

*** Radiation to the Pelvis
~ The Radiation
Therapist's
Perspective**

Joseph Pagano, BS RT(T)

Presented today by Patricia Chapin, RT(T)

* Pelvic RT outline

- * Anatomy & cancer incidence
- * Common cancers we see
 - * Patient setup
 - * On treatment concerns
 - * Common side effects
 - * OARs
- * Interesting cases

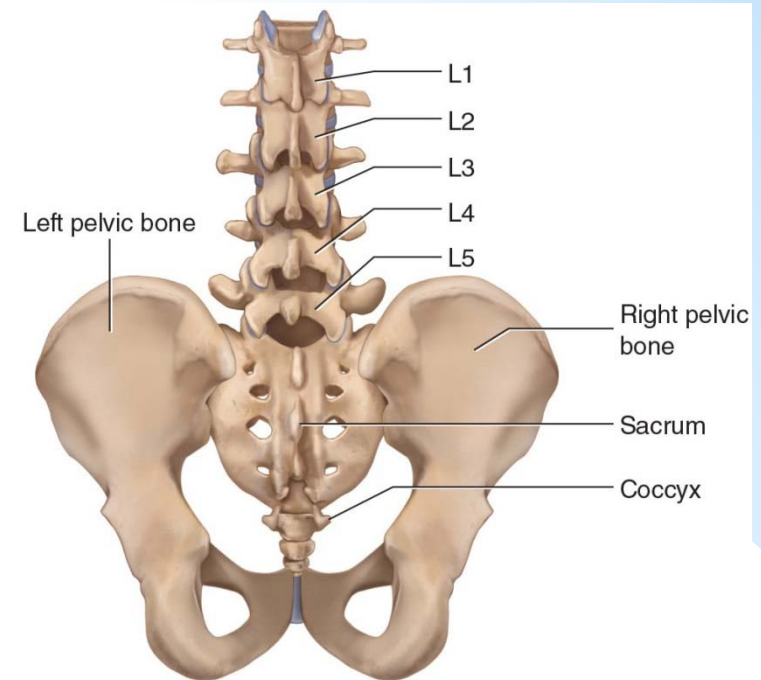


**Pelvic region ~ lower
part of the trunk
between the abdomen
and thighs**

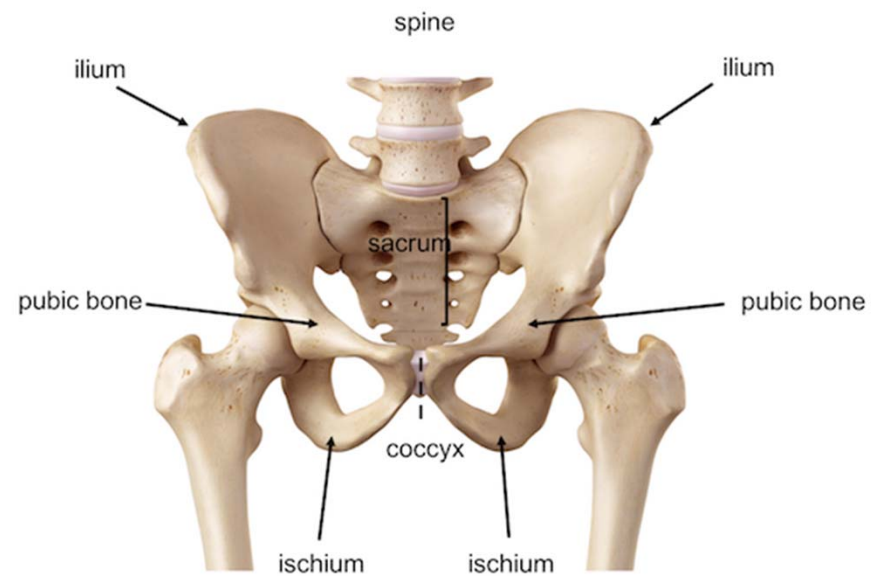


Bony Anatomy of the pelvis

- Lumbar Spine
- Sacrum
- Ilium
- Pubic bone
- Coccyx
- Ischium
- Femoral head
- Proximal femur



Copyright © 2015 Wolters Kluwer Health | Lippincott Williams & Wilkins



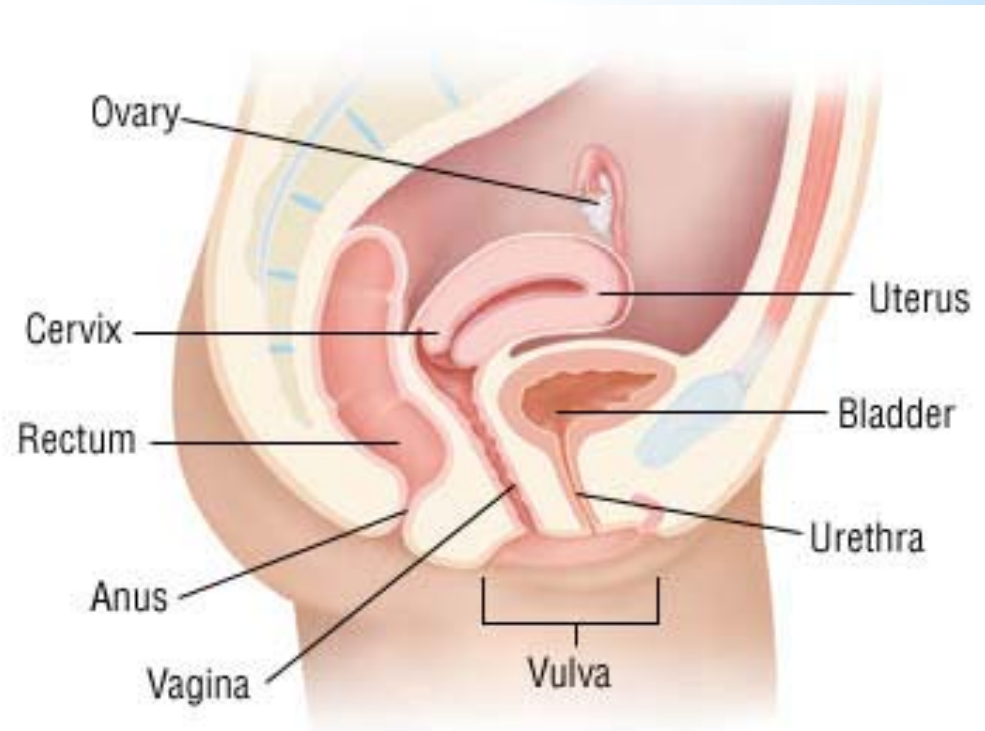
How Common Is This Cancer?

Common Types of Cancer	Estimated New Cases 2019	Estimated Deaths 2019
1. Breast Cancer (Female)	268,600	41,760
2. Lung and Bronchus Cancer	228,150	142,670
3. Prostate Cancer	174,650	31,620
4. Colorectal Cancer	145,600	51,020
5. Melanoma of the Skin	96,480	7,230
6. Bladder Cancer	80,470	17,670
7. Non-Hodgkin Lymphoma	74,200	19,970
8. Kidney and Renal Pelvis Cancer	73,820	14,770
9. Uterine Cancer	61,880	12,160
10. Leukemia	61,780	22,840
-	-	-
Cancer of Any Site	1,762,450	606,880

In 2019, it is estimated that there will be 1,762,450 new cases of cancer of any site and an estimated 606,880 people will die of this disease.

* <https://seer.cancer.gov/statfacts/>

-Most common GYN cancer in the US is endometrial followed by ovarian cancer.



-Global cancer incidence in women

Rank	Cancer	New cases diagnosed in 2018	% of all cancers (excl. non-melanoma skin cancer)
	All cancers*	8,218,216	
1	Breast	2,088,849	25.4
2	Colorectal**	794,958	9.7

Global cancer incidence in men

Rank	Cancer	New cases diagnosed in 2018	% of all cancers (excl. non-melanoma skin cancer)
	All cancers*	8,818,685	
1	Lung	1,368,524	15.5
2	Prostate	1,276,106	14.5
3	Colorectal**	1,006,019	11.4
4	Stomach	683,754	7.8
5	Liver	596,574	6.8
6	Bladder	424,082	4.8

SARCOMA

Types

Angiosarcoma

Malignant neoplasm
in the vessel walls

Osteosarcoma

Tumor in a bone

Ewing's sarcoma

Bone

Chondrosarcoma

Cartilage

Gastrointestinal stromal tumor

Mesenchymal neoplasms
of the gastrointestinal tract

Liposarcoma

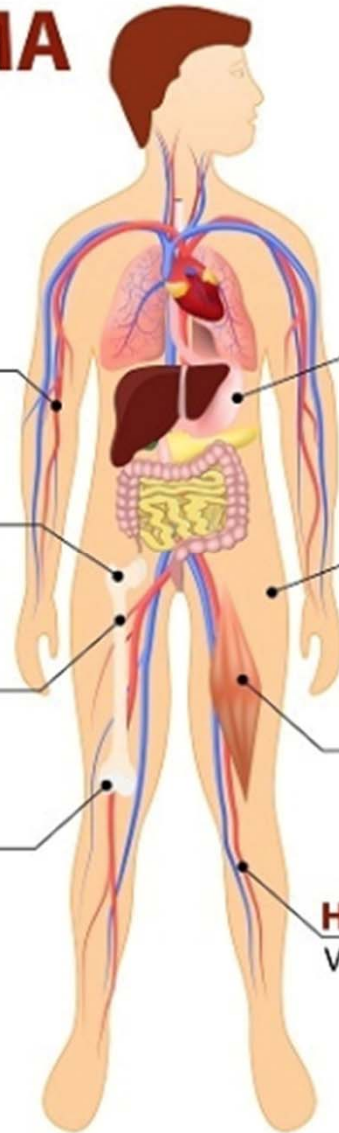
Fat cells

Fibrosarcoma

Fibrous connective tissue

Hemangioendothelioma

Vascular neoplasms



*Treatment sites!

- * Bony Mets
- * Bladder
- * Prostate
- * Colorectal
- * Cervical
- * Uterine/Endometrial
- * Vaginal ~ vagina/vulvar
- * Sarcoma
- * Etc...

*Organs at risk during pelvis RT

- Rectum
- Bladder
- Urethra & Ureter
- Large & Small Bowels
- Gynecologic
- Bone and bone marrow
- Testicles, etc...

Treatment sites & associated patient setup

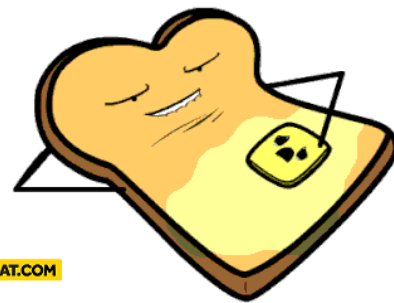
Cancers:

- * Bony mets
- * Bladder
- * Prostate
- * Cervical
- * Uterine/endometrial

Pelvic RT

Setup:

- Supine
- Head First
- Hands on chest
- Knee roll or leg immobilization
- Triangulation points at a reproducible spot on the pelvis



STARECAT.COM

Cancers:

* Rectal

* Sarcomas?

Setup:

Prone

Head first

Bellyboard

Triangulation points
at a reproducible spot
on the pelvis

Pelvic RT

Cancers:

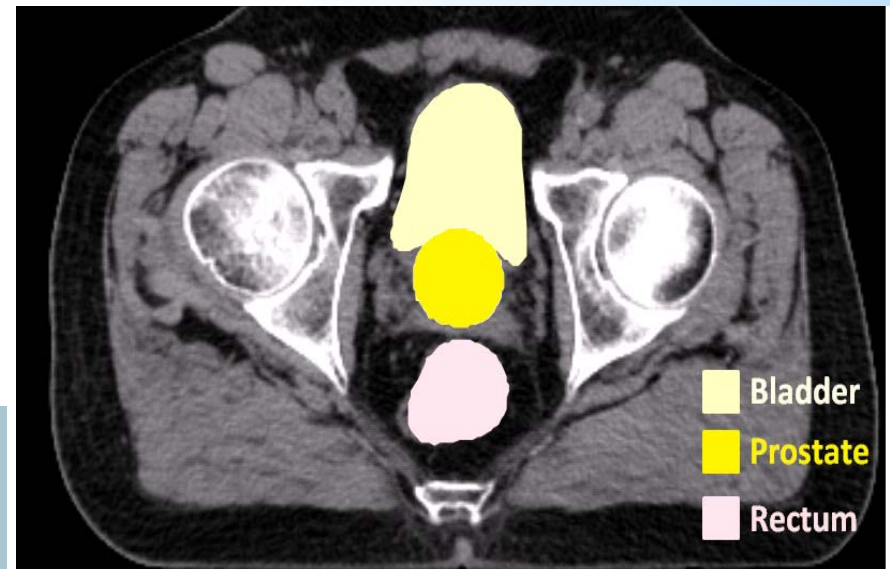
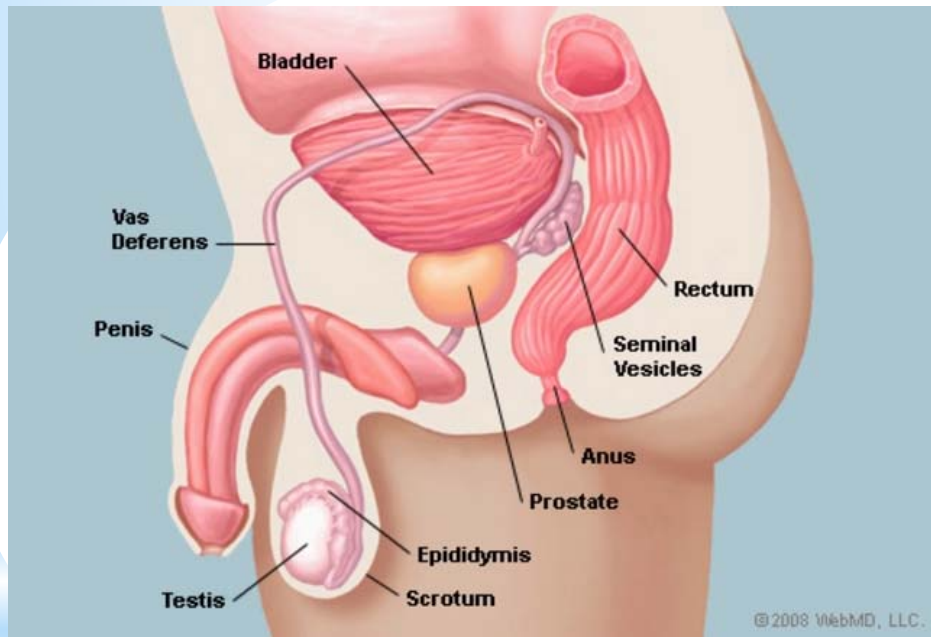
- * Anal
- * Vulvar
- * Inguinal

Pelvic RT

Setup:

- Supine
- Head first
- Hands on chest
- Frog-legged
- Vac-lok fixed into backwards wing board indexed to table

**Site specific setup,
treatment, and
interesting topics!**



* Prostate cancer

* Patient setup

- * Supine, legs straight in Vac-Lok, CA placed at a reproducible location (close to fiducial markers or prostate bed)
- * Empty rectum ~ Full Bladder
- * In-tact prostate~ Fiducial Markers, kV/kV match daily, CBCT week 1, once a week Thereafter
- * Prostate bed~ CBCT daily



* Standard fractionation ~ 180cGy to 200 cGy/fraction, 40 to 44 fractions

~Trending towards ~

* hypofractionated course: 7000 cGy in 28 fractions
250 cGy/fx

* Can be used with low, intermediate, and high risk prostate cancer, as long as the lymph nodes are not being treated

* Prostate Cancer

Where we are going...

- * ultrahypofractionation

- * ~ 3500 cGy in 5 fractions 700 cGy/fx, or

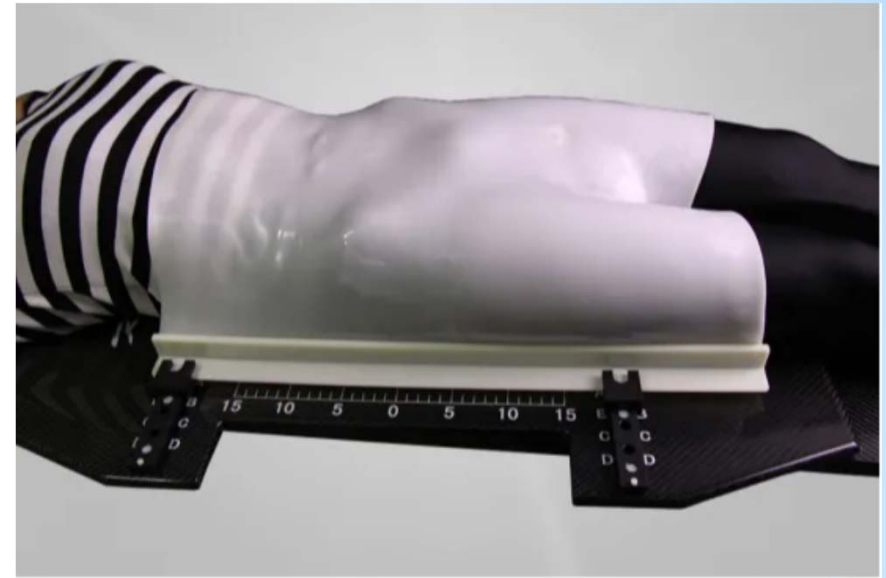
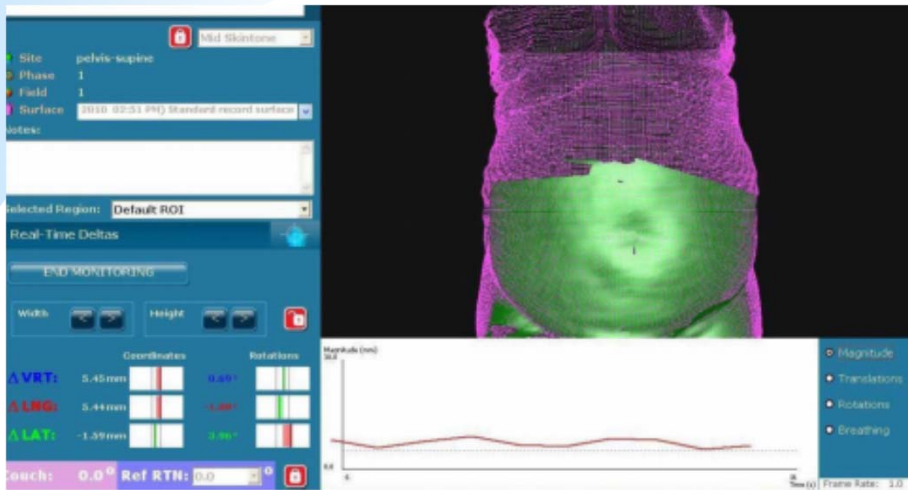
- * 3625 cGy in 5 fractions 725 cGy/fx over 1-2 weeks

- * Recommended for low risk patients as of right now

* Prostate Cancer

<https://www.healio.com/hematology-oncology/prostate-cancer/news/in-the-journals/%7Bcb812c62-3506-4c37-a948-3dde59b6f297%7D/guideline-supports-shorter-radiation-therapy-option-in-prostate-cancer>

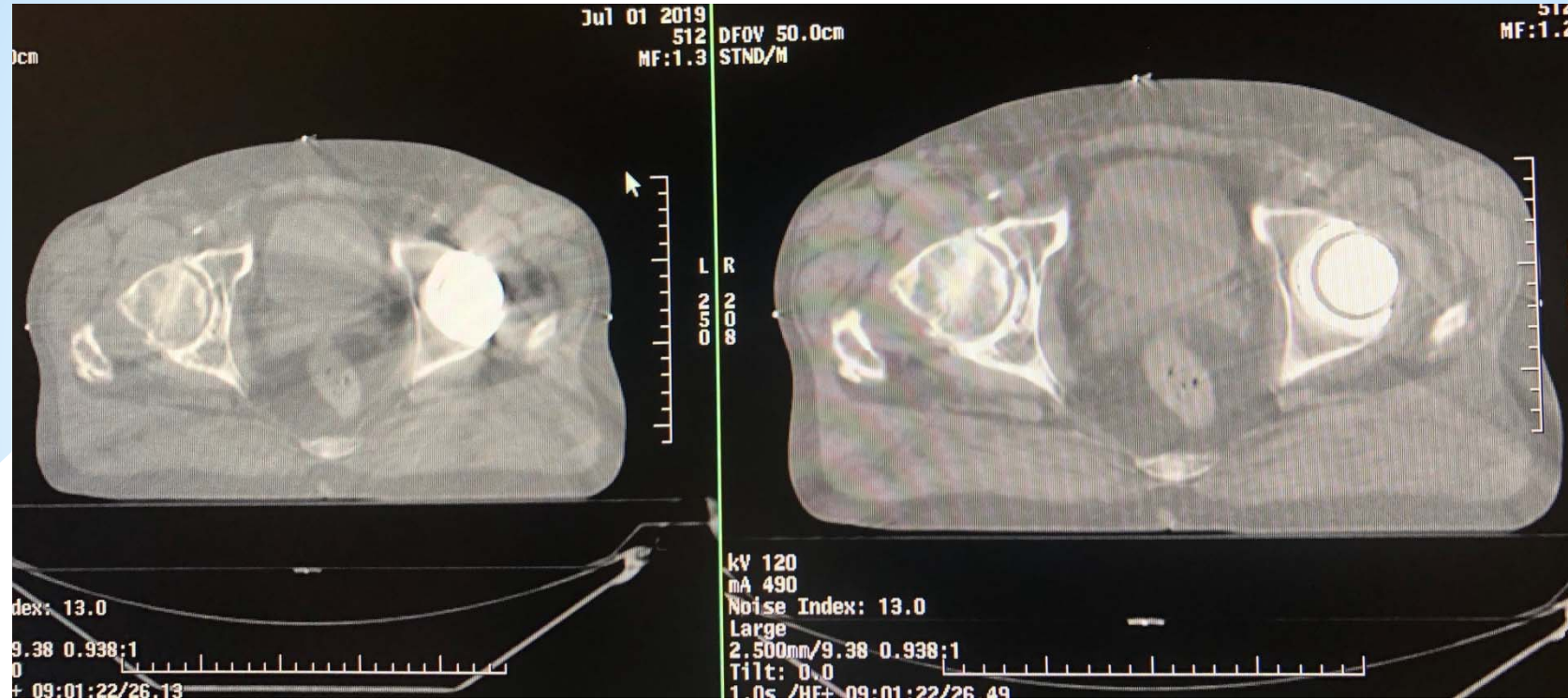
- * Indexable immobilization
- * Real time motion monitoring



Could new fraction schemes affect patient setup?

*Unique on treatment issues

- *Daily imaging issues arise for patients with hip replacements (single and bilateral)
- *How can you visualize the fiducials with your standard oblique kV pair?

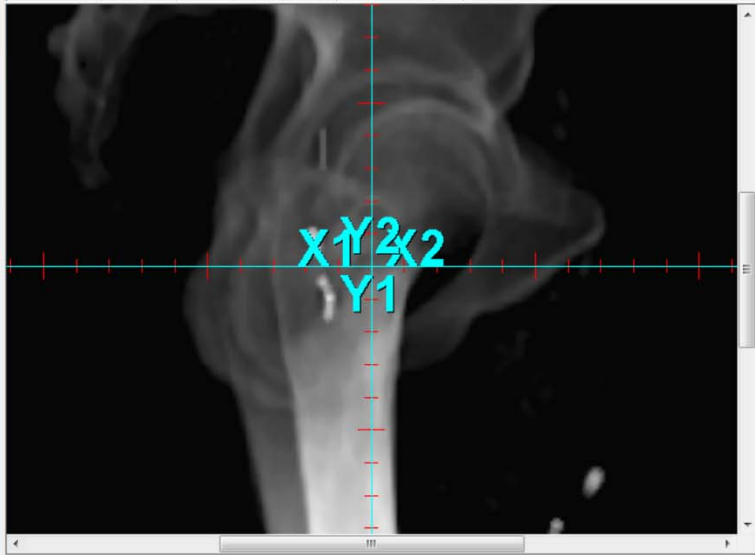


* Metal artifact reduction (MAR)
reconstruction
~ aids in contour/planning

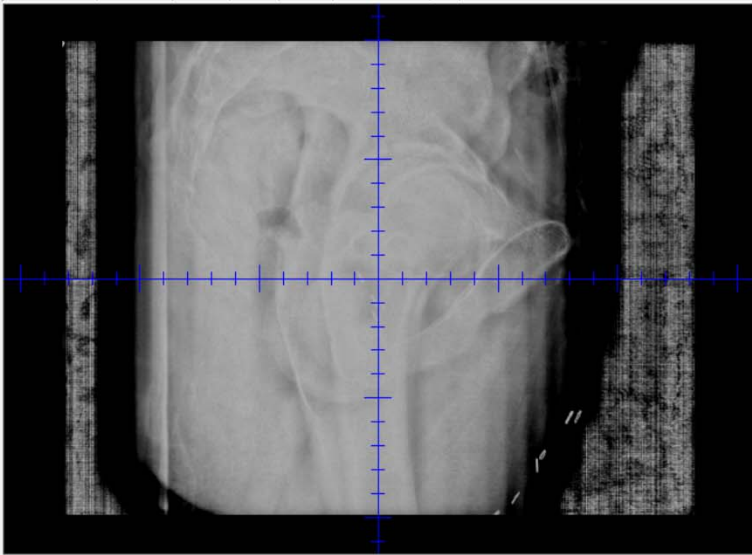


*MAR cont.

Date	Time	Type	Proj.	Assoc.	Assoc. Name	Cp.	Zoom
6/19/2019	1:13 PM	DRR	270.0	H	Rt Lat Ref		280%

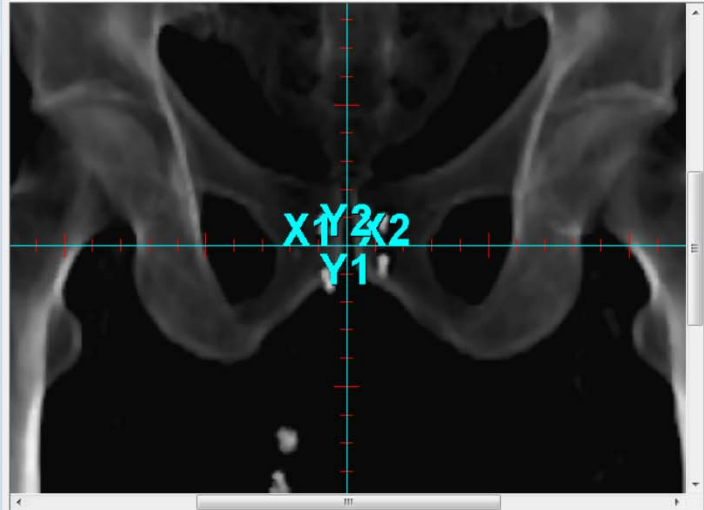


Date	Time	Type	Proj.	Assoc.	Assoc. Name	Cp.	Zoom
8/21/2019	9:36 AM	kV Portal	269.9	H	Rt Lat Ref		54%

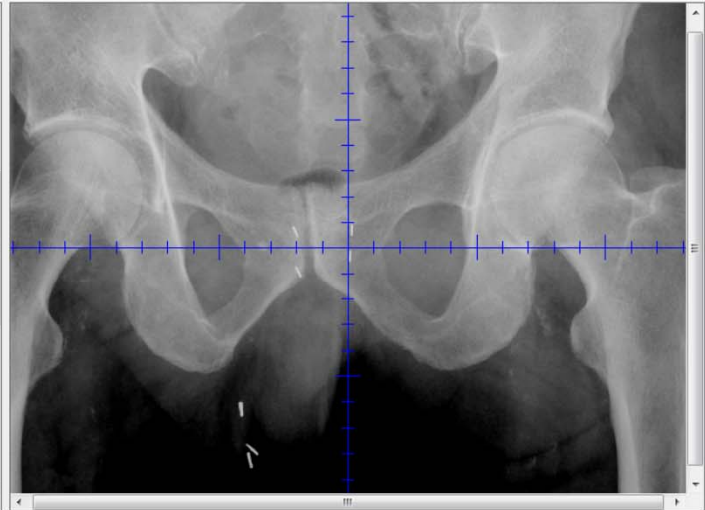


Status	Date	Time	Association		Type	Imager	Proj.	Cp.	Request Status					Review Status		Comment
			ID	Name					Fld	Blk	Oth	Img	Off	Final	Optional	
VCO	8/21/2019	9:36 AM	H	Rt Lat Ref	kV Portal		269.9						Yes	NA	NA	
O	8/21/2019	9:37 AM	G	Ant Ref	kV Portal		0.0						Yes	NA	NA	

Date	Time	Type	Proj.	Assoc.	Assoc. Name	Cp.	Zoom
6/19/2019	1:13 PM	DRR	0.0	G	Ant Ref		261%



Date	Time	Type	Proj.	Assoc.	Assoc. Name	Cp.	Zoom
8/21/2019	9:37 AM	kV Portal	0.0	G	Ant Ref		63%



Status	Date	Time	Association		Type	Imager	Proj.	Cp.	Request Status					Review Status		Comment
			ID	Name					Fld	Blk	Oth	Img	Off	Final	Optional	
VCO	8/21/2019	9:36 AM	H	Rt Lat Ref	kV Portal		269.9						Yes	NA	NA	
VO	8/21/2019	9:37 AM	G	Ant Ref	kV Portal		0.0						Yes	NA	NA	

Date	Time	Type	Proj.	Assoc.	Assoc. Name	Cp.	Zoom
7/10/2019	12:57 PM	DRR	270.0	B	Rt Lat Ref		257%

Date	Time	Type	Proj.	Assoc.	Assoc. Name	Cp.	Zoom
8/22/2019	8:45 AM	kV Portal	270.0	B	Rt Lat Ref		64%

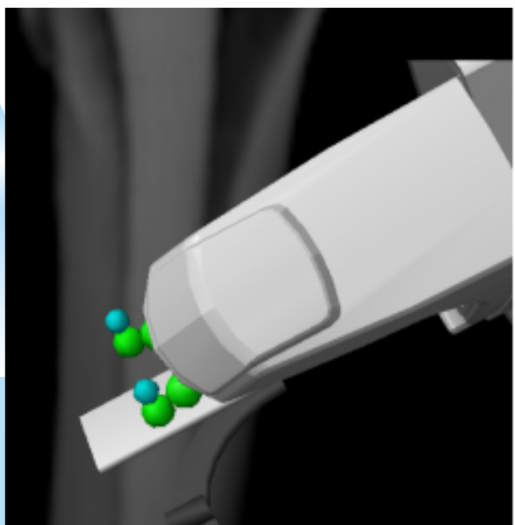
Status	Date	Time	Association		Type	Imager	Proj.	Cp.	Request Status					Review Status		Comment
			ID	Name					Fld	Blk	Oth	Img	Off	Final	Optional	
VC	8/22/2019	8:45 AM	B	Rt Lat Ref	kV Portal		270.0							NA	NA	



Date	Time	Type	Proj.	Assoc.	Assoc. Name	Cp.	Zoom
3/29/2019	12:20 PM	DRR	45.0	B	LAO Ref		171%

Date	Time	Type	Proj.	Assoc.	Assoc. Name	Cp.	Zoom
4/05/2019	2:43 PM	kV Porta	45.0	B	LAO Ref		50%

Status	Date	Time	Association		Type	Imager	Proj.	Cp.	Request Status					Review Status		Comment
			ID	Name					Fld	Blk	Oth	Img	Off	Final	Optional	
VO	4/05/2019	2:43 PM	A	RAO Ref	kV Portal		315.0						Yes	AP	NR	
VO	4/05/2019	2:43 PM	B	LAO Ref	kV Portal		45.0						Yes	AP	NR	

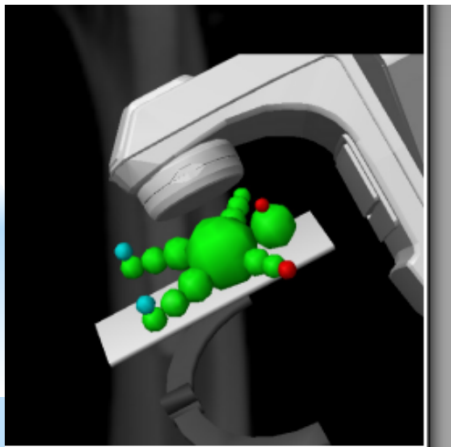


* LAO Reference ~
gantry @ 45,
imaging arm 315

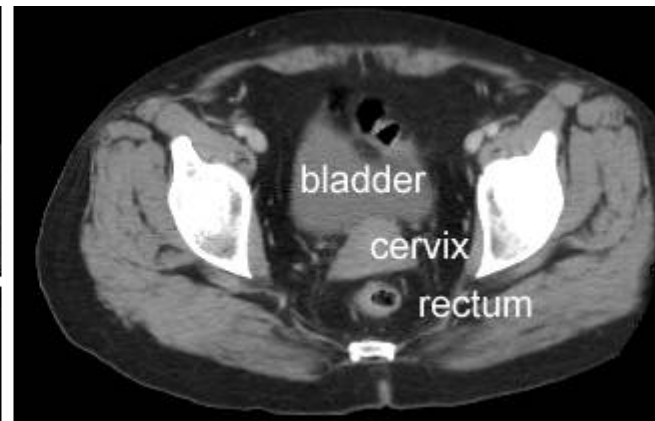
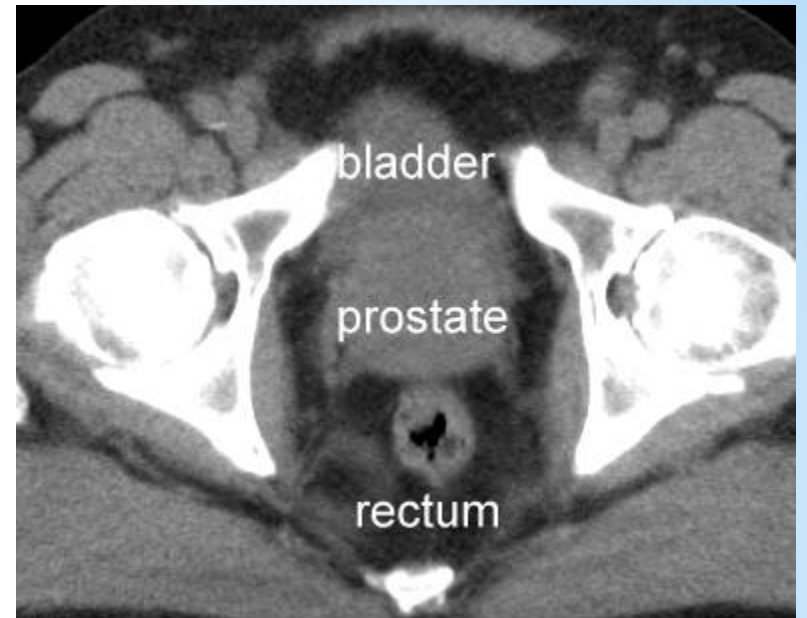
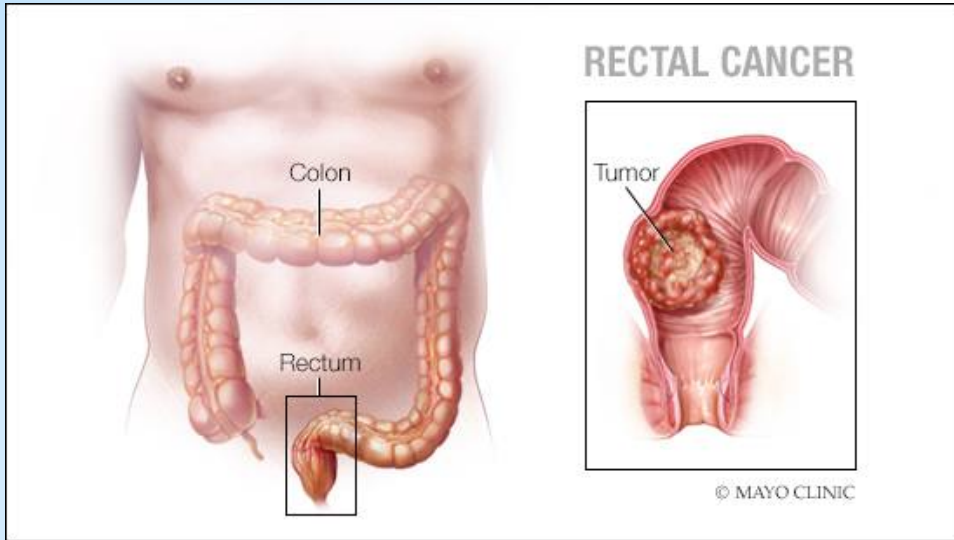
Date	Time	Type	Proj.	Assoc.	Assoc. Name	Cp.	Zoom
3/28/2019	12:40 PM	DRR	315.0	A	RAO Ref		194%

Date	Time	Type	Proj.	Assoc.	Assoc. Name	Cp.	Zoom
4/05/2019	2:43 PM	kV Porta	315.0	A	RAO Ref		38%

Status	Date	Time	Association		Imager	Proj.	Cp.	Request Status				Review Status		Comment
			ID	Name				Flid	Blk	Oth	Img	Off	Final	
VO	4/05/2019	2:43 PM	A	RAO Ref	kV Portal	315.0					Yes	AP	NR	
O	4/05/2019	2:43 PM	B	LAO Ref	kV Portal	45.0					Yes	AP	NR	



* RAO Reference ~
gantry @ 315,
imaging arm 45

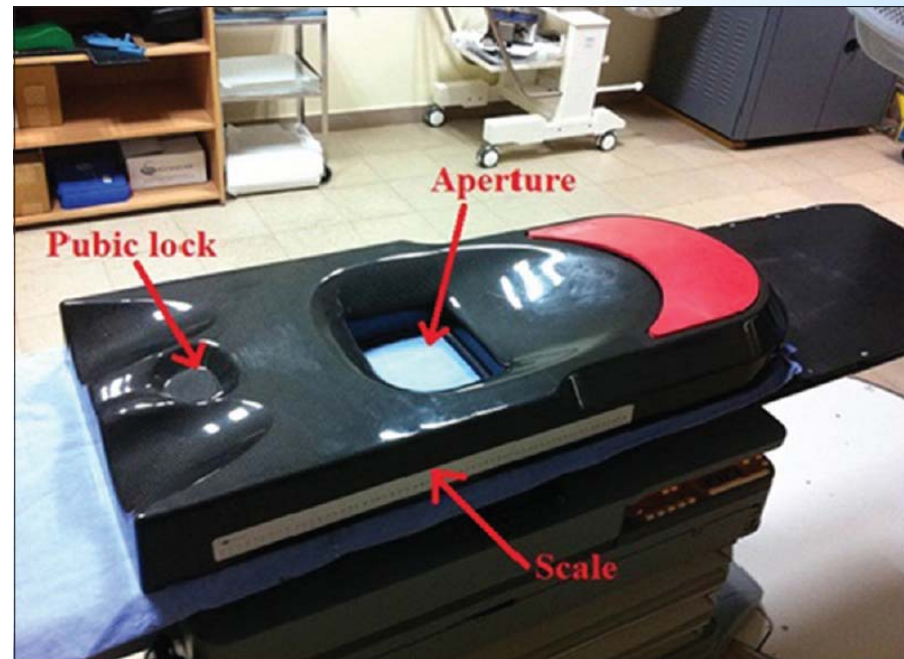


*Rectal Cancer

- * Acute side effects ~ tenesmus, bleeding, and diarrhea
- * Side effects can arise early in course of radiation therapy ~ as early as 20Gy
- * Late reactions result in bleeding, ulcers, strictures, and fistula formation.

* Rectum

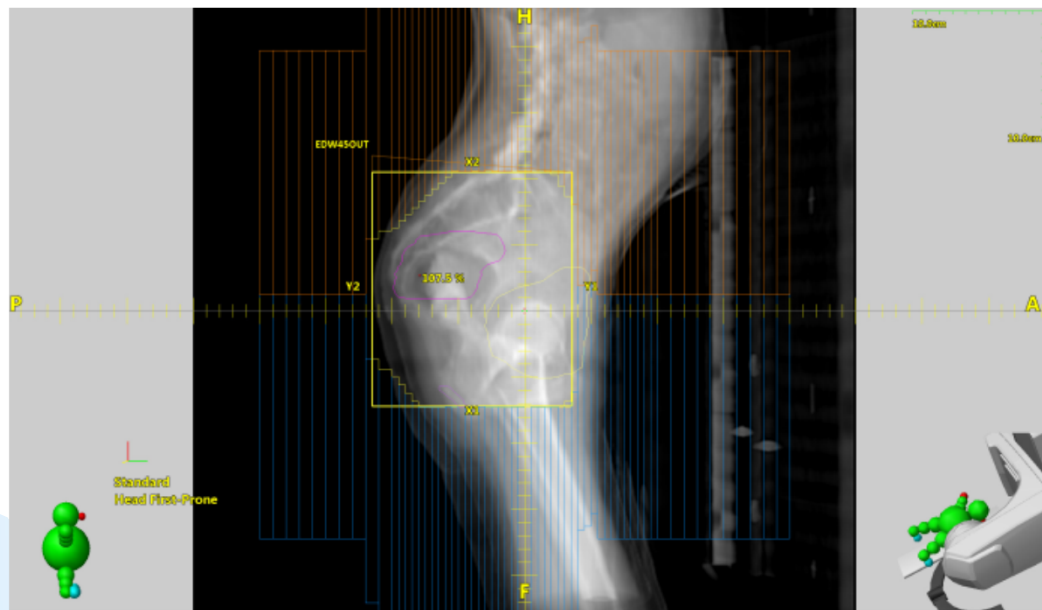
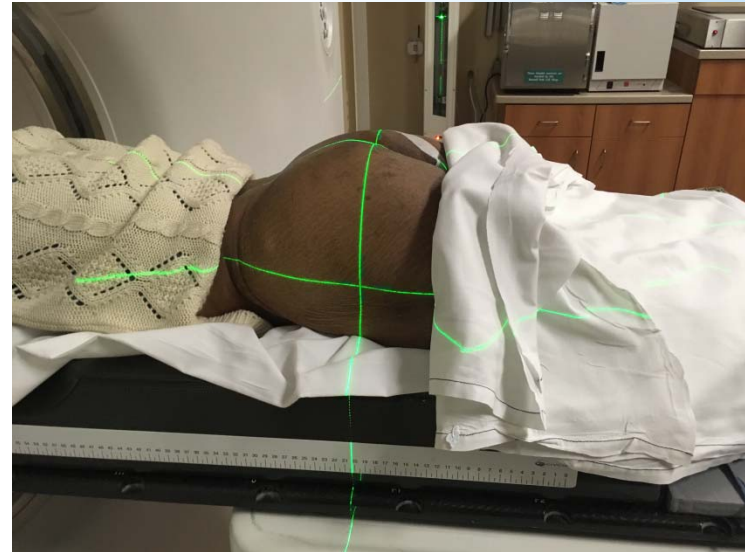
- * Advantage ~ reduce dose to the small bowel
- * Disadvantage ~ patient dependent, ostomy, etc..



* Prone position

* Prone position ~ belly board setup

- Indexed
- Number scale on side of board
- Reduced dose to bowels



- * Patient has an ostomy
- * Tumor extending out of the anus, extreme discomfort
- * Certain circumstances dictate what the most reproducible patient position will be.

**May need to be
treated Supine**

*Vulvar & Anal cancers

- * Acute effects ~ epithelial discomfort which may be aggravated by radiation-induced diarrhea
- * Erythema → desquamation → ulcerations
- * Developing into tenesmus

Anal cancer

Vulvar Cancer

- ❖ Very sensitive to radiation.
- ❖ Certain anatomical structures can self-bolus causing early reactions.
- ❖ Even Mild erythema can cause significant symptoms for patients.
- ❖ Sometime built in breaks are used to improve the acute tolerance of the treatment.

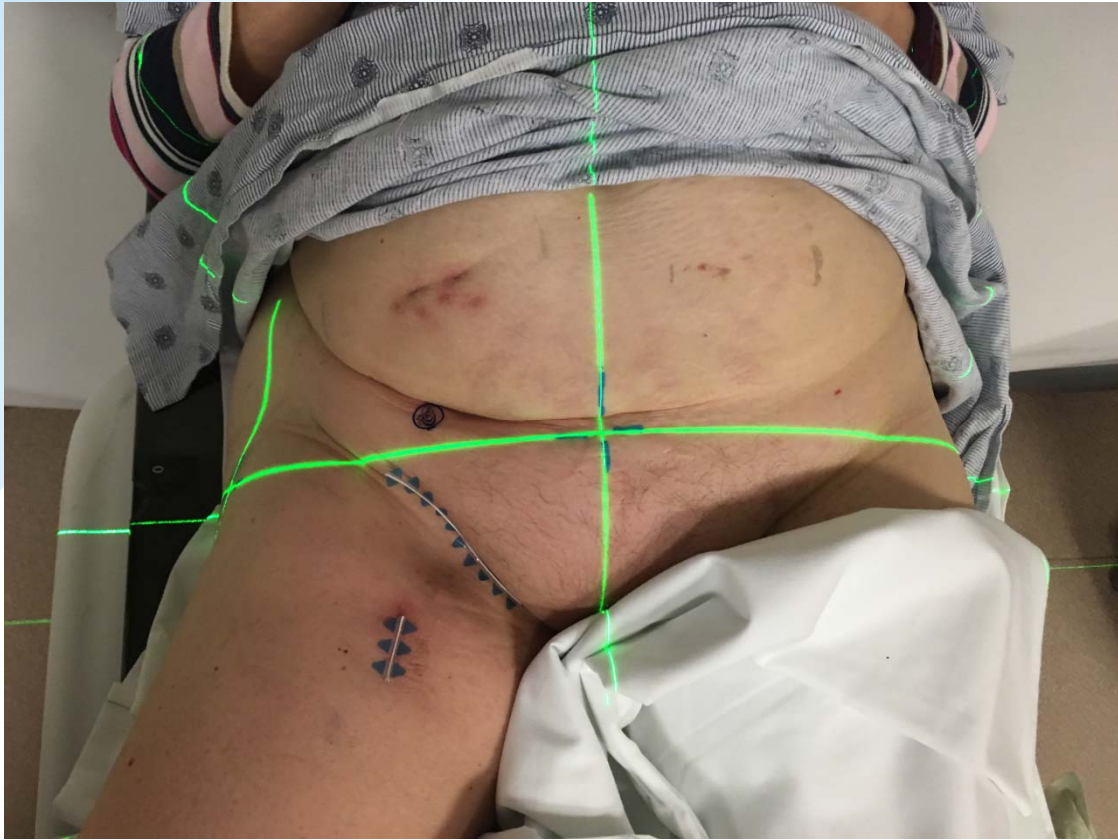


* Backwards wing board indexed to the table with vac-loc.
triangulation points at pelvic level





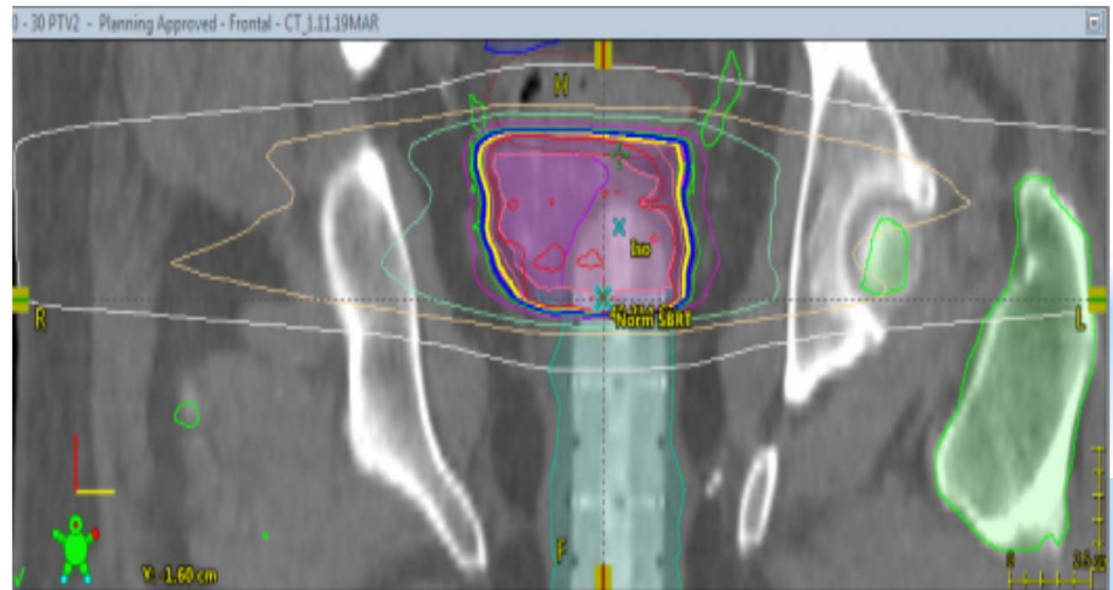


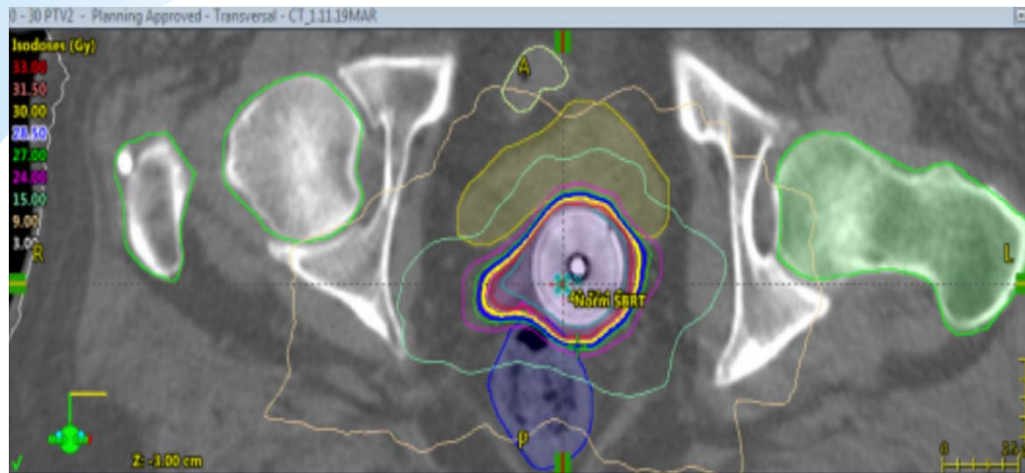
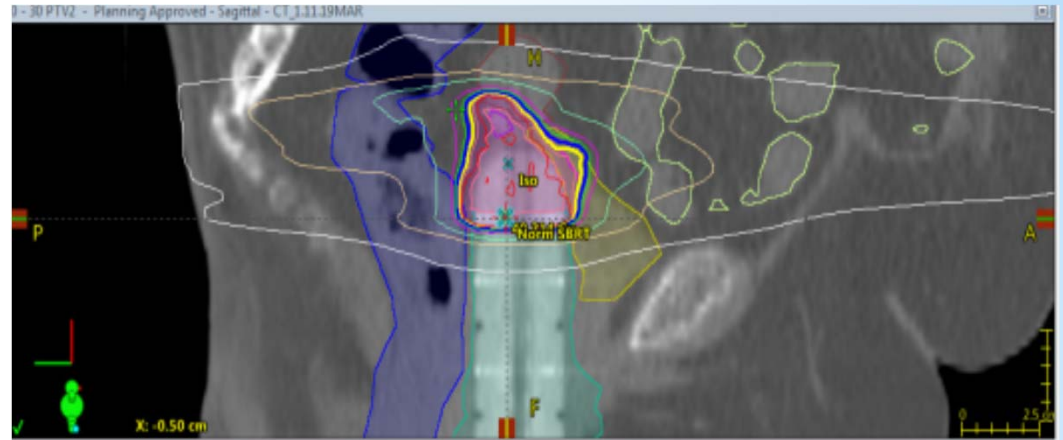


*Interesting cases

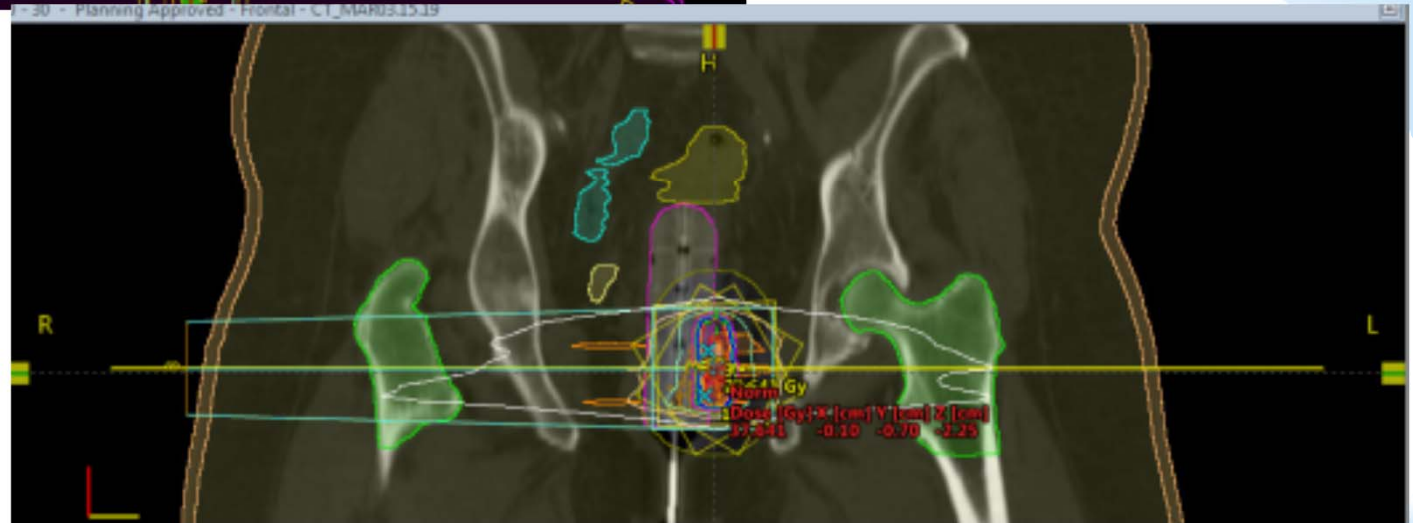
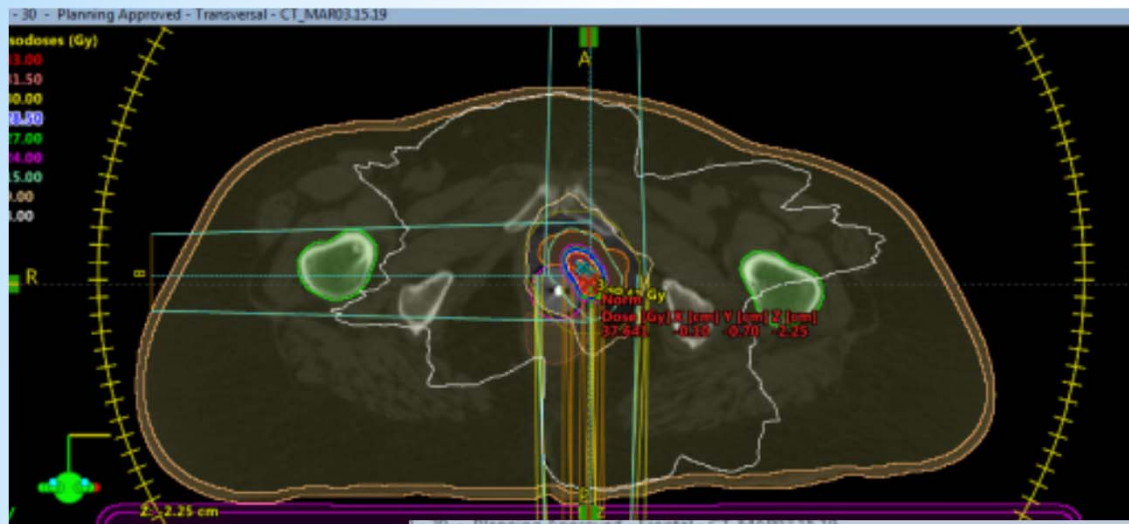
* GYN ~ Applicator guided SBRT

- * 3,000 cGy @ 600 cGy x 5
- * Recurrent disease of the vaginal cuff/wall
- * Applicator is utilized to stabilize the disease site





*Vaginal Cuff
treatment



* Left anterior vaginal wall

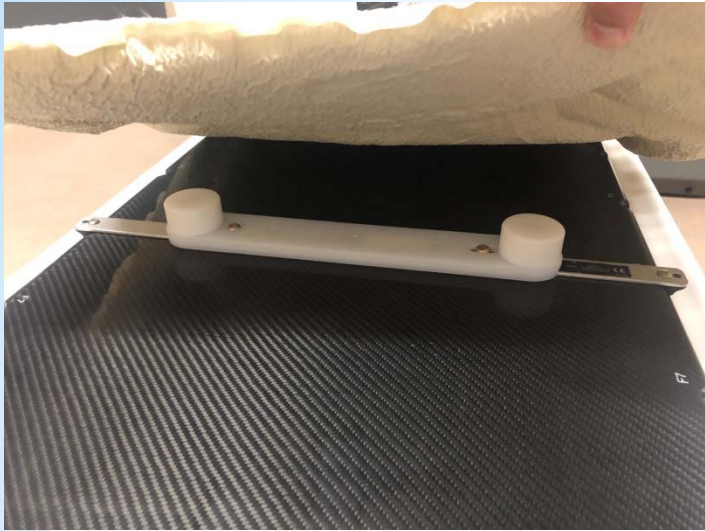
*Patient Setup

- *Supine

- *Pelvic and lower extremity immobilization with Vac-Lok
*indexed to the table.

- *CA placed @ pubic symphysis

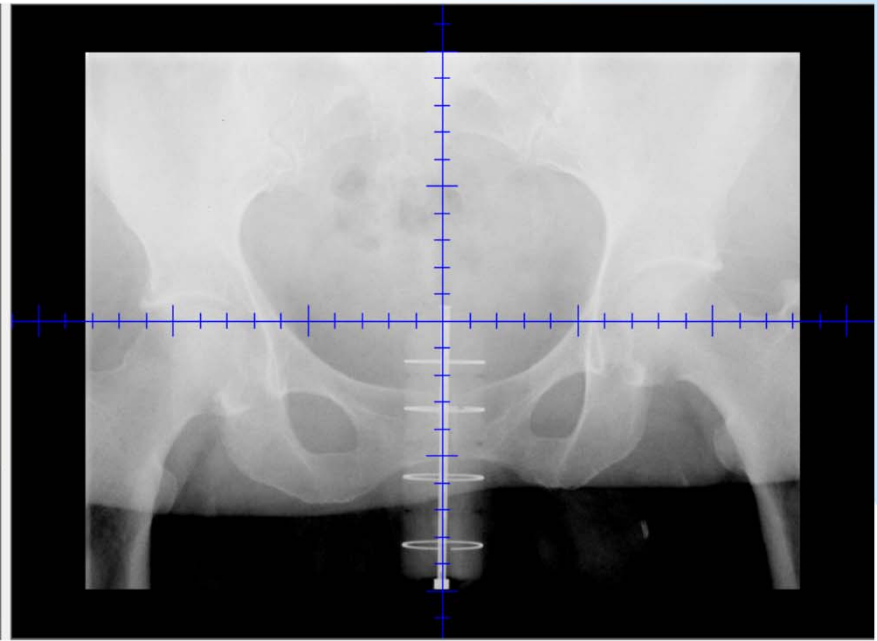
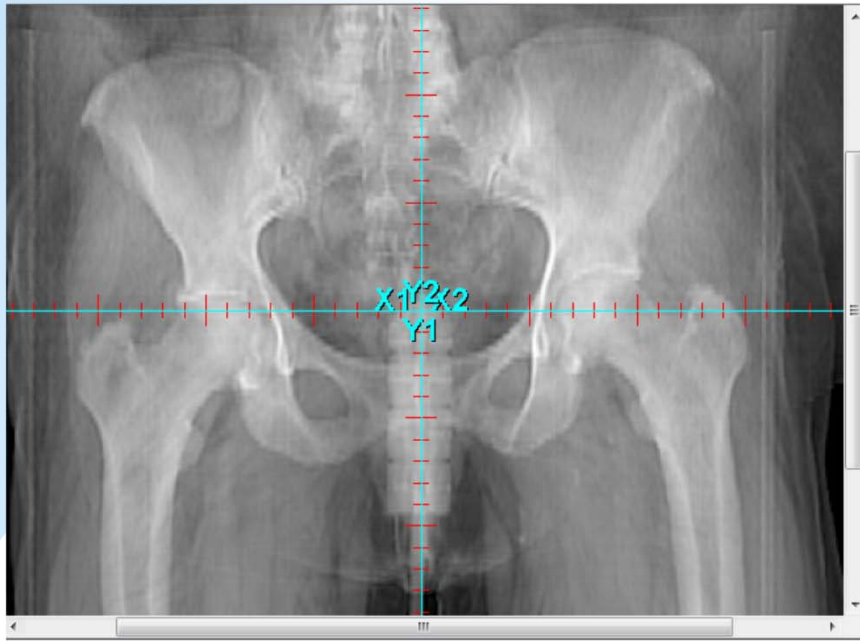
- *Cylinder board form fitted into vac-Lok



* Patient setup



* Patient setup



* AP DRR ~ applicator placement

*REMEMBER:

- *When a patient arrives for simulation or treatment, YOU have done this thousands of times....
- *But this is their FIRST time!
- *Take time.....

THANK YOU!