The Role of Adjuvant vs Salvage Radiation Therapy after Prostatectomy

Dr. Matt Andrews
Supervisor: Dr. David Bowes
Objectives

- Discuss the evidence for adjuvant radiotherapy (ART)
  - EORTC, SWOG, ARO
- Current evidence supporting salvage radiotherapy (SRT)
- Review of AUA/ASTRO guidelines for ART and SRT
- **Who** should I refer to RadOnc post RP for rads?
- **When** should I refer to RadOnc post RP for rads?
Prostate cancer in the PSA era

- In 2013, ~23,600 Canadians were diagnosed with PCa
  - ~40% will be treated with RP

- After RP, 15-30% of pts with localized disease experience recurrence
  - Manifested initially as ↑ PSA - Biochemical Recurrence (BCR)

- For pts with pT3, risk of local failure varies from 10-50%

- CaPSURE data
  - ~1/3 of men undergoing RP have positive margins

- Independent predictors of BCR include
  - PSA
  - Gleason score
  - + Surgical margins
  - + SV invasion

Understanding Biochem Recurrence

- Pound et al. JAMA 1999
  - BCR precedes the appearance of distant mets by an average 5-8yrs

- Initial management of rising PSA/BCR,
  - Determined by whether recurrence focal or distant disease
    - Unfortunately impossible in most cases
    - RT to prostate bed +/- LN’s may reduce risk of systemic progression

- Risk factors for progression to distant mets and PCa-mortality
  - Short PSADT
  - Path Gleason score 8-10
  - Short disease-free interval from RP-to-BCR

- Not all men with BCR will dev clinical progression
  - < 10% pts with BCR may have stable disease for 10+ years w/o clinical failure

- Ultrasensitive PSA assays detect recurrent PCa at earlier stage and may lead to improved outcomes

Timing of post-operative RT

- **Adjuvant RT (ART)**
  - Offered to pts at high risk of recurrence due to adverse pathological factors prior to PSA recurrence
  - Usually administered w/i 3-6 mths following RP
    - Generally after return of acceptable urinary control

- **Salvage RT (SRT)**
  - Men with proven BCR after RP with no evidence of distant mets
    - Administer to prostate bed +/- surrounding tissues, including LNs
    - BCR generally defined - ↑ post-op PSA ≥ 0.2 ng/ml

Superiority of each approach yet to be determined
- No RCT’s directly compare ART vs SRT
Comparison of ART and SRT

• Favoring ART
  1. Recurrences are predominantly local in the absence of SV invasion or LN mets
     • Early local tx may prevent mets
  2. Possibly more effective
     • Disease tx’d before more time to disseminate outside the pelvis
  3. Less toxic than SRT,
     • Lower radiation doses (controversial)

Swanson J Clin Oncol 2007
Anscher Int J Cancer 2001

• Favoring SRT
  1. Avoids overtreatment in pts not destined to recur
     • Reserves RT and assoc side-effects to pts with biochemical or clinical relapse
  2. Risk of competing co-morbidities may exceed the risk of PCa-specific mortality for majority of men
  3. Longer interval from RP to RT
     • More time to recover urinary function & potency

Stephenson Eur Urol 2012
Optimal timing of early versus delayed adjuvant radiotherapy following radical prostatectomy for locally advanced prostate cancer

Keith J. Kowalczyk, M.D.\textsuperscript{a},*, Xiangmei Gu, M.S.\textsuperscript{b}, Paul L. Nguyen, M.D.\textsuperscript{c}, Stuart R. Lipsitz, Sc.D.\textsuperscript{b}, Quoc-Dien Trinh, M.D.\textsuperscript{d,e}, John H. Lynch, M.D.\textsuperscript{a}, Sean P. Collins, M.D., Ph.D.\textsuperscript{f}, Jim C. Hu, M.D., M.P.H.\textsuperscript{g}

- Aim: To determine the optimal timing for ART post RP
- SEER database - 963 men with pT3NO PCa
  - Early (< 4 mth after RP, n=419) vs Delayed (4-12 mth after RP, n=544)

**Early ART (< 4 mth)**
- Improved PCa-specific mortality (0.47 vs 1.02 events per 100 person-yrs, p=0.038)
- Less salvage HT (2.88 vs 4.59 events per 100 person-yrs, p=0.001)

**Delaying ART**
- > 3 mths – more bone related events (HR 1.6, p=0.025)
- > 4 mths – higher rates of salvage HT (HR 1.6, p=0.002)
- > 5 mths – worse Pca-specific mortality (HR 2.3, p=0.020)

**Critique**
- Lack of PSA values
- Can not R/O that some of delayed RT was given as salvage RT for rising PSA level
- Dataset lacks type and dosage of RT delivered
- May affect outcomes

First report of improved PCSM favoring early vs late ART.
Adjuvant Radiation Therapy
Considerations when interpreting the evidence for ART

- Studies unable to indicate the appropriate use of ADT

- 3 RCTs started b/w 1988 - 1996 assessing ART in high risk cases
  - 60 Gy was recommended standard of ART - lower than current std
  - Conventional EBRT since replaced with 3D conformal RT and IMRT
    - Expect less toxicity, better biochem and local control

- 3 trials were powered for different primary endpts
  - SWOG 8794: metastases-free survival
  - EORTC 22911: biochemical progression-free survival
  - ARO 96-02: progression-free survival

- With long-term F/U, changes in characteristics for contemporary pts
  - Increased PSA screening
    - Detection of disease and initiation of therapy at earlier stages
  - Pts recruited into decade old trials have greater risk of adverse outcomes
Postoperative radiotherapy after radical prostatectomy for high-risk prostate cancer: long-term results of a randomised controlled trial (EORTC trial 22911)

Michel Bolla, Hein van Poppel, Bertrand Tombal, Kris Vekemans, Luigi Da Pozzo, Theo M de Reijke, Antony Verhaeys, Jean-François Bosset, Roland van Velthoven, Marc Colombel, Cees van de Beek, Paul Verhagen, Alphansus van den Bergh, Cora Sternberg, Thomas Gasser, Geertjan van Tienhoven, Pierre Scalliet, Karin Haustermans, Laurence Collette, for the European Organisation for Research and Treatment of Cancer, Radiation Oncology and Genito-Urinary Groups

- European Phase 3 RCT (37 institutions)
- Immediate ART post RP for pT3 or R+ PCa vs. RP alone
- 1005 pts randomized 1:1

| Immediate adjuvant rads w/i 16 wks of RP (60Gy / 25 + 5 fractions / 6wks) | Wait-and-See post RP until biochem recurrence (defined as PSA > 0.2 on two consecutive measures) (Salvage 70Gy / 35 fractions / 7wks / LHRH analogue) |

- Eligibility:
  - age ≤ 75yrs, WHO performance status 0-1
  - one or more pathological risk factors:
    - capsule perforation, SV invasion, or + surgical margins

- Median F/U: 10.6 yrs

• Sig improved biochem PFS
  • 61.8% vs 39.4% (HR 0.49, p<0.0001)
    • Confirms 5yr data

• No sig improved clinical PFS
  • 70.3% vs 64.8%
    • Previous reported difference not sustained

• No improvement in OS
  • 10 yr survival 77% with ART,
    81% with Wait-and-see

• Similar proportion of pts dev distant mets in both groups
  (11.0% vs 11.3%)
Other Findings of EORTC 22911

- No difference in PCa-specific mortality (p=0.3407)
  - 10 yr cumulative PCa mortality 3.9% (rads) vs 5.4% (WS)
- Significant tx effect heterogenity according to pt’s age
  - ART may not improve Biochem PFS in pt’s ≥ 70 yrs (p=0.0443)
    - Benefical for pt’s < 70 yrs
  - Excess mortality in pts ≥ 70 yrs who received ART vs WS
    - (HR 2.94, 95% CI 1.74-4.93)
- Significant reduced need for salvage therapy at 10 yrs
  (21.8% vs 47.5%)
- Significant improved locoregional control at median 10.6 yrs
  (8.4% vs 17.3%, p < 0.0001, HR 0.45)
- Negative surgical margins may not benefit as much from ART as pts with positive margins
Multi-institution North American Phase 3 RCT (**SWOG 8794**)

Immediate ART post RP for pT2/3N0M0 or R+ Pca vs. delayed RADs
- 425 men randomized:
  - 60-64 Gy adjuvant RT vs Observation
  - 33% in both arms had PSA > 0.2 ng/ml at randomization (?ART vs SRT)

Eligibility:
- At least one criteria of pT3 disease (EPE, +SV, or +margins)
- No prior rads or chemo for PCa
- neg bone scan, adequate bone marrow and liver fxn
- Performance status 0-2
- No evidence of total urinary incont/pelvic infection/urinary extravasation, no Hx of intraop rectal injury
SWOG 8794

• **1<sup>st</sup> endpt:** Metastasis free survival
  - defined as time to first evidence of met disease or death of any cause

• **2<sup>nd</sup> endpts:**
  - PSA relapse
    - (PSA > 0.4 ng/mL for pts with post-op PSA ≤ 0.4)
  - recurrence-free survival
  - overall survival
  - freedom from hormonal therapy
  - postoperative complications

• Intention to Tx analysis
SWOG 8794 Update

Met Free-Survival

- HR 0.71 (95% CI 0.54-0.94)
- NNT 12.2 men with pT3 to prevent 1 case of met disease

Overall Survival

- HR 0.72 (95% CI 0.55-0.96)
- NNT 9.1 men with pT3 to prevent 1 death

J Urol Mar 2009
Met-free survival for RT stratified by PSA post prostatectomy

- Risk of mets greater in pts with detectable PSA who receive RT vs those undetectable PSA
SWOG Conclusions

- Adjuvant rads with 18 weeks after RP for pts with pT3N0MO PCa
  1. Sig reduces risk of PSA recurrence
  2. Sig reduces the risk of mets and need for hormonal therapy
  3. Sig increases survival
Adjuvant Radiotherapy Versus Wait-and-See After Radical Prostatectomy: 10-year Follow-up of the ARO 96–02/AUO AP 09/95 Trial

Thomas Wiegel a,*, Detlef Bartkowiak a, Dirk Bottke a, Claudia Bronner a, Ursula Steiner b, Alessandra Siegmann c, Reinhard Golz d, Stephan Störlkel d, Normann Willich e, Axel Semjonow f, Michael Stöckle g, Christian Rübe h, Udo Rebmann i, Tilman Kälble j, Horst Jürgen Feldmann k, Manfred Wirth l, Rainer Hofmann m, Rita Engenhart-Cabillic n, Axel Hinke a, Wolfgang Hinkelbein c, Kurt Miller b

• Different from other studies
  • Only trial with undetectable PSA at time of RT
    • Only exclusive adjuvant trial
  • Only trial to use 3D conformal ART (60 Gy)
    • rate of Grade 3 or 4 late A/E’s low (0.3%)

• 388 men post-RP with pT3NO Pca randomized
  • ART (beginning 6-12 wks after Sx) vs Wait-and-see

• Eligibility:
  • cT1c-cT3No PCa who underwent RP,
  • histological adenocarcinoma pT3-T4No with pos or neg surgical margins, neg bone scan
  • < 76 yrs, WHO performance status 0-1
  • Median F/U 10 yrs
Progression-free survival after RP in pts with undetectable PSA

- PFS sig improved in RT group
  - 10 yr PFS 56% vs 35%, HR 0.51 (95% CI 0.37-0.70)
- PSA negative pts do benefit from ART after RP

- No improvement in Overall Survival or Mets-free survival
  - Study was also not powered to detect these end points

- Independent unfavorable prognostic parameters (Multivariant analysis):
  - positive margins
  - ≥ pT3c
  - Gleason score >6 (borderline sig)
ARO 96-02 Summary

- Improved PFS after ART vs WS
- Pts with undetectable PSA do profit from ART post RP
- Subanalysis
  - Men with +Margins are the most likely to profit from ART
## Take Home Message

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AUA update 2014; AUA Guideline 2013
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AUA update 2014
Why the discrepancy in results?

- ? Ascertainment Bias - Men in EORTC possibly more likely to be Dx with recurrence sooner
  - F/U less frequent in SWOG
  - Radiographic studies less frequent in SWOG
    - EORTC - Bone scan and pelvic imaging annually
    - SWOG - only for clinical symptoms

- Significant difference in rates of SRT in observation arm
  - SWOG (20%) vs EORTC (33%)
    - Survival benefit in SWOG may be driven by later use of SRT vs EORTC

- Individual differences in pt characteristics between trails
  - % EPE, % positive margins, % SVI, OS rate of observation group

- ~30% had detectable PSA in SWOG/EORTC vs undetectable PSA in ARO
  - ? Early SRT vs Late SRT (some critics)
Limitations of present RCTs on ART

- **All 3 trials**
  - Incomplete central pathology review
    - Subsequent central review
      - poor concordance of Margin status, EPE, & Gleason grade
  - **60 Gy dose** lower than today’s standard of care
  - **Gleason grades assigned probably lower** than with contemporary review (20 yo data)

- **EORTC**
  - **62.6% positive margin rate**
    - Current rate likely lower

Toxicity

• GU and GI effects described according to RTOG scoring criteria
  • 0 = no change, 5 = death
  • Divided into acute & late toxicity

• Difficult to inform pts accurately
  • Rates vary widely across studies
  • Many confounders
    • Variation in dose, field, and technology
      • Newer delivery modes 3D-CRT and IMRT may minimize toxicity

• Currently not possible to determine differences in toxicities & QOL effects b/w ART and SRT
Potential Side Effects of post-RP Radiotherapy

- Urinary frequency
- Proctitis
- Rectal bleeding
- Urethral strictures
- Reduced recovery of erectile function
- Incontinence
- Risk of secondary malignancies not known

**GU**
- Acute grade 1-2 common first few mths
  - Freq, urgency, dysuria
- Acute Grade 3-4 less common
  - Pelvic pain, hematuria
- Late Grade 3-4 (up to 17%)

**GI**
- Acute grade 1-2
  - diarrhea, anorexia, nausea
- Grade 3-4 (rare)
  - Bowel necrosis, perforation, fistula
• 217/425 SWOG pts

• assess impact of RT on HRQL
  • pT3N0M0 Pca
  • ART vs no ART

• QOL Questionnaire - baseline, 6 wks, 6 mths, and annually for 5 yrs
  • 6 wk assessment capture S/E of rads at peak
Salvage Radiation Therapy
Considerations with SRT

• 2 separate clinical scenarios for SRT
  1. Delayed increase in PSA after initially undetectable post-op
  2. Persistently detectable PSA after RP (worse)

• Pts with PSA recurrence have higher risk of dev metastatic disease or death from PCa (AUA Guideline 2013)
  • Worse prognosis if rapidly ↑ PSA (PSADT < 10mths)

• Critical issue is determining whether ↑ PSA results from local or distant recurrence
  • SRT may eradicate locally recurrent cancer in ~60% of men
    • Often delivered with curative intent

• In the absence of SRT,
  • Median time from PSA recurrence to distant metastasis is 8 yrs

Pound JAMA 1999; Stephenson Eur Urol 2012
Quality of SRT studies

• Lack of randomized data
  • Reliant on observational studies and systematic reviews

• Dose escalation has never been prospectively tested

• Appropriate Timing of initiating SRT
  • PSA level or PSADT at which SRT is most effective unknown
• Multi-institutional cohort of 1,540 pts
• SRT after RP for PSA recurrence b/w 1987-2005
• Assessed probability of cancer control at 6 yrs after SRT for PSA-defined recurrence

- More favorable outcomes with SRT at lower pre-SRT PSA levels
- 48% disease free at 6 yrs if SRT when PSA ≤ 0.50

Suggest SRT should be given at 1st sign of PSA recurrence

4yr Progression Free Probability after SRT in hormone naïve pts

Fig 2. Four-year progression-free probability after salvage radiotherapy for 1,326 patients who did not receive androgen-deprivation therapy before or during radiation therapy, stratified by preradiotherapy prostate-specific antigen (PSA), Gleason score, surgical margins, and PSA doubling time (PSADT). RT, radiotherapy; PFP, progression-free probability; CI, 95% CI.
169 hormone-naïve pts received SRT for BCR post RP
88% treated with 66 Gy, Median F/U 41.5 mths

Most sig independent predictor of bRFS was undetectable PSA (< 0.1 ng/ml) after SRT (HR 8.4)
• Higher chance of cure

Best candidates for SRT are:
• Low pre-SRT PSA (< 0.5ng/ml)
• Low tumor stage (≤ pT2c)
• Positive margins
The Timing of Salvage Radiotherapy After Radical Prostatectomy: A Systematic Review

Christopher R. King, PhD, MD

Department of Radiation Oncology, UCLA School of Medicine, Los Angeles, California

- Systematic review of 41 studies, 5597 pts
  - PSA pre-SRT
  - RT dose
  
  Only independent variables assoc with RFS

Every 0.1μg/L increase in PSA correspond to 2.6% loss in 5yr biochem PFS

Extrapolated PSA ≤ 0.2 before SRT, RFS 64%

King Int J Rad Oncol Biol Phys 2012
Progressively better tumor control rates when:

- Initiation of SRT at lowest possible PSA
- With higher RT doses

**Dose-response relationship for SRT**

2% improvement in RFS for each additional Gy

TCD$_{50}$ 67.8 Gy
- Doses 64-66 Gy too low
- High SRT doses necessary

King Int J Rad Oncol Biol Phys 2012
**Prostate Cancer–Specific Survival Following Salvage Radiotherapy vs Observation in Men With Biochemical Recurrence After Radical Prostatectomy**

Bruce J. Trock, PhD
Misop Han, MD
Stephen J. Freedland, MD
Elizabeth B. Humphreys, MS
Theodore L. DeWeese, MD
Alan W. Partin, MD, PhD
Patrick C. Walsh, MD

**Context** Biochemical disease recurrence after radical prostatectomy often prompts salvage radiotherapy, but no studies to date have had sufficient numbers of patients or follow-up to determine whether radiotherapy improves survival, and if so, the subgroup of men most likely to benefit.

**Objectives** To quantify the relative improvement in prostate cancer–specific survival of salvage radiotherapy vs no therapy after biochemical recurrence following prostatectomy, and to identify subgroups for whom salvage treatment is most beneficial.


- **Retrospective**
- **Aim:** Determine assoc b/w SRT and PCa-specific survival, and identify subgroups where SRT provides greatest benefit

- **635 men with biochem and/or local recurrence post-RP for clinically localized PCa**
  - 397 - no salvage tx
  - 160 - SRT alone (median 66.7 Gy conformal RT)
  - 78 - SRT (median 67.2 Gy) + HT (before/during/after)

- **1st Outcome:** PCa-specific survival (PCSS)

- median F/U after recurrence 6yrs
SRT pts less likely to die of PCa at 5 or 10 yrs, regardless of whether ADT used

- **SRT had sig 3-fold ↑ in PCSS vs no SRT** *(HR 0.32, 95% CI 0.19-0.54)*
  - Limited to men with PSADT < 6mths and SRT < 2yrs after recurrence
    - Independent for path stage, Gleason score, surgical margin status

- No added benefit with hormones

- SRT initiated > 2 yrs after recurrence provide no sig increase in PCSS
Prediction of Outcome Following Early Salvage Radiotherapy Among Patients with Biochemical Recurrence After Radical Prostatectomy

Alberto Briganti, R. Jeffrey Karnes, Steven Joniau, Stephen A. Boorjian, Cesare Cozzarini, Giorgio Gandaglia, Wolfgang Hinkelbein, Karin Haustermans, Bertrand Tombal, Shahrokh Shariat, Maxine Sun, Pierre L. Karakiewicz, Francesco Montorsi, Hein Van Poppel, Thomas Wiegel

• Dev model to predict BCR after early SRT
  • identify candidates for SRT vs those better managed with more extensive salvage Tx’s

• 766 pts
  • pT2/pT3, R0-R1, pN0
  • No neoadj or adj hormones

• eSRT for BCR (PSA ≤ 0.5 ng/ml)
  • All had undetectable PSA after Sx
  • High energy photon beams or 3D conformal RT (66.6Gy)

Overall 5 yr BCR-free survival post eSRT 73.4%
Nomogram to predict BCR after early SRT

Lacks PSADT
Gleason Pattern 5 Is the Strongest Pathologic Predictor of Recurrence, Metastasis, and Prostate Cancer-Specific Death in Patients Receiving Salvage Radiation Therapy Therapy Following Radical Prostatectomy

- 575 pts received SRT +/- ADT post RP for localized Pca
  - 3D-CRT or IMRT; > 95% received 64.8 - 76.2 Gy; Median F/U 56.7 mths

- Role of Gleason pattern 5 (10, 20, 30) for pts considering SRT after BCR

- **Gleason Pattern 5**
  - Shorter interval b/w RP - SRT (25.3 vs 40.7 mths, p=0.001)
  - More likely to have biochem failure after SRT
  - More likely to receive salvage ADT earlier and more often following biochem failure
  - Multivariate analysis:
    - GP5 most adverse path predictor of:
      - Biochem Failure (HR 2.9)
      - Distant Mets (HR 14.8)
      - Pca-specific mortality (HR 5.7)

Jackson et al. Cancer Sept 2013
Conclusions SRT

- SRT recommended for pts with BCR after RP and presumed local failure with no mets

- Pre-RT PSA is most sig predictor of freedom from biochem failure post SRT

- SRT should be administered at earliest sign of BCR
  - ↓ clinical progression
  - ↓ PCa - specific mortality
  - ↓ Biochem failure
Major predictors of Biochem Failure after SRT

- Gleason 8-10
- Pre-SRT PSA > 2.0 ng/ml (or ≥ 0.5 ng/ml) - Major Determinant
- Negative surgical margins
- SV invasion
- PSADT ≤ 10 mths

• Help select pts most likely to benefit from SRT

1. **ART should be offered** to pts with adverse pathological findings at RP including **SV invasion, + surgical margins, or EPE** (Standard, Grade A)
   - reductions in biochem recurrence, local recurrence, and clinical progression

2. Defined biochem recurrence as a detectable PSA or rising PSA value after surgery that is \( \geq 0.2 \text{ ng/ml} \) and second confirmatory level \( \geq 0.2 \text{ ng/ml} \) (Recommendation, Grade C)

1. Physicians should **offer salvage RT** to **pts with PSA or local recurrence** after RP in whom there is no evidence of distant mets (Recommendation, Grade C)

1. Inform pts that the **effectiveness of RT for PSA recurrence** is **greatest when given at lower levels of PSA**, ideally PSA < 1.0 ng/ml (Clinical Principle)
Radiotherapy after Radical Prostatectomy: Treatment Recommendations Differ between Urologists and Radiation Oncologists

Luke T. Lavallée¹, Dean Fergusson², Ranjeeta Mallick², Renée Grenon³, Scott C. Morgan⁴, Franco Momoli⁵, Kelsey Witiuk², Chris Morash¹, Illias Cagiannos¹, Rodney H. Breau¹,²

- 146 Canadian physicians (104 Urologists, 42 GU RadOnc)
- Practice patterns and attitudes toward ART and SRT in standardized clinical scenarios
Scenario: Healthy 60 yo male 3-mths post RP with undetectable PSA

- **RadOnc more likely to recommend ART across all clinical scenarios** (RR 1.48, 95% CI 1.39-1.60)
- **Major differences**
  - Gleason 6, pT2 and R1 - 21% Urologists vs 70% RadOnc’s
  - +EPE and neg Margins - 18% Urologists vs 57% RadOnc’s
Clinical parameters favoring salvage RT

- Higher post-op PSA
- Longer time to PSA recurrence
- Longer PSADT
Unresolved issues: ART vs SRT

- Only observational studies
- **ART generally offers better outcomes vs SRT**
  - Lower rates of biochem recurrence & met recurrence
  - Patterns regarding CSS and OS less clear
- Declaring superiority of ART difficult in absence of RCT’s
  1. SRT studies focus on pts who have already relapsed, making direct comparisons difficult
  2. Differences in pt characteristics
     - ART likely bias with more adverse pathological profiles
  3. Differences in RT protocols
     - SRT often higher doses than ART (median 65 Gy vs 61 Gy)
- Most literature reports on older RT techniques
  - Unclear whether newer techniques result in fewer differences b/w ART and SRT outcomes
Unresolved issues

- Whether ADT given in conjunction with ART or SRT improves outcomes vs RT alone
  - Studies differ in type, timing, and duration of hormones
  - Results conflicting

- The optimal target volume, technique, or dose-fractionation schedule for ART
  - 64-65 Gy is minimum recommendation (AUA guideline 2013)
  - Data suggest doses > 65 Gy safe and may improve outcomes
Awaited future studies

- **RADICALS**
  - Radiation and Androgen Deprivation In Combination After Local Surgery
  - Compare SRT vs ART, both with & w/o HT (6mth vs 24 mth)

- **RAVES**
  - Radiotherapy Adjuvant Verus Early Salvage (non-inferiority trial)
  - pT3 or +Margins and undetectable PSA

- **Role of hormones + SRT**
  - **RTOG 0534**
    - 3D-CRT / IMRT 64.8-70.2 Gy +/- 45 Gy to LN’s +/- 4-6 mths ADT
  - **RTOG 9601**
    - Effects of 64.8 Gy RT to prostate bed +/- long term ADT (Bicalutamide)
I DON'T ALWAYS PRESCRIBE TREATMENTS

BUT WHEN I DO, THEY'RE BACKED BY EVIDENCE