Locally-advanced cervical cancer

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Epidemiology of cervical cancer in the US

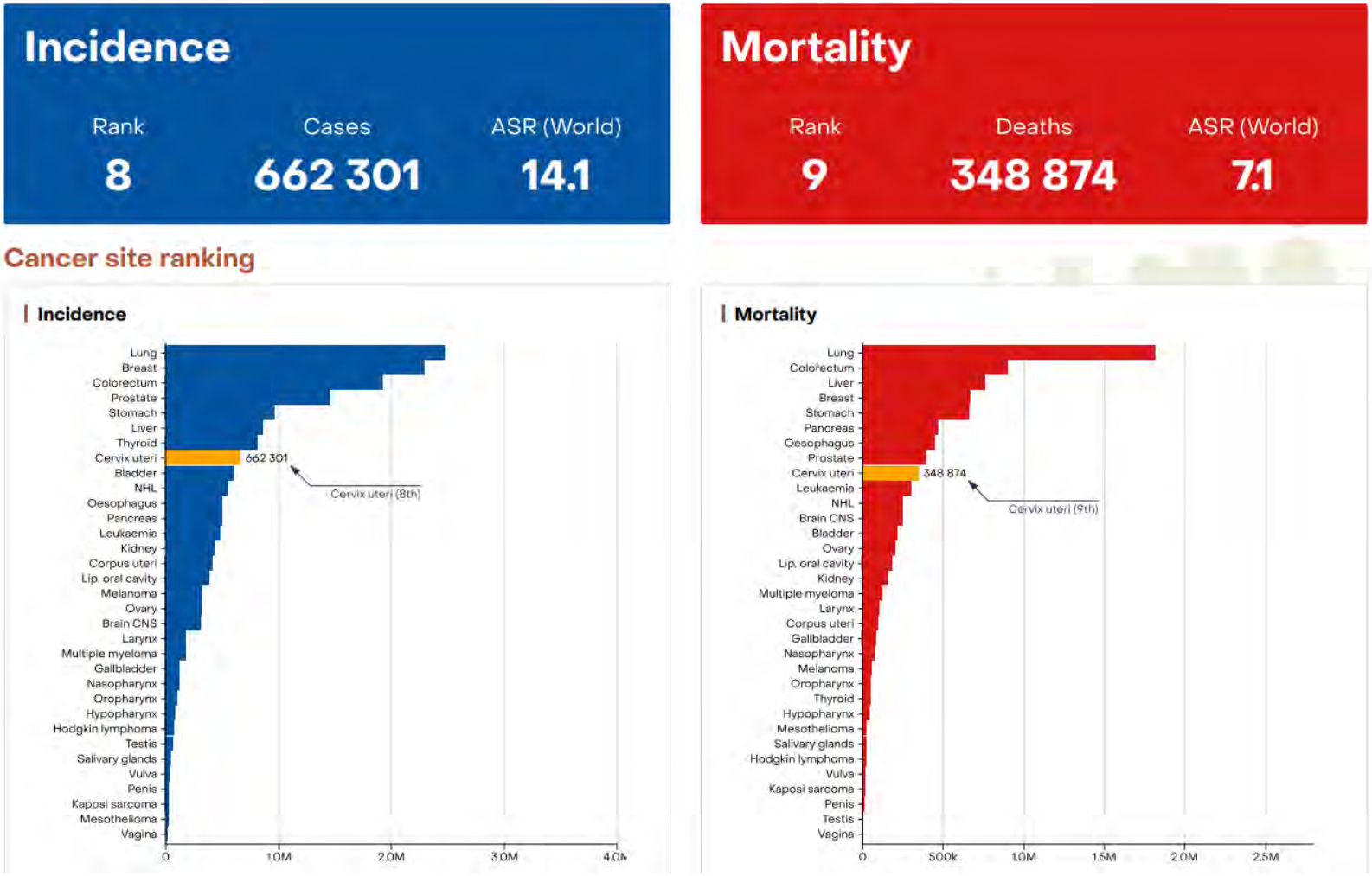
Estimated Number* of New Cancer Cases and Deaths by Sex, US, 2023

Female		
Breast	297,790	31%
Lung & bronchus	120,790	13%
Colon & rectum	71,160	8%
Uterine corpus	66,200	7%
Melanoma of the skin	39,490	4%
Non-Hodgkin lymphoma	35,670	4%
Thyroid	31,180	3%
Pancreas	30,920	3%
Kidney & renal pelvis	29,440	3%
Leukemia	23,940	3%
All sites	**948,000**	

Female		
Lung & bronchus	59,910	21%
Breast	43,170	15%
Colon & rectum	24,080	8%
Pancreas	23,930	8%
Ovary	13,270	5%
Uterine corpus	13,030	5%
Liver & intrahepatic bile duct	10,380	4%
Leukemia	9,810	3%
Non-Hodgkin lymphoma	8,400	3%
Brain & other nervous system	7,970	3%
All sites	**287,740**	

US incidence of cervical cancer: 13,960
US mortality from cervical cancer: 4,310

Epidemiology of cervical cancer around the world

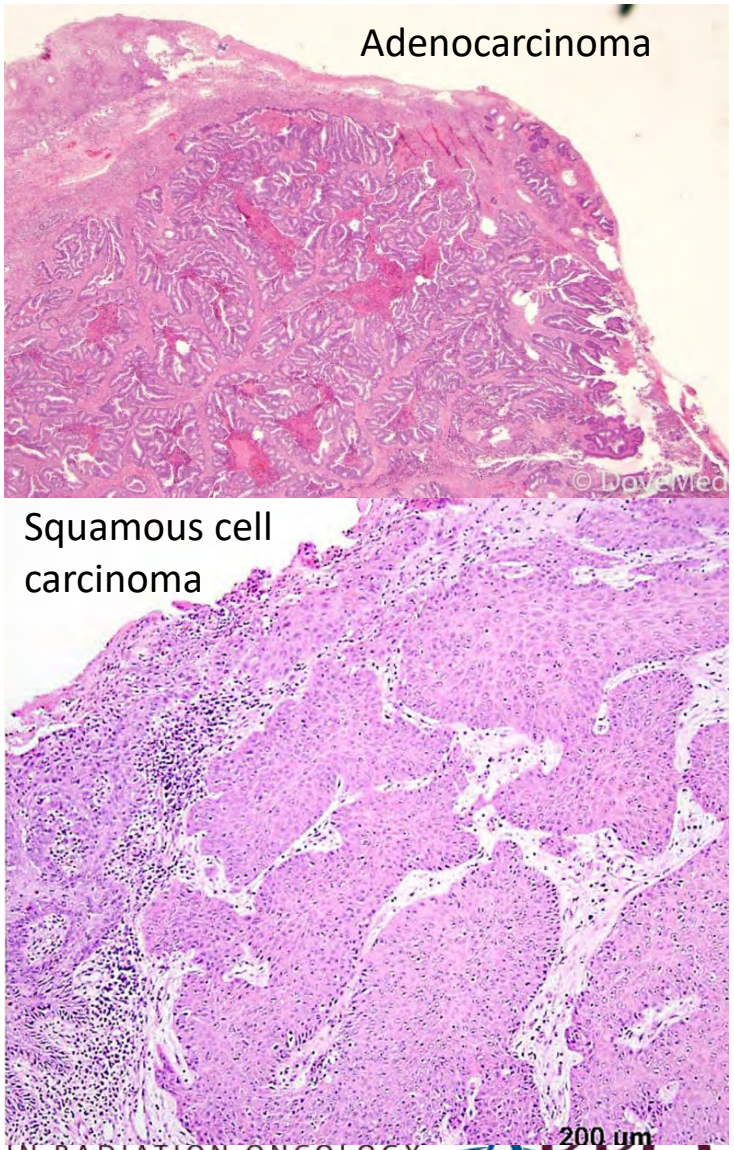


Data source: **GLOBOCAN 2022**
Graph production: **IARC**
(http://gco.iarc.fr/today)
World Health Organization

International Agency for Research on Cancer
World Health Organization

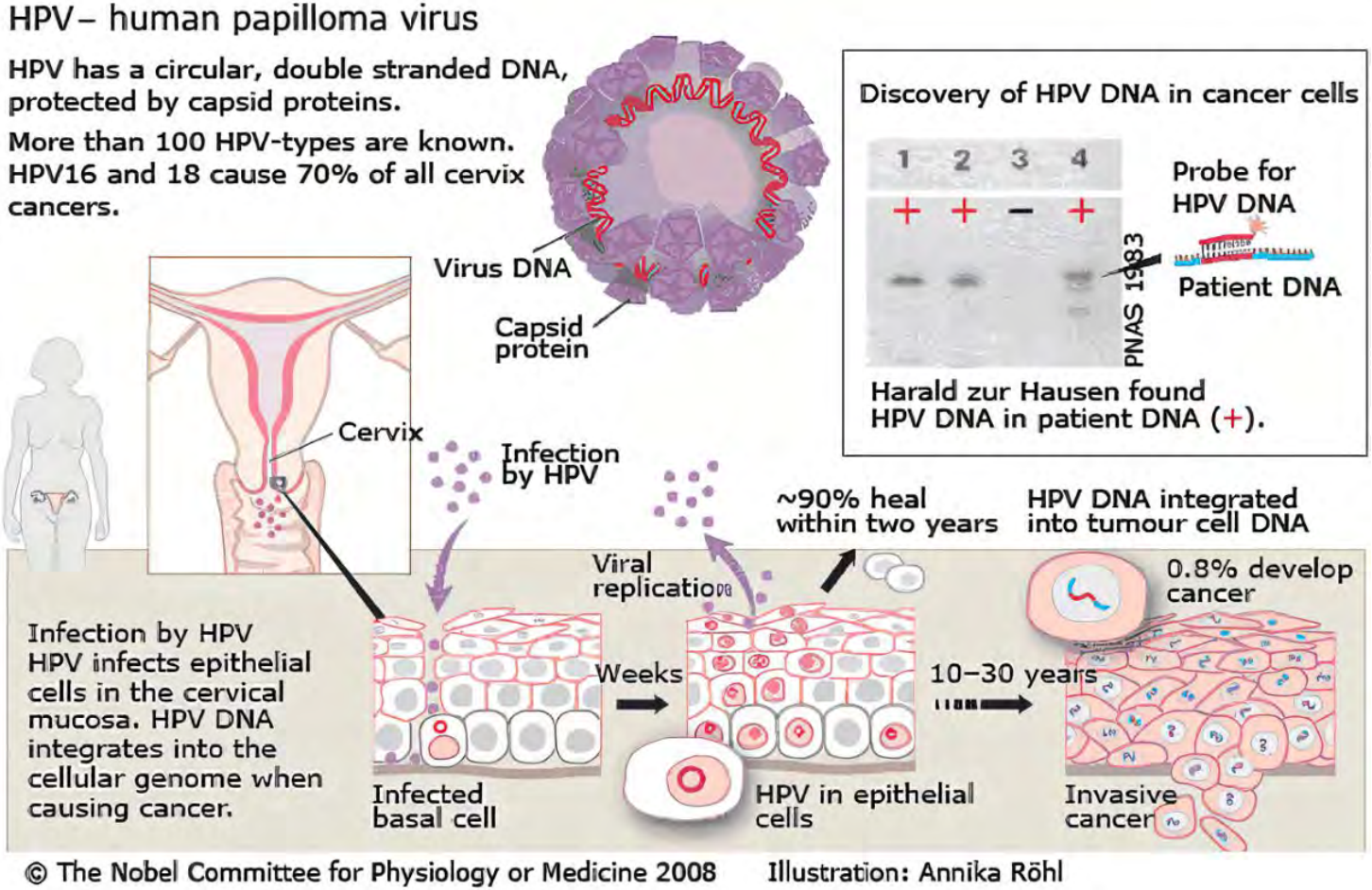
Histology

- Squamous cell carcinoma (~80%)
- Adenocarcinoma
  - Mucinous
  - Endometrioid
  - Serous
  - Clear cell*
- Adenosquamous carcinoma
- Rare: small cell neuroendocrine, rhabdomyosarcoma, lymphoma



*Related to *in utero* exposure to DES

HPV infection is the primary agent responsible for > 95% of cervical cancers



Note, management does not differ by HPV status, but HPV-associated cancers have a better prognosis

Common high-risk subtypes: 16, 18, 31, 33

Case: A 40 F presents with heavy vaginal bleeding

- Reports bleeding started about 2 weeks ago and became so heavy that she presented to the ED
- Bleeding stopped after she was given medroxyprogesterone

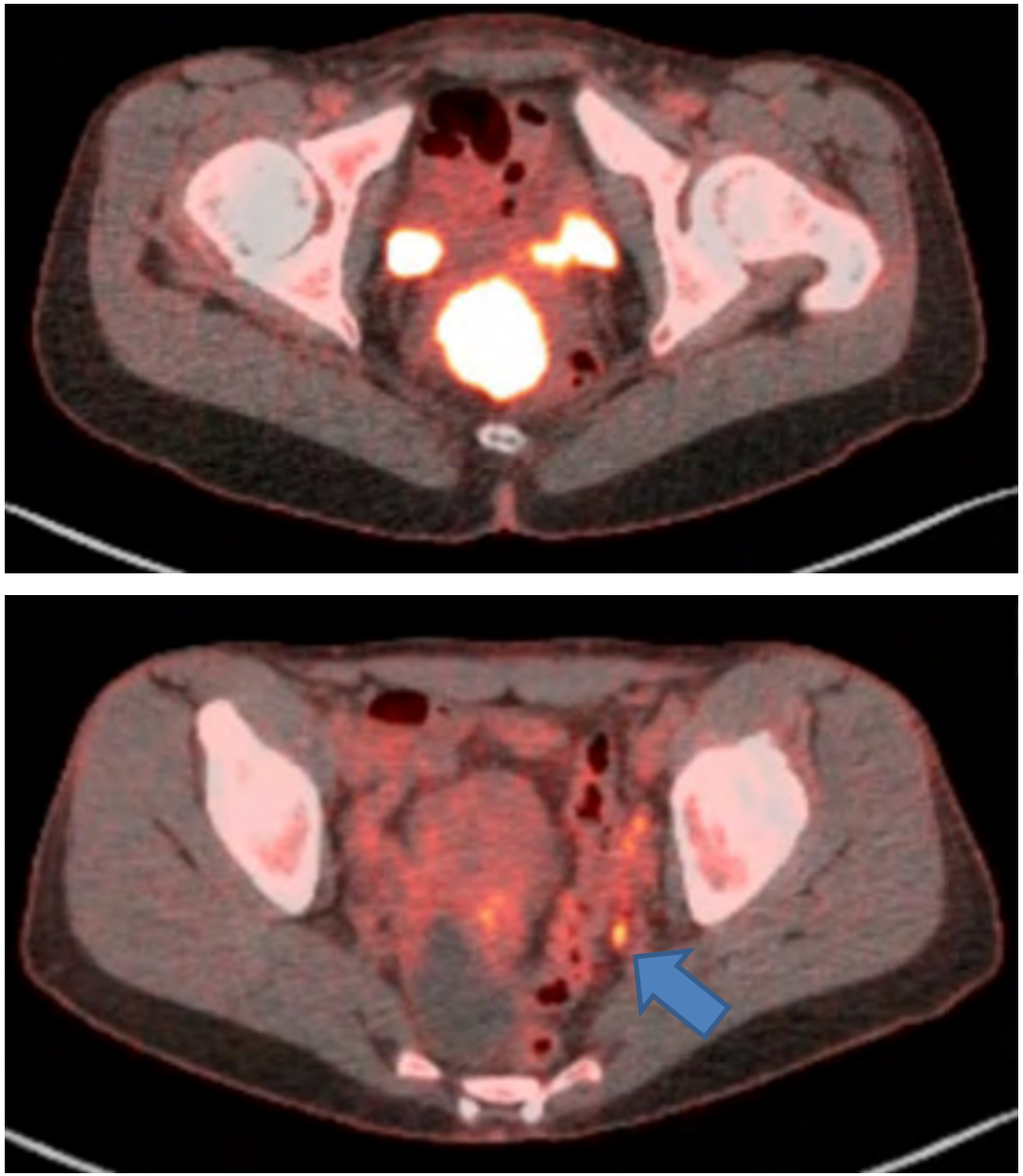
Clinical pearls: Work-up

- H&P
  - Pelvic exam
    - Speculum
    - Bimanual
    - Rectovaginal exam – to assess for parametrial and rectovaginal septal involvement
  - Inguinal lymph nodes
- Labs: CBC, CMP
  - Pregnancy test if of child-bearing potential
  - Consider HIV test
- Cervical biopsy with HPV status
- Imaging:
  - Stage I:
    - PET / CT or CT chest / abdomen / pelvis
    - Pelvic MRI required if considering fertility-sparing surgery, otherwise pelvic MRI can be considered
  - Stage II - IVA:
    - Pelvic MRI
    - PET / CT or CT chest / abdomen / pelvis
- Additional workup (cystoscopy, proctoscopy, further imaging) dictated by clinical presentation

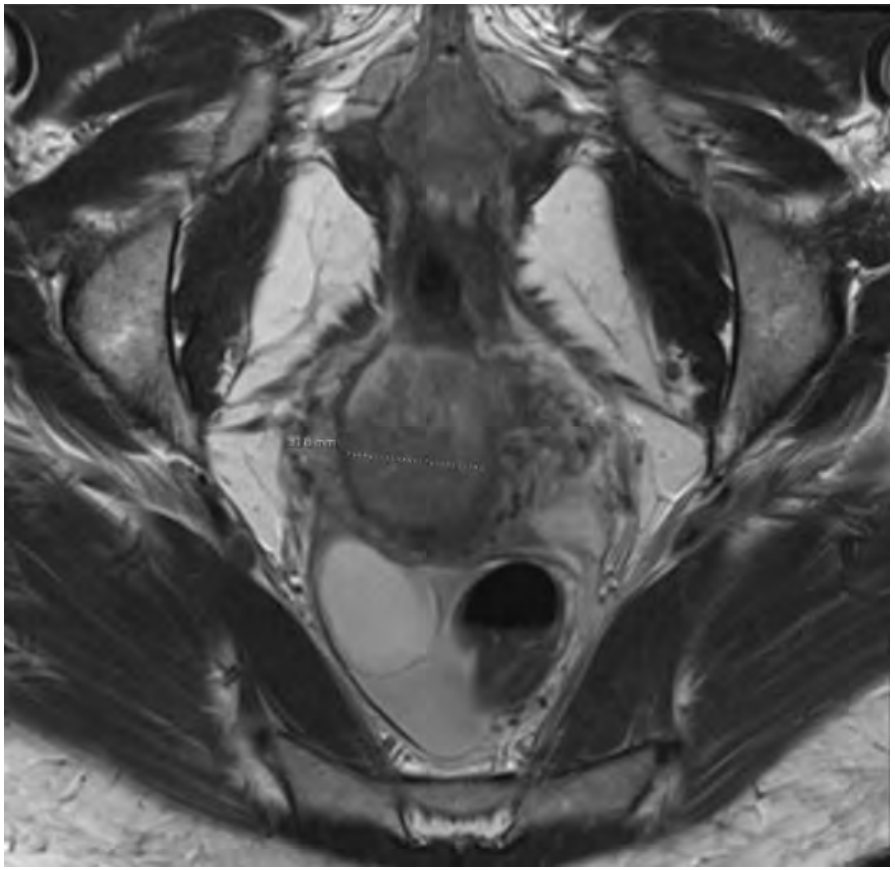
Physical exam

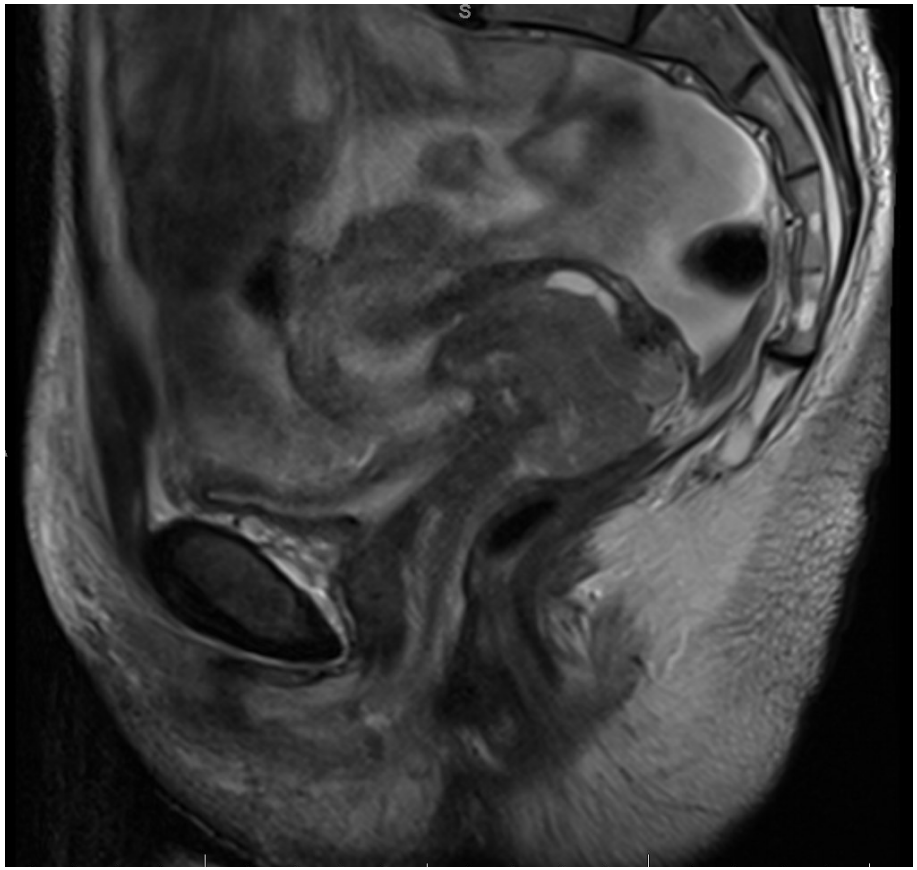
- Underwent pelvic US in the ED that revealed an 8 cm uterus, 5 mm endometrial stripe, mass in lower uterine segment
- Pelvic exam: 4 x 3 cm friable cervical mass without parametrial nodularity
- Cervical mass biopsy: invasive adenocarcinoma, **p16+**

PET / CT:
Hypermetabolic 4 cm mass extending into endometrium and subcentimeter <u>left internal iliac LN</u>

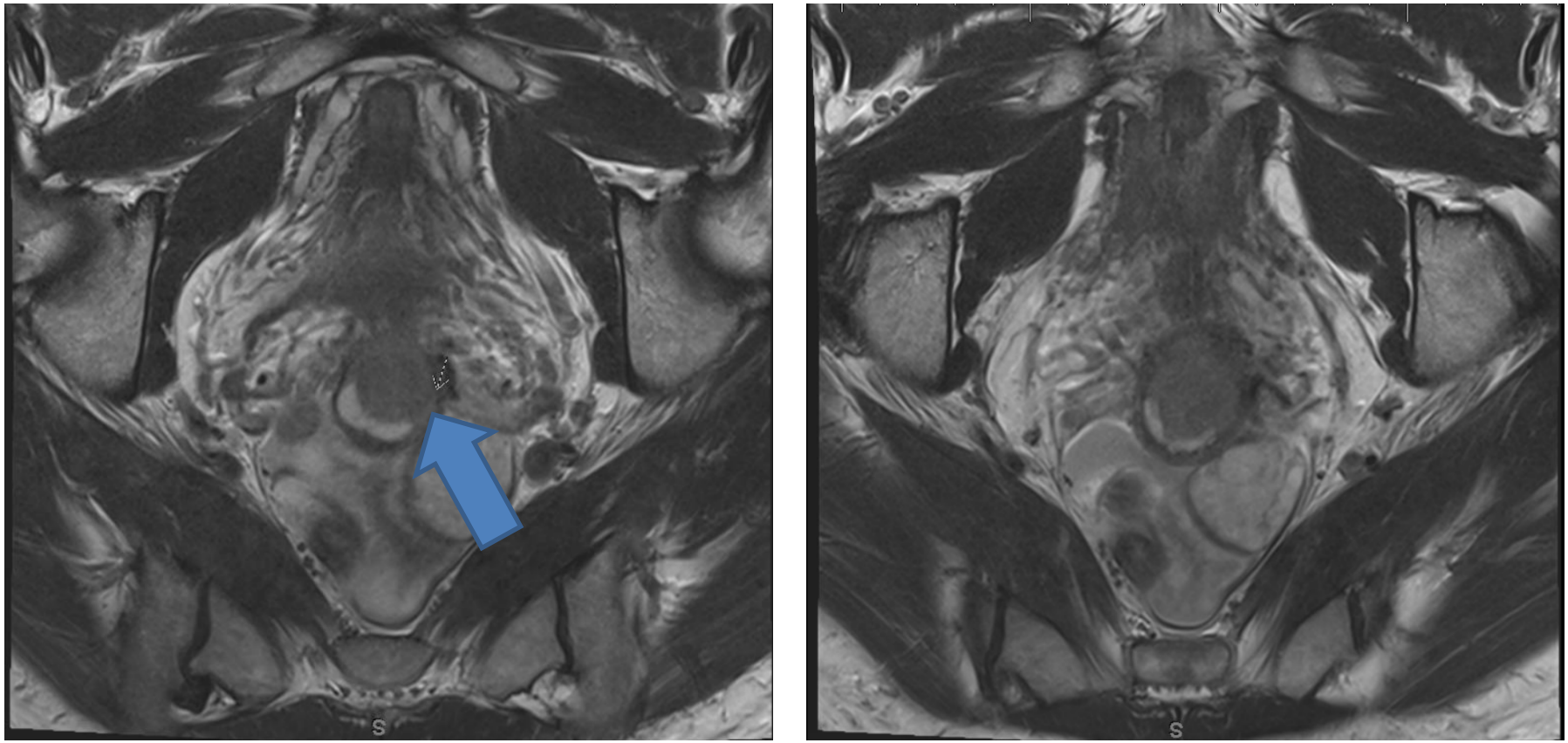


MRI pelvis: 5.0 x 2.0 x 3.1 cm cervical mass extending into lower uterus and upper 1/3 of vagina with parametrial invasion



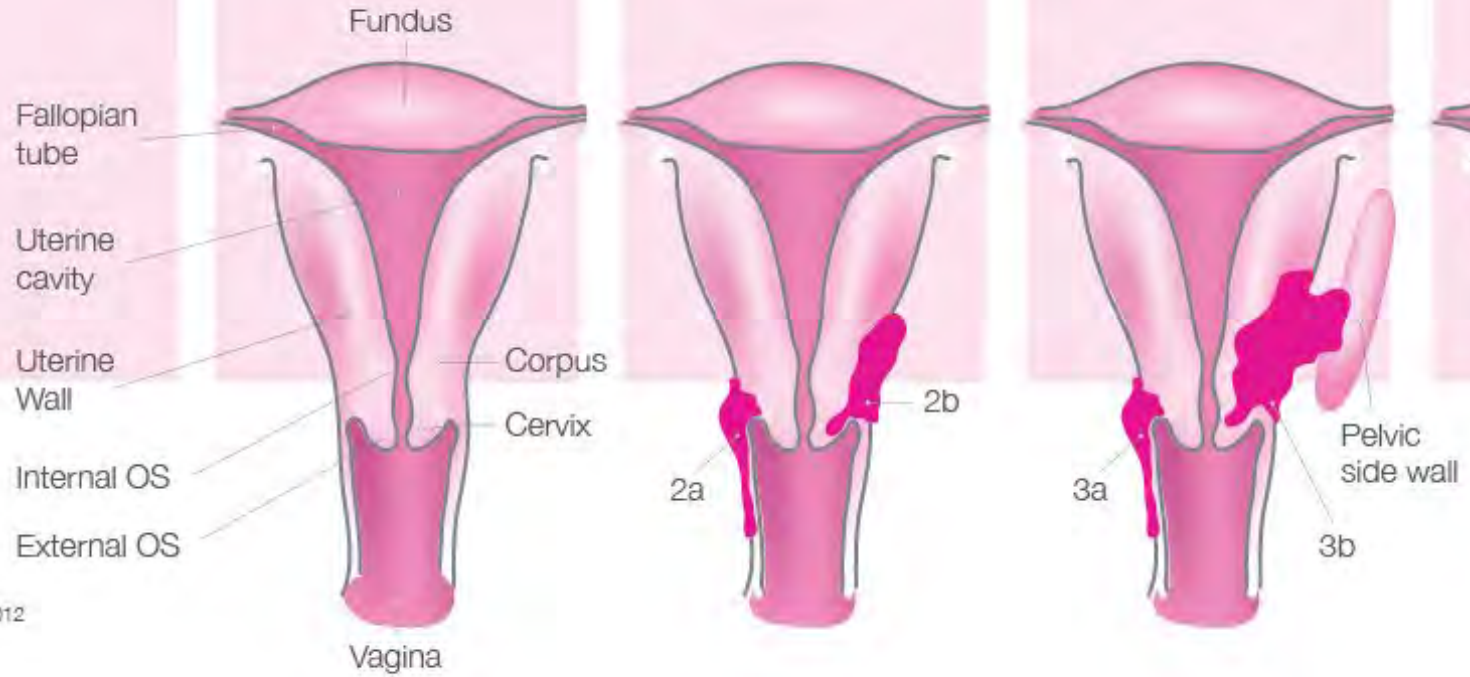


MRI showing disruption of cervical stromal ring indicating parametrial extension



Staging of Cervical Cancer

	Stage 0	Stage 1	Stage 2	Stage 3
Extent of tumor	Carcinoma in-situ	Confined to Cervix	Disease beyond cervix but not to pelvic wall or lower 1/3 of vagina	Disease to pelvic wall or lower 1/3 of vagina
5-year survival	100%	85%	65%	35%
Stage at presentation		47%	28%	21%



FIGO stage I: carcinoma confined to the cervix*

*ignores extension into uterus

- Stage IA: diagnosed by microscopy, depth of invasion ≤ 5 mm
  - IA1: invasion ≤ 3 mm
  - IA2: Invasion > 3 but ≤ 5 mm
- Stage IB: limited to cervix but DOI > 5 mm
  - IB1: > 5 mm depth of invasion and up to 2 cm in greatest dimension
  - IB2: > 2 cm but up to 4 cm in greatest dimension
  - IB3: > 4 cm in greatest dimension

FIGO 2018

FIGO stage II: carcinoma extends beyond the cervix but NOT to lower 1/3 of vagina or pelvic wall

- Stage IIA: limited to upper 2/3 of vagina
  - IIA1: carcinoma $\leq$ 4 cm in greatest dimension
  - IIA2: carcinoma > 4 cm in greatest dimension
- Stage IIB: parametrial invasion

FIGO 2018

FIGO stage III: carcinoma involves lower 1/3 of vagina / extends to pelvis wall / causes hydronephrosis / involves regional LNs

- Stage IIIA: involves lower 1/3 of vagina
- Stage IIIB: extends to pelvic wall and/or causes hydronephrosis or non-functioning kidney (unless known to be due to another cause)
- Stage IIIC: involves regional lymph nodes
  - IIIC1: pelvic lymph node involvement
  - IIIC2: para-aortic lymph node involvement

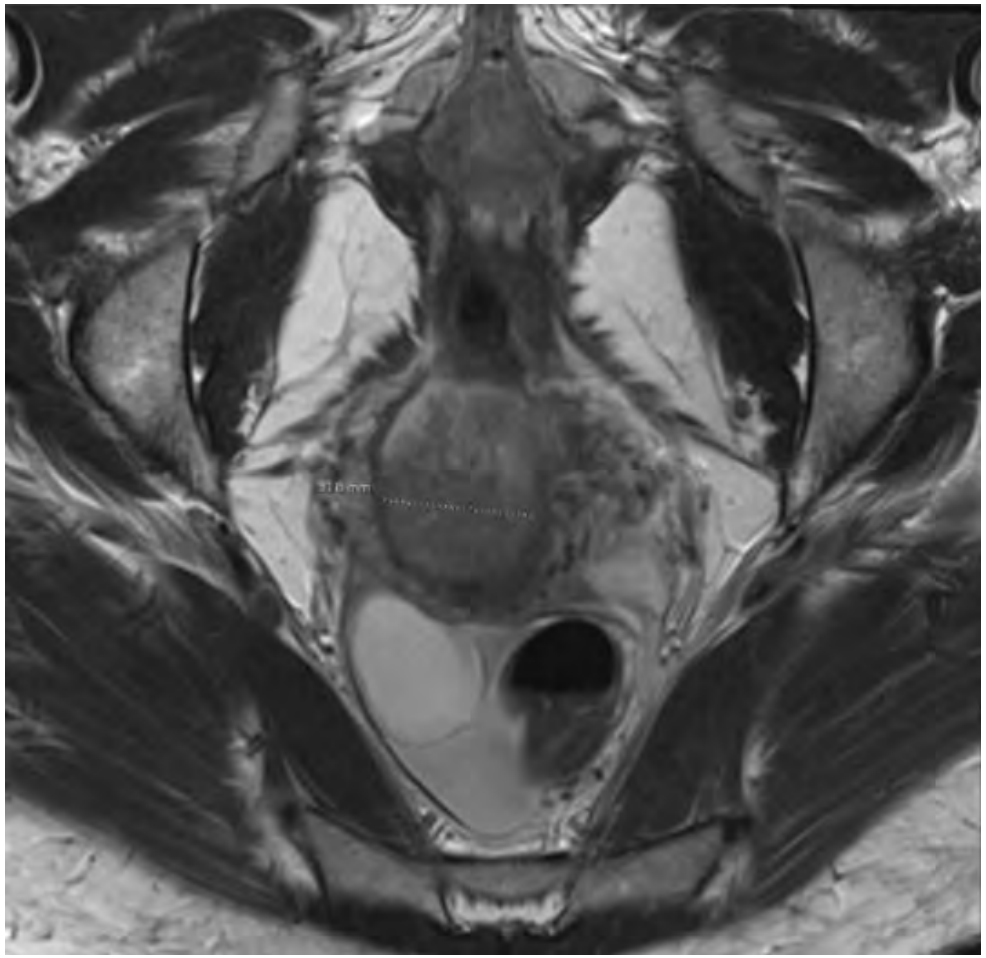
FIGO 2018

FIGO stage IV: carcinoma involves other organs

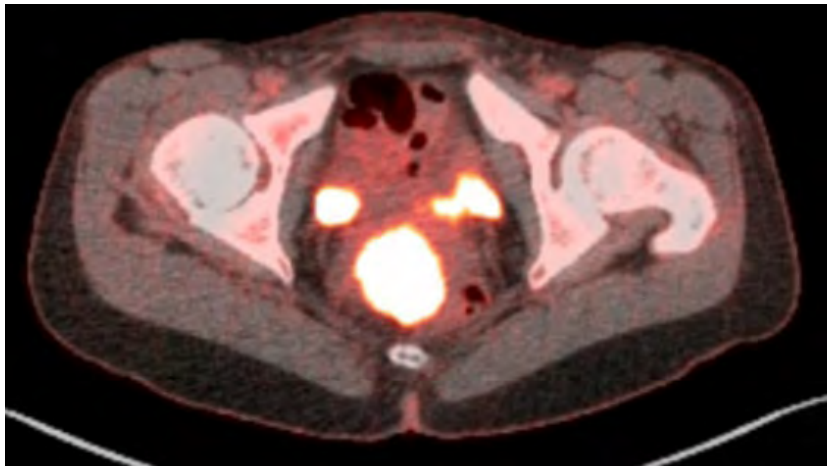
- Stage IVA: biopsy-proven spread to adjacent organs (rectum or bladder)
- Stage IVB: spread to distant organs

FIGO 2018

How would you stage our patient?



T2b: parametrial extension



N1: pelvic lymph node involvement

FIGO IIIC1

T2bN1M0

What is the optimal management of locally-advanced cervical cancer?: Lessons from the Landoni Experience

- Prospective, randomized study comparing RT vs radical hysterectomy +/- adjuvant RT for early-stage cervical cancer
- Population: FIGO IB – IIA

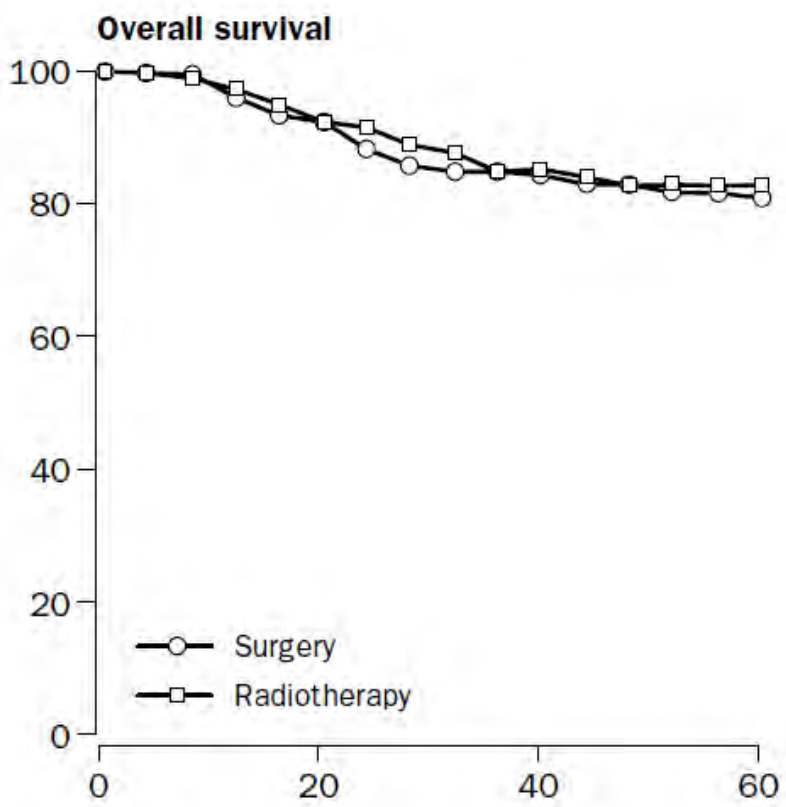
Indications for adjuvant RT: Stage pT2b or greater, < 3 mm of uninvolved cervical stroma, cut-through, positive lymph nodes

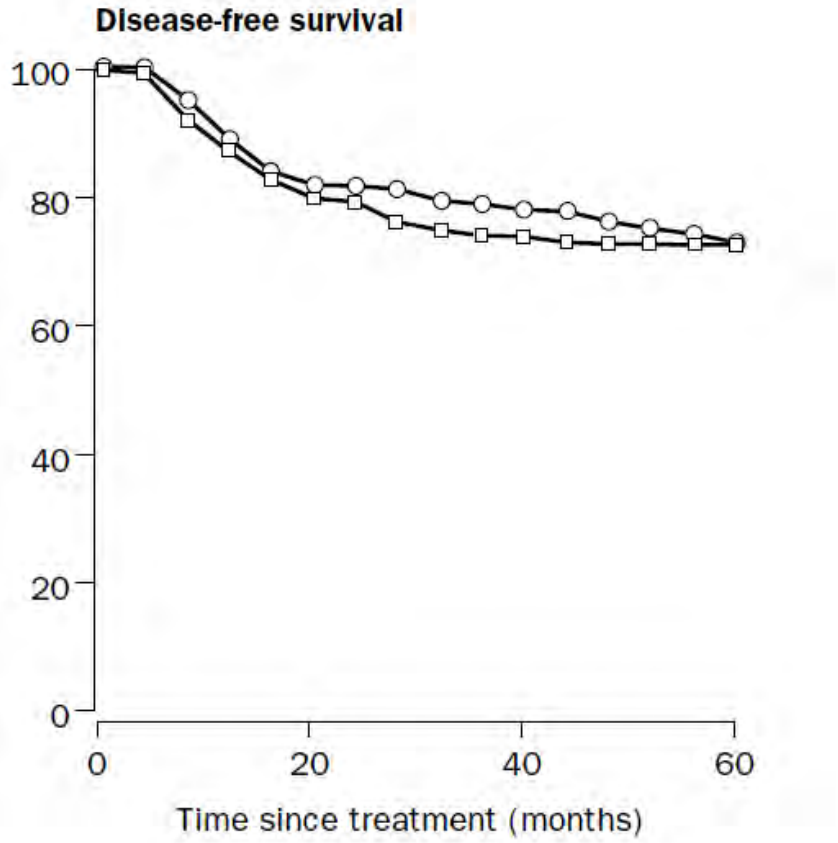
- Treatment:
  - RT: EBRT (40-53 Gy in 1.8 - 2.0 Gy fractions) + LDR boost (70–90 Gy to point A with Cs 137)
    - N = 167
  - Surgery: radical hysterectomy
    - N = 170

If node-positive: para-aortic nodes received 45 Gy with 5-10 Gy boost to involved node(s)

Landoni et al., 1997. *Lancet.*

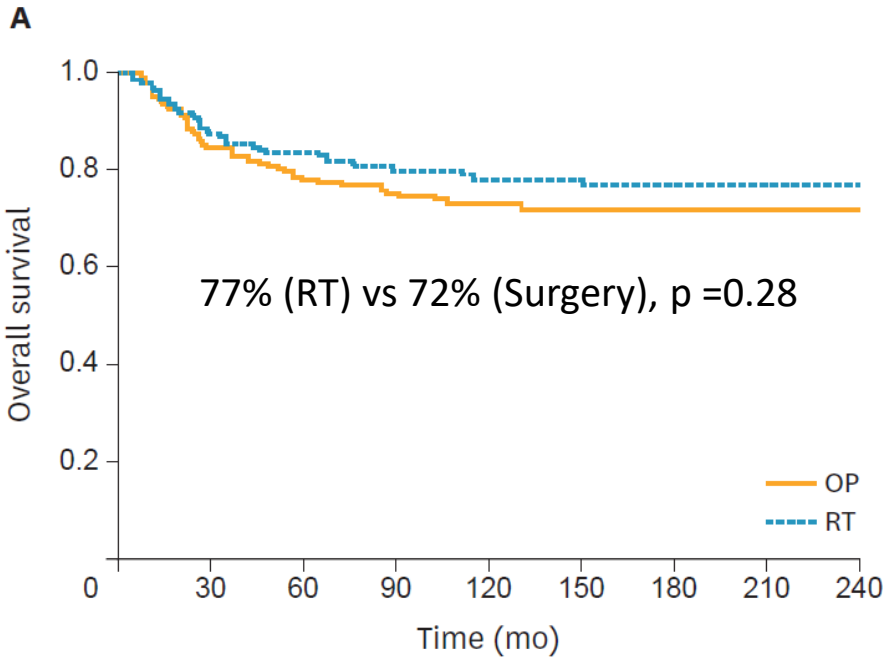
No difference in 5-year OS or DFS

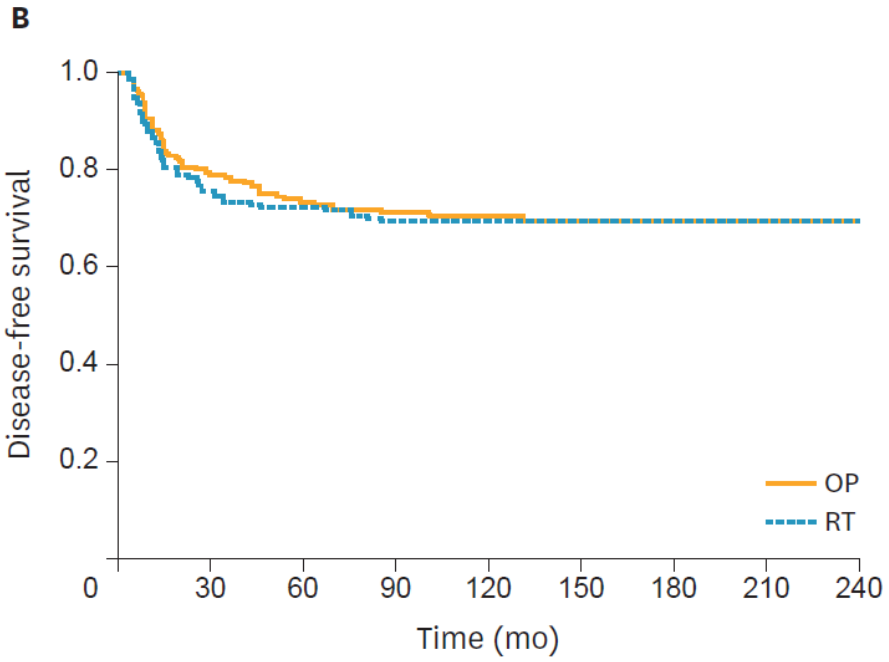




Landoni et al., 1997. *Lancet.*

No difference in 20-year OS or DFS





Note - 64% of surgical patients had adjuvant RT!

Landoni et al. 2017. *JGO.*

So oncologic outcomes are similar, but what about adverse effects?

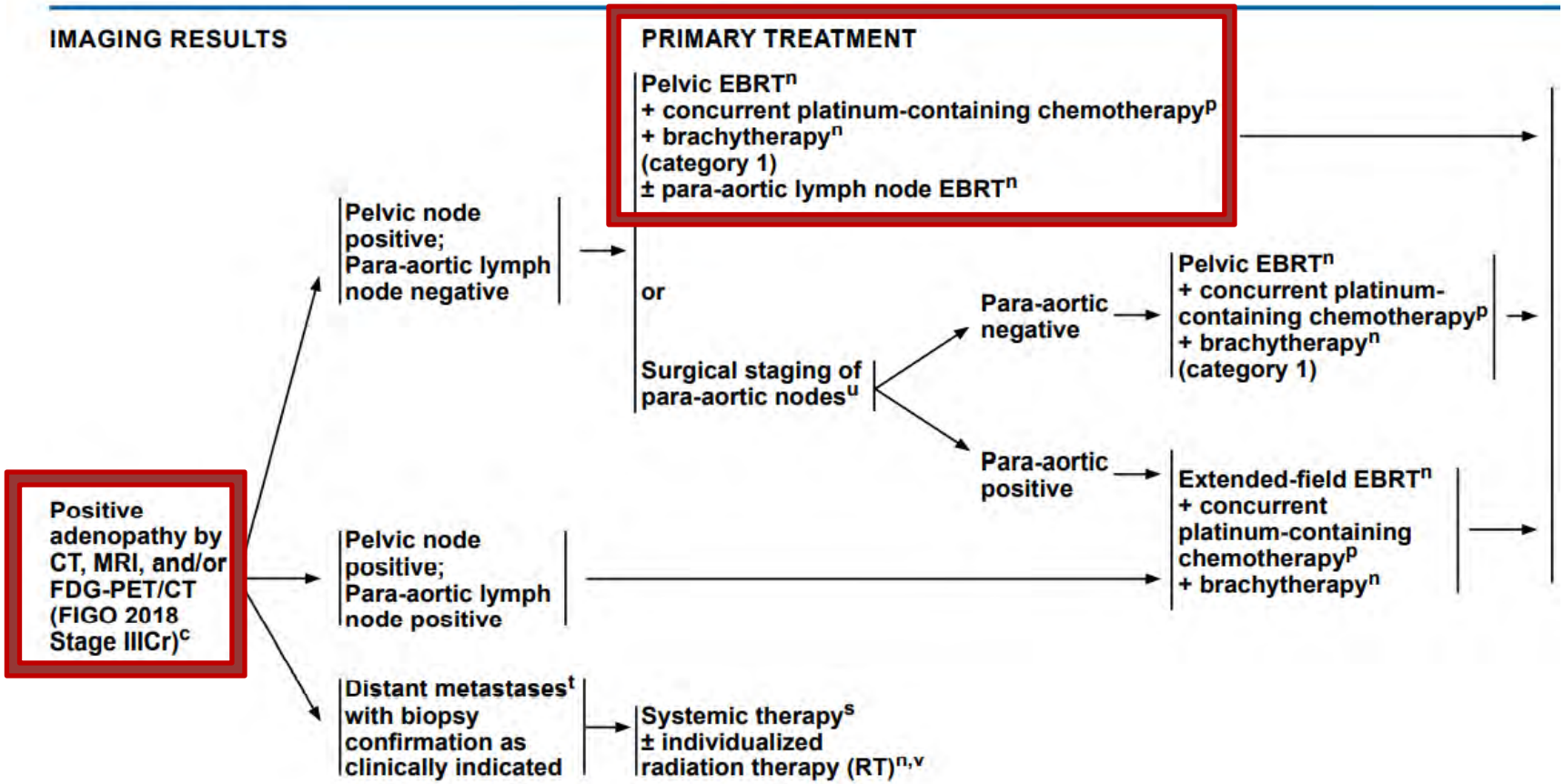
Type of complication	Surgery	Surgery+RT	RT
No. of patients	61	108	158
Urologic			
Hydroureteronephrosis*	2 (3.3)	11 (10.1)	9 (5.6)
Ureteral fistula	1 (1.6)	-	-
Urinary incontinence	2 (3.3)	4 (3.7)	-
Atonic bladder	8 (13.1)	5 (4.6)	1 (0.6)
Actinic cystitis	-	7 (6.4)	9 (5.6)
Vascular			
Pulmonary embolism	2 (3.3)	1 (0.9)	-
Legs edema	-	12 (11.1)	1 (0.6)
Lymphocyst	5 (8.2)	5 (4.6)	1 (0.6)
Vascular lesion	1 (1.6)	-	-
Intestinal			
Rectal fistula	-	-	1 (0.6)
Bowel obstruction	-	6 (5.5)	2 (1.2)
Proctitis	-	-	14 (8.8)
Others			
Wound abscess	-	-	-
Abdominal hernia	4 (6.6)	4 (3.7)	2 (1.2)
Bone necrosis	-	1 (0.9)	-
Vaginal necrosis	-	-	1 (0.6)
Vaginal stenosis	-	1 (0.9)	2 (1.2)
Pelvic fibrosis	-	4 (3.7)	3 (1.8)
Uterine perforation	-	-	1 (0.6)
Peritonitis	-	1 (0.9)	-
Total	25 (40.7)	62 (56.4)	47 (29.0)

Landoni et al. 2017. *JGO.*

What did we learn from the Landoni experience?

Since complications are highest in patients who receive surgery + RT, patients should be appropriately selected for surgery (i.e. must have a low likelihood of requiring adjuvant RT) in order to reduce the complications associated with multi-modal therapy

NCCN guidelines



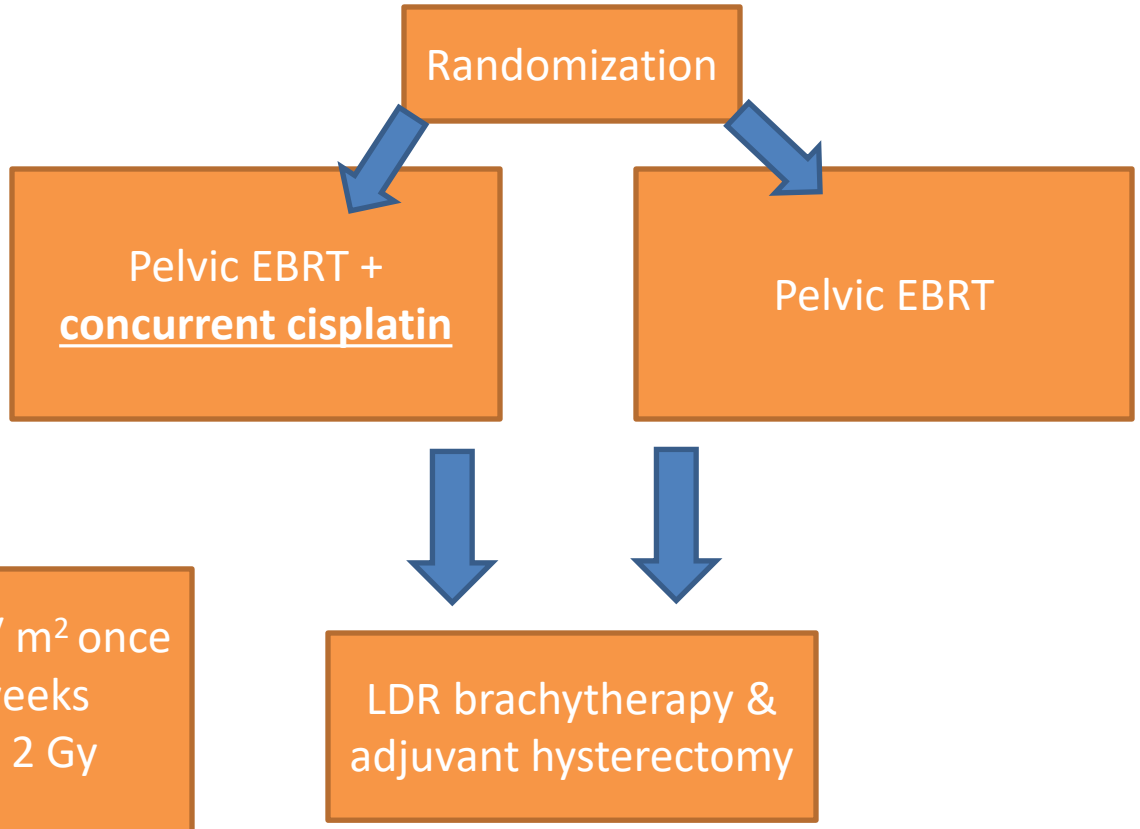
What's the evidence for concurrent cisplatin?

Trials to know:

GOG 123
GOG 109
GOG 85 / SWOG 8695
GOG 120
RTOG 90-01

GOG 123

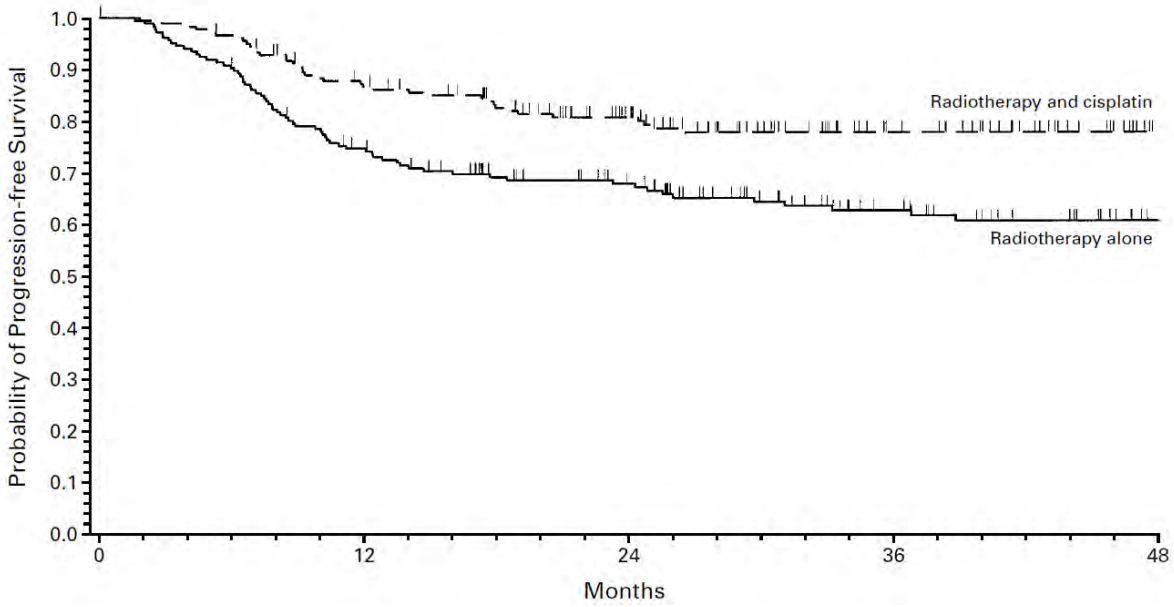
Population: patients with bulky stage IB cervical cancer

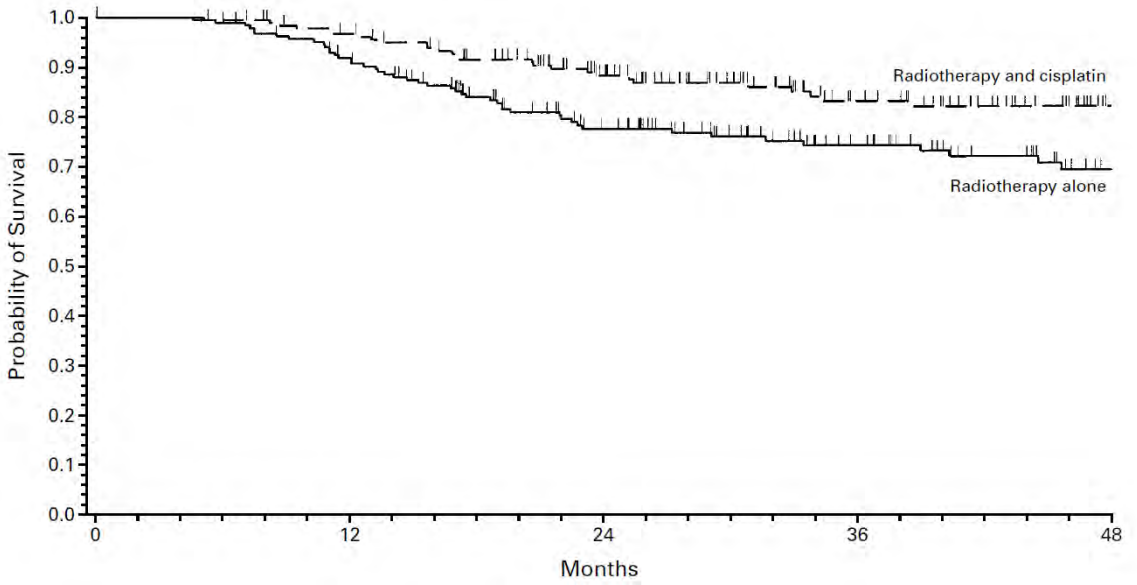


Cisplatin dosing: 40 mg / m^2 once weekly for up to 6 weeks
EBRT: 45 Gy in 1.8 or 2 Gy fractions
Brachytherapy prescribed 30 Gy to point A

Keys et al., 1999. *NEJM.*

Improved PFS and OS with cisplatin





Keys et al., 1999. *NEJM.*

GOG 109

Population: patients with cervical cancer, stages IA2, IB, or IIA who underwent hysterectomy & had at least 1 of the following:

- **Positive margins**
- **Positive pelvic nodes**
- **Parametrial involvement**

Hysterectomy

Adjuvant pelvic RT

Adjuvant pelvic RT with concurrent cisplatin + 5-FU

Cisplatin delivered as 70 mg / m^2 for 4 cycles

★ Peters criteria

Peters et al., 2000. *JCO.*

Improved PFS and OS with cisplatin + 5-FU

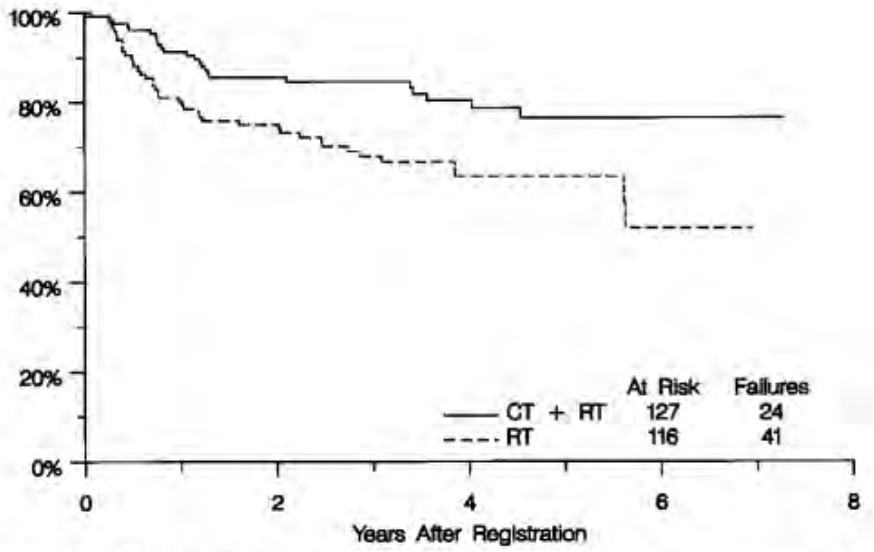


Fig 1. Progression-free survival for 127 patients randomized to receive CT + RT and for 116 patients randomized to receive RT alone.

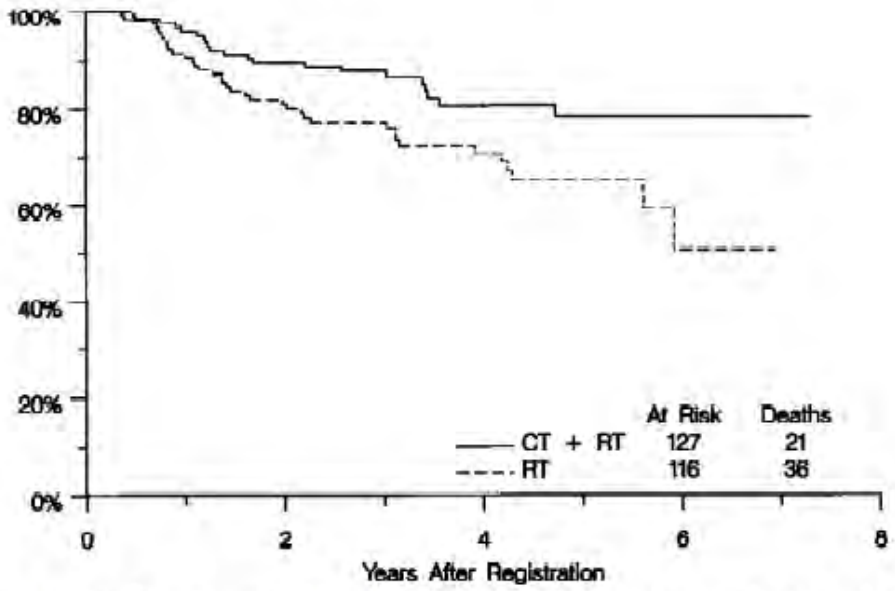


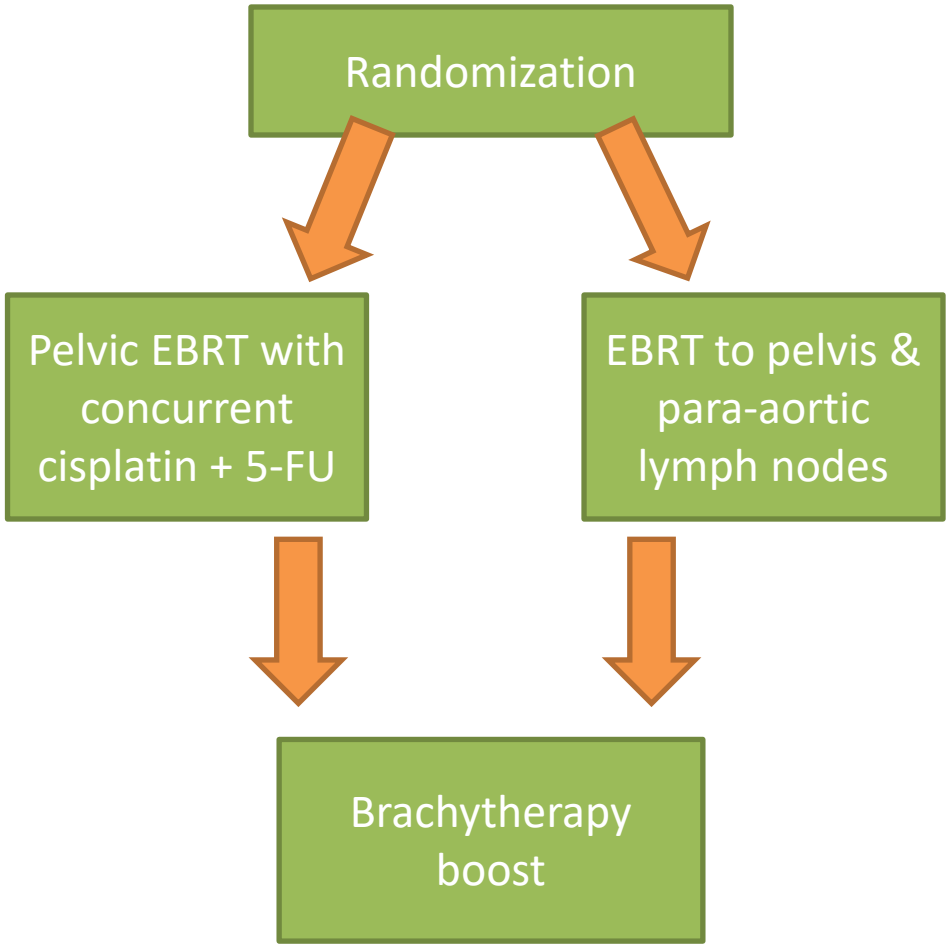
Fig 2. Overall survival for 127 patients randomized to receive CT + RT and for 116 patients randomized to receive RT alone.

Peters et al., 2000. *JCO.*

RTOG 90-01

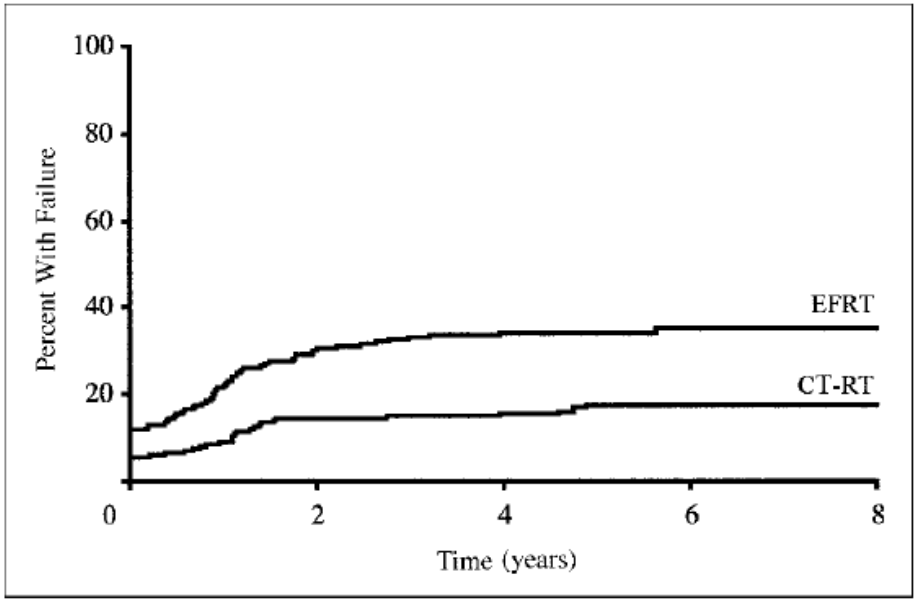
Population: patients with cervical cancer, stages IIB – IVA or stage IB- IIA with tumors at least 5 cm

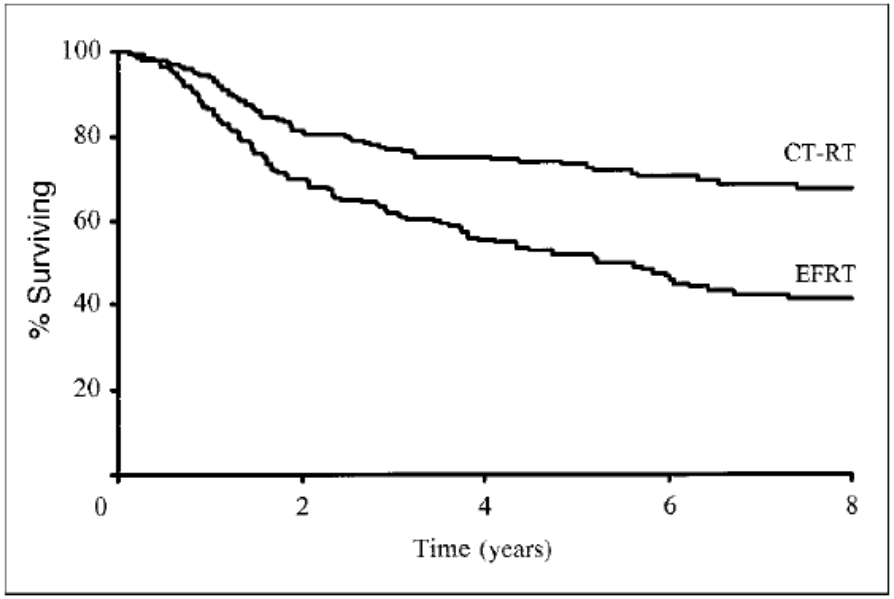
EBRT delivered 45 Gy / 25 fx
Cumulative dose to Point A was 85 Gy
Cisplatin 75 mg / m^2 followed by 5-FU 4000 mg / m^2 over 96 hours delivered every 3 weeks for 3 cycles total



Eifel et al., 2004. *JCO.*

Lower rates of locoregional recurrence and improved OS with cisplatin + 5-FU



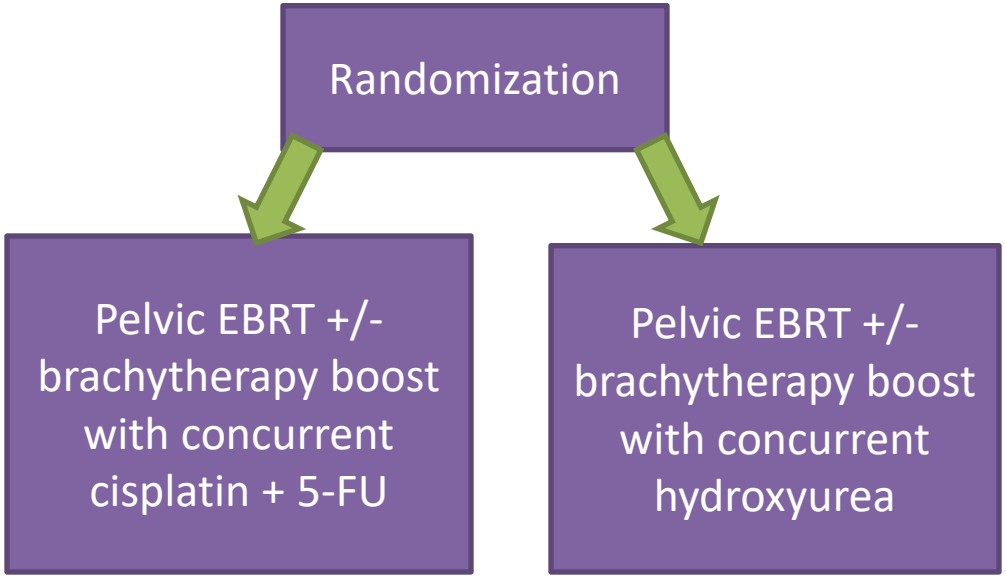


Eifel at al., 2004. *JCO*.

GOG 85 / SWOG 8695

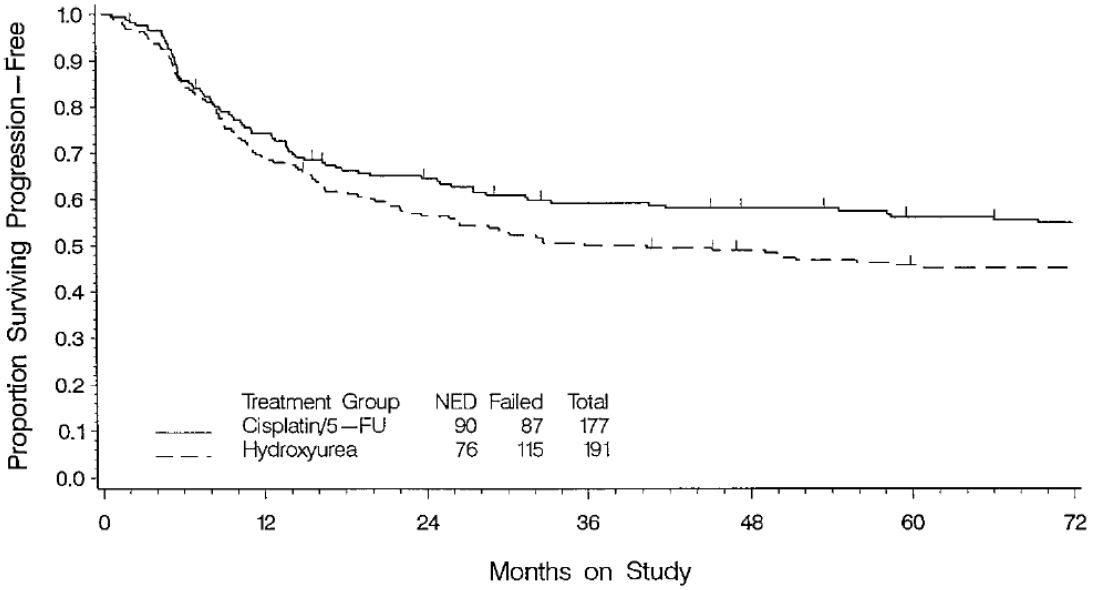
Population: Patients with cervical cancer, stages IIB - IVA

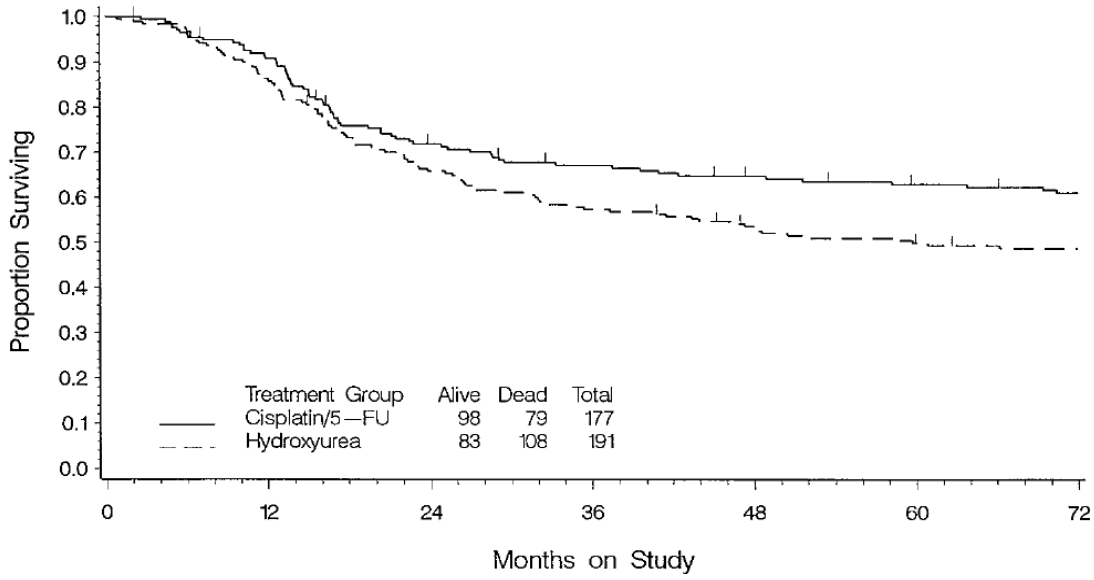
EBRT delivered with conventional fractionation, with total dose depending on patient's stage
Cisplatin 50 mg / m^2 followed by 5-FU 4000 mg / m^2 delivered over 96 hours for 2 cycles
Hydroxyurea 80 mg / kg PO twice weekly



Whitney et al., 1999. *JCO.*

Improved PFS and OS with cisplatin + 5-FU





Whitney et al., 1999. *JCO.*

GOG 120

Population: patients with cervical cancer, stages IIB - IVA

Randomization

Pelvic RT + concurrent cisplatin

Pelvic RT + concurrent cisplatin, 5-FU, & hydroxyurea

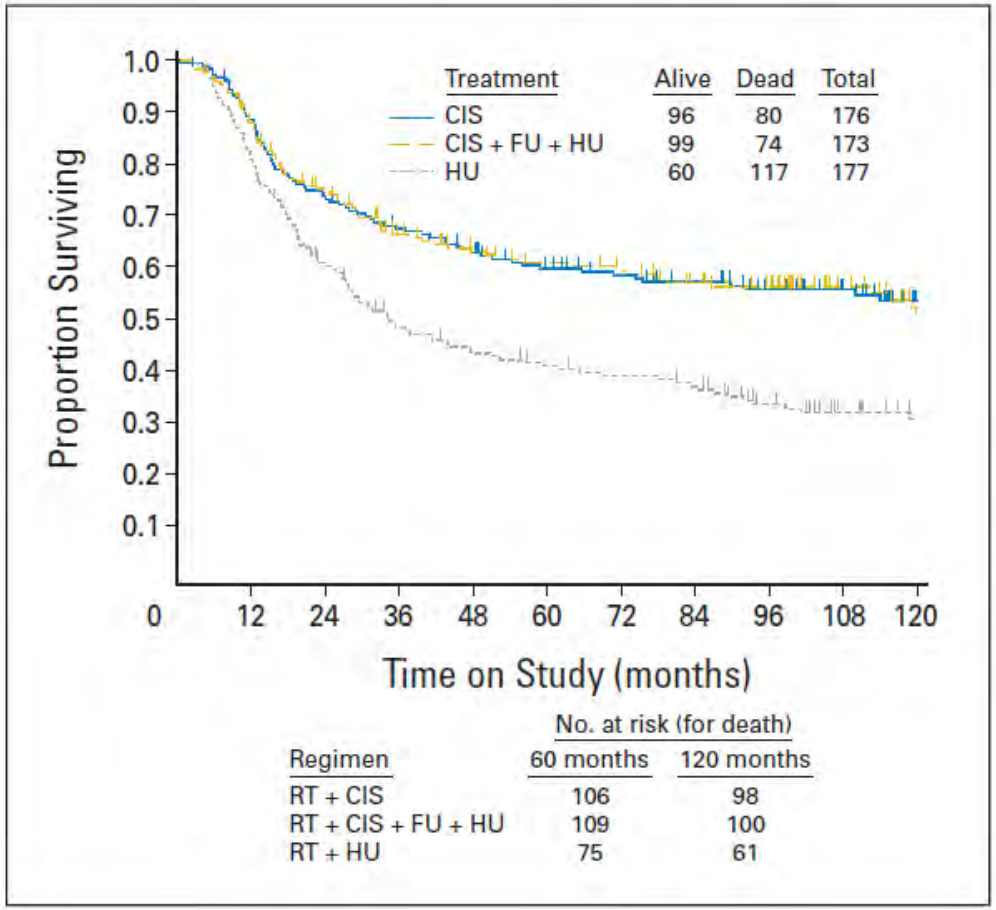
Pelvic RT + concurrent hydroxyurea

Pelvic RT included EBRT + LDR brachytherapy boost, cumulative dose depended on patient stage

Rose et al., 2007. *JCO.*

Improved OS with cisplatin

OS benefit seen for those with stage IIB and stage III disease



Rose et al., 2007. *JCO.*

Results of these trial prompted -

NCI alert recommending EBRT with concurrent cisplatin

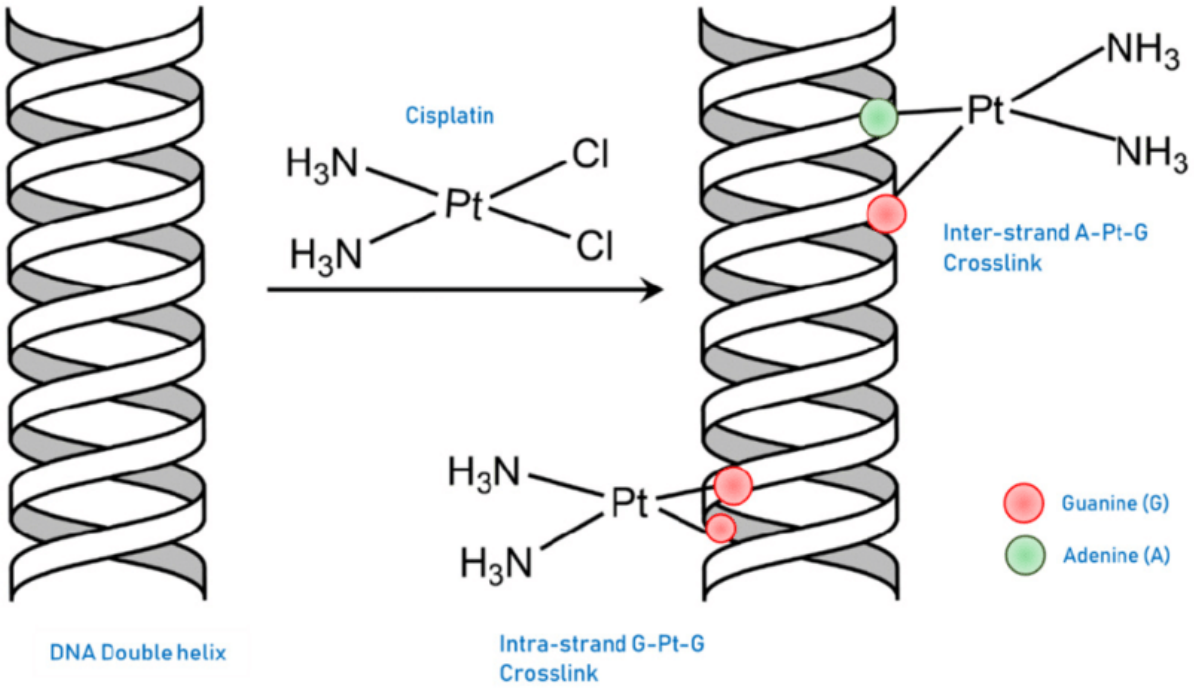
Absolute OS benefit at 5 years is 6% with platinum chemotherapy
Hazard ratio 0.81 in 1 meta-analysis

Reducing Uncertainties About the Effects of Chemoradiotherapy for Cervical Cancer: A Systematic Review and Meta-Analysis of Individual Patient Data From 18 Randomized Trials

Chemoradiotherapy for Cervical Cancer Meta-Analysis Collaboration

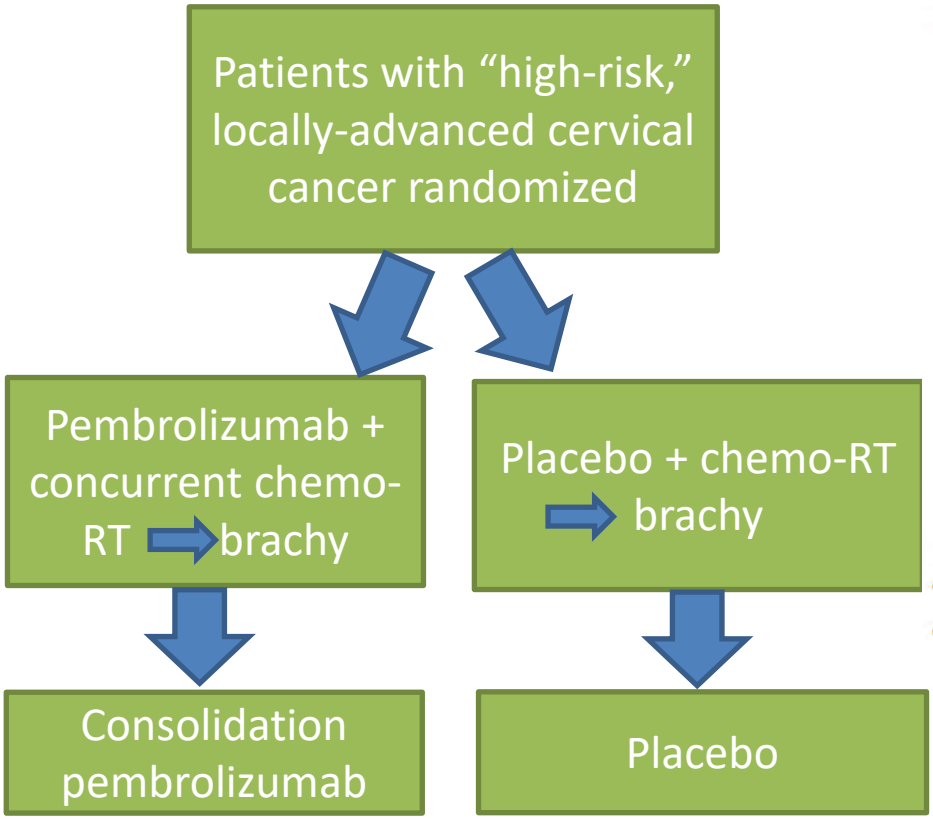
Cisplatin dosing

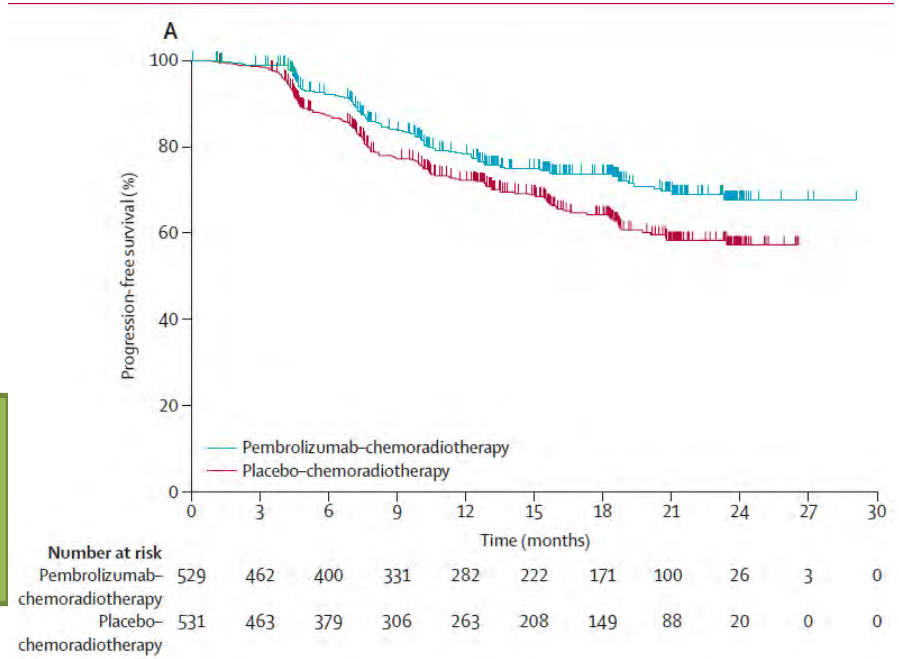
- 40 mg / m^2 weekly
- 5-6 weeks



In there a benefit with immunotherapy?: KEYNOTE A-18

- Randomized, double-blind, placebo-controlled phase III trial





Improved 2-year PFS with pembrolizumab (68%) compared to placebo (57%)

Lorusso et al., 2024. *Lancet*.

NCCN recommends *considering* concurrent + consolidative pembrolizumab when "high risk":

- FIGO (2014) stage III – IVA
  - Category 1
- FIGO (2018) stage III – IVA
  - Category 2B

Note, FIGO 2014 staging is clinical and does not incorporate imaging

III		The carcinoma has extended onto the pelvic sidewall. On rectal examination, there is no cancer free space between the tumor and pelvic sidewall. The tumor involves the lower third of the vagina. All cases of hydronephrosis or non-functioning kidney should be included unless they are known to be due to other causes.
	IIIA	Involvement of the lower vagina but no extension onto pelvic sidewall.
	IIIB	Extension onto the pelvic sidewall, or hydronephrosis/non-functioning kidney.
IV		The carcinoma has extended beyond the true pelvis or has clinically involved the mucosa of the bladder and/or rectum.
	IVA	Spread to adjacent pelvic organs.

External beam radiotherapy course

- EBRT to pelvis
  - 45 Gy / 25 fractions to pelvis
  - SIB to 57.5 Gy to positive node
- Concurrent cisplatin

Simulation for EBRT

- Patient positioned head-first, supine, and with arms on chest and legs in neutral position
  - Superior border: above diaphragm
  - Inferior border: below ischial tuberosities
- 2 scans obtained to create an ITV
  1. Full bladder, no contrast
  2. Empty bladder, with IV contrast
- Empty rectum

A review of pelvic target volumes per EMBRACE II

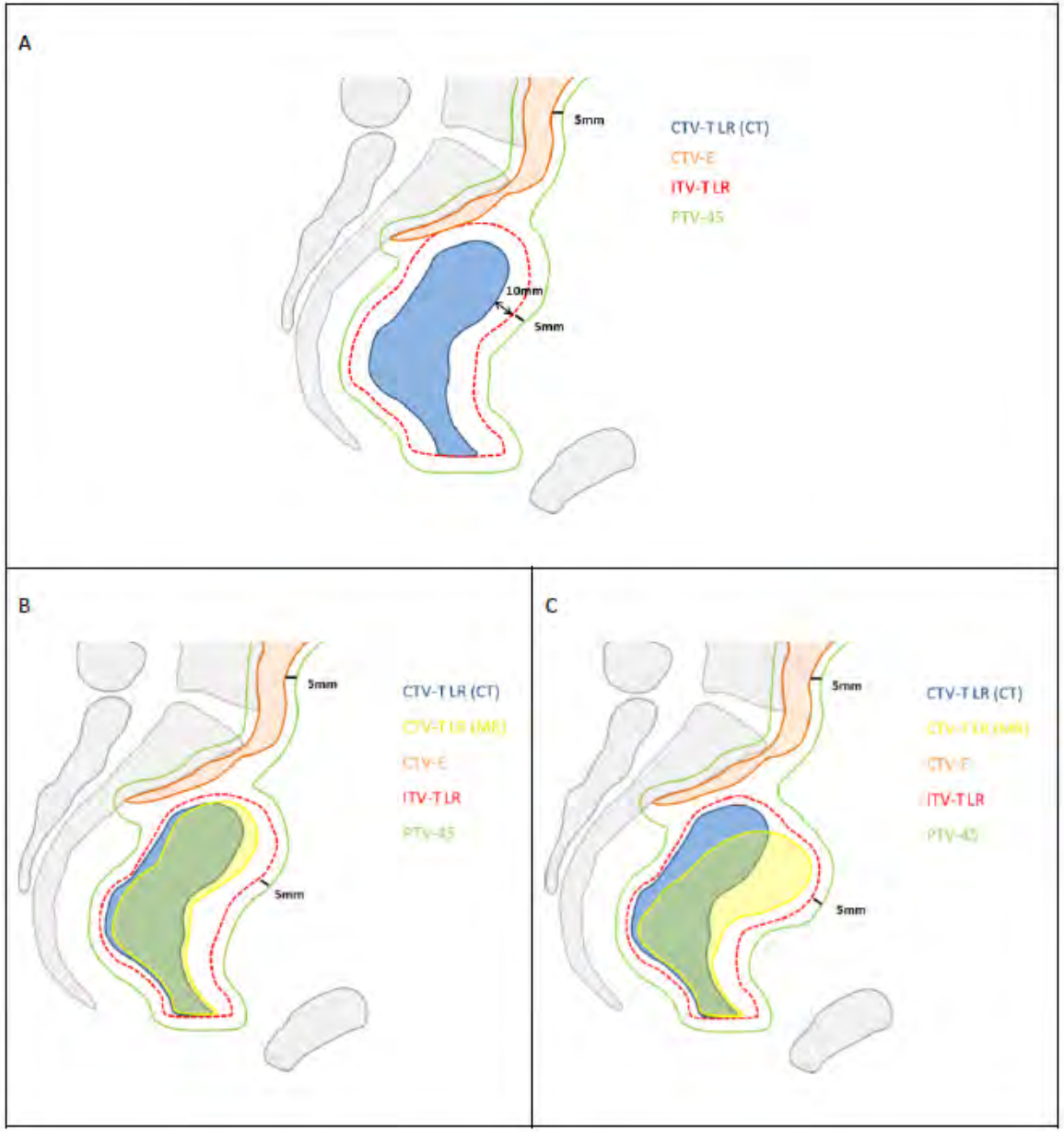
- GTV-T: cervical tumor as seen on MRI
- CTV-T HR: tumor and entire cervix
- CTV-T LR:
  - CTV-T HR + 5 mm anterior and posterior
  - Uterus
  - Parametria and involves nodes
  - Upper vagina
  - If pelvic wall, mesorectum, or other structures are involved, add 2 cm around CTV-T HR to include these structures
- ITV accounts for the position of the CTV-T LR on the empty & full bladder scans

Creating the ITV

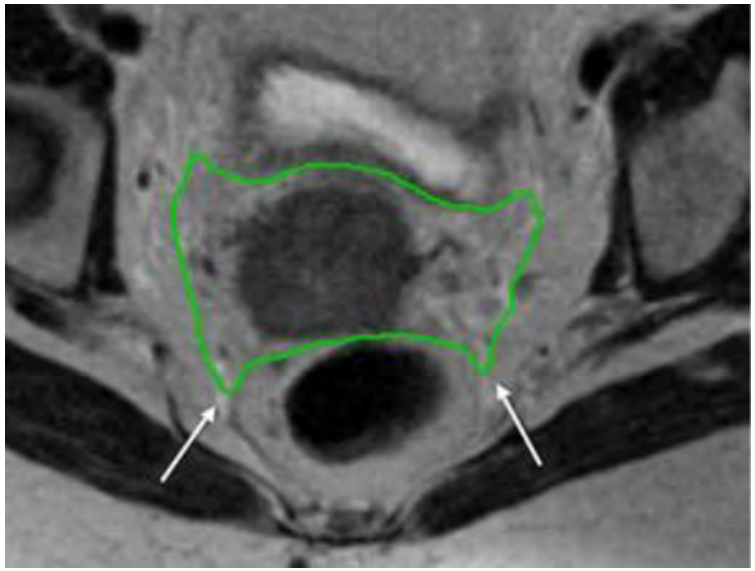
1. Fuse: empty & full bladder scans from simulation, MRI (T2 sequences)
   - Full bladder scan will be used for treatment planning, so draw on this
2. Contour cervical tumor as seen on MRI to create GTV-T
   - Incorporate other clinical & radiographic information as appropriate
3. Contour uninvolved cervix and add this to GTV-T to create CTV-T HR
4. Create CTV-T LR by creating 5 mm anterior & posterior expansions to CTV-T HR (but crop out of bladder & rectum)
   - Add parametria, uterus, upper vagina (ending volume 2 cm inferior to gross tumor) to CTV-T LR
5. Copy CTV-T LR as drawn on full bladder scan to ITV-T and adjust volumes based on empty bladder scan.
   - Goal is for ITV-T LR to include same structures when bladder is full or empty

Strategies to derive the ITV

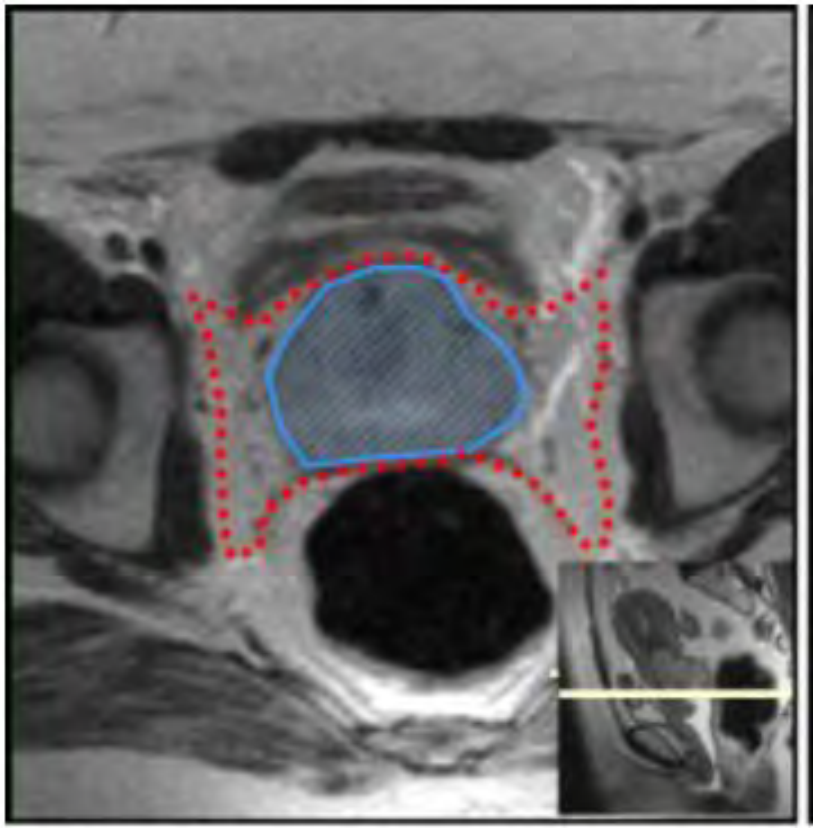
- Standard margin applied to CTV (A)
- Individualized margin created based on anatomic changes seen on all planning imaging (B & C)



Borders of the parametria



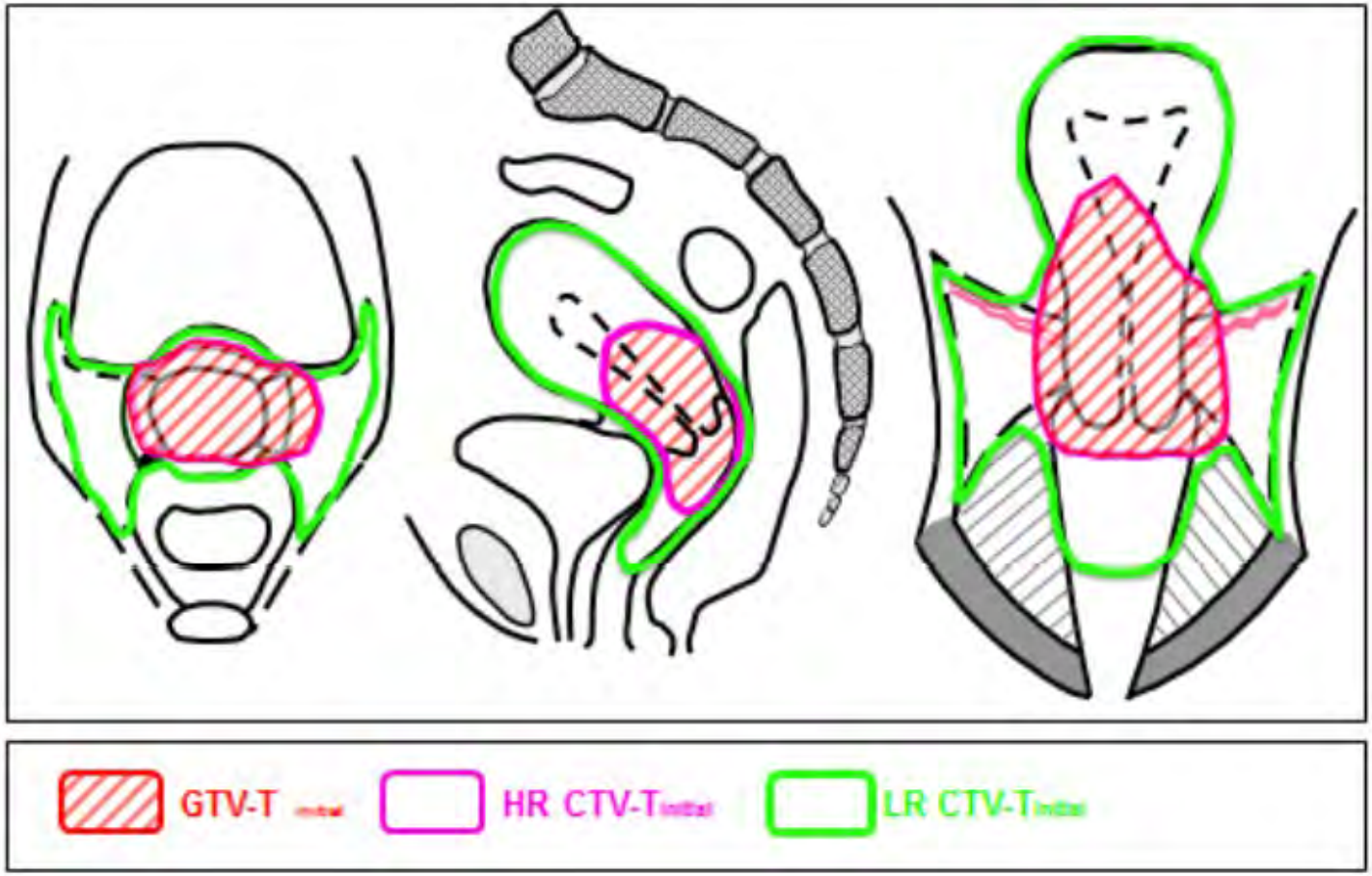
Anteriorly	Posterior wall of bladder or posterior border of external iliac vessel
Posteriorly	Uterosacral ligaments and mesorectal fascia (figure 6)
Laterally	Medial edge of internal iliac and obturator vessels
Superiorly	Top of fallopian tube/ broad ligament/uterine arteries. Depending on degree of uterus flexion, this may also form the anterior boundary of parametrial tissue.
Inferiorly	Urogenital diaphragm



Left: parametria delineated in green
Right: parametria delineated in red

Image credit: EMBRACE II

Sample target volumes per EMBRACE II

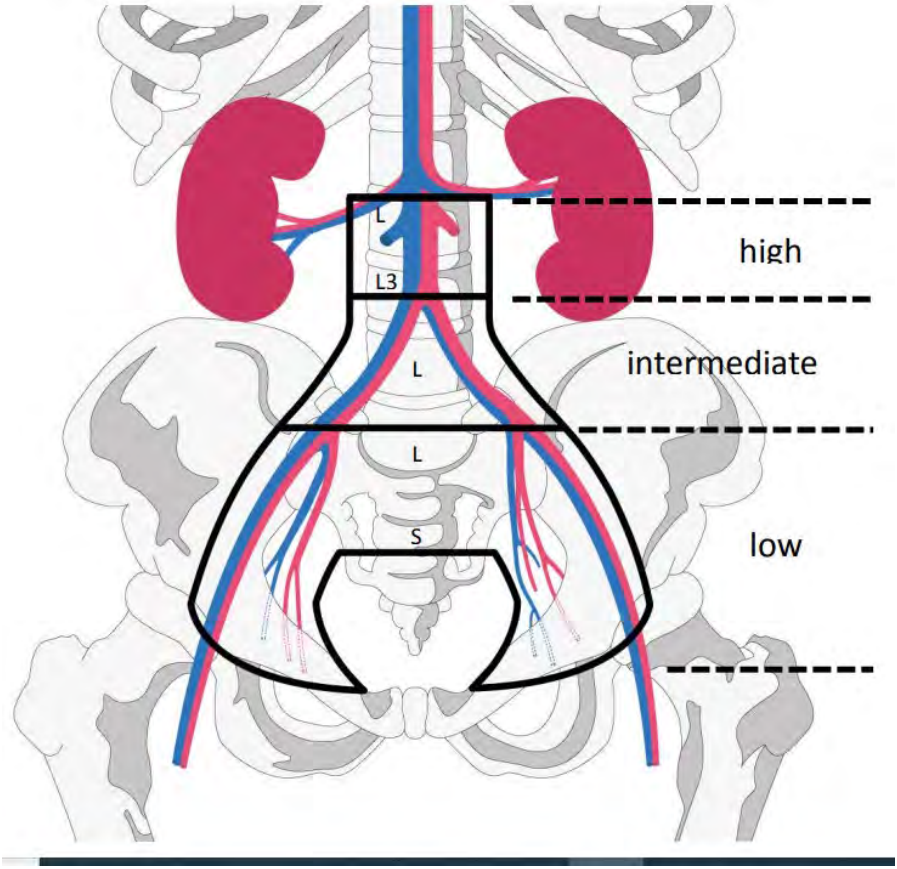


A deep dive on pelvic lymph node volumes per EMBRACE II

Risk Group LN	Definition	EBRT lymph node regions
Low Risk (LR LN)	Tumour size ≤4cm AND stage IA/IB1/IIA1 AND N0 AND squamous cell carcinoma AND no uterine invasion	**"Small Pelvis"** internal iliac external iliac obturator presacral
Intermediate Risk (IR LN)	Not low risk No high risk features **<u>***Our patient fits this category***</u>**	**"Large Pelvis"** Nodes included in "Small Pelvis" and common iliac region (including the aortic bifurcation). In addition: • inguinal in case of distal vaginal involvement. • Mesorectal space in case of mesorectal nodes and advanced local disease
High Risk (HR LN)	Based on nodal pathology • ≥ 1 pathologic node at common iliac or above • OR ≥ 3 pathologic nodes	**"Large Pelvis + Para-aortic"** Nodes included in "Large Pelvis" and para-aortic region with the upper border of CTV minimum at the level of renal veins (usually incl. L2), and at least 3 cm cranial of the highest pathological node in case of para-aortic nodes].

Contouring pelvic lymph nodes

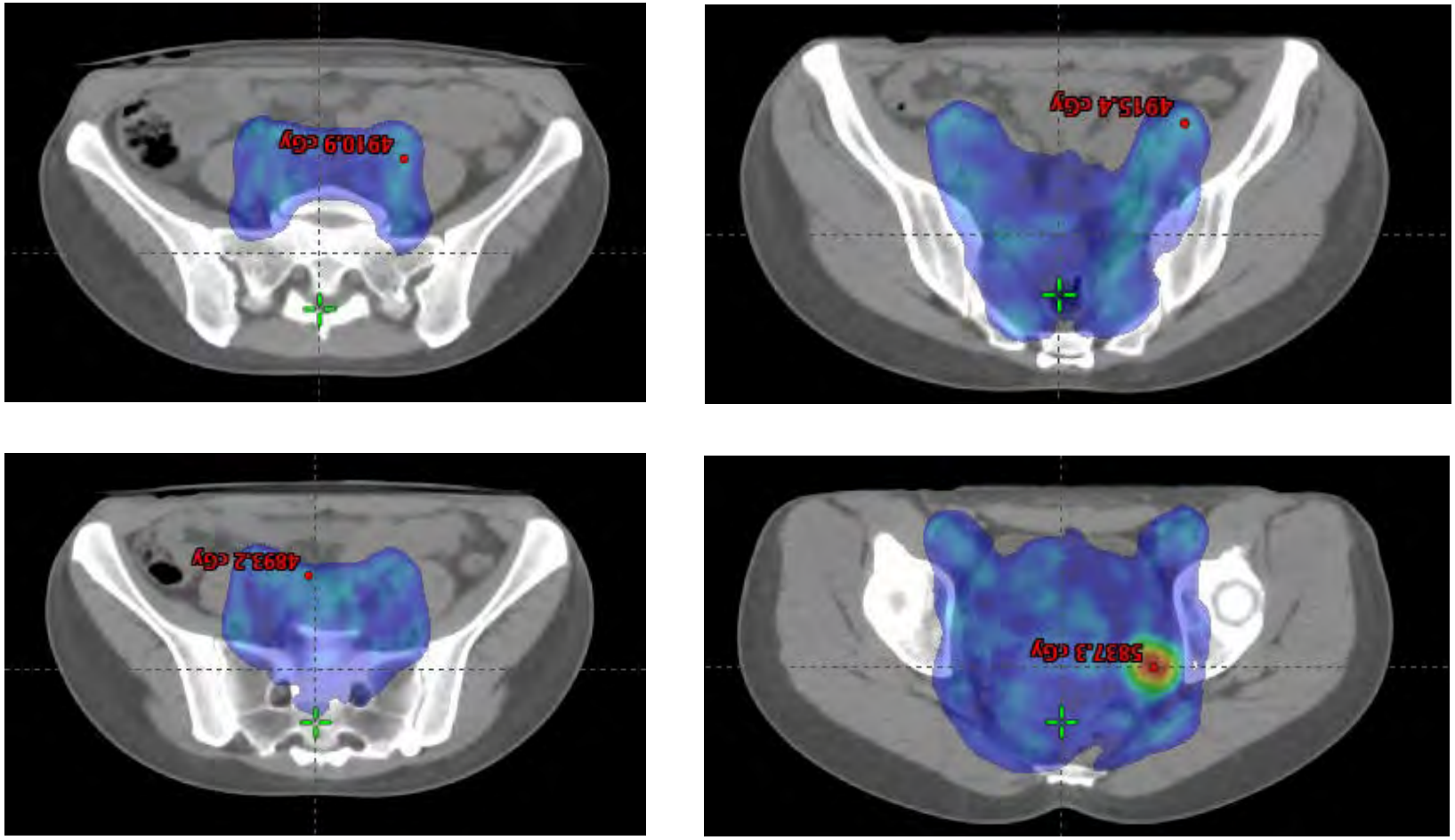
- CTV-E (elective nodal regions): 7 mm margin along the relevant vessels
  - Small pelvis
  - Large pelvis
  - Extended pelvic field
- GTV-N: pathologic nodes, can include margin up to 3 mm to create CTV-N



Planning considerations

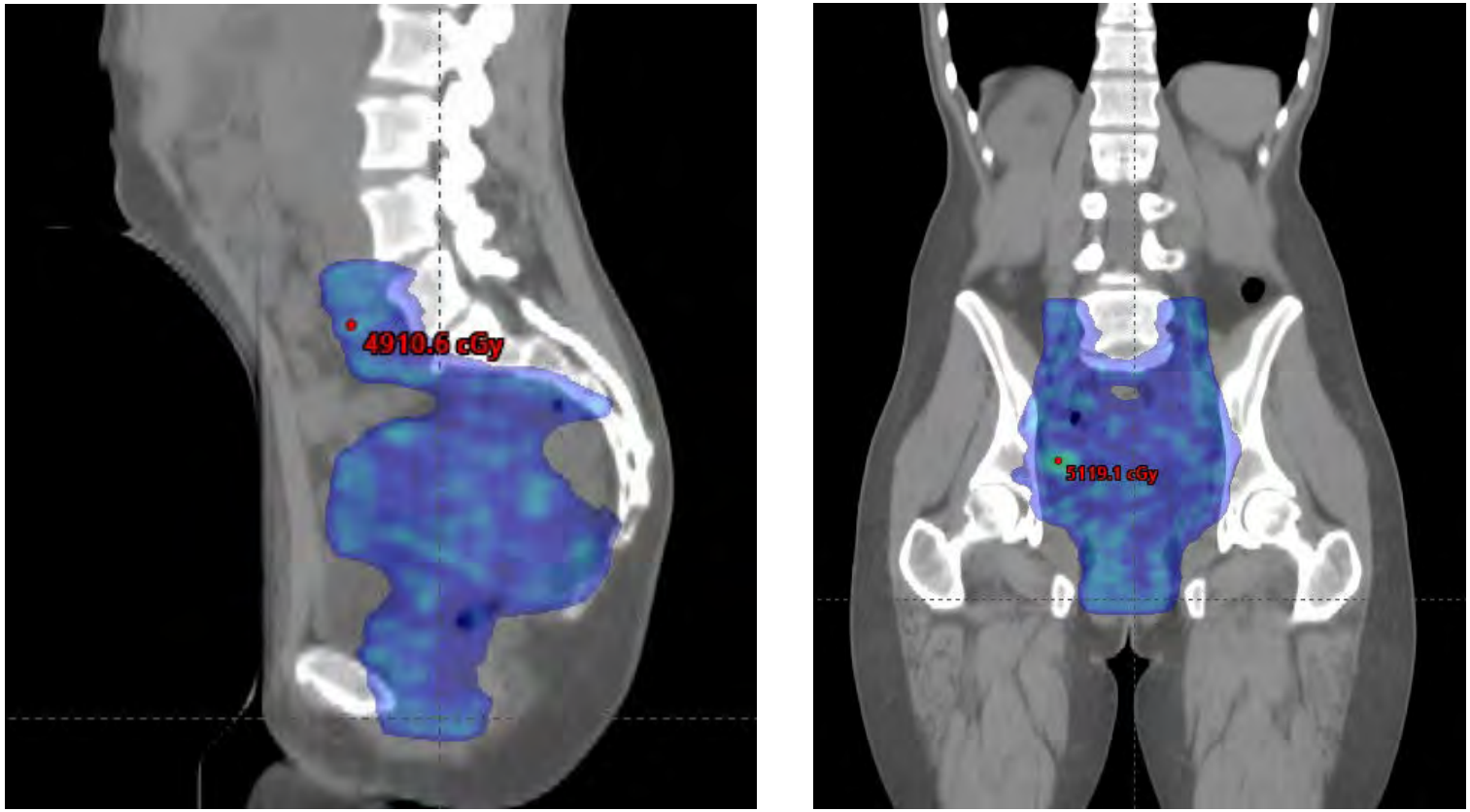
- Dose to pelvis – 45 Gy / 25 fx
  - EMBRACE I showed decreased morbidity with 45 Gy vs 50 Gy
- Dose to involved nodes – SIB 55 – 57.5 Gy
  - True pelvis: 2.2 Gy / fx for total dose of 55 Gy (EQD2 56 Gy)
    - Estimate 3-4 Gy EQD2 contribution from brachy for total EQD2 ~ 60Gy
  - Outside true pelvis: 2.3 Gy / fx for total dose of 57.5 Gy (EQD2 ~59 Gy)

Plan evaluation: EBRT

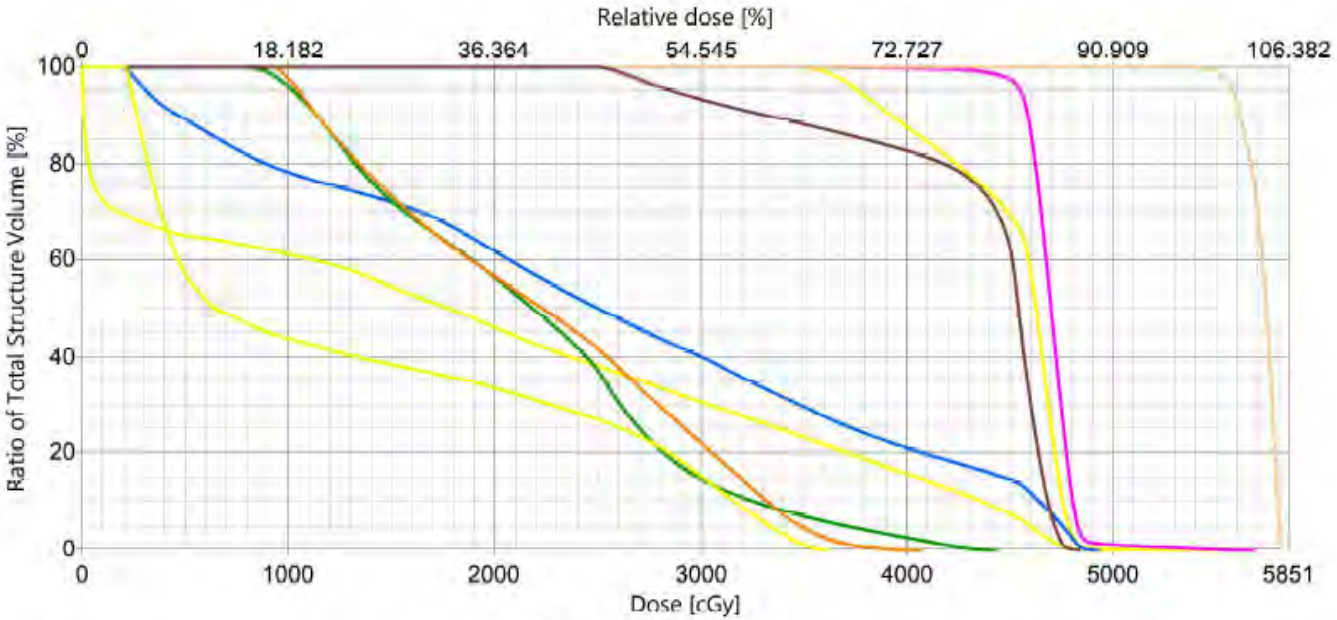


PTV45: CTV-T LR, pelvic nodes, pathologic nodes, 5 mm expansion
Positive nodes boosted to 57.5 Gy

Plan Evaluation: EBRT



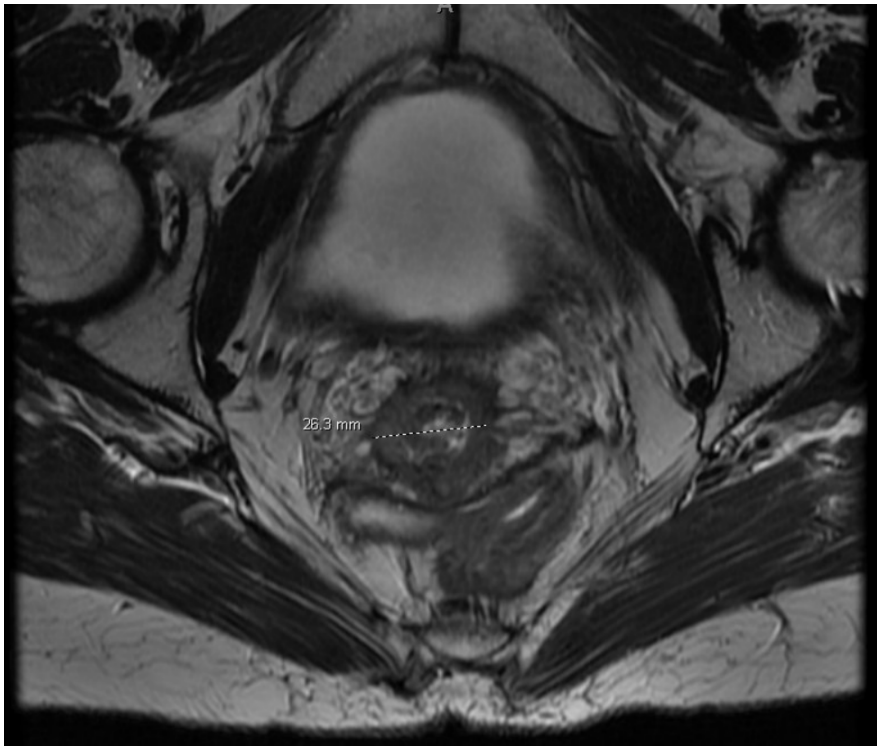
Pelvis - TPS DVH

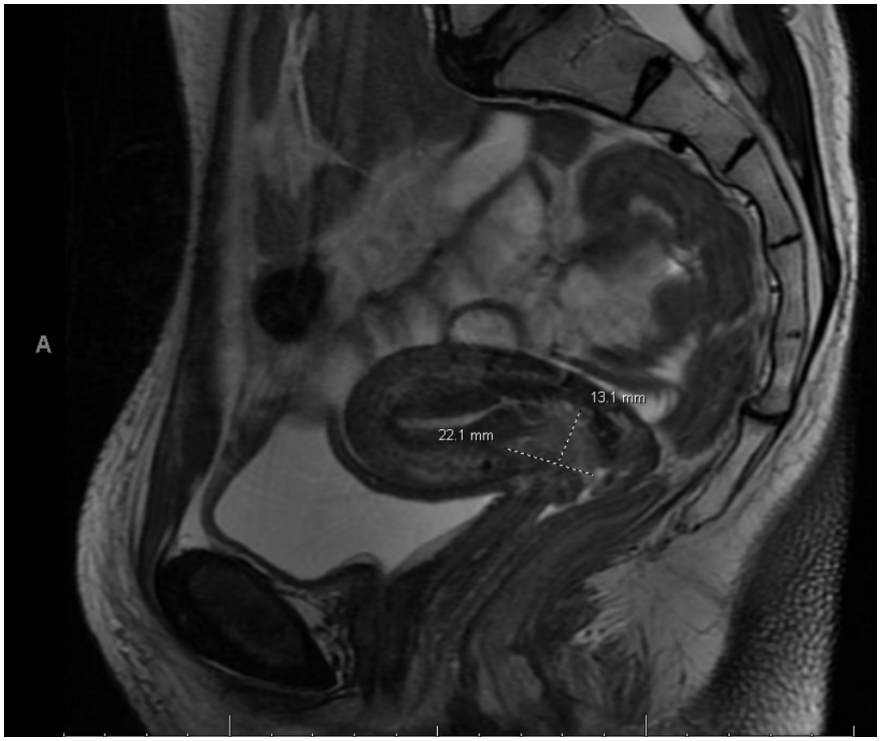


Structure Color	Pelvis	Coverage	Sampling Coverage (%)	Volume (cc)	Min Dose (cGy)	Max Dose (cGy)	Mean Dose (cGy)
	Bladder	100.00	100.00	216.43	3394.5	5469.3	4493.0
	Bones	100.00	99.67	1919.62	0.0	5482.2	1899.1
	Bowelbag	100.00	100.01	1028.93	174.8	4931.3	2534.7
	FemoralHead_L	100.00	100.00	69.07	763.2	4437.9	2178.4
	FemoralHead_R	100.00	100.00	72.58	916.0	4074.9	2225.1
	plan_45 PLAN	100.00	100.01	1557.53	3002.7	5681.4	4697.4
	PTV_LN	100.00	100.08	14.78	5396.0	5850.7	5724.0
	Rectum	100.00	99.99	66.57	2500.7	4840.3	4316.3
	SpinalCord1	100.00	100.17	13.87	205.5	3618.0	1361.1

Restaging MRI following EBRT

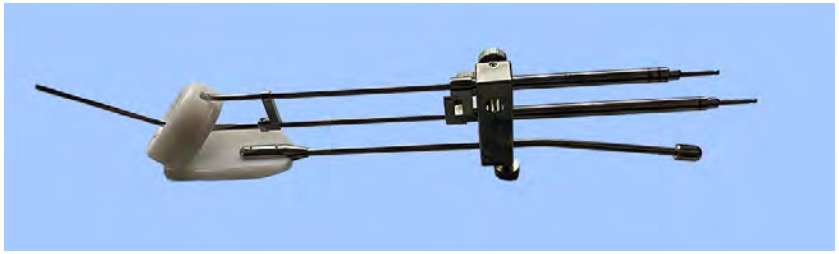
Decreased size of cervical mass to 2.2 x 1.3 x 2.6 cm from 5 cm in greatest extension

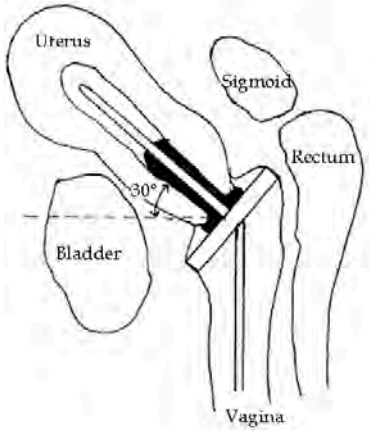


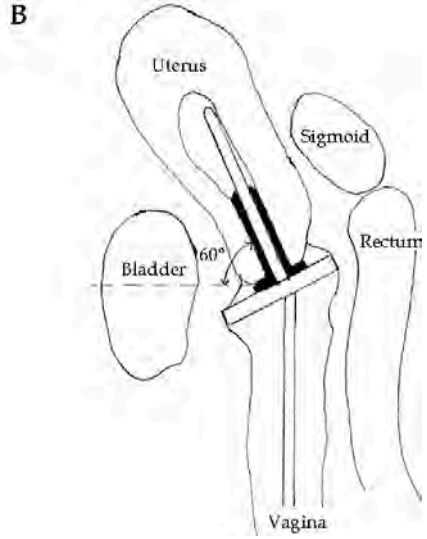


What's next? HDR brachytherapy boost via tandem & ring

- Goal: EQD2 D90 > 90 Gy to tumor
  - 85 Gy is acceptable
- Prescription: 7 Gy x 4 fractions
- HDR isotope: Ir-192



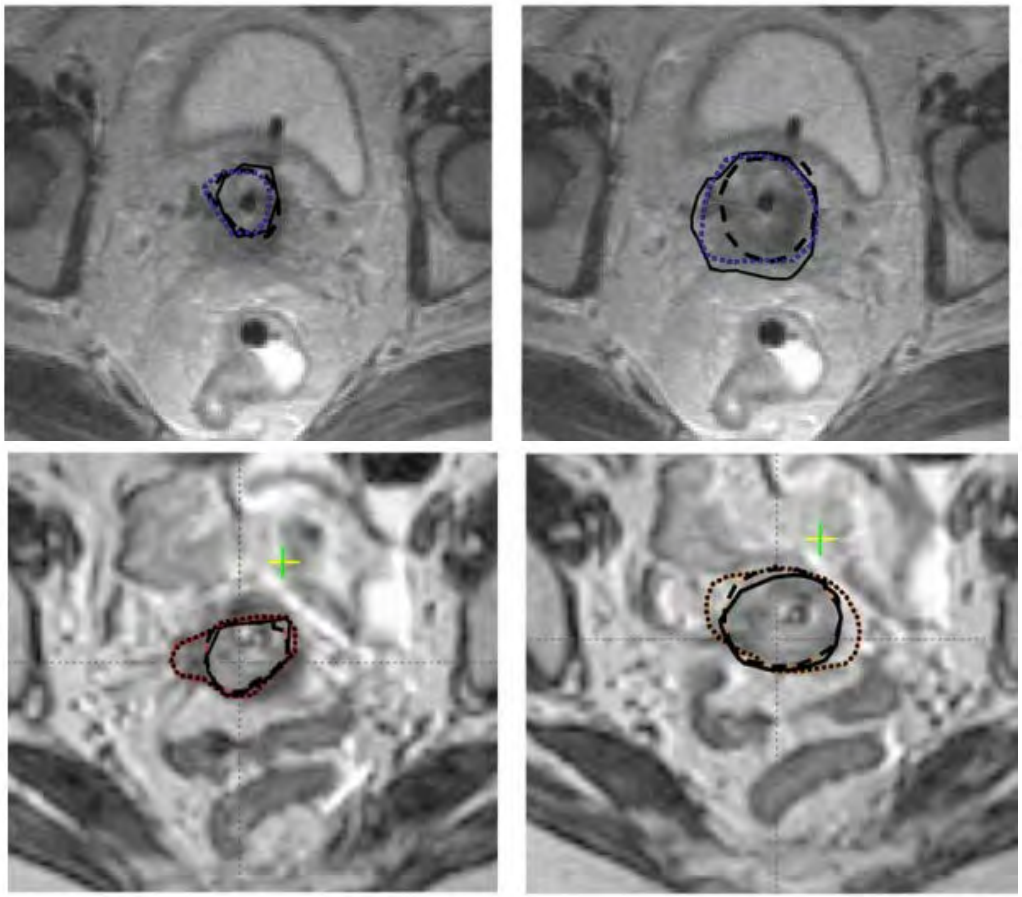


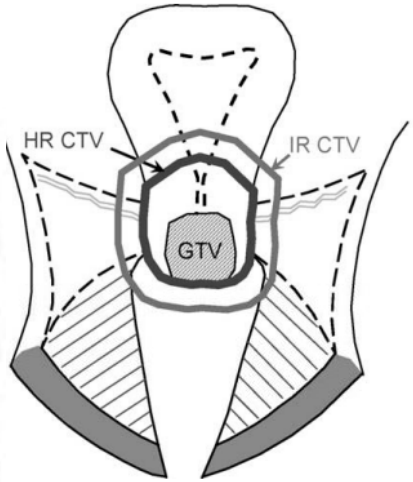


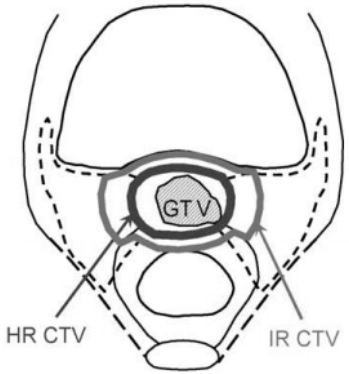
Brachytherapy Contouring

GTV

CTV-HR







GTV: residual tumor at time of brachy, as defined by MRI & exam

CTV HR: GTV + cervix

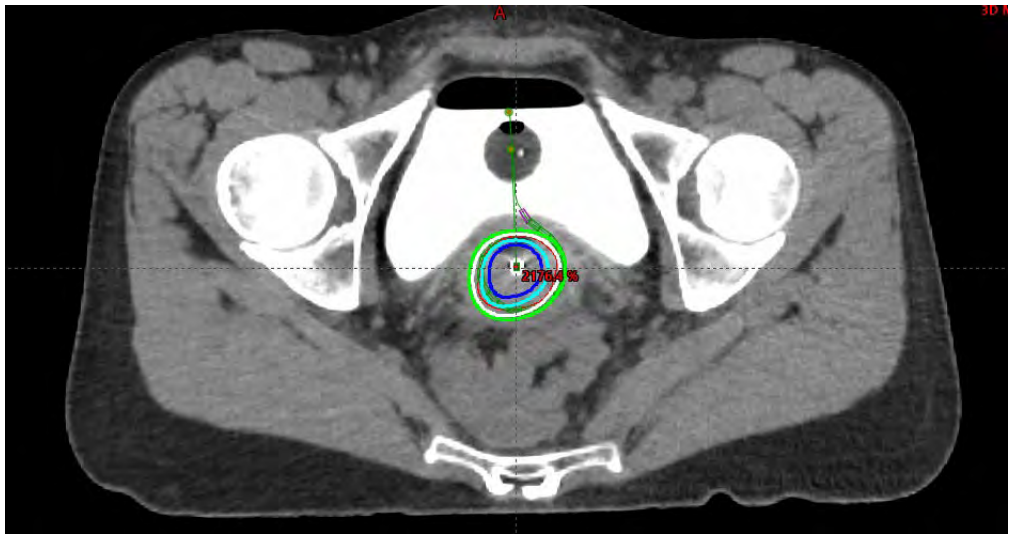
Note, **CTV IR** (intermediate risk CTV) is used in Europe & appears in GEC-ESTRO guidelines. This is defined as the CTV HR + 5– 5 mm margin.

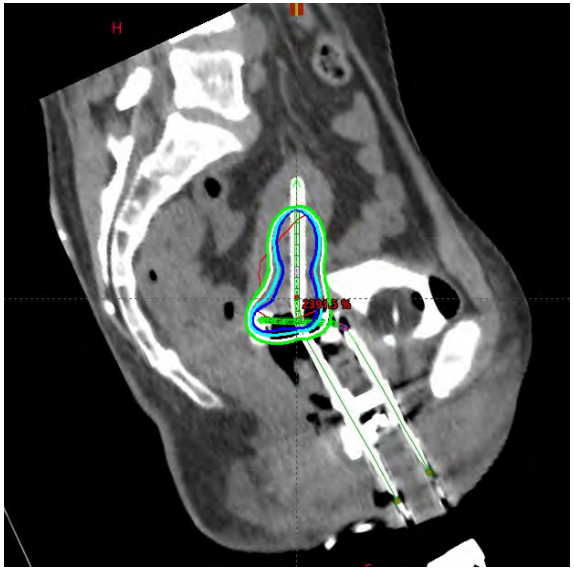
For our patient, planning MRI was obtained after each tandem placement.

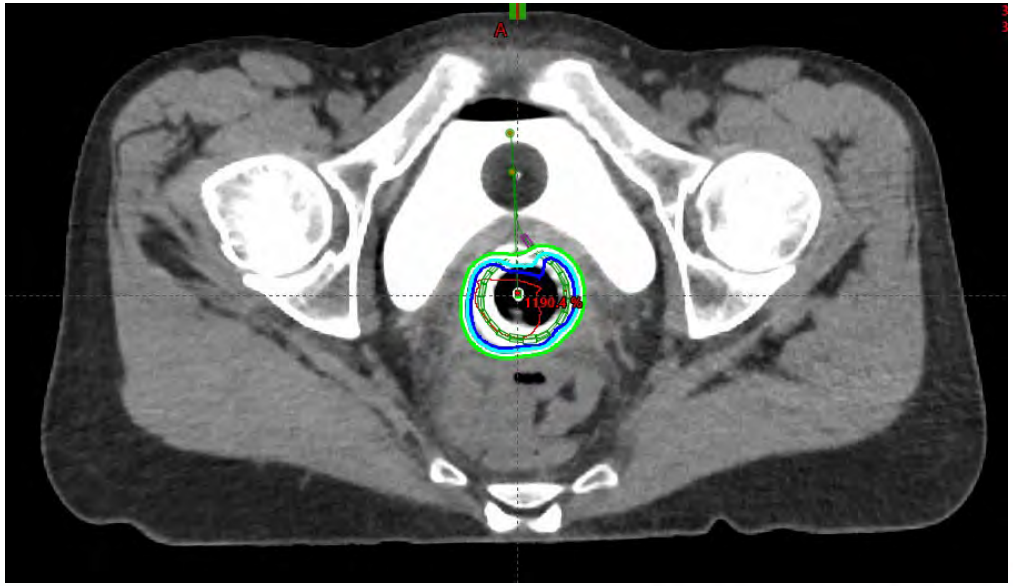
Haie-Meder, et al. 2005. *Radiotherapy & Oncol.*

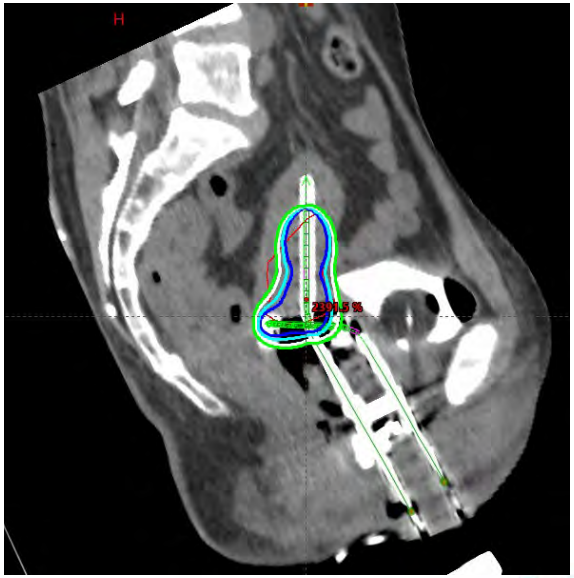
Fractions 1-2

White = 100% isodose line



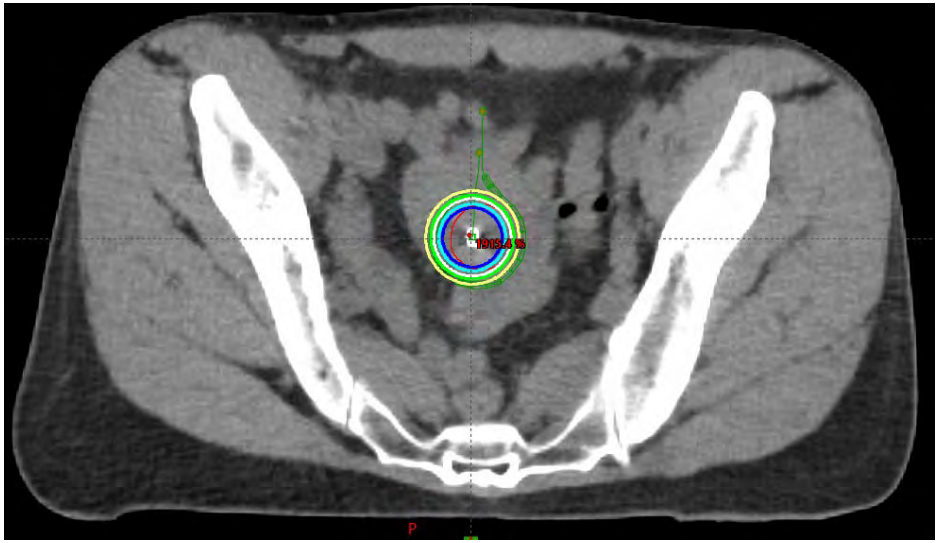


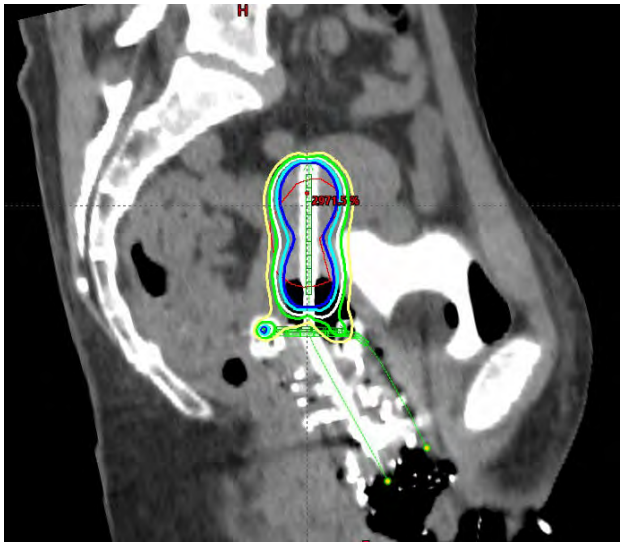


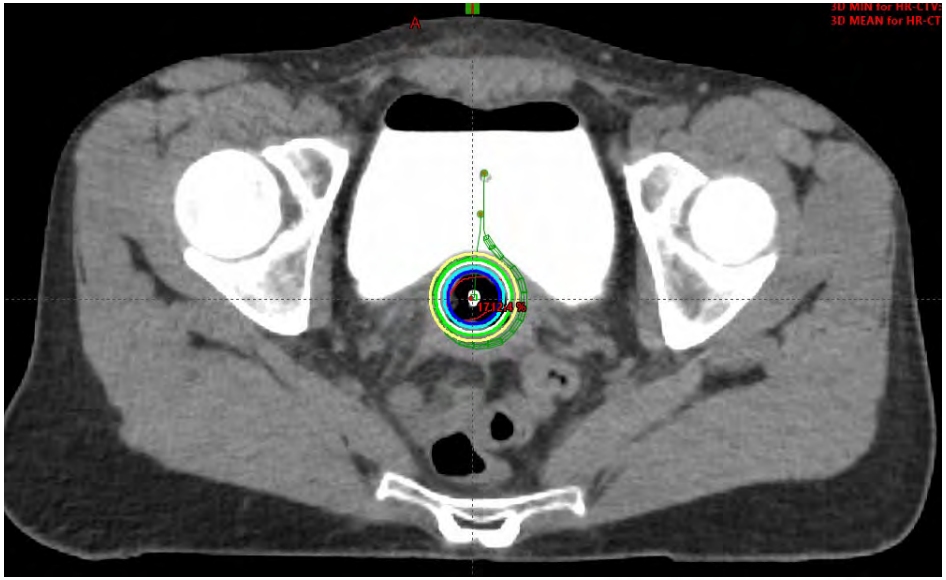


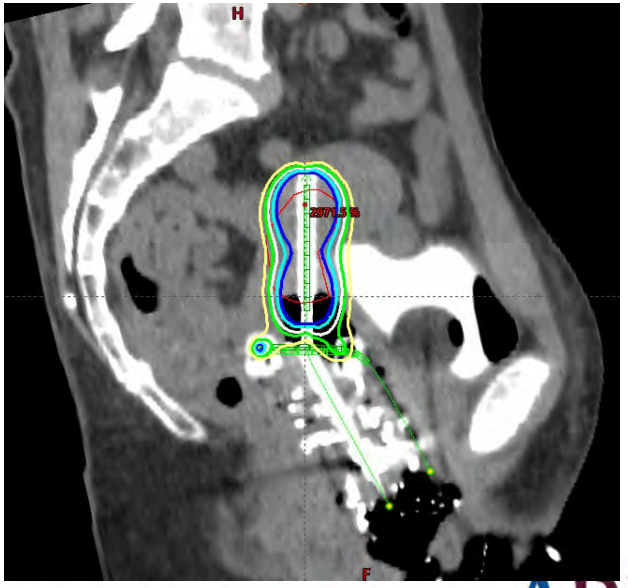
Fractions 3-4

White = 100% isodose line





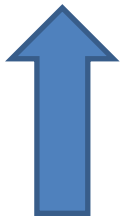




EQD2 spreadsheet calculating dose across fractions

					Brachytherapy total	EBRT + Brachytherapy
Prescribed dose (Gy)	7.0	7.0	7.0	7.0		
Planning aim $EQD2_{10}$	9.9	9.9	9.9	9.9	39.7	**83.9**

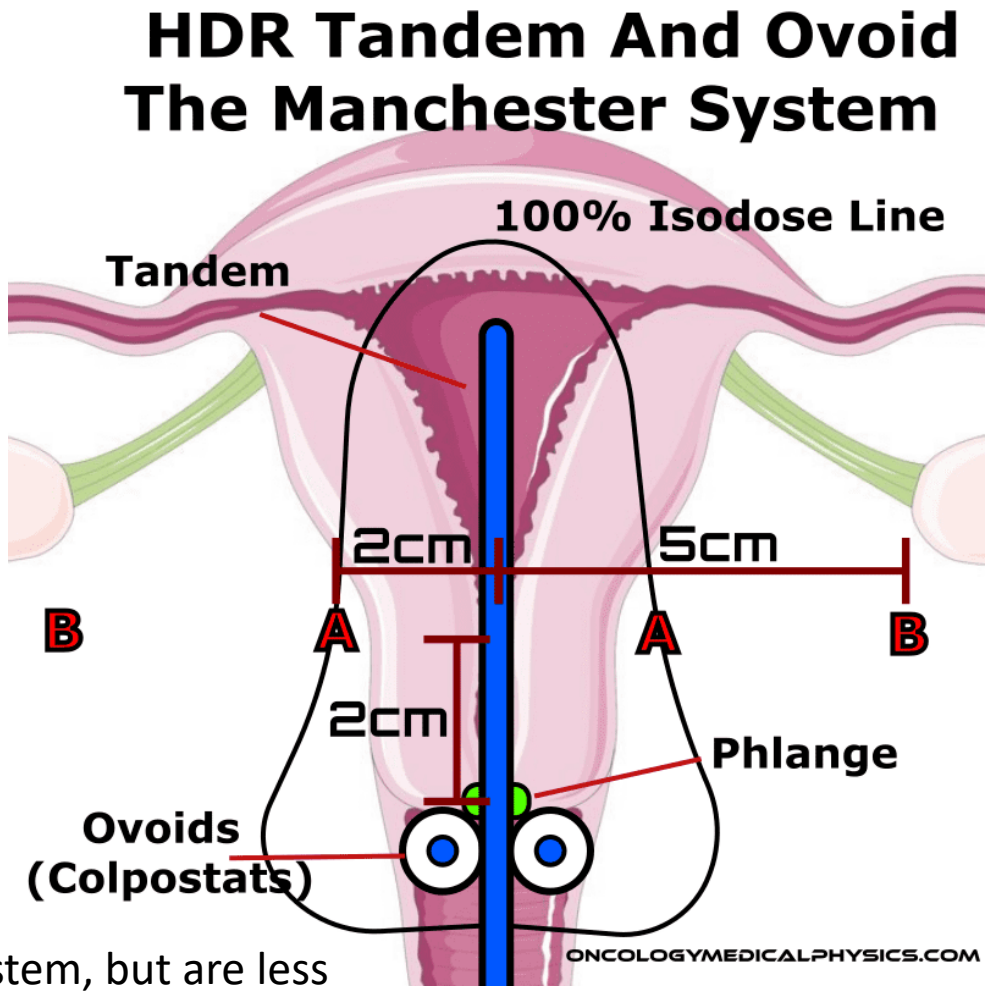
CTV_{HR} [cm^3]	19.4	19.4	12.5	12.5	*16.0*	*3.5*
D_{90}	7.2	7.2	7.2	6.8		
D_{90} $EQD2_{10}$	10.2	10.2	10.3	9.5	40.3	**84.5**



Dose was just shy of 85 Gy, but there was good coverage of the residual disease

Historical treatment points

- Point A, “point of limiting tolerance”: 2 cm superior to external cervical os & 2 cm lateral to tandem
- Point B: 3 cm lateral of Point A (lateral parametrium / obturator nodes)



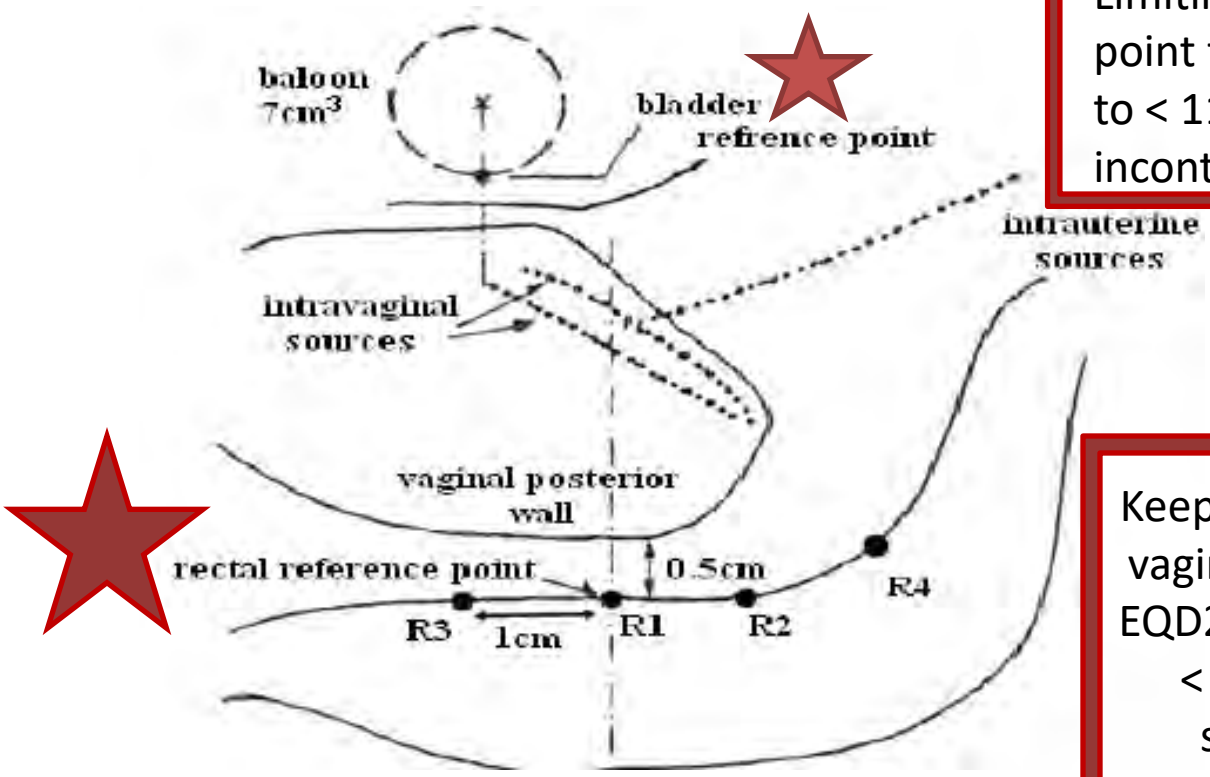
These points are from the Manchester system, but are less relevant in the age of 3D image-guided brachytherapy

Setting limits: OAR dose constraints per EMBRACE II

OAR	Bladder D_{2cm^3} $EQD2_3$	Rectum D_{2cm^3} $EQD2_3$	Recto-vaginal point $EQD2_3$	Sigmoid D_{2cm^3} $EQD2_3$	Bowel D_{2cm^3} $EQD2_3$
Planning Aims	< 80 Gy	< 65 Gy	< 65 Gy	< 70 Gy*	< 70 Gy*
Limits for Prescribed Dose	< 90 Gy	< 75 Gy	< 75 Gy	< 75 Gy*	< 75 Gy*

Note – EQD2 includes pelvic EBRT

Historical toxicity points



Limiting dose at bladder point to < 65 Gy translates to < 11% risk of urinary incontinence

Keeping dose to the recto-vaginal reference point to EQD2 < 65 Gy translates to < 20% risk of vaginal stenosis at 5 years

Recto-vaginal point: 5 mm posterior to vaginal wall at the midpoint of the ring

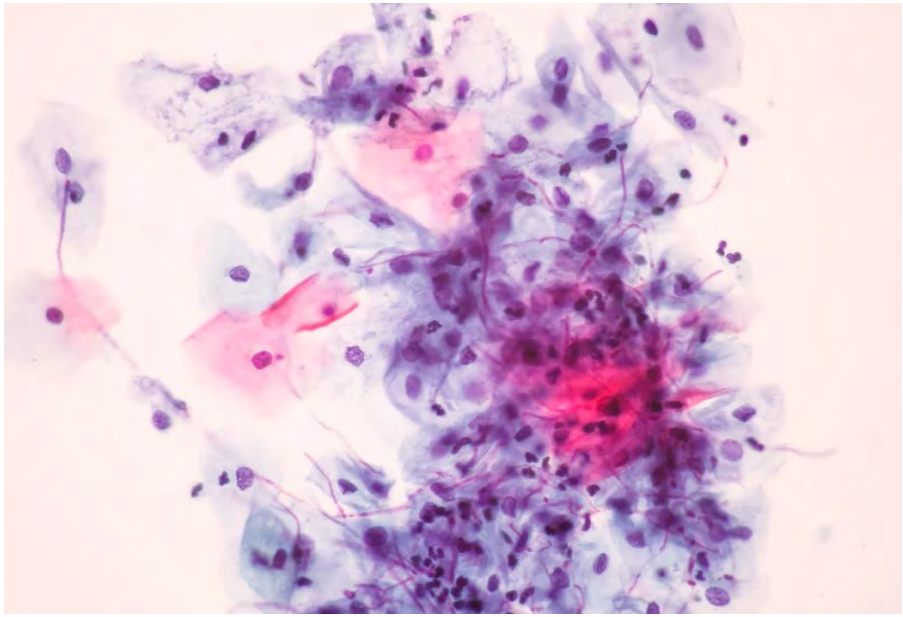
Bladder point: posterior Foley balloon at widest point, when inflated with 7 cc

Dose to OARs

					Brachytherapy	Total
BLADDER						
Bladder reference point	1.9	1.9	1.8	1.8		
ICRU $EQD2_3$	1.8	1.8	1.8	1.8	7.2	**59.3**
$D_{0.1cm^3}$	7.0	7.0	7.3	5.4		
$D_{0.1cm^3}$ $EQD2_3$	13.8	13.8	15.2	9.2	52.0	104.1
D_{2cm^3}	5.0	5.0	5.5	3.6		
D_{2cm^3} $EQD2_3$	8.1	8.1	9.3	4.8	30.2	**82.3**
RECTUM						
Recto-vaginal reference point	3.3	3.3	2.1	2.1		
ICRU $EQD2_3$	4.2	4.2	2.1	2.1	12.7	**64.8**
$D_{0.1cm^3}$	3.8	3.8	2.5	2.2		
$D_{0.1cm^3}$ $EQD2_3$	5.1	5.1	2.7	2.2	15.1	67.2
D_{2cm^3}	2.8	2.8	2.0	1.6		
D_{2cm^3} $EQD2_3$	3.2	3.2	2.0	1.5	10.0	**62.1**
SIGMOID						
$D_{0.1cm^3}$	5.8	5.8	3.8	3.5		
$D_{0.1cm^3}$ $EQD2_3$	10.1	10.1	5.2	4.6	30.1	82.2
D_{2cm^3}	4.0	4.0	2.7	2.7		
D_{2cm^3} $EQD2_3$	5.6	5.6	3.1	3.0	17.4	**69.5**
BOWEL						
$D_{0.1cm^3}$	4.2	4.2	2.2	4.5		
$D_{0.1cm^3}$ $EQD2_3$	6.0	6.0	2.2	6.8	21.1	73.2
D_{2cm^3}	2.9	2.9	1.5	3.5		
D_{2cm^3} $EQD2_3$	3.4	3.4	1.4	4.6	12.8	**64.9**

What's next after the HDR boost? Cervical cancer surveillance & survivorship

- 1 month post-RT check to assess for resolution of acute effects
- PET and MRI 3 months s/p HDR
- H&P every 3 months for 2 years
- H&P every 6-12 months for 3-5 years
- Annual cytology with pap smears may be considered*



*value of detection of recurrent cervical cancer is limited, and accuracy of results may be affected in those who received pelvic radiation

The vaginal dilator: An important component of post-treatment care

- Prevention of vaginal stenosis
- Allows for surveillance via physical exam
- Recommend use 2-3 times per week (3-5 minutes each time) for *at least* 2 years

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