

# BrachyNext



Working Together to Shape the Future of  
**Brachytherapy**

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**Brachytherapy**

## The Organ-Sparing Capacity of Brachytherapy

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Seattle, WA

## Disclosure

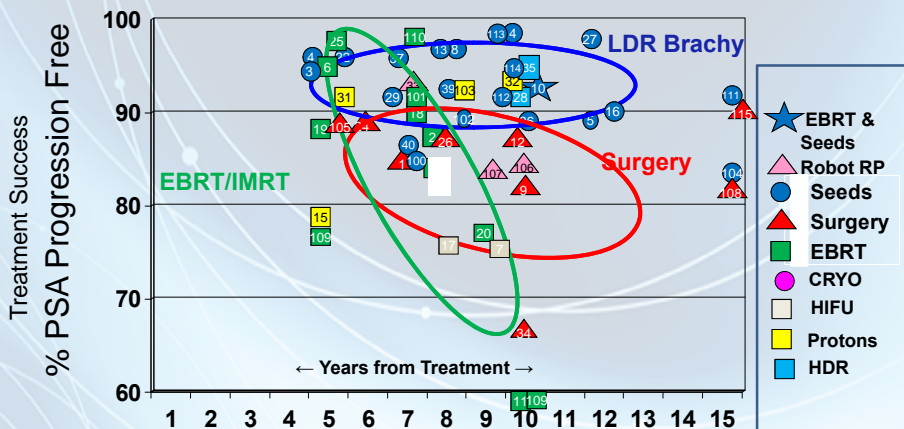
- Royalty: Bard Source Link, Oncura Thin Strand, Rapid Strand
- Consulting Fees: Bard



## Cancer Control

### LOW-RISK RESULTS

Weighted



6/27/2014  
BJU Int, 2012, Vol.  
109(Supp. 1)

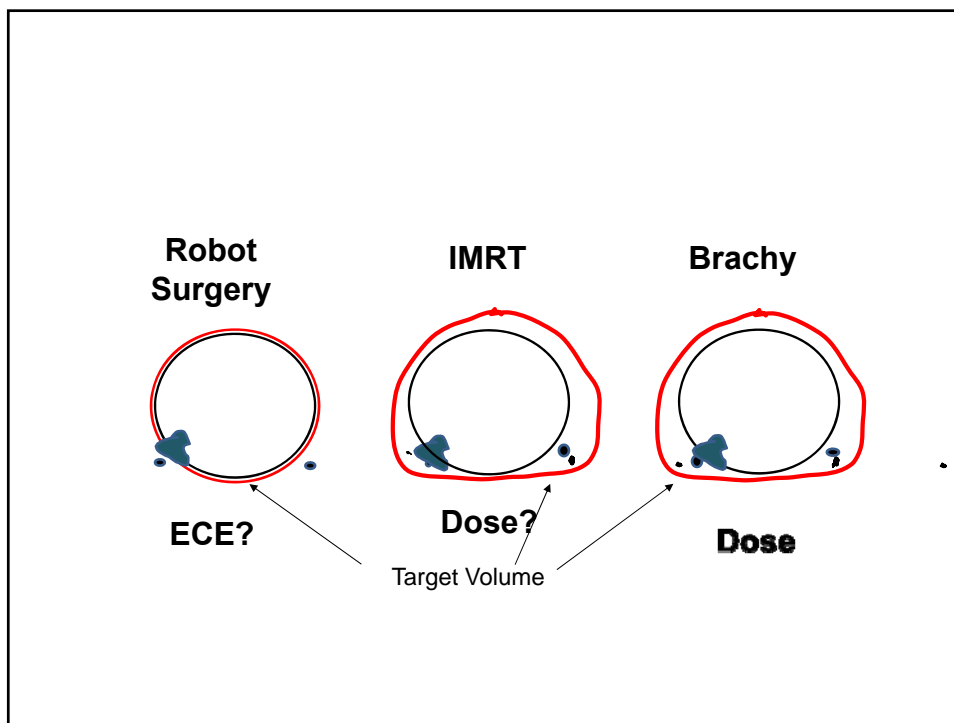
- Prostate Cancer Results Study Group
- Numbers within symbols refer to references

Prostate Cancer Center of Seattle



## Brachytherapy Advantage

- Versus surgery
  - Customized target volume
  - Treats Extra Capsular Disease
- Versus IMRT/protons
  - Higher target dose
  - Less volume





## Linear Extension of EPE

Study	Patients	Range
Teh (Baylor) <sup>14</sup>	712	<b>0.5–12 mm</b>
Davis (Mayo)	376	<b>0.04–4.4 mm</b>
Sohayda (Cleveland Clinic)	265	<b>0.1–10 mm</b>
Chao (William Beaumont) <sup>1</sup>	121	<b>0.05–7 mm</b>

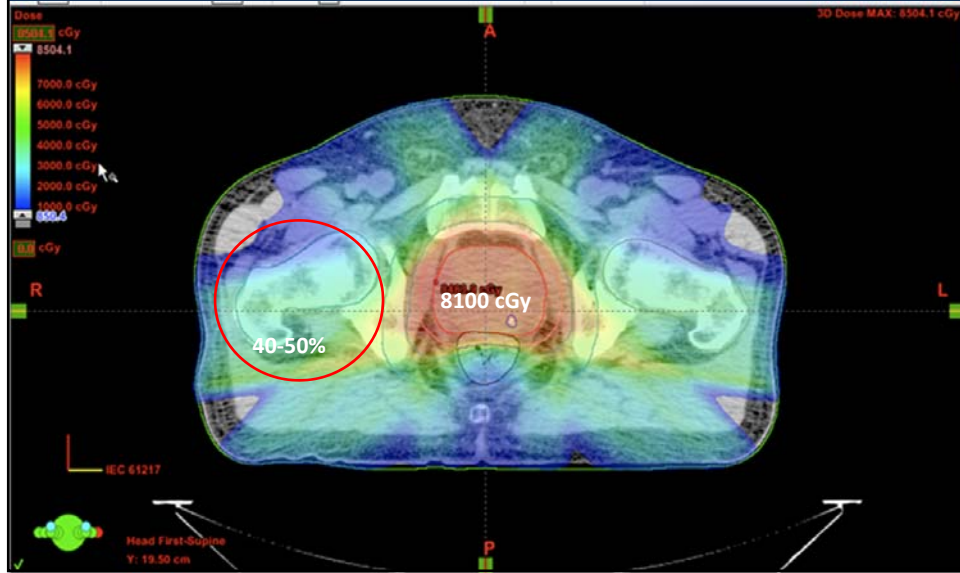
## Positive Margins vs Risk Group

<b>Low</b>	<b>15%</b>
<b>Intermediate</b>	<b>22%</b>
<b>High</b>	<b>35%</b>

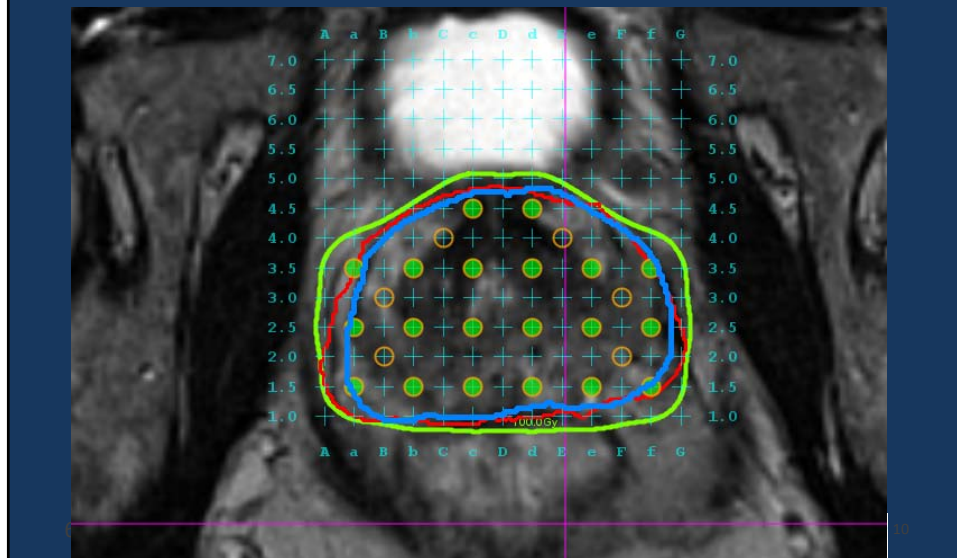
. Alkhateeb Impact of Surg Margins after RP by Risk Group J Urol Vol 183, 145-150, 2010



## Target Volume IMRT

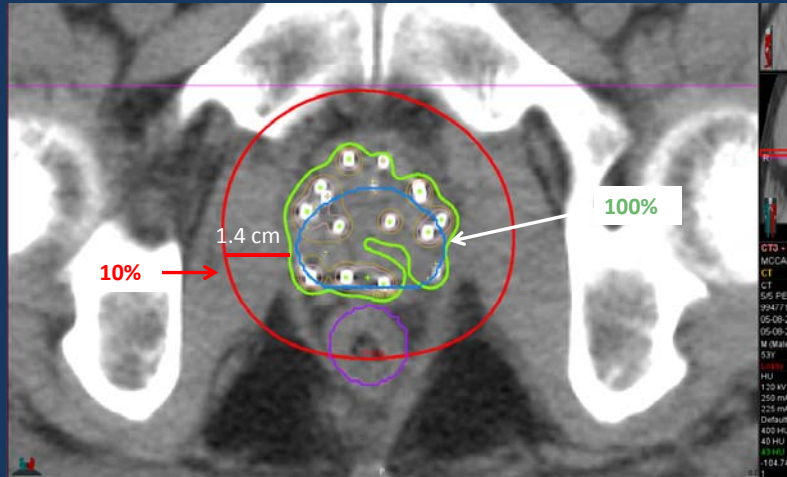


## Target Volume LDR Brachy





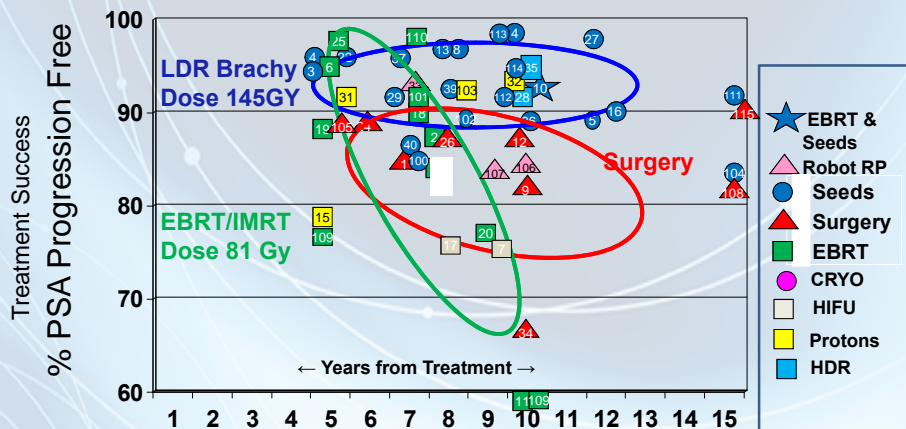
## 10% Isodose LDR Brachy



6/27/2014

## LOW-RISK RESULTS

### Weighted



6/27/2014

BJU Int, 2012, Vol. 109(Supp. 1)

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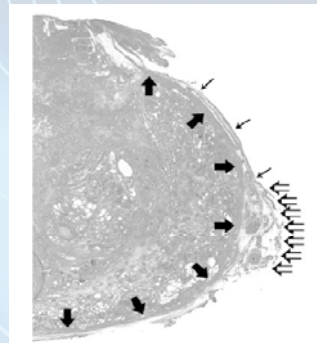


## Nerves

### Nerve Bundle Location

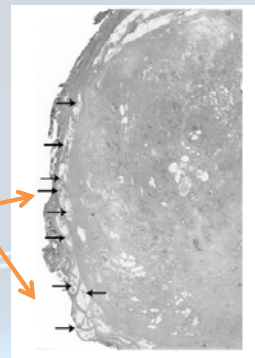
48%

Definitive Bundle



52%

No Definitive Bundle



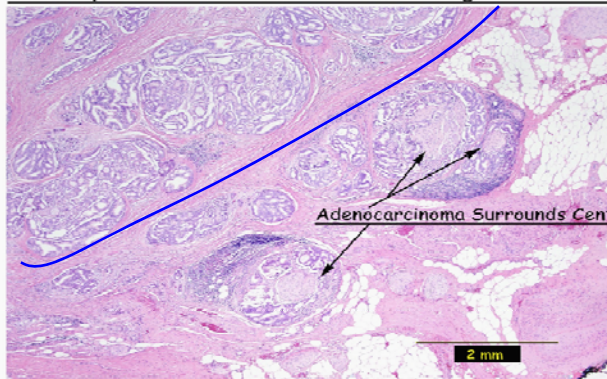
Vessels and nerve trunks in the postero-lateral region of prostate.

Kiyoshima et al. *Jpn J Clin Oncol* 2004



## ECE Neurovascular Bundle

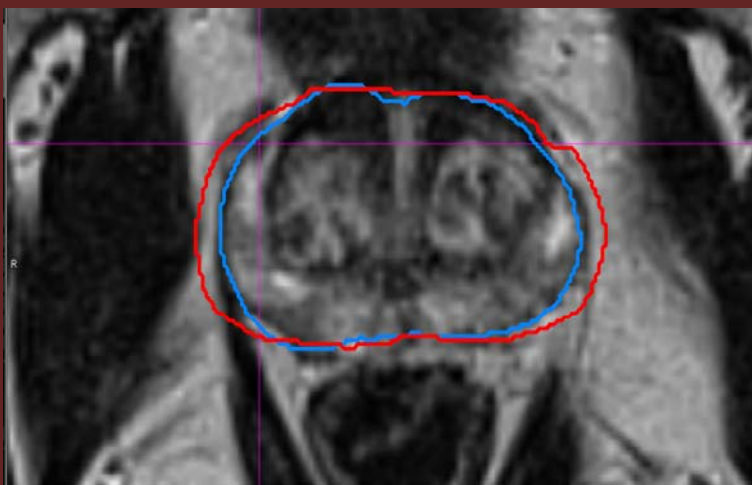
Extracapsular Extension Via Growth Along Neurovascular Bundle



“Almost all identifiable ECE occurred in the posterolateral region of the prostate, with all significant extensions ( $\geq 2$  mm) occurring in that region.”

Chao, Martinez et al. *IJROBP*; 65(4): 999-1007, 2006. (William Beaumont)

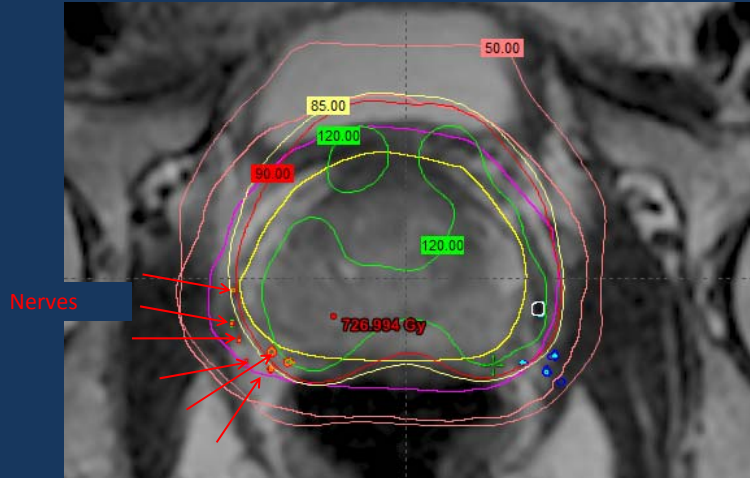
## LDR Target Volume





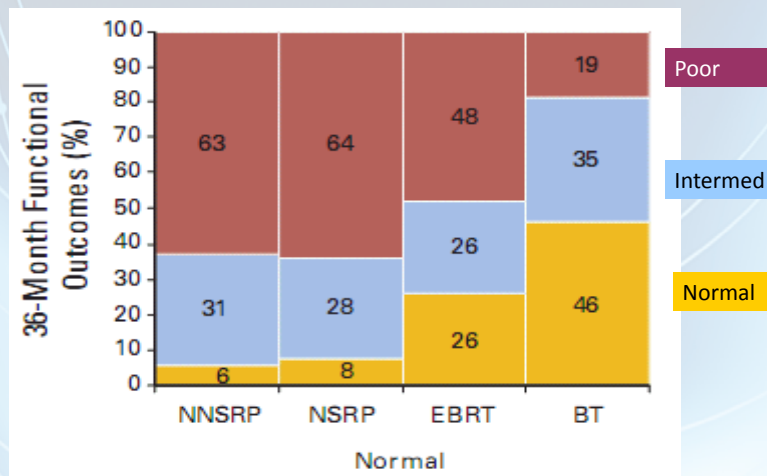


## LDR Dose to Nerves 75-100%



Adam Liss, MD, Jessica Zhou, MD, Jure Murgic, MD, Cheryl Evans, BS, Vrinda Narayana, PhD, Edsa Negussie, MD, Dan Hamstra, MD, PhD, Bill McLaughlin, MD Univ Mich 2014 ABS Mtg

## 3-Year Sexual Function Normal Starting Point



Chen, Clark, Talcott Individualizing QOL Outcomes for Localized PCA. JCO Vol 27, No 24, 3916-3922, 2009



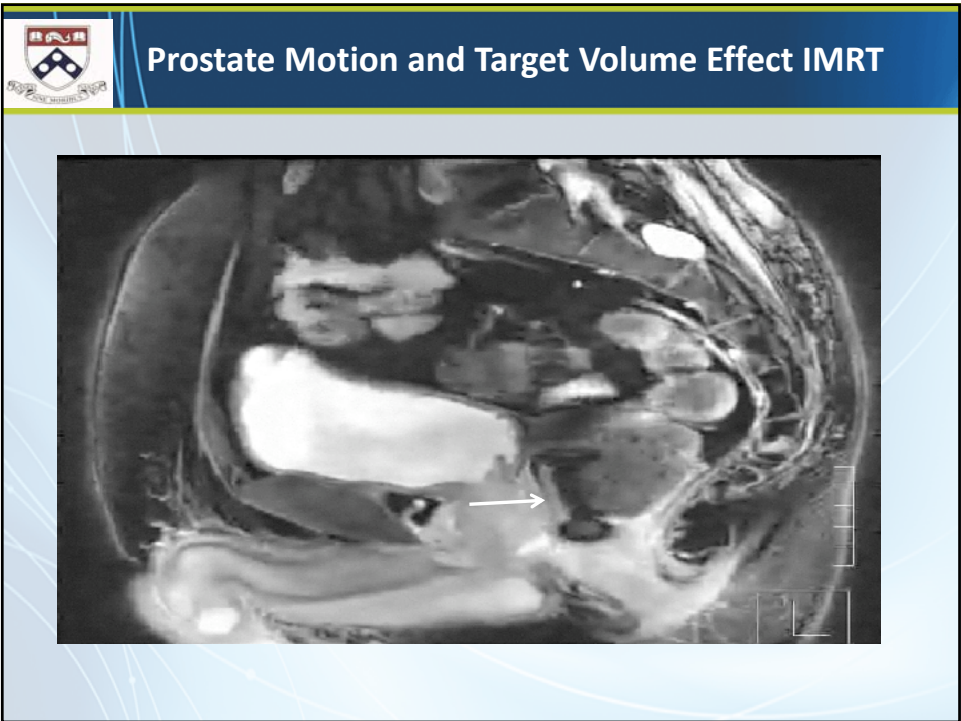
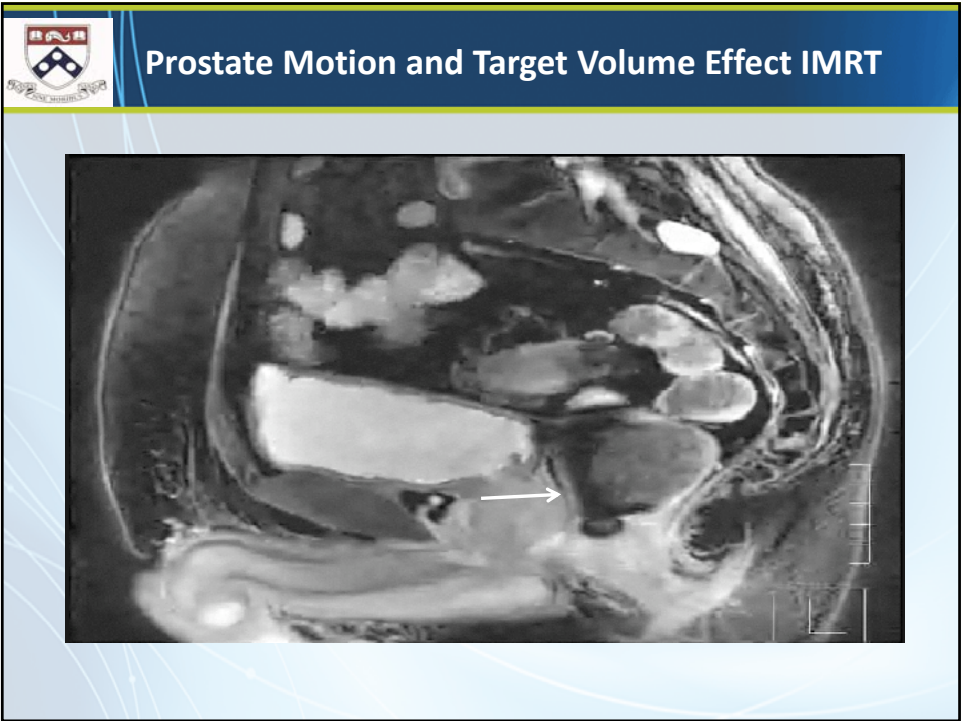
## Decline By Age Effect of Brachy

Age	Age Effect No TX	Tx Effect	5 Years Post
<60	92%	14%	78%
60-64	85%	23%	62%
65-69	74%	32%	42%
70-74	60%	35%	25%
>74	45%	33%	7%

Current ability = full normal erection or suboptimal erections adequate for intercourse

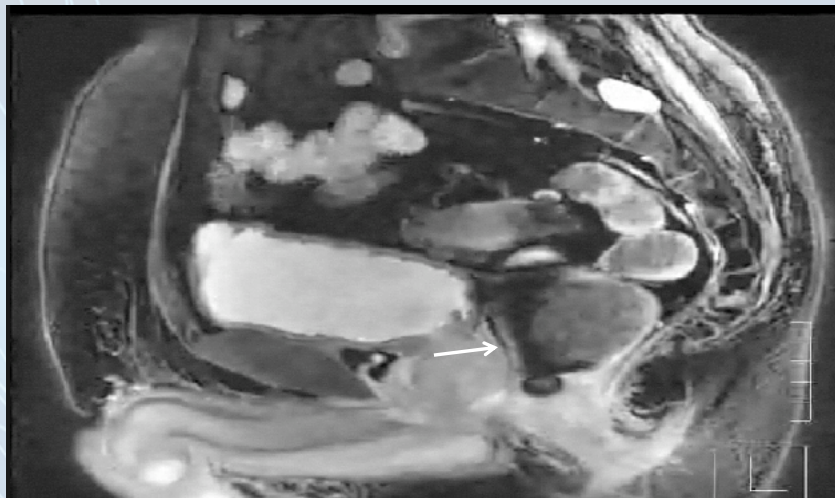
Keyes, Morris , Pickles et al BCCA 2014

# Rectum

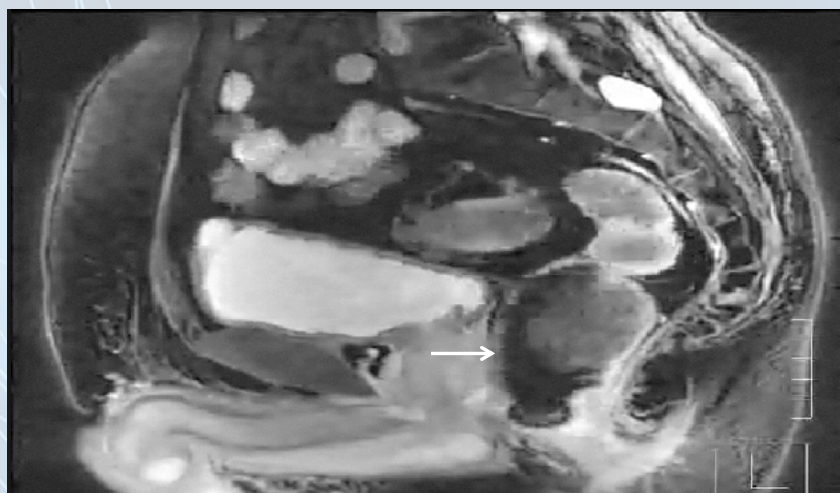


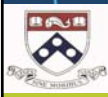


## Prostate Motion and Target Volume Effect IMRT

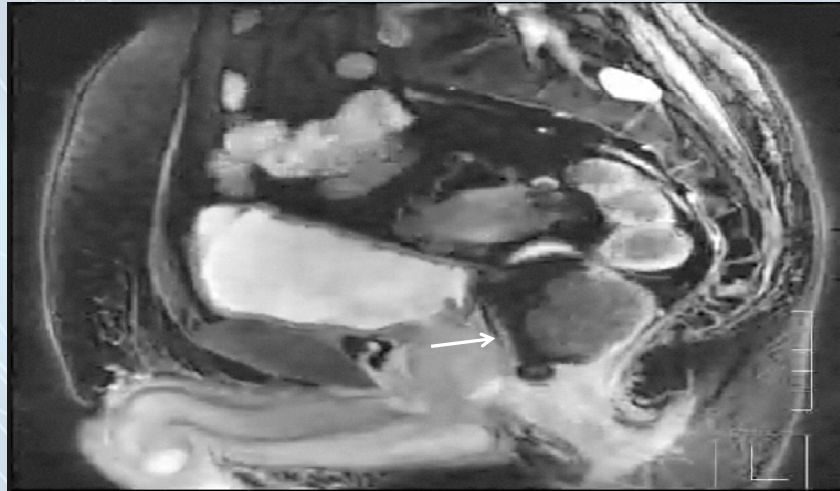


## Prostate Motion and Target Volume Effect IMRT

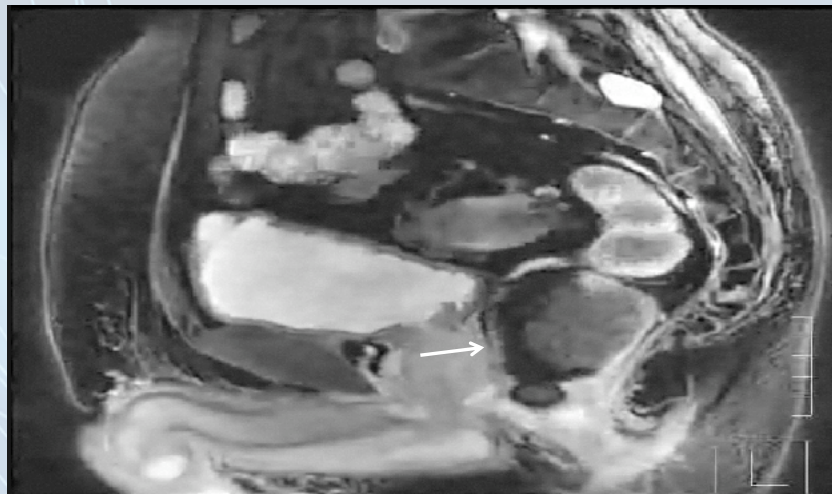




## Prostate Motion and Target Volume Effect IMRT

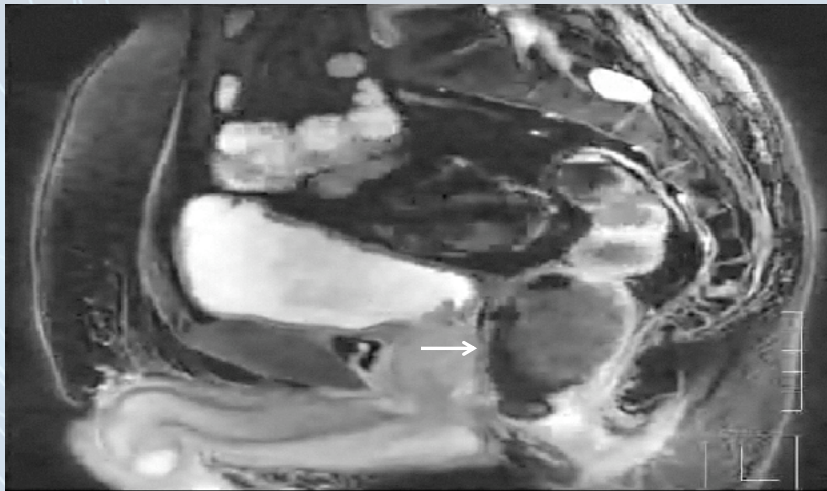


## Prostate Motion and Target Volume Effect IMRT

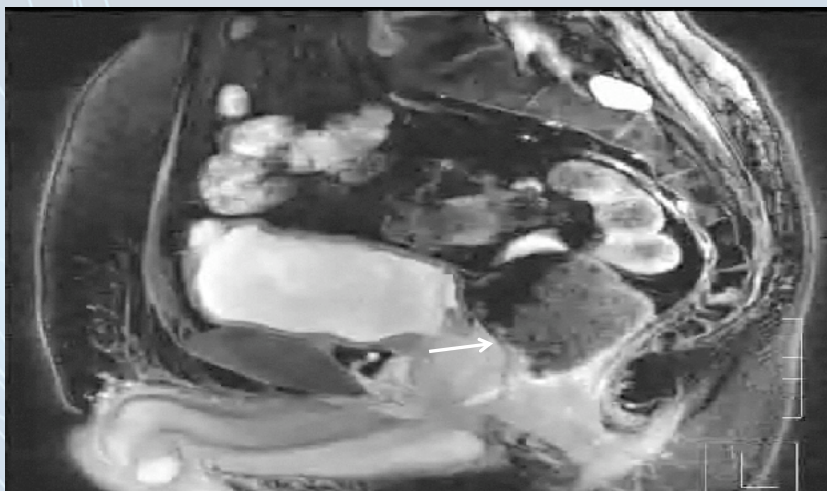




## Prostate Motion and Target Volume Effect IMRT

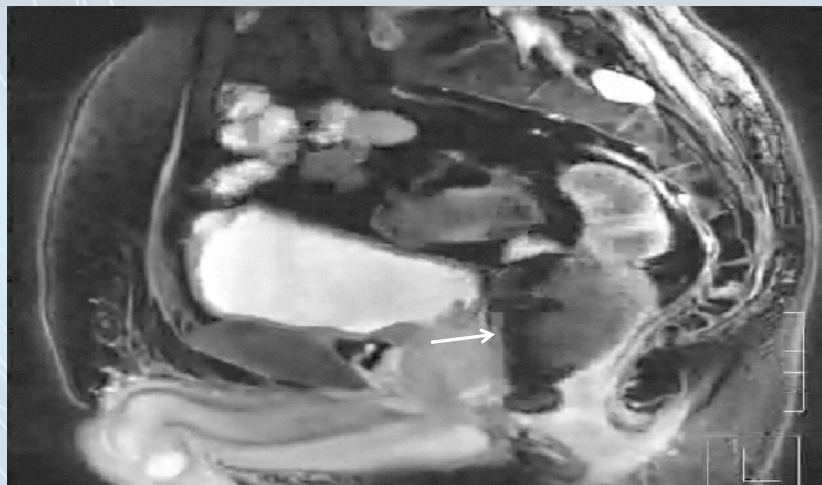


## Prostate Motion and Target Volume Effect IMRT

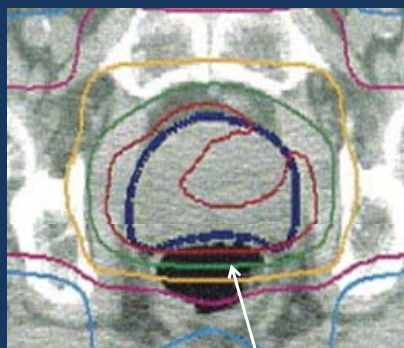




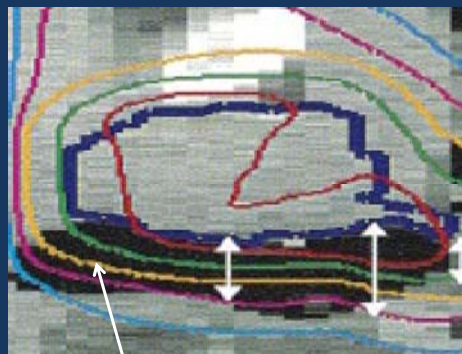
## Prostate Motion and Target Volume Effect IMRT



## Rectum IMRT 81 Gy PTV



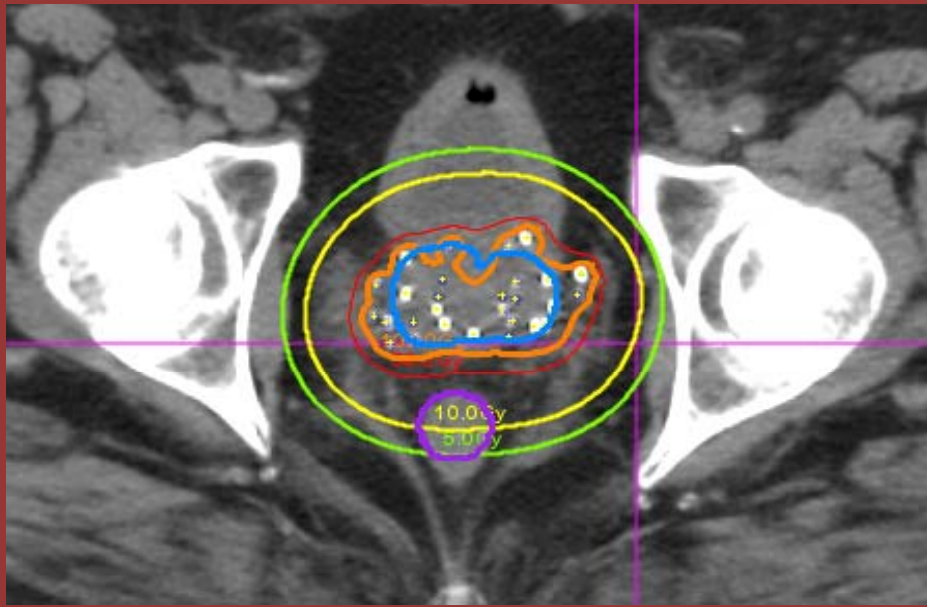
7400 cGy



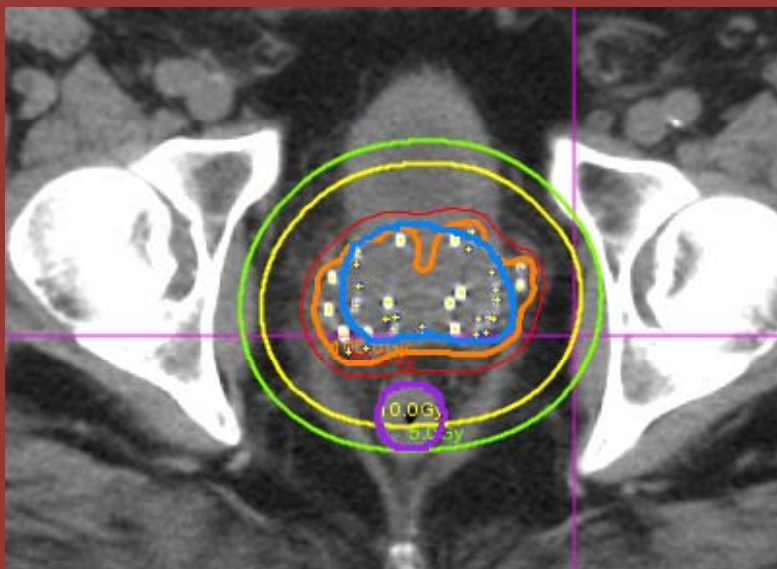
6000 cGy



## LDR Dose to Rectum Base



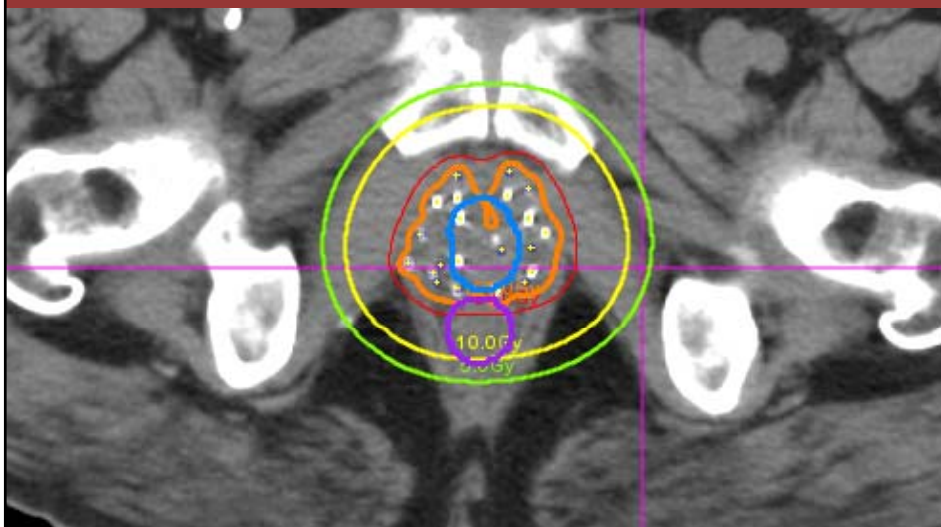
## LDR Dose Mid Rectum



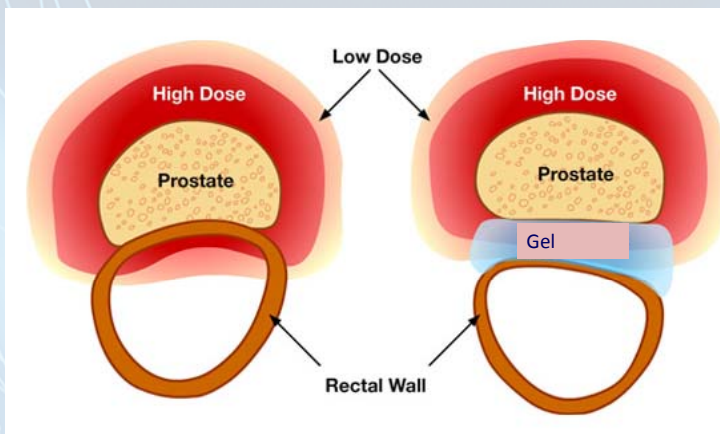




## LDR Dose Apical Rectum



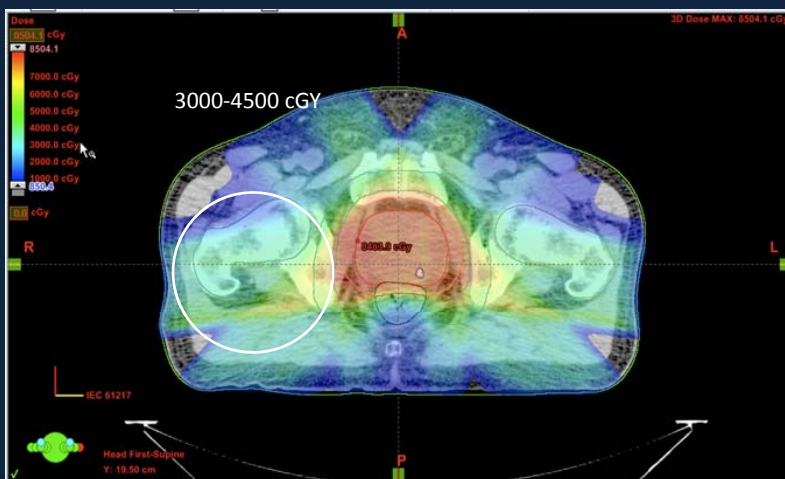
## Rectal Sparing





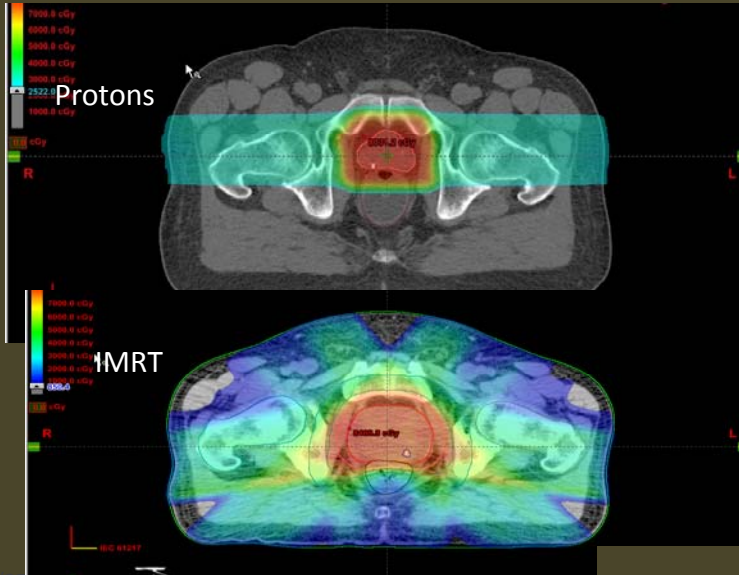
## Hips

## Hip Dose IMRT

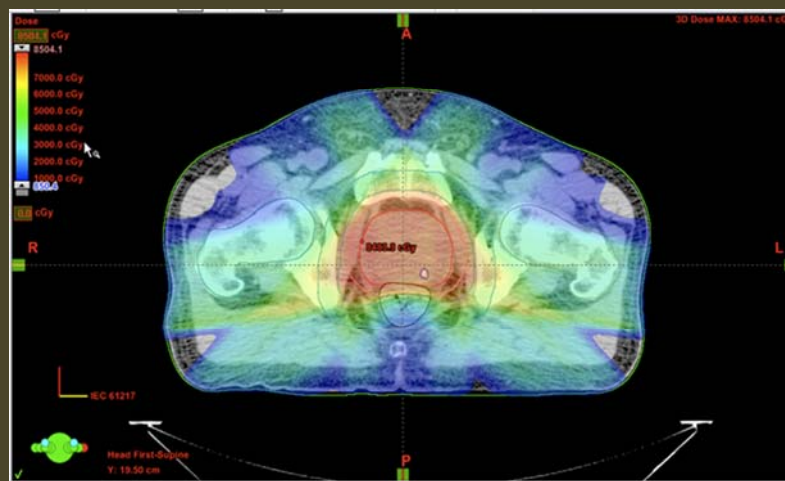




## IMRT Protons and Hip Dose

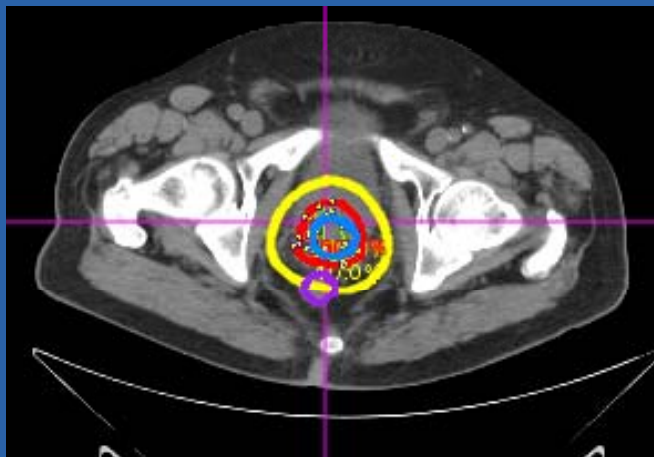


## Hip Dose Brachy vs IMRT





## 10% Isodose Line LDR Brachytherapy



## 5% Isodose LDR Brachy





## Hip Fractures

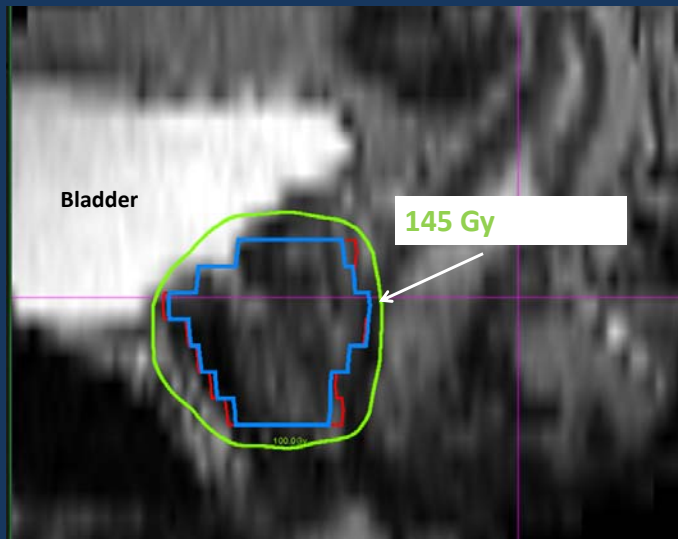
- \*IMRT 46 mo. med f/u  
26/684 3.8%
- \*Proton 50 mo. med f/u  
26/684 3.8%
- \*\*EBRT >42 Gy 15 Yr 15%
- Brachy None reported

Sheets et al. JAMA. 2012 April 18; 307(15): 1611-1620. doi:10.1001/jama.2012.460  
\*\*Grigsby, PW, HL Roberts, and CA Perez. 1995. Femoral neck fracture following groin irradiation. Int J  
Radiat Oncol Biol Phys 32(1):63-67.

## Bladder

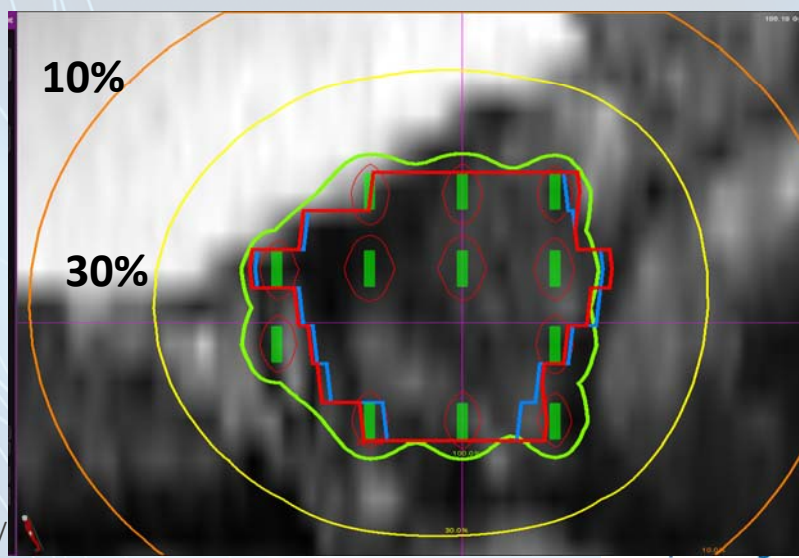


## Bladder-Sparing Brachy



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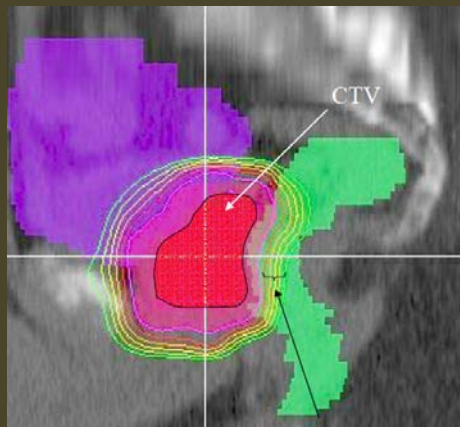
## LDR Dose to Bladder



6/



## IMRT Bladder



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## Summary Brachy Advantage

- High Dose to target volume
- High dose to nerves
  - Modest clinical effect
- Low dose to:
  - Bladder
  - Rectum
  - Hips



# Thank You

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