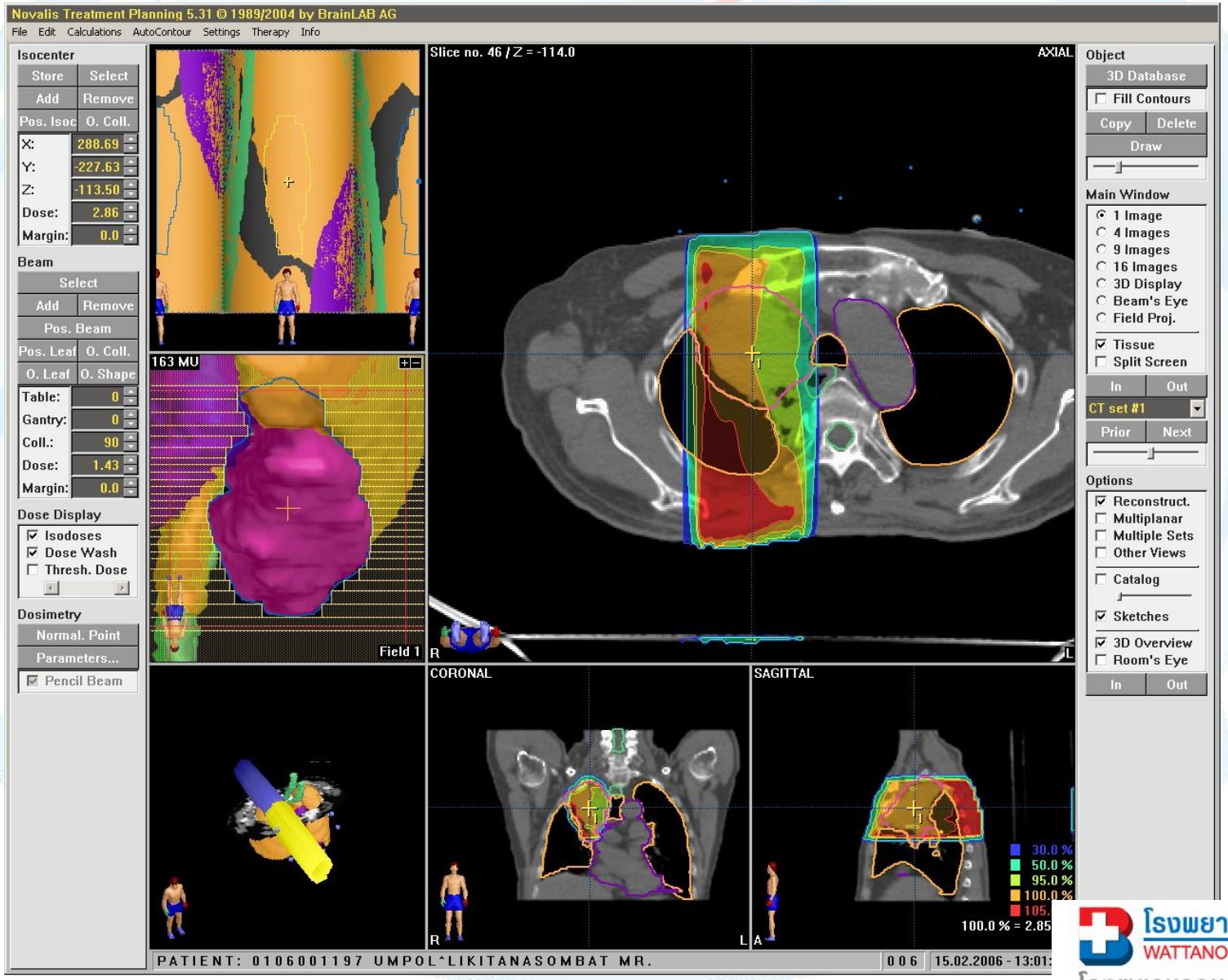


Radiation Treatment Techniques

- - 2D RT
- - 3D CRT :- IMRT, SRS, SRT, SBRT, IGRT
- - 4D RT
- - VMAT/Rapid Arc

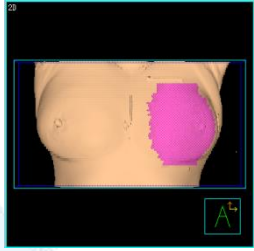
2D RT

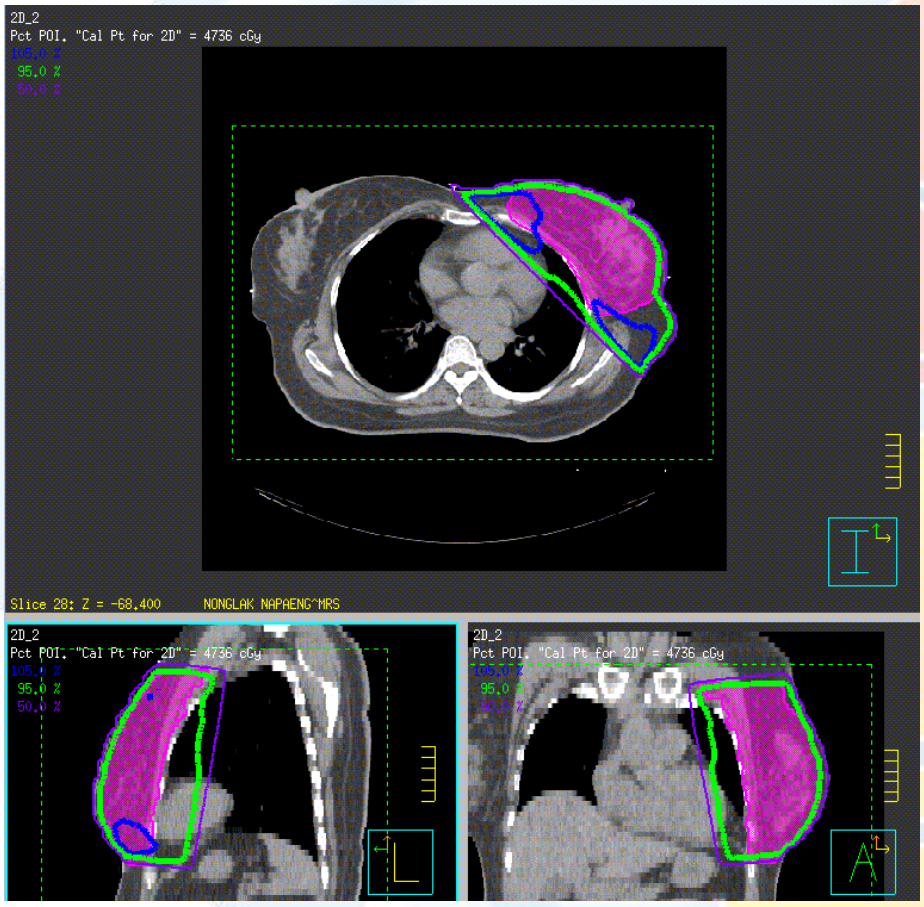
Both tumor and normal tissue receive the same radiation dose

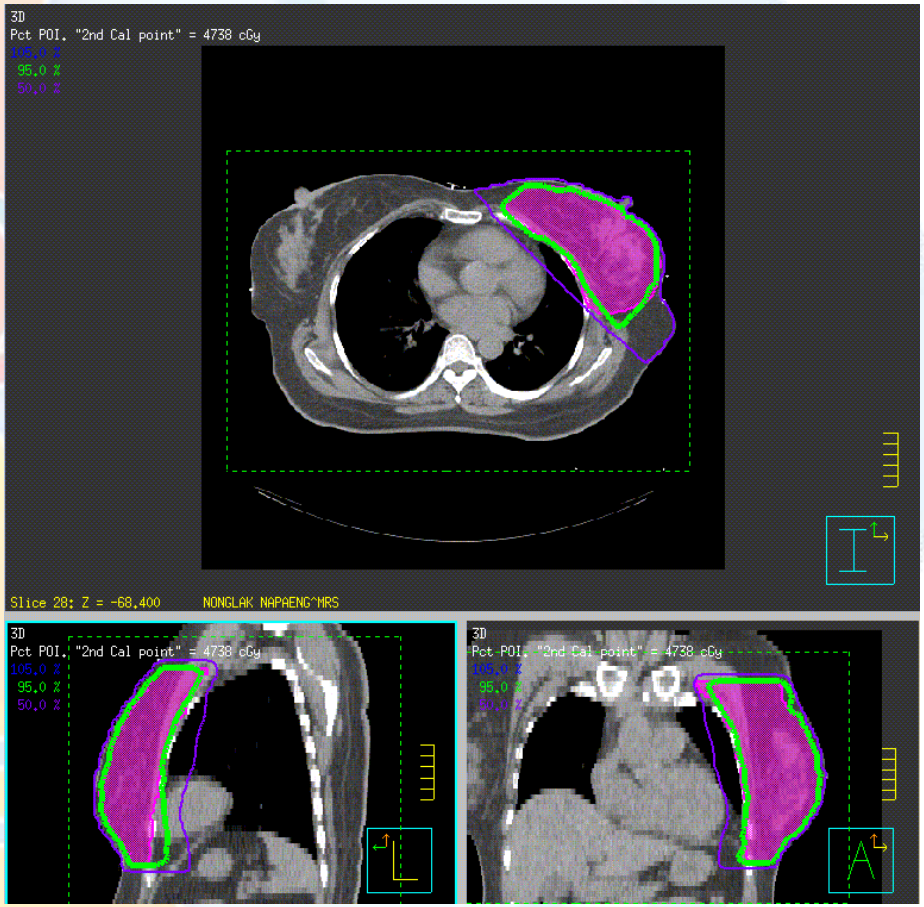


2D-Tangential beams

3D-CRT







- High exposure dose to lung and heart also hot spot at periphery area

- Better precise beam to target with dose homogeneity

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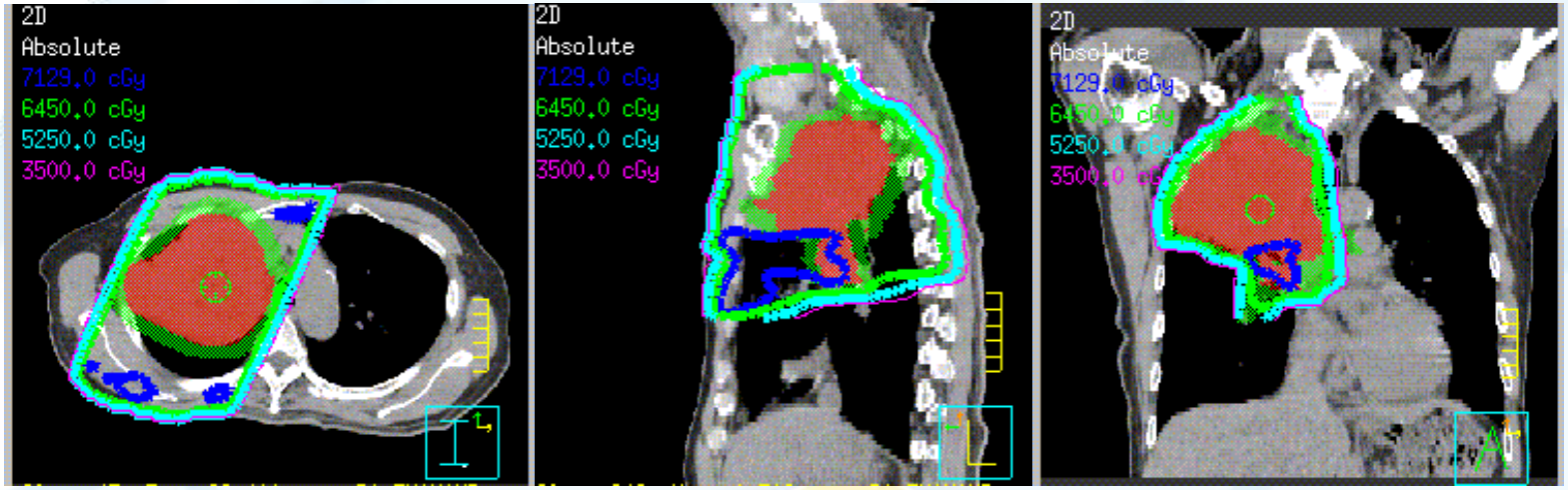
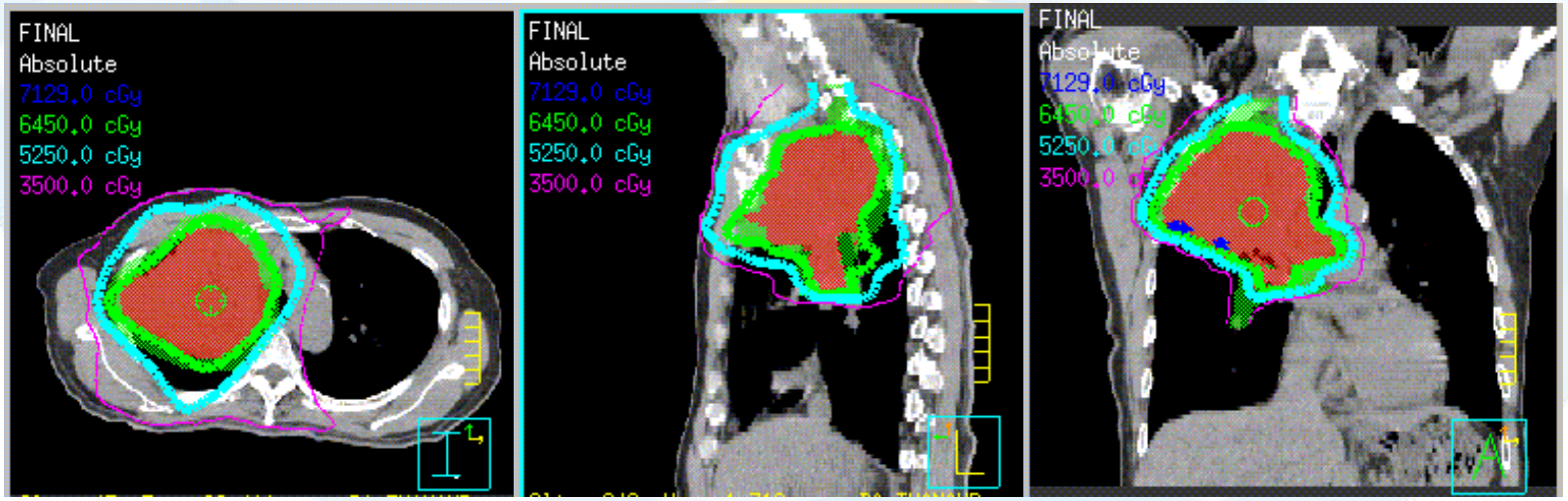
Radiation planning: Lung

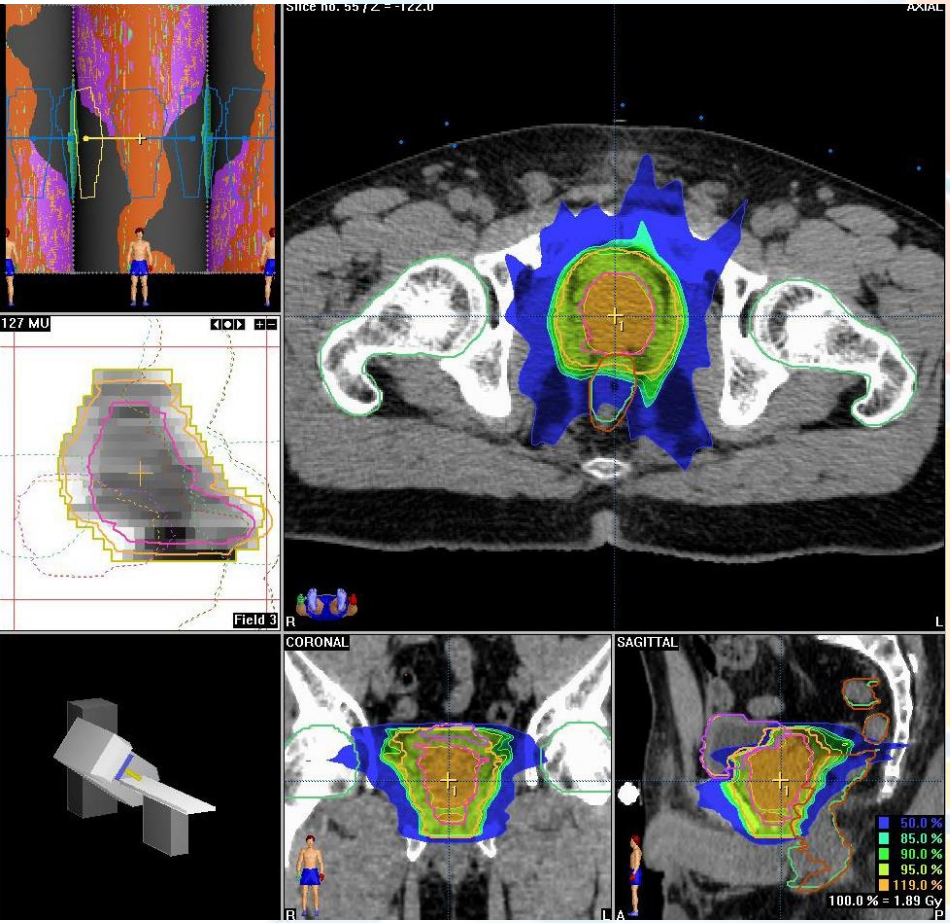


2D

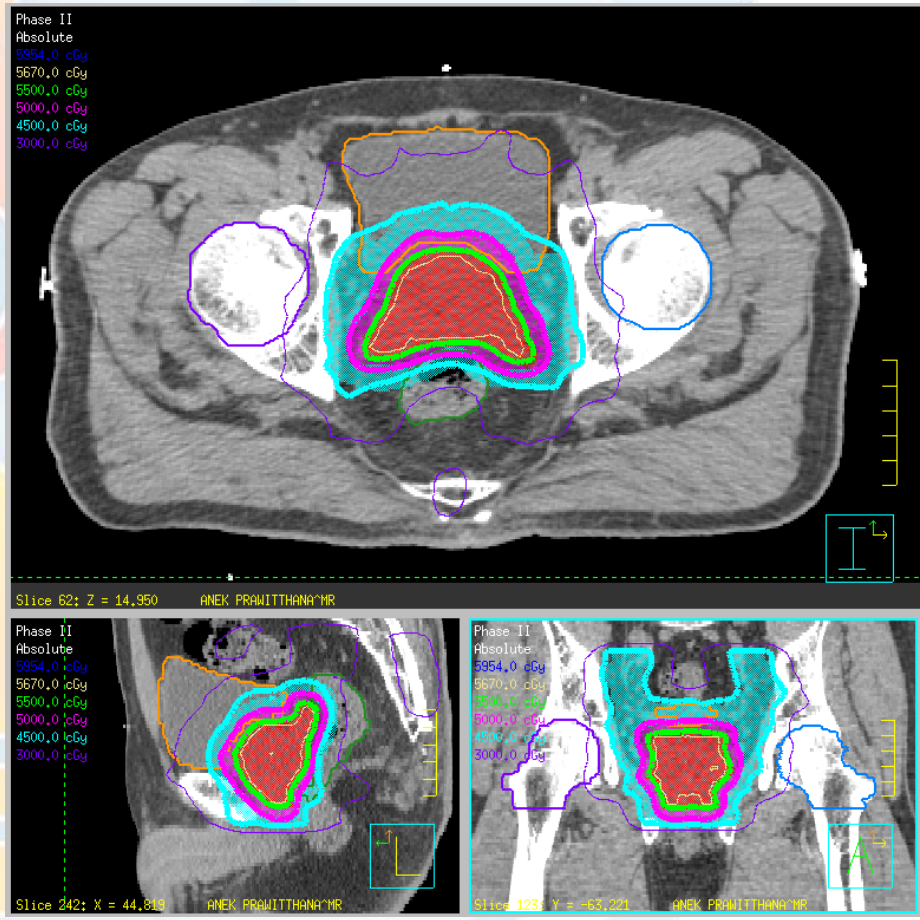


IMRT

CA PROSTATE
(IMRT Technique)



Prostate with seminal vesicle



Prostate with seminal vesicle and pelvic lymphnode

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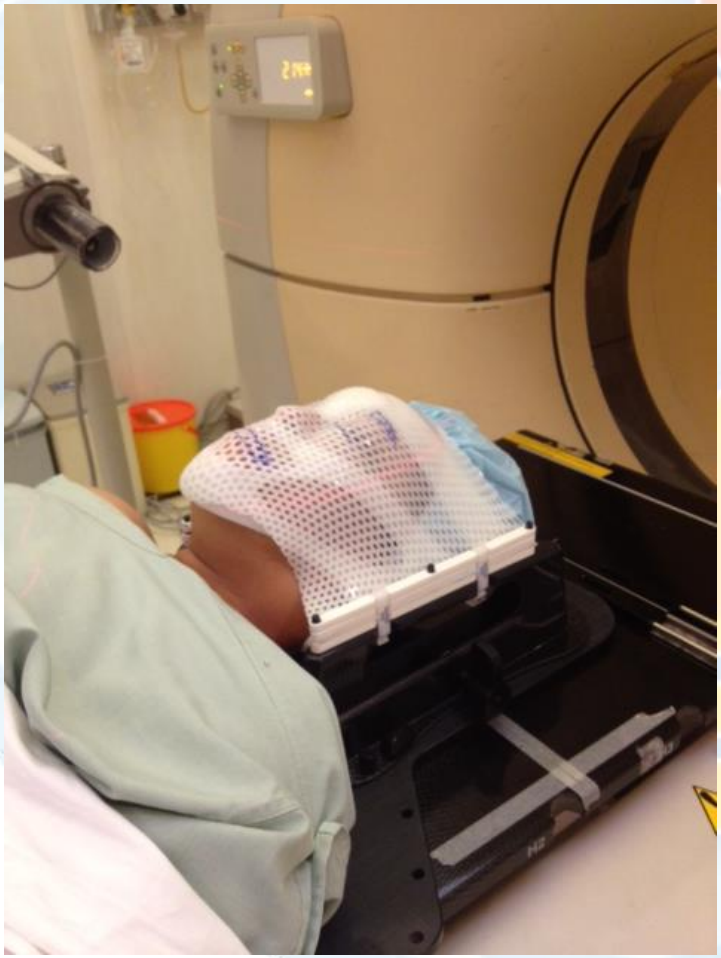
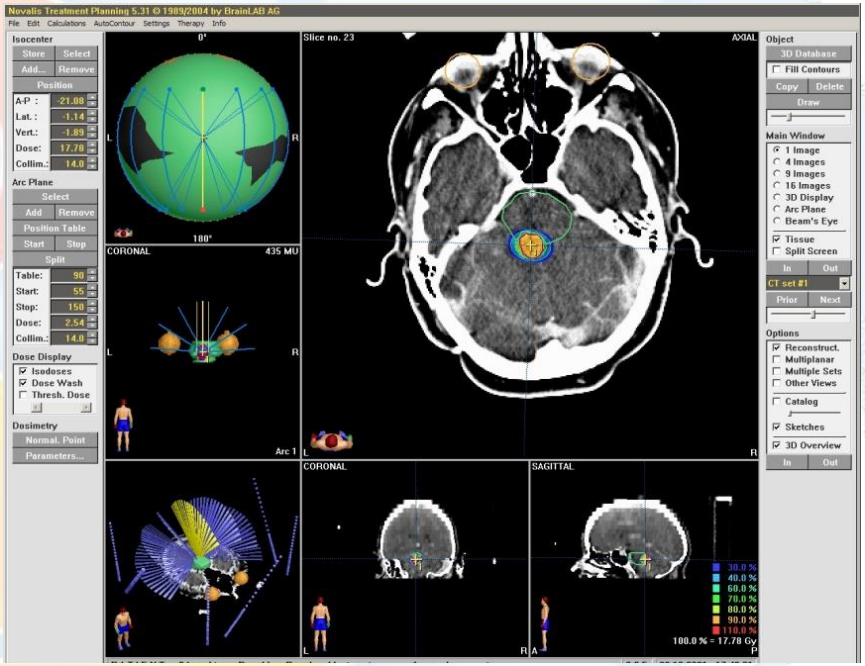
Cranial Immobilization with Localizing box



Novalis Brain SRS/SRT

Acoustic neuroma (SRS)



Brain metastasis (SRT)

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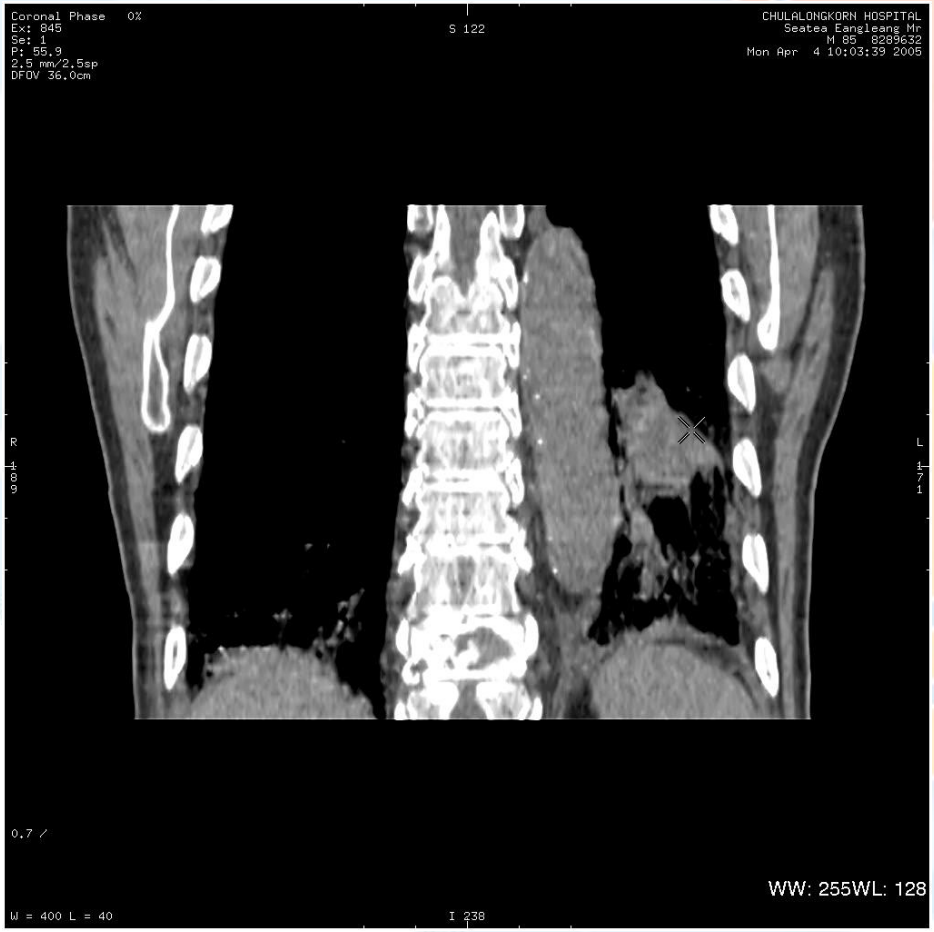
IGRT (Image-Guided Radiation Therapy)

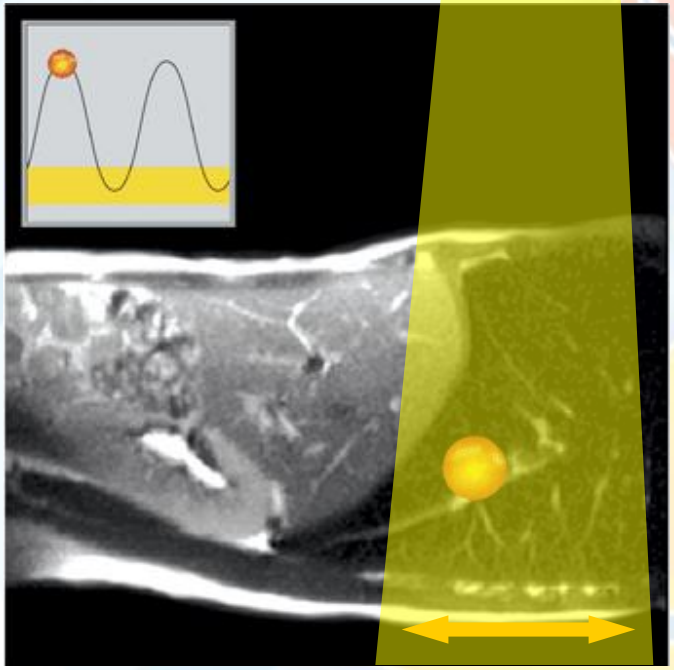
Robotic couch movement

Four Dimension Radiation Therapy (4D RT)



In some types of tumors, such as lung and liver cancer, the lesion move during radiation treatment.

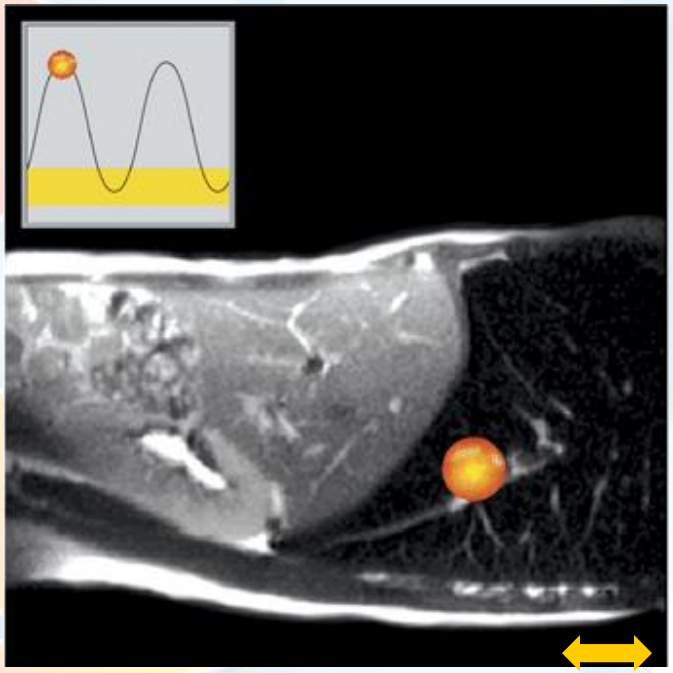
4D-RT
Novalis Adaptive Gating



Treatment Margin

Traditional treatment

- Large margins



Treatment Margin

Adaptive gating

- Reduced treatment margins

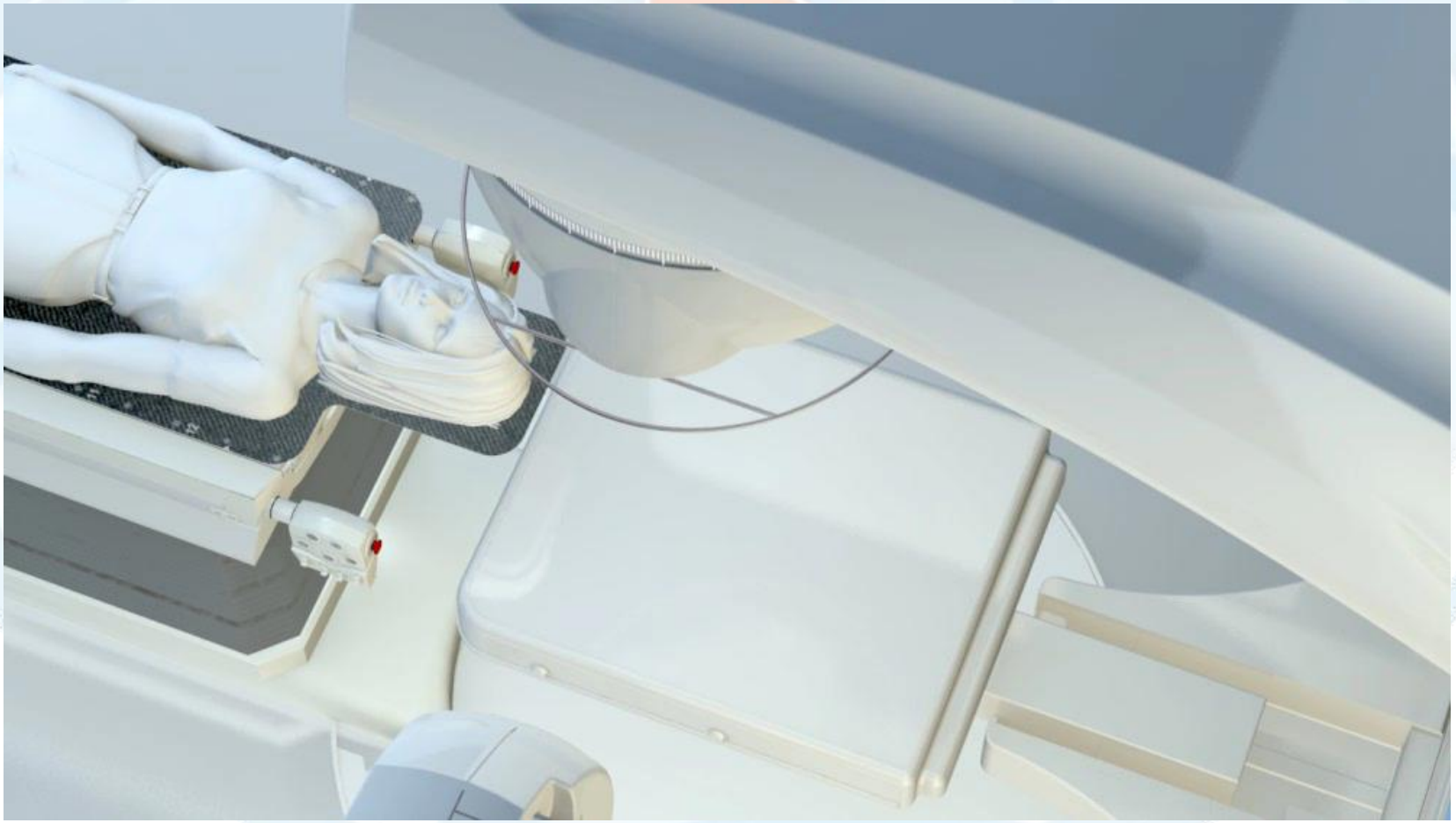
VMAT
(Volumetric Modulated Arc Therapy)

Radiation is delivered with continuous variation

- Gantry rotation
- Gantry speed
- Multileaf Collimator (MLC)
- Collimator angle
- Dose rate

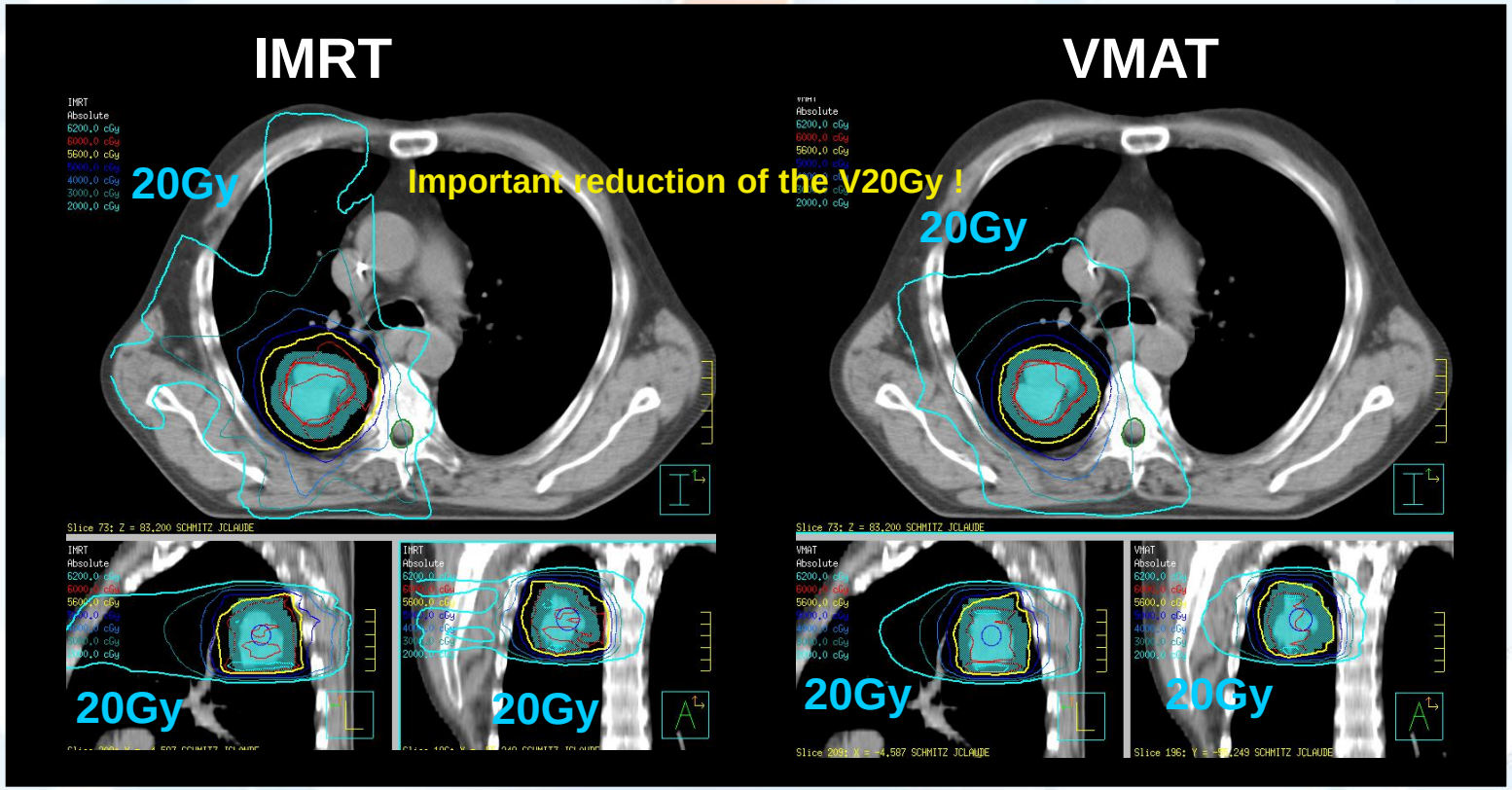
Highly conformal plans can be delivered with a single or a few arc in a short treatment time

Volumetric Modulated Arc Therapy (VMAT)



Private Radiotherapy Center of Metz

Clinical experience / VMAT / Lung



5 fields
35 segments
220 MU
8 min

Same objectives & constraints

1 arc
243 MU
1 min 30

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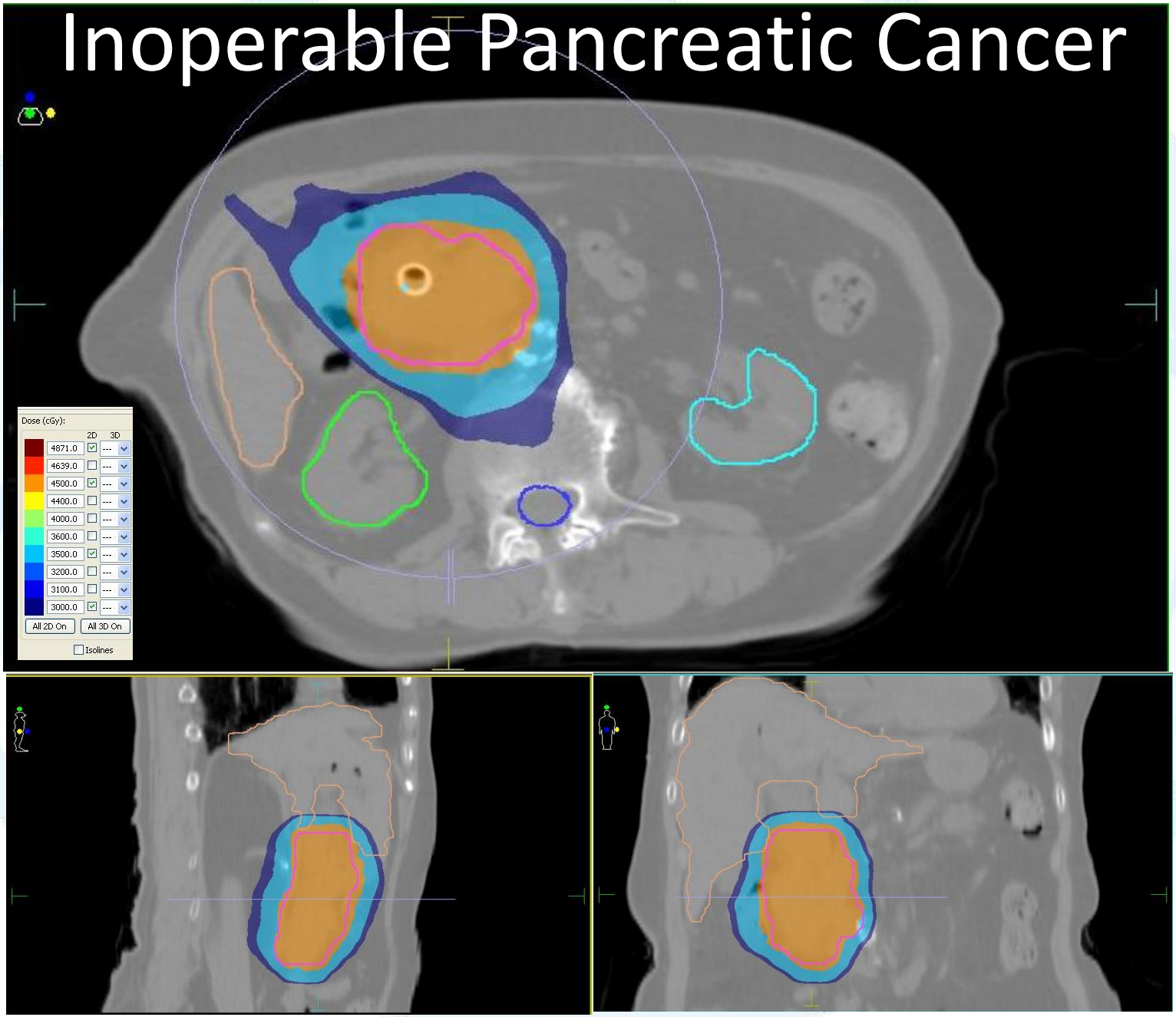
Inoperable Pancreatic Cancer



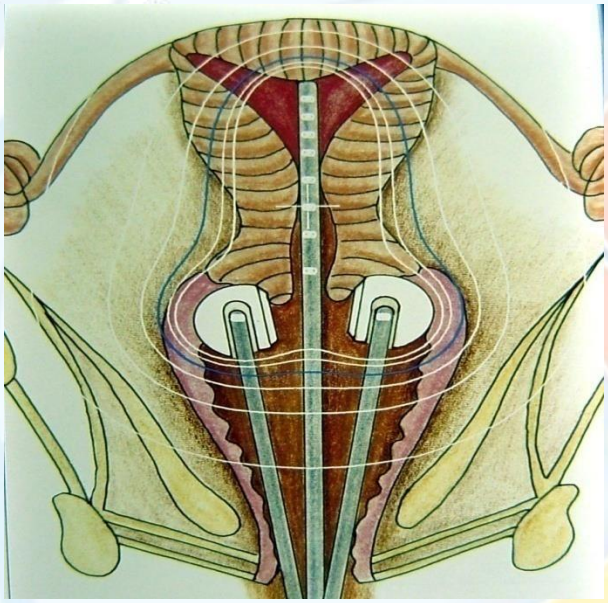
BRACHYTHERAPY

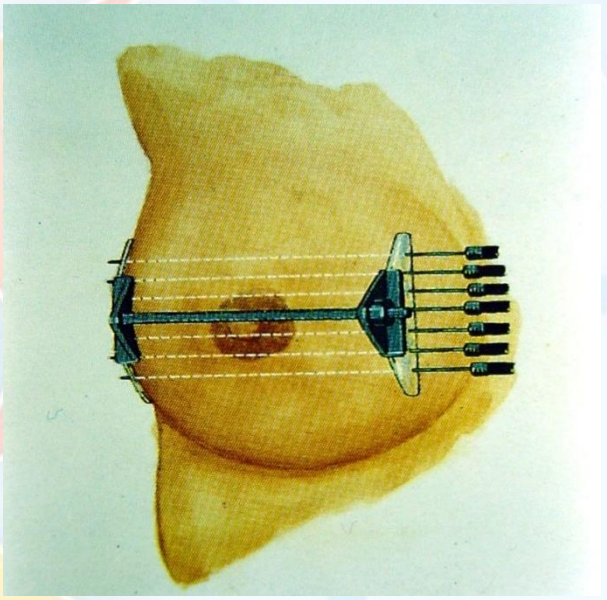
Brachytherapy

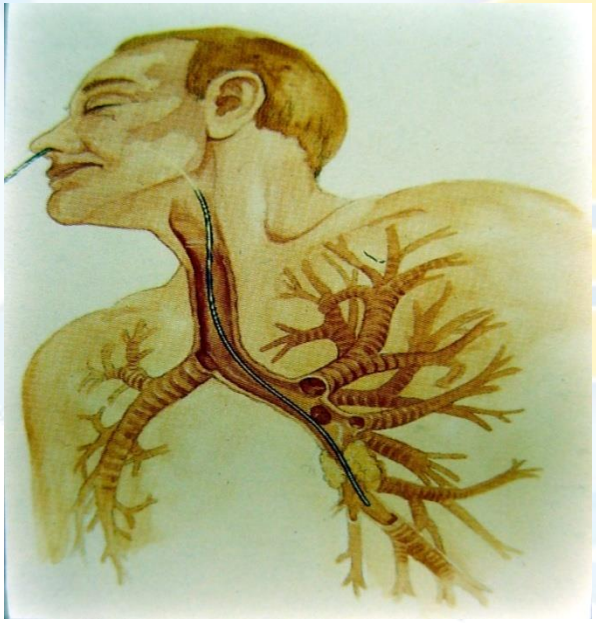
- Temporary brachytherapy : Ra- 226
  : Cs-137
  : Ir-192

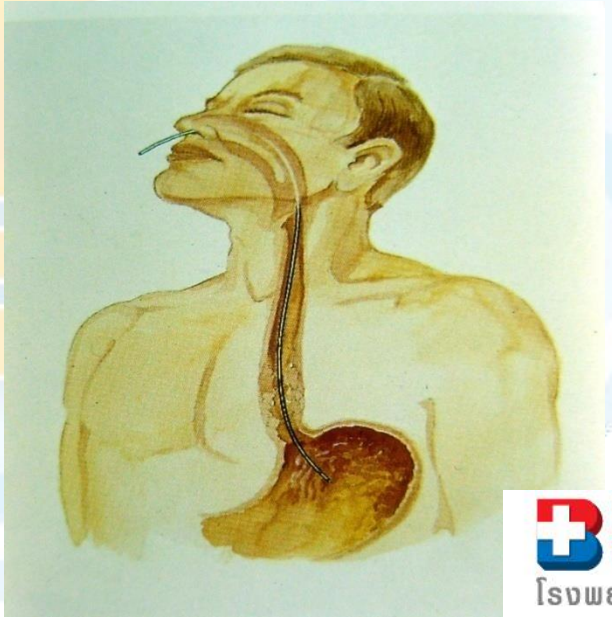
- Permanent brachytherapy : I-125
  : Paladium-103
  : Cesium -131

BRACHYTHERAPY

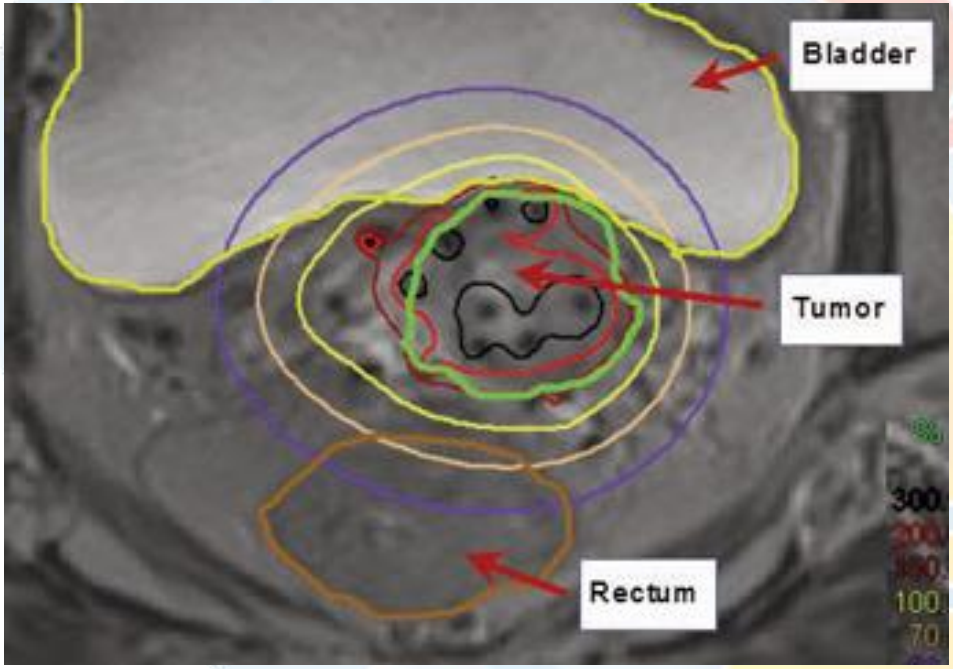




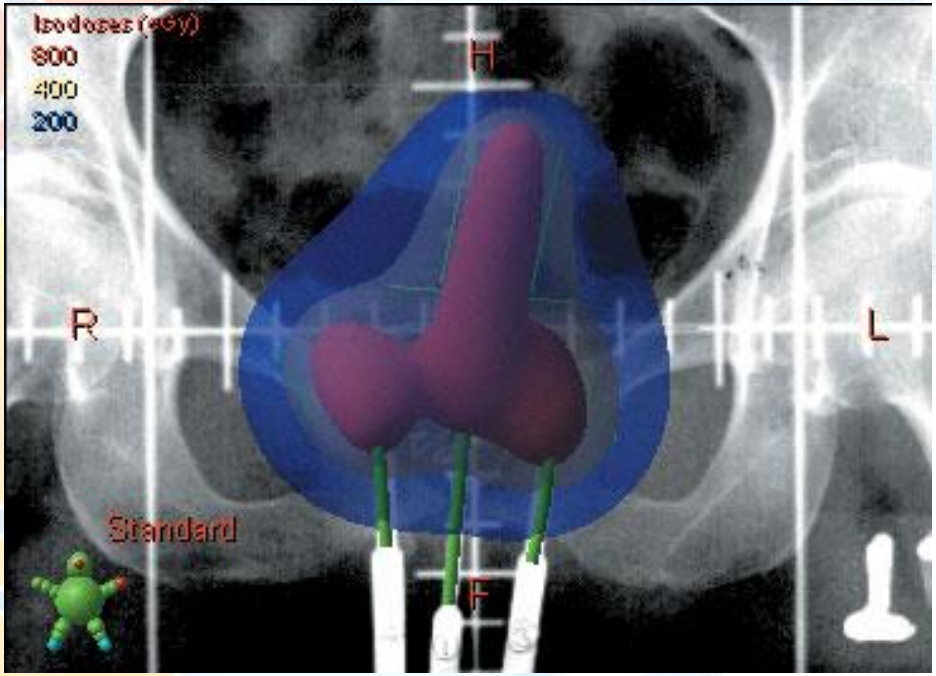




3D BRACHYTHERAPY
DOSE DISTRIBUTION



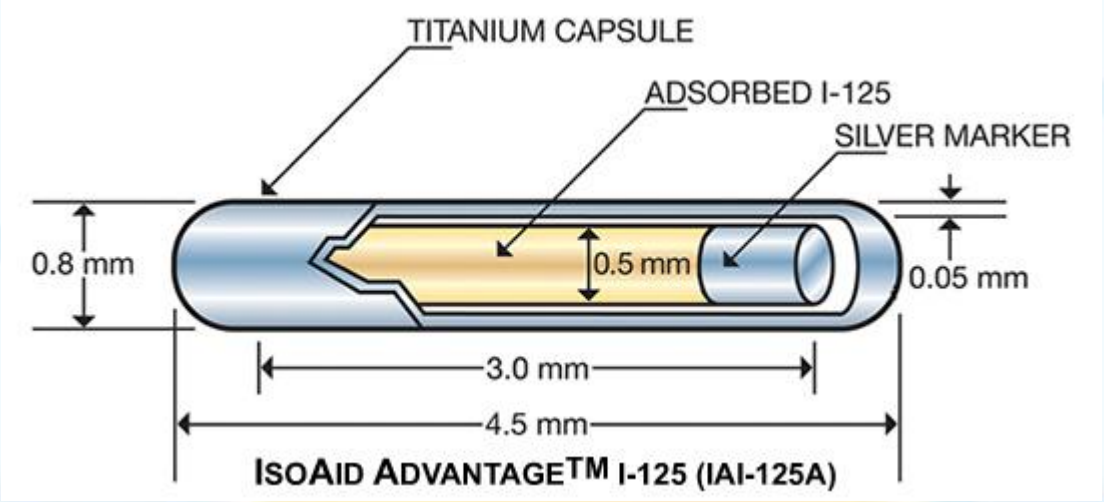
AXIAL VIEW

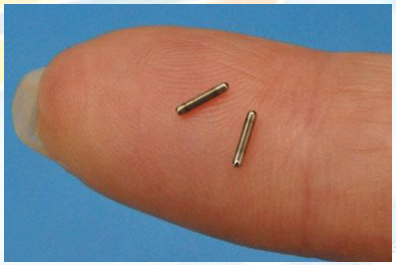


AP VIEW

การฝังแร่กัมมันตรังสีแบบถาวร
Permanent Brachytherapy

เม็ดแร่กัมมันตรังสี I-125



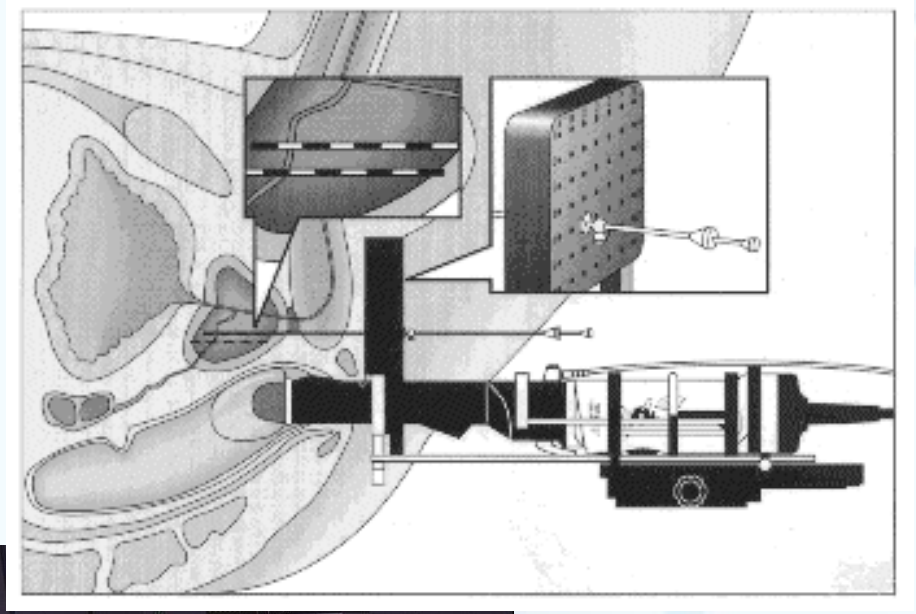


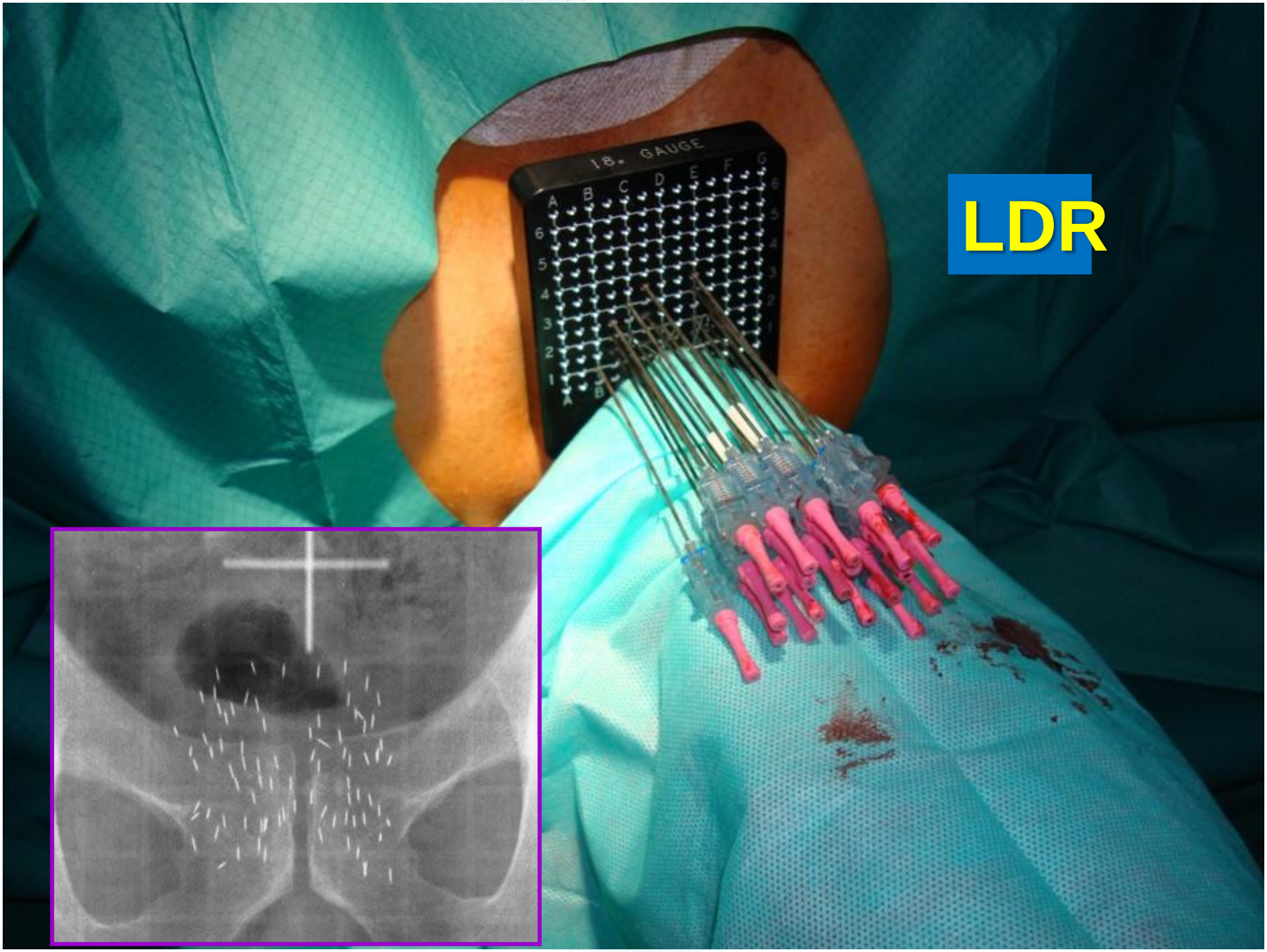
Iodine -125

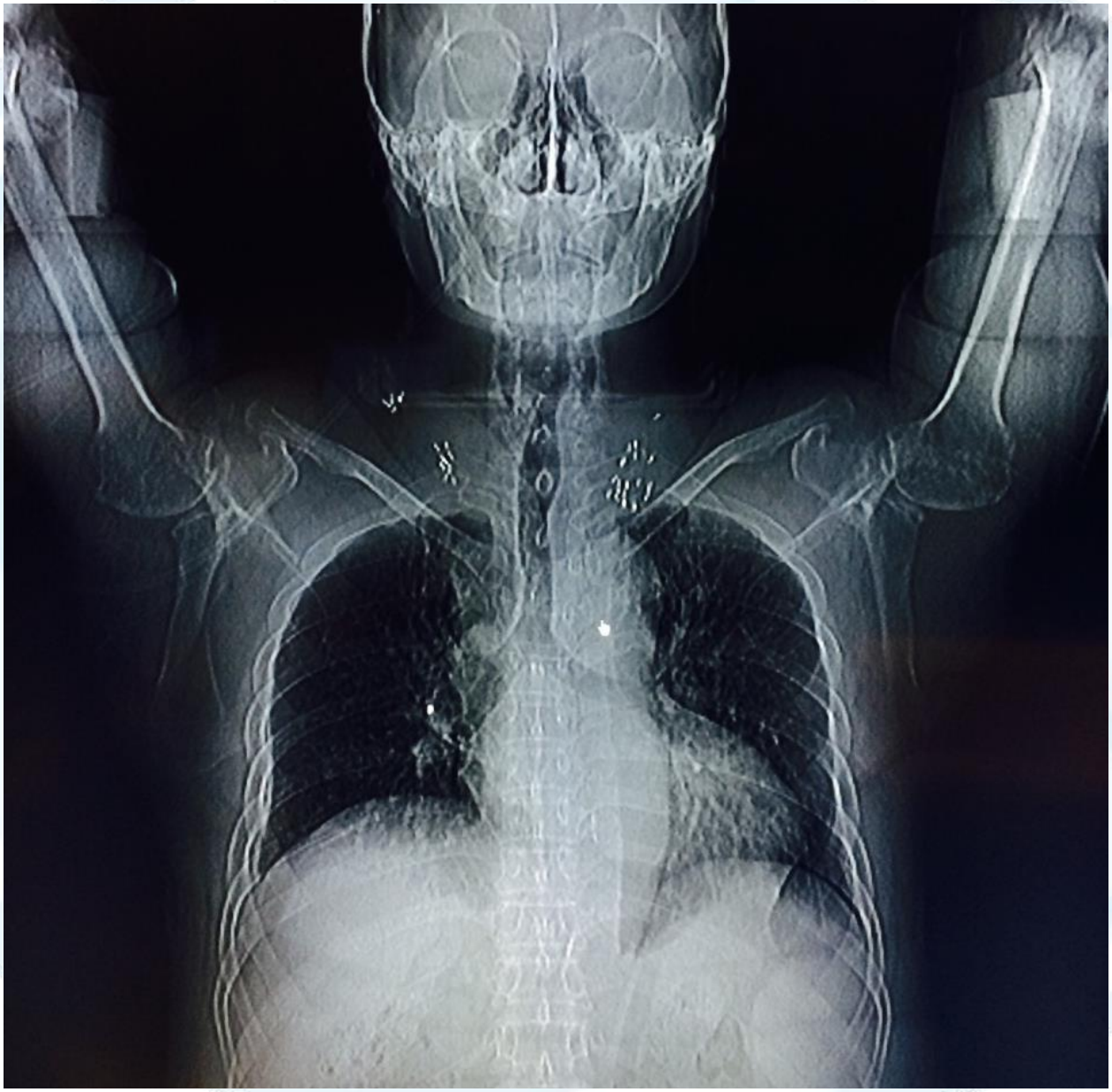
- Half life is 60 days
- Gamma decay with low energy of 35 kev
- Half value layer = 0.025 mm Pb
- Not suitable for imaging
- Use for radiation therapy as brachytherapy to kill cancer only in locally

PROSTATE IMPLANTATION

IMPLANTATION THECNIQUE



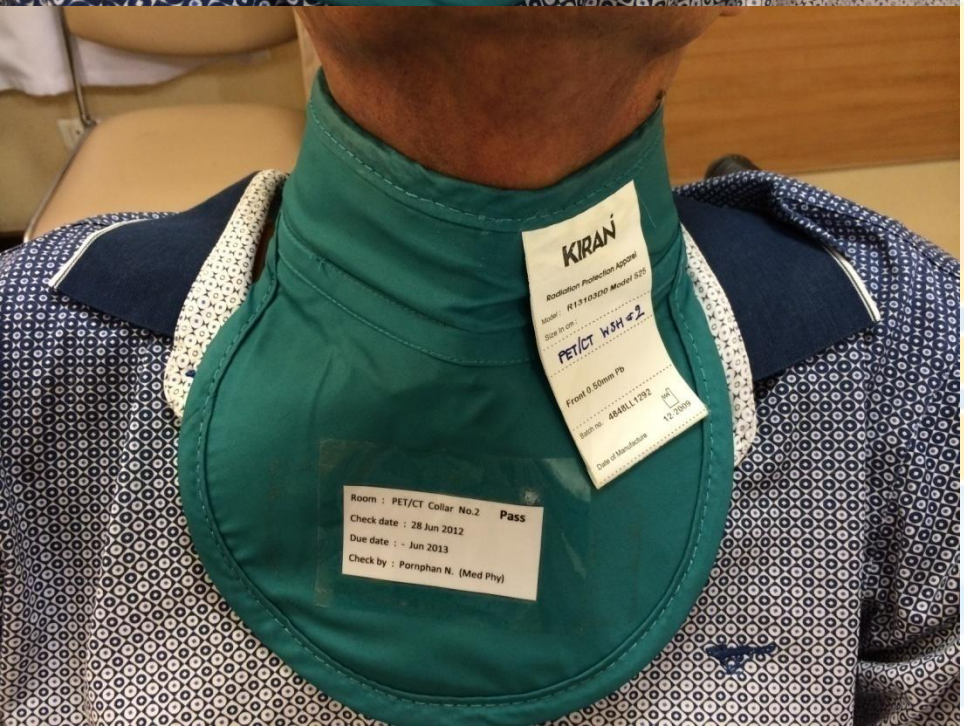

18. GAUGE
LDR



CA

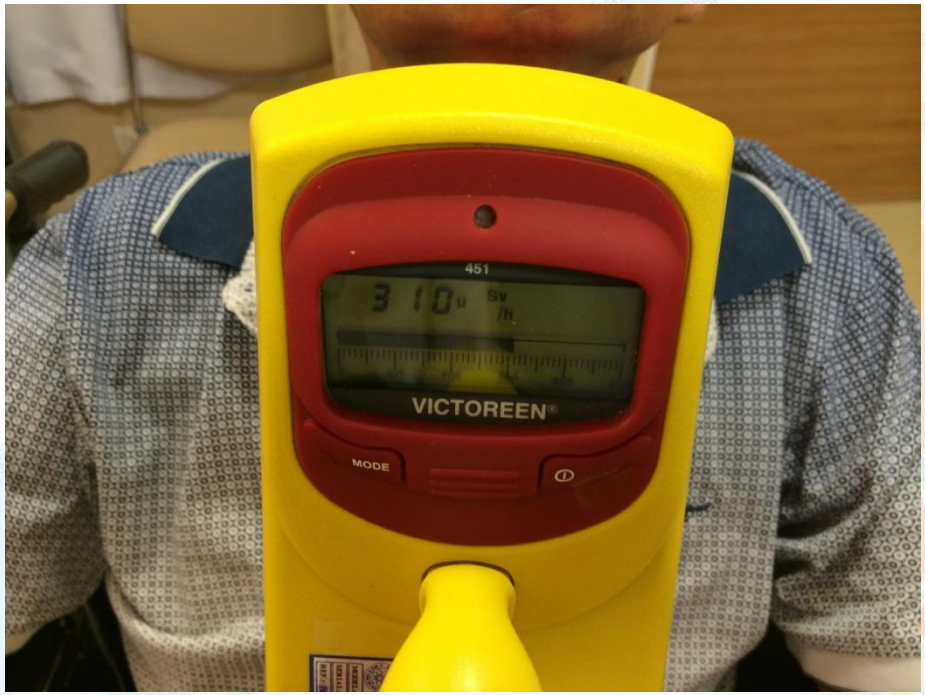
CA LUNG

Lead shield ด้านข้าง



Lead shield ด้านหน้า

At surface



Without shield

With shield


At 30 cm
Without shield
At 100 cm
With shield
VICTOREEN
451
MODE
KIRAN

SHORT REPORT Open Access

Incidence of seed migration to the chest, abdomen, and pelvis after transperineal interstitial prostate brachytherapy with loose ^{125}I seeds

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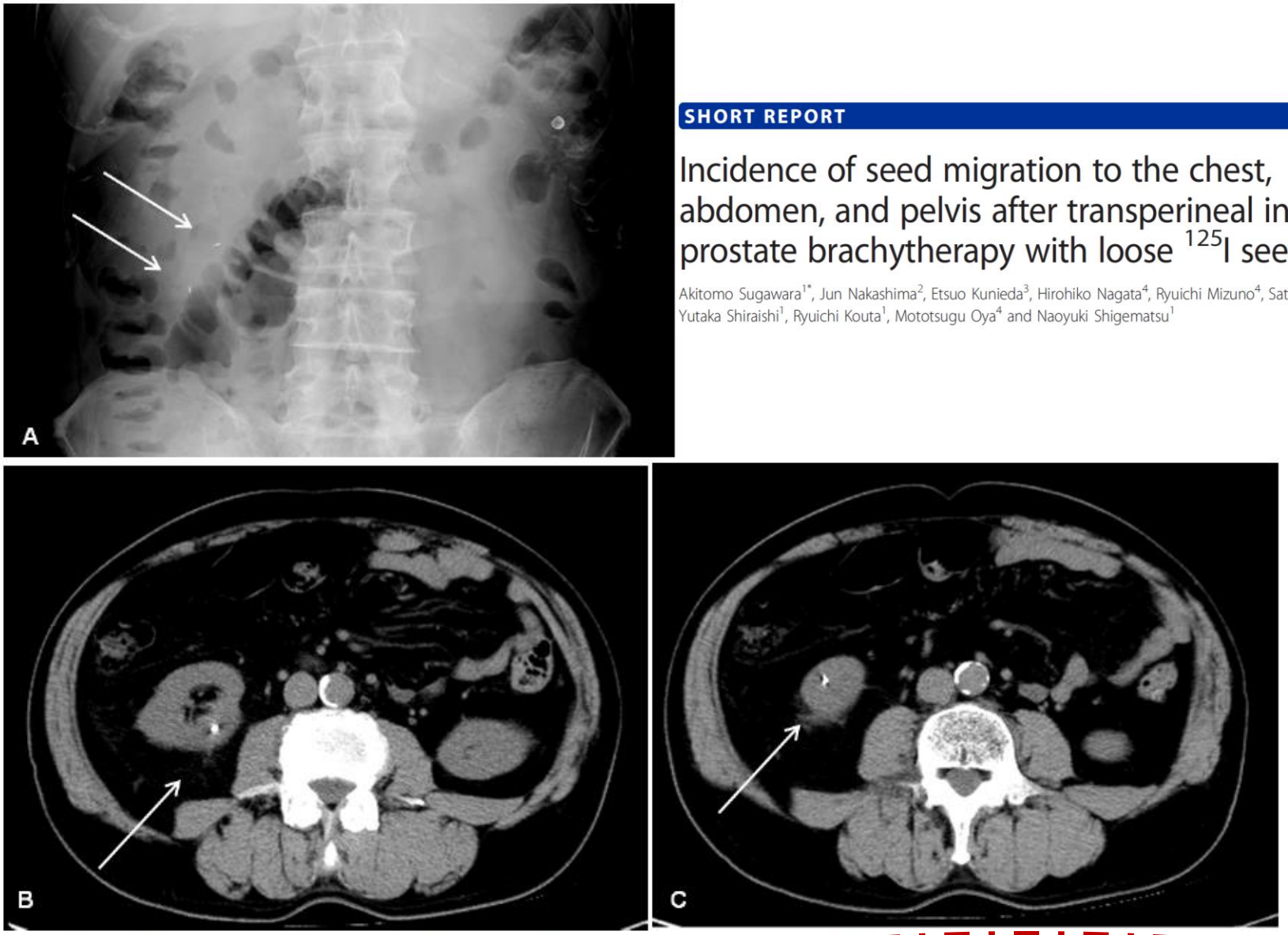
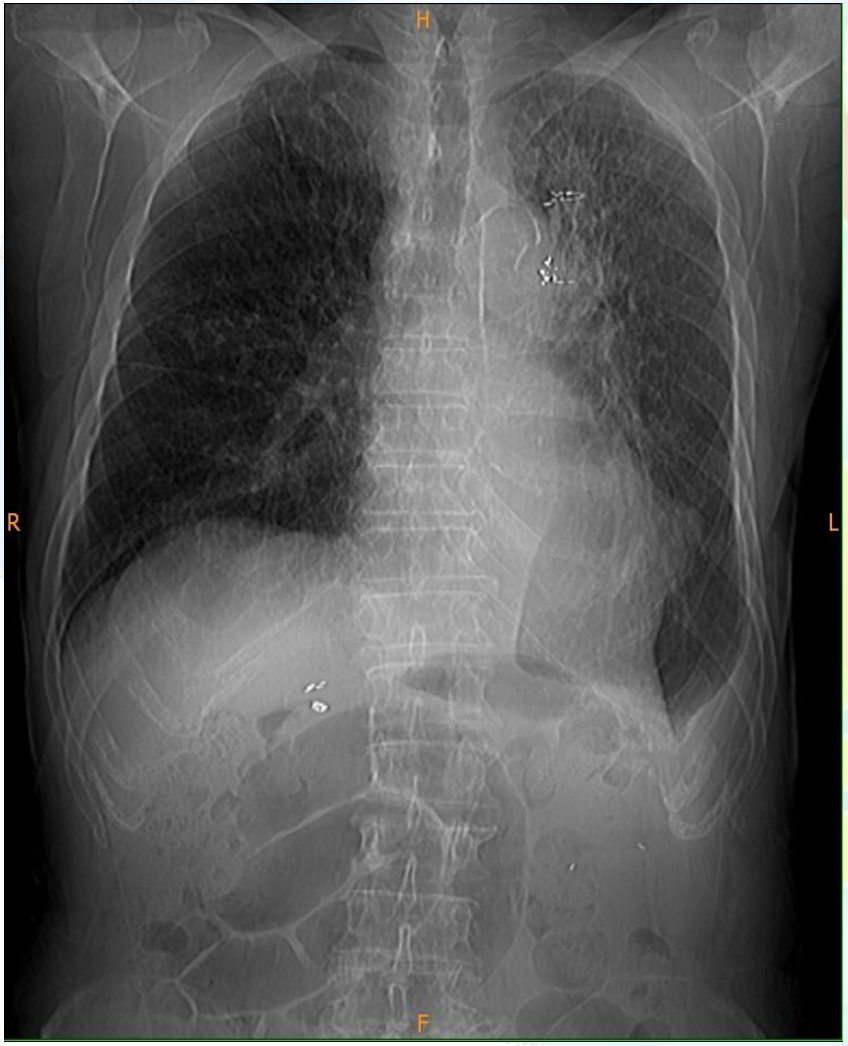
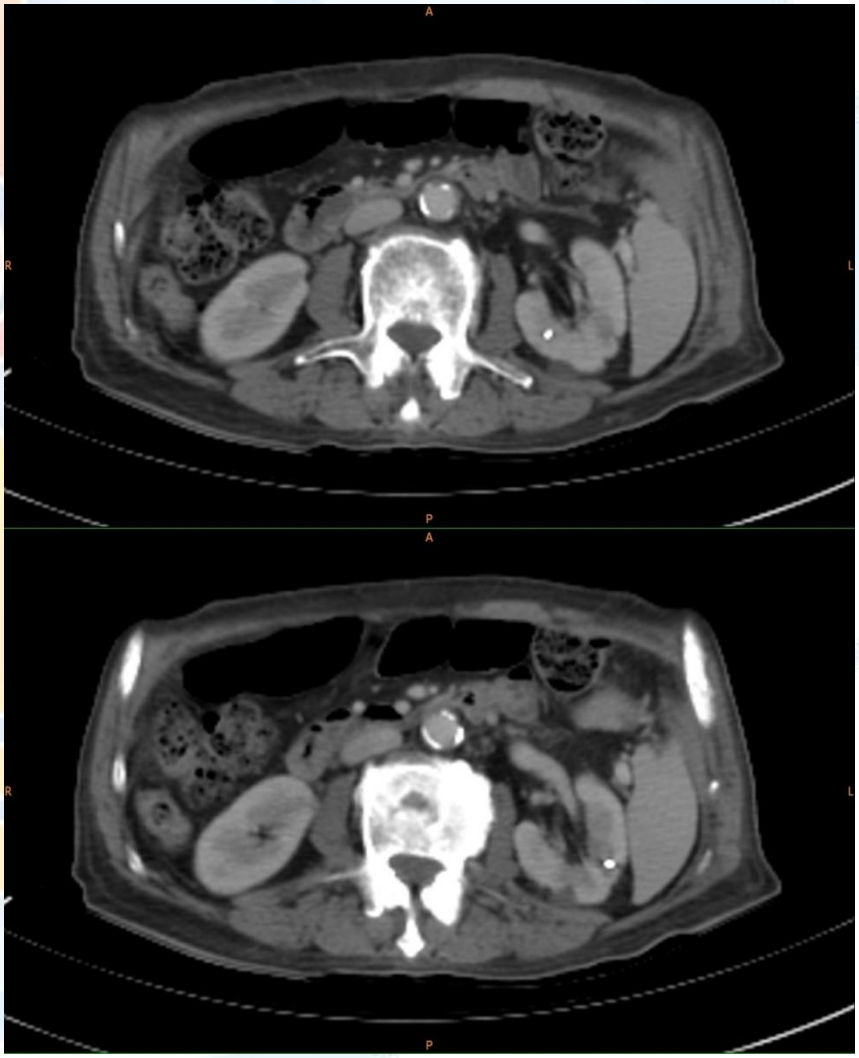


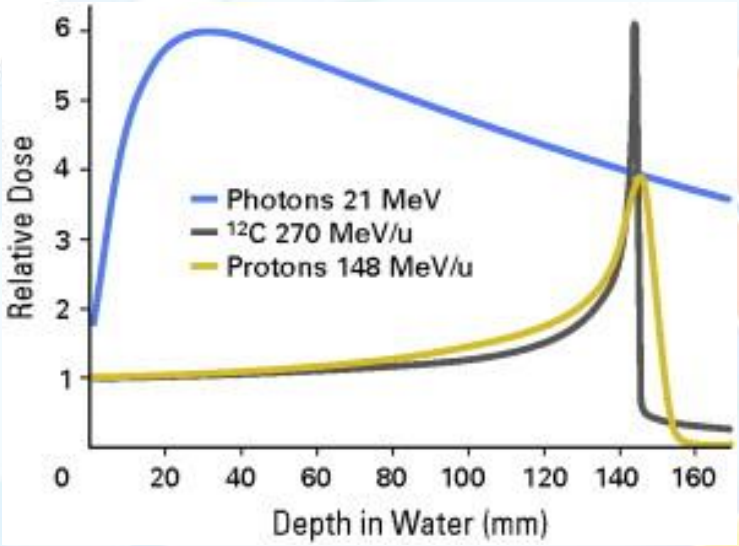
Figure 2 Case 2: Migration of two seeds to the same right kidney. Two weeks after seed implantation, a follow-up abdominal radiograph showed that two seeds had migrated to the right side of the middle abdomen (solid arrows) (A). Subsequent computed tomography showed that these two seeds had migrated to the same right kidney (solid arrows) (B,C).

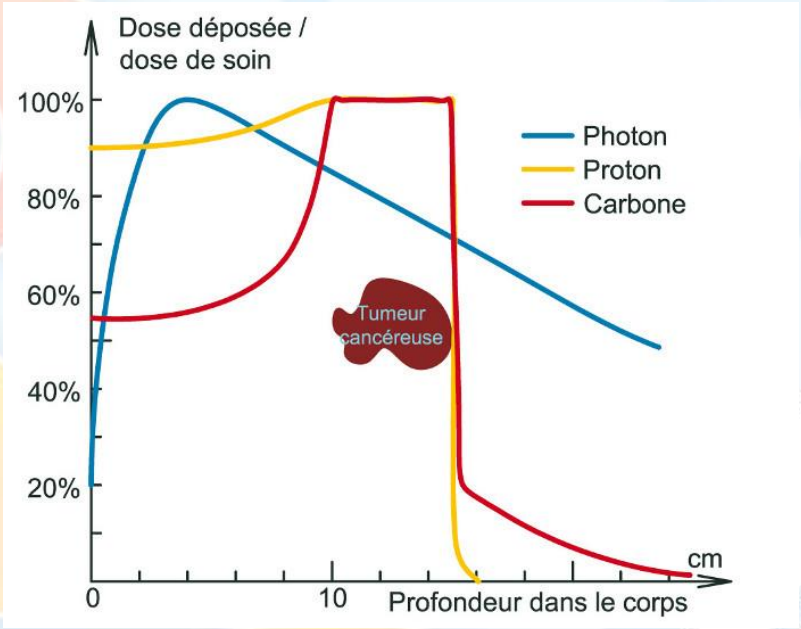
NSCLC with Adrenal gland metastasis post I-125 implantation with seeds migration to left kidney

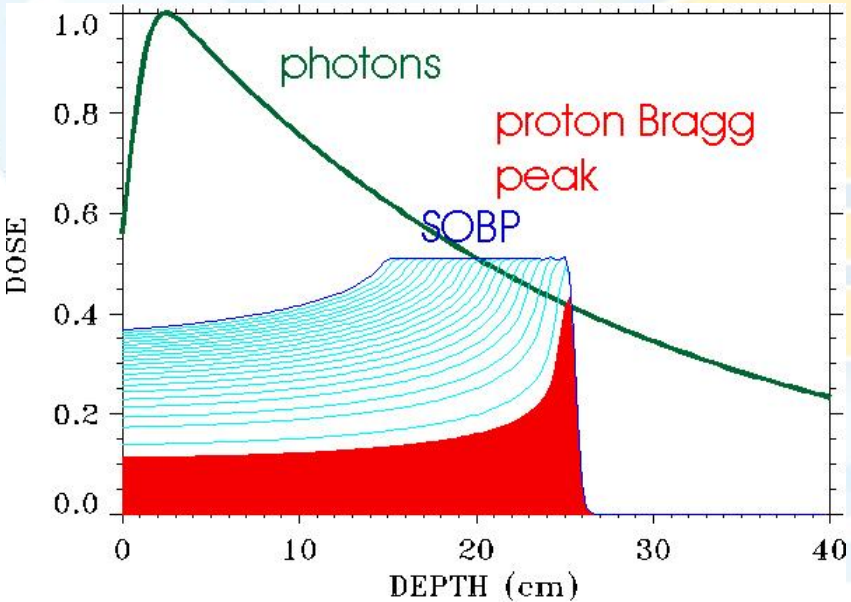




Particle Beam Therapy

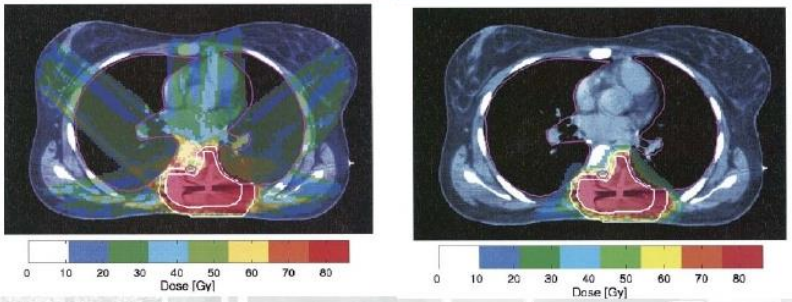






PROTON THERAPY

Paraspinal tumour treated with
IXRT vs. IPRT



From Weber et al, Int. J. Radiation Oncology Biol. Phys., Vol. 58, No. 5, pp. 1596–1606, 2004

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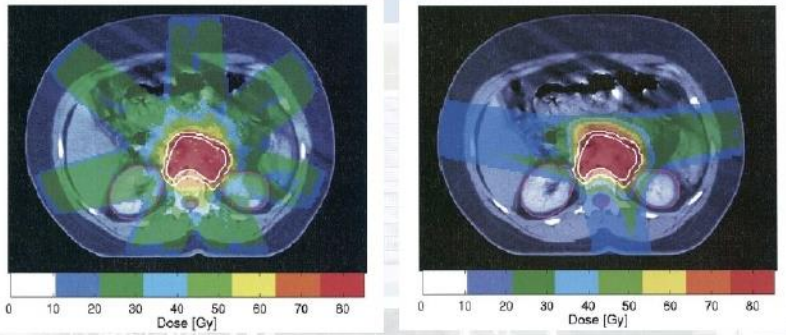

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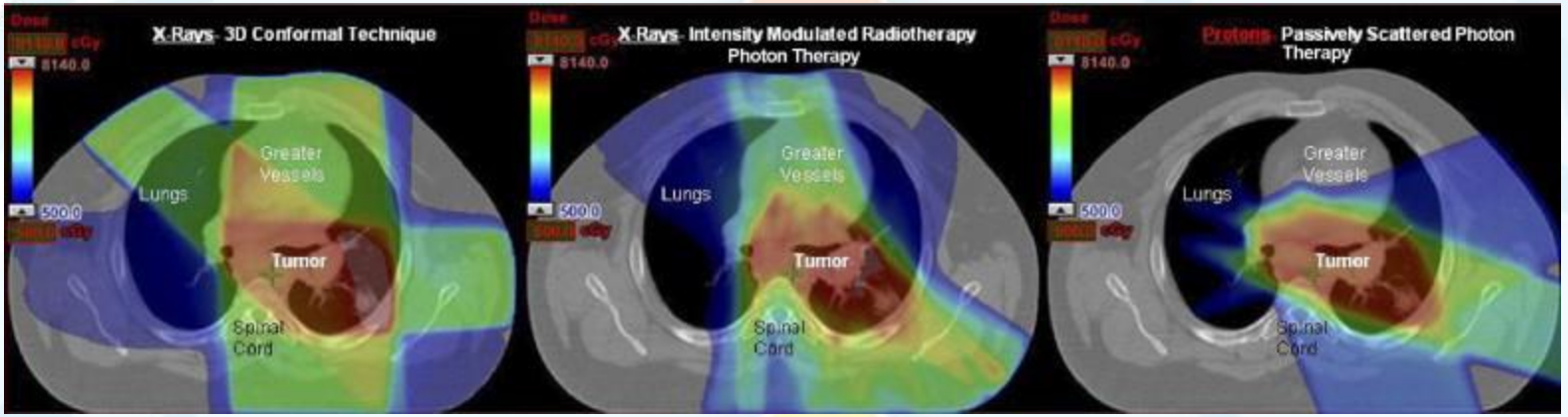
Carbon ion Therapy

Particle Beam Therapy



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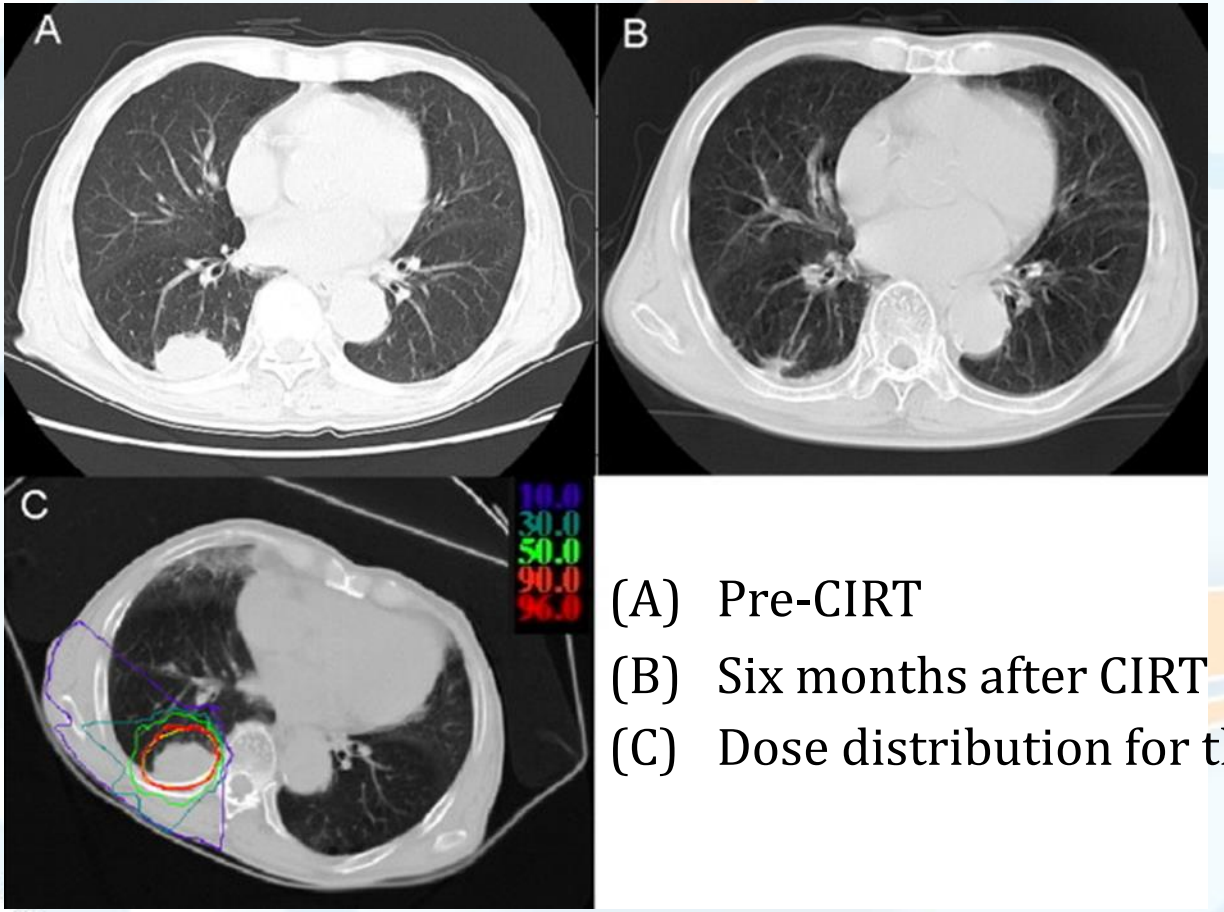
- Martijn Engelsman, PhD⍰, , , Marco Schwarz, PhD†, Lei Dong, PhD‡



(A) Pre-CIRT

(B) Six months after CIRT

(C) Dose distribution for the tumor

Thank You

Presented by:

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