



๔๐ปี วันพระราชทานนาม  
๑๒๐ปี มหาวิทยาลัยมหิดล  
สืบสานพระราชปณิธาน  
สู่ปณิญาของแผ่นดิน

# Advanced RT in CA Cervix; Stereotactic Body Radiotherapy

Chomporn Sitathanee, M.D.

Ramathibodi Hospital, Mahidol  
University, Bangkok, Thailand



คณะแพทยศาสตร์โรงพยาบาลรามาธิบดี  
Faculty of Medicine Ramathibodi Hospital



# RT in CA Cervix

## Techniques:

- External RT
- Brachytherapy
  - Intracavitary
  - Interstitial implant

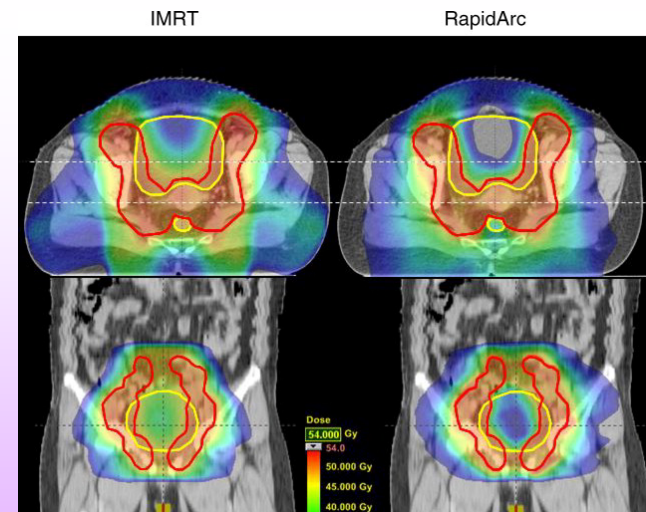
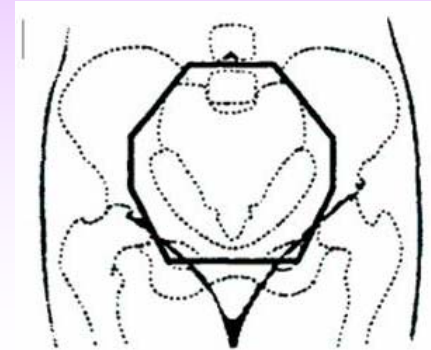
## Roles:

- Definitive RT
- Adjuvant
- Salvage for recurrence
- Palliation



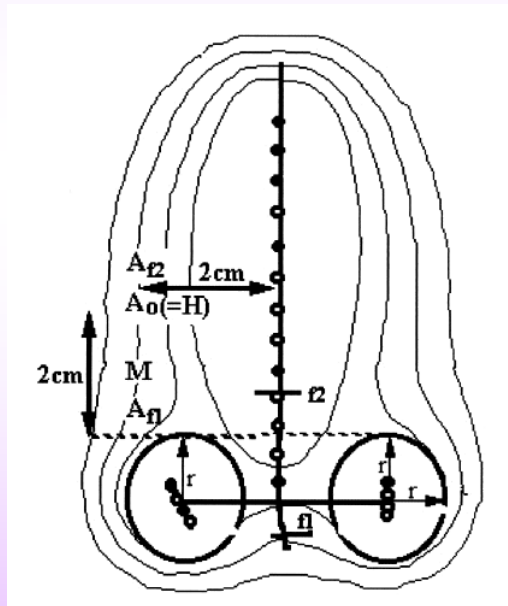
# Evolution; External RT

- 2D
- 3D: – 3DCRT  
– IMRT  
– Stereotactic RT
- 4D: IGRT
- Adaptive RT

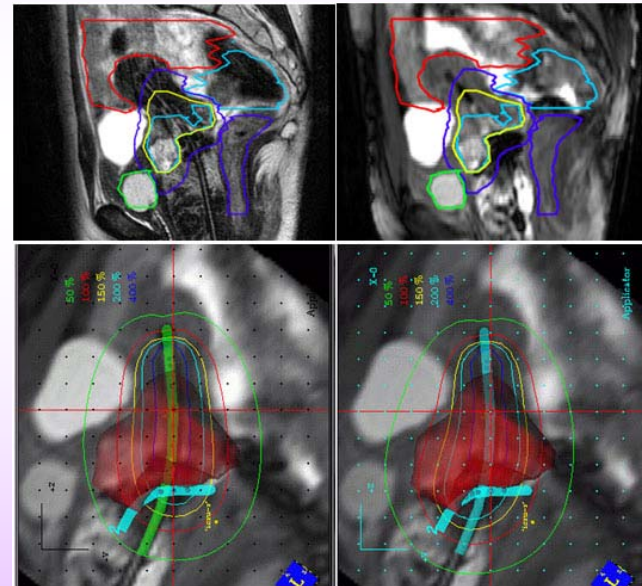


# Evolution; Brachytherapy

- 2D



- 3D: CT/MRI-based





๔๐ปี วันพระราชทานนาม  
๑๒๐ปี มหาวิทยาลัยมหิดล  
สืบสานพระราชปณิธาน  
สร้างปัญญาของแผ่นดิน

# Stereotactic Radiation

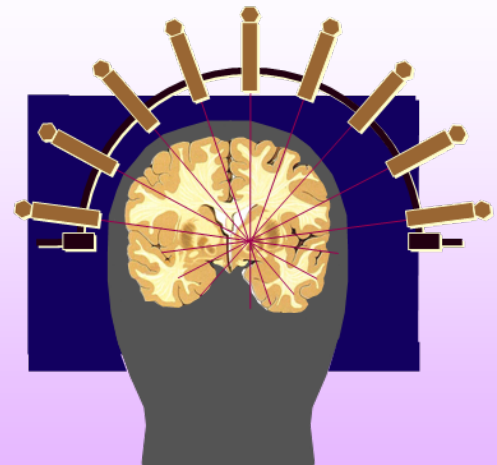


คณะแพทยศาสตร์โรงพยาบาลรามาธิบดี  
Faculty of Medicine Ramathibodi Hospital



→ A specialized type of EBRT uses

- “Small multiple convergent non-coplanar beams”, targeting a well-defined tumor
- Aimed to deliver high dose to the target while sparing normal tissues (rapid dose fall off)



# Stereotactic Radiation

- Need detailed 3D imaging
- Computerized 3D planning
- Precise patient set up & treatment delivery
- Tumor tracking – image-guided

→ *High accuracy treatment*

# Stereotactic Radiation

- Stereotactic Radiosurgery (SRS)= single f
- Stereotactic Radiotherapy (SRT)= multiple f

## Methods

- Gammaknife: Co-60 (only SRS)
- Linac-based (X-knife)
- Particle beam



# Technological development

- Frame-based  
→ Intracranial-skull base



- Frameless
- Image-guided tumor tracking  
→ whole body



*“Stereotactic Body Radiotherapy (SBRT)”*

# Robotic Radiosurgery; *CyberKnife*



- Frameless whole-body image-guided robotic radiosurgery system
- Usually 1-5 f (use high d/f)

# Clinical Uses

- Brain: malignant, benign, functional
  - Spine
  - Lung
  - Liver
  - Prostate
- } primary or metas.
- Recurrent pelvic & paraaortic tumor (colorectal, GU, Gyn)

# Patient selection for SBRT

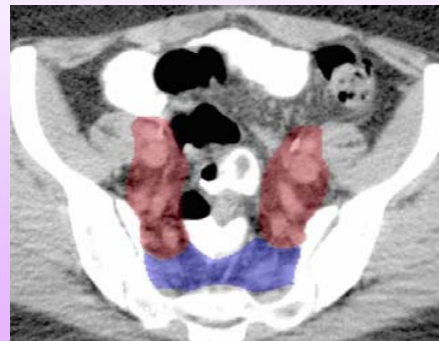
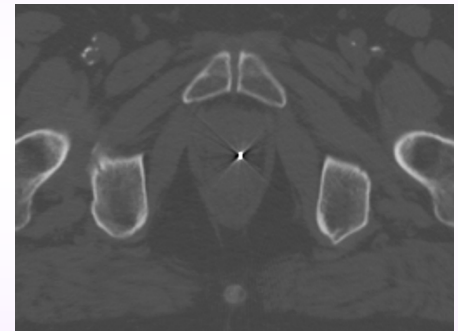
- Lesions < 10 cm (well-defined)
- No ulceration through skin or involve > 50% of bowel/bladder/rectum/vessel
- Limited volume and well-controlled oligometastasis
- Life expectancy  $\geq$  6 mo
- Well co-operate

# Patients who are unlikely to benefit or *NOT* suitable

- widely metastatic disease
- Short life expectancy, unstable condition, not co-operate
- Lesions invade luminal structures
- Extensively infiltrative lesions
- Following complete resection
- Not feasible for fiducial placement

# Treatment Process

- Fiducial placement (if needed)
- Wait at least 1 wk
- CT scan  $\pm$  MRI/PET
- Target & normal organ delineation



# Treatment Process

- Treatment planning (inverse plan)
- Plan evaluation



- **Treat:** 1-5f within 1-2 wk, 1-3hr each

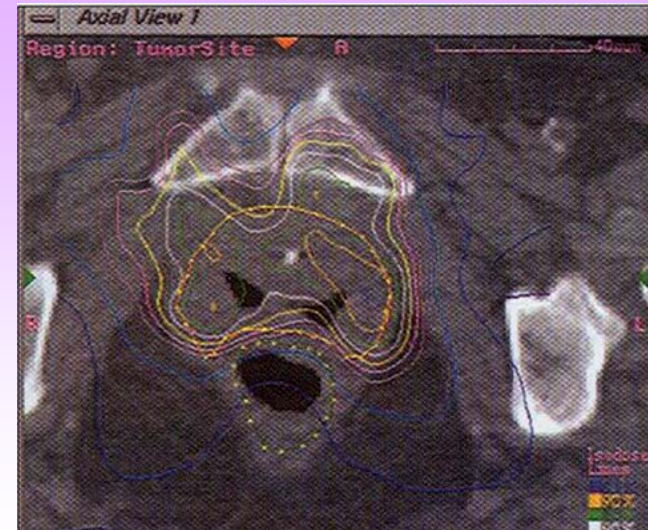


# CKSBRT & IMRT comparison

	IMRT	CKSBRT
Area of treatment	Large/infiltrative	Small/well-defined
Dose/f	~ 1.8-2 Gy/f	10-20 Gy 5-8 Gy
# of fraction	25-35f in 5-7wk	1-5f within 2wk
# of beam	6-10 beams	100-300 beams
Treatment time	20-30 min	1-3 hr



- Recurrent CA cervix at vaginal stump 20y after RT and surgery treated with CKSRT



Pretx



3 mo.

## CLINICAL INVESTIGATION

### IMAGE-GUIDED STEREOTACTIC BODY RADIATION THERAPY IN PATIENTS WITH ISOLATED PARA-AORTIC LYMPH NODE METASTASES FROM UTERINE CERVICAL AND CORPUS CANCER

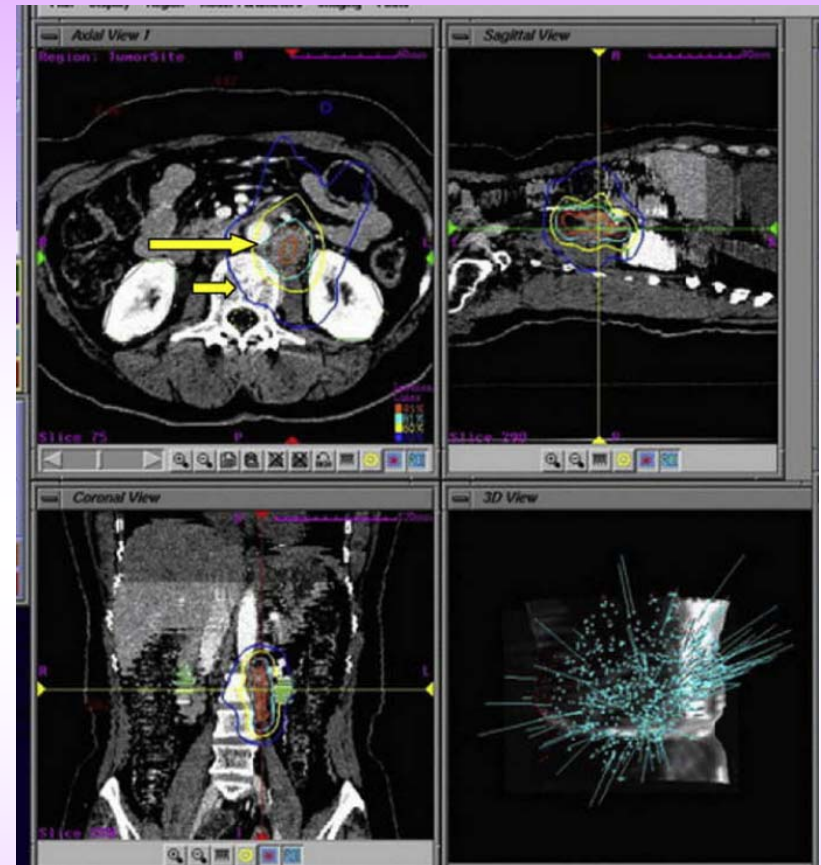
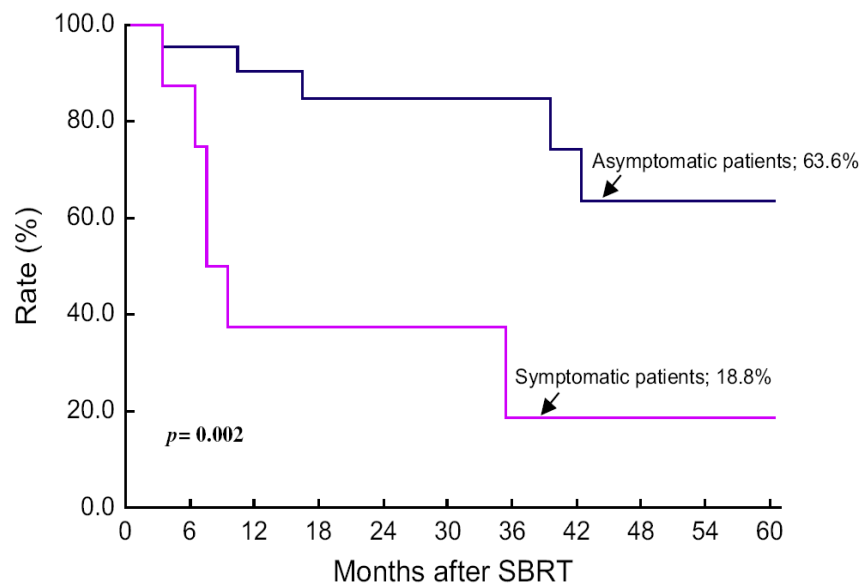
■ 30 pt

#### Dose (Gy)

EBRT	SBRT	Fractions of SBRT	No. of patients	PTV (ml)	NTD <sub>2Gy</sub>
45	13	1	1	7.4	60
27–45	30–33	3	3	5.5–54.2	77–94
	33–37.5	3	12	3.7–52.5	58–70
	39	3	11	5.6–57.3	75
	42–45	3	3	1.3–7.7	84–94

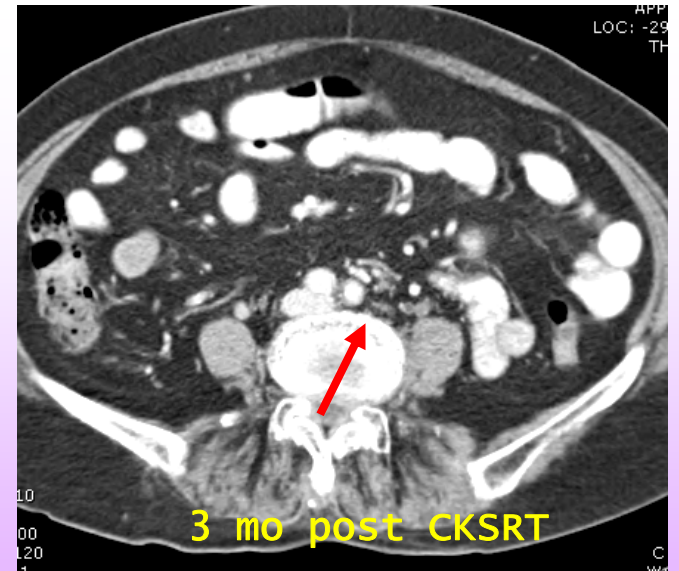
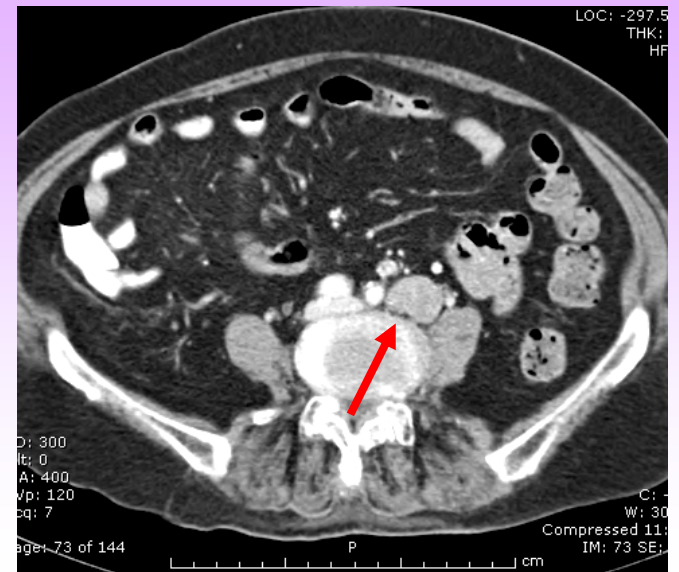
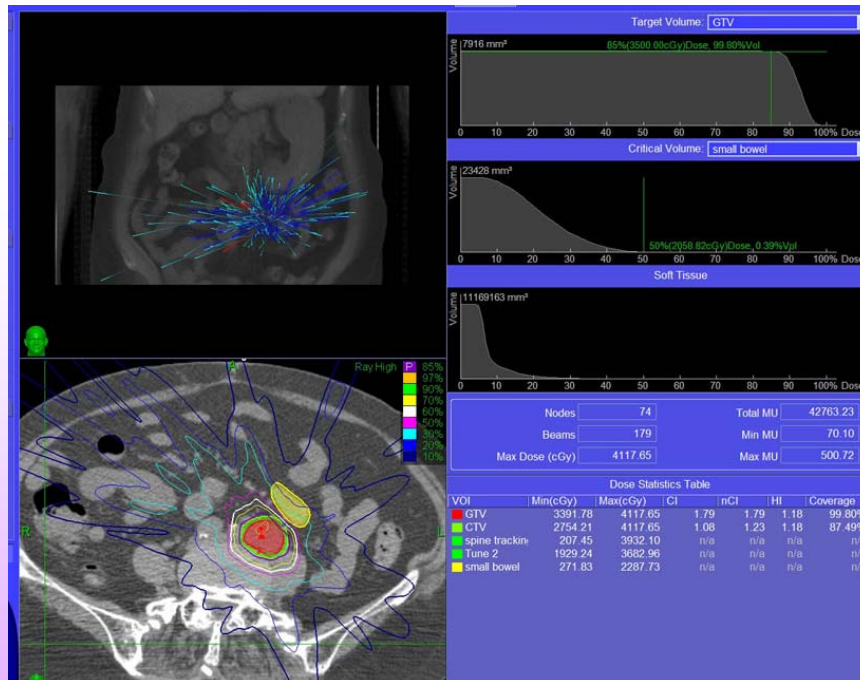
- 4yLC 67%, OS 50%, PFS 45%

#### 4y overall survival rates



## *Ramathibodi Hospital*

- CA cervix IIB post RT 3yr  
→ Lt CILN recurrence
- CKSRT 7 Gy at 85% x 5f  
(179 beams; spine tracking)



# Conclusions

- SBRT is a promising treatment strategy for recurrent pelvic lesions.
- Prelim results show encouraging tumor control, as well as excellent palliation with minimal adverse effects.





๔๐ปี วันพระราชทานนาม  
๑๒๐ปี มหาวิทยาลัยมหิดล  
สืบสานพระราชปณิธาน  
สู่ปัญญาของแผ่นดิน



คณะแพทยศาสตร์โรงพยาบาลรามาธิบดี  
Faculty of Medicine Ramathibodi Hospital

