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Disclosures

NCCN Guideline Bladder Cancer Panel: Duke Cancer Institute Representative
Medtronic: National PI HUGO robotic surgery FDA IDE trial , consultant
Pfizer: PI phase 1 intravesical therapy trial
Droplet Inc: National PI biomarker discovery trial, consultant
Johnson and Johnson: bladder cancer advisory board
Tyra: PI for oral FGFR inhibitor clinical trial
ArteraAI: PI for digital histology AI biomarker trial (IIT)

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Overview

- Epidemiology
- Treatment
- Urinary diversion
  - Types
  - Quality of life
  - Complication management

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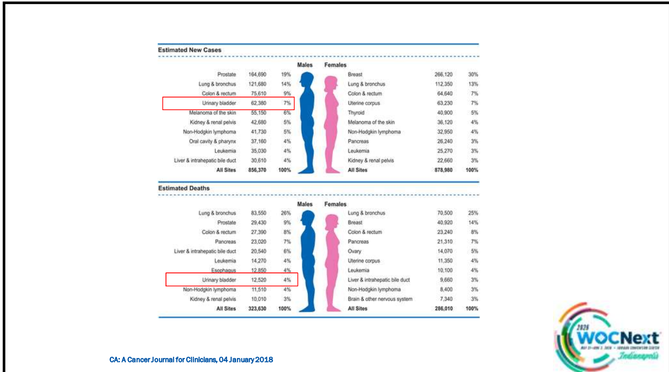

Estimated New Cases

Males			Females		
Prostate	164,690	19%	Breast	266,120	30%
Lung & bronchus	121,680	14%	Lung & bronchus	112,350	13%
Colon & rectum	75,610	9%	Colon & rectum	64,640	7%
Urinary bladder	62,380	7%	Uterine corpus	63,230	7%
Melanoma of the skin	55,150	6%	Thyroid	40,900	5%
Kidney & renal pelvis	42,680	5%	Melanoma of the skin	36,120	4%
Non-Hodgkin lymphoma	41,730	5%	Non-Hodgkin lymphoma	32,950	4%
Oral cavity & pharynx	37,160	4%	Pancreas	26,240	3%
Leukemia	35,030	4%	Leukemia	25,270	3%
Liver & intrahepatic bile duct	30,610	4%	Kidney & renal pelvis	22,660	3%
All Sites	**856,370**	**100%**	**All Sites**	**878,980**	**100%**

Estimated Deaths

Males			Females		
Lung & bronchus	83,550	26%	Lung & bronchus	70,500	25%
Prostate	29,430	9%	Breast	40,920	14%
Colon & rectum	27,390	8%	Colon & rectum	23,240	8%
Pancreas	23,020	7%	Pancreas	21,310	7%
Liver & intrahepatic bile duct	20,540	6%	Ovary	14,070	5%
Leukemia	14,270	4%	Uterine corpus	11,350	4%
Esophagus	12,850	4%	Leukemia	10,100	4%
Urinary bladder	12,520	4%	Liver & intrahepatic bile duct	9,660	3%
Non-Hodgkin lymphoma	11,510	4%	Non-Hodgkin lymphoma	8,400	3%
Kidney & renal pelvis	10,010	3%	Brain & other nervous system	7,340	3%
All Sites	**323,630**	**100%**	**All Sites**	**286,010**	**100%**

CA: A Cancer Journal for Clinicians, 04 January 2018

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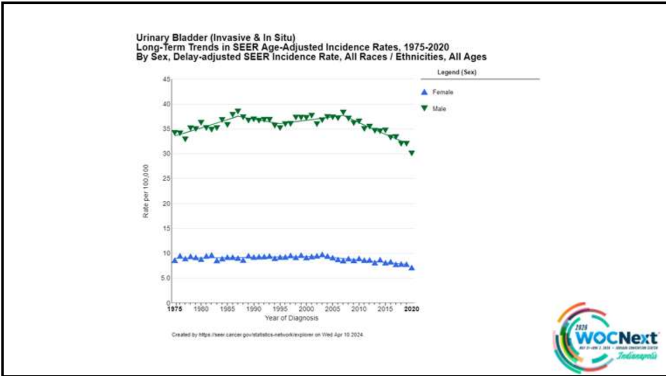

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Risk factors

Exposures (estimated 70%)	• Tobacco: 2-7 X RR • Pelvic radiation (bladder): 1.6 X RR • Balkan/Chinese herb (Aristolochia fangchi) nephropathy: UTUC • Occupational/industrial exposure (benzidine, b napthalene): 8 X RR
Inherited (estimated up to 30%)	• Mutations in MMR/MSI, RB1,P53,PTEN,CHEK2 • Family history

Colin P et al, BJUI 2009
Abern M et al, Urol Oncol 2013
Nortier J, NEJM 2000

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Detection

Signs
- Microscopic hematuria – prevalence ~1%
- Gross hematuria – prevalence ~20%

Symptoms
- Irritative LUTS (rarely isolated)
- Flank pain
- Advanced disease: cough, bone pain, etc.

Messing EM et al, Cancer, 2006
Khadra MH et al, J Urol 2000

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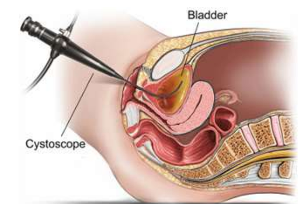
Endoscopy – FLEXIBLE WHITE LIGHT

- Current gold standard for detection and surveillance
- Indicated for signs/symptoms not a screening test!
- Well tolerated
- Sensitivity 90-98% overall, *70-85% for CIS*
- Specificity ~94%



Burger M et al, Eur Urol 2013
Schwalb DM et al, J Urol 1993
Blick CG et al, BJUI 2011

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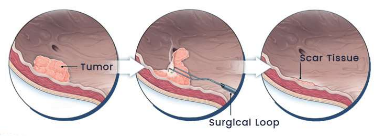
TURBT

- For abnormal cystoscopy
- When feasible complete resection of all tumor(s)
- Depth to deep muscle – obtain staging
- Bladder instillation of chemotherapy
- For muscle invasive carcinoma curative in ~10% (pT0 rate at cystectomy)



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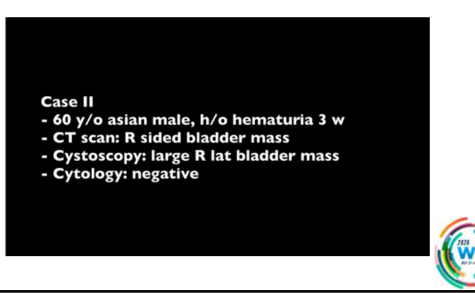
Enhanced cystoscopy/TUR example



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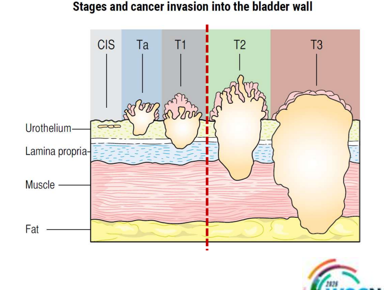
Surgical management

- Transurethral resection of bladder tumor
  - NMIBC
- Partial cystectomy
- Radical cystectomy
  - Refractory NMIBC
  - MIBC without metastasis
  - Palliative



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Intravesical therapy with TURBT

- Single instillation (MMC,Gemcitabine, others)
- Reduces recurrence of NMIBC by ~30%

Author, Year	Relative Risk [CI]
Burnand et al,[32] 1976	0.54 [0.35, 0.84]
Malling and Sorensen,[21] 1980	0.63 [0.40, 0.99]
Zincke et al,[27] 1983	0.43 [0.27, 0.69]
Tolley et al,[26] 1988	0.94 [0.79, 1.11]
Oosterlinck et al,[23] 1993	0.70 [0.54, 0.92]
MRC,[19] 1994	1.12 [0.82, 1.53]
Ali-El-Dein et al,[28] 1997	0.46 [0.27, 0.78]
Rajala et al,[24] 1999	0.81 [0.62, 1.06]
Solsona et al,[25] 1999	0.48 [0.24, 0.96]
Okamura et al,[22] 2002	0.40 [0.23, 0.69]
Barghi et al,[29] 2006	0.06 [0.00, 0.92]
El-Ghobashy et al,[35] 2007	0.41 [0.14, 1.18]
Berrum-Svennung et al,[30] 2008	0.82 [0.67, 0.99]
Cai et al,[33] 2008	0.86 [0.61, 1.21]
Jalon Monzon et al,[20] 2008	0.74 [0.46, 1.19]
Böhle et al,[31] 2009	0.90 [0.57, 1.42]
Gudjónsson et al,[36] 2009	0.80 [0.67, 0.96]
De Nunzio et al,[34] 2011	0.22 [0.11, 0.42]
Random effects model	0.67 [0.56 , 0.79]

0 0.25 0.75 1 1.5 2
Relative Risk

Abern et al, JNCCN, 2013

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WOCNext 2026 Indianapolis

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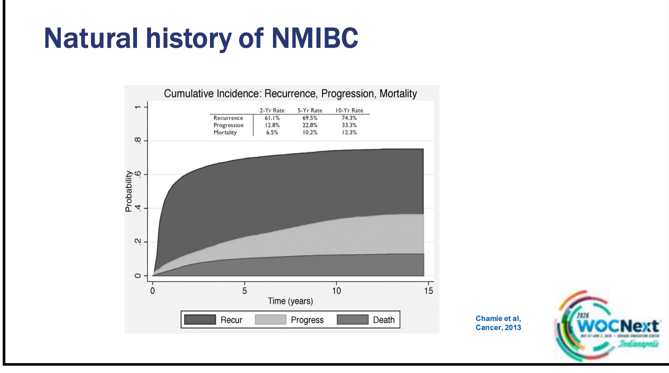
Natural history of NMIBC



Chamie et al, Cancer, 2013

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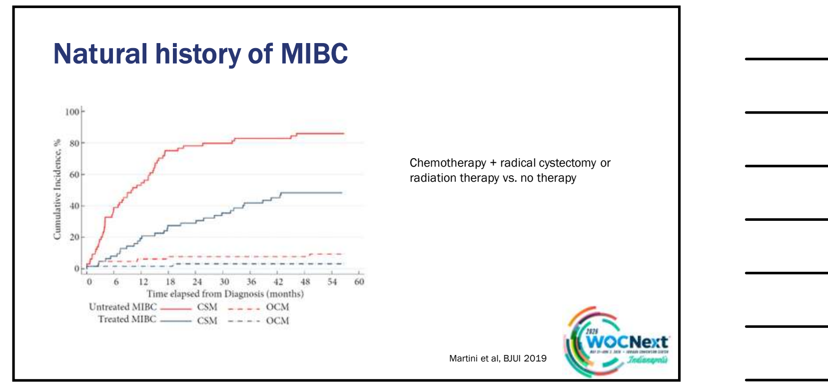
Natural history of MIBC



Chemotherapy + radical cystectomy or radiation therapy vs. no therapy

Martini et al, BJUI 2019

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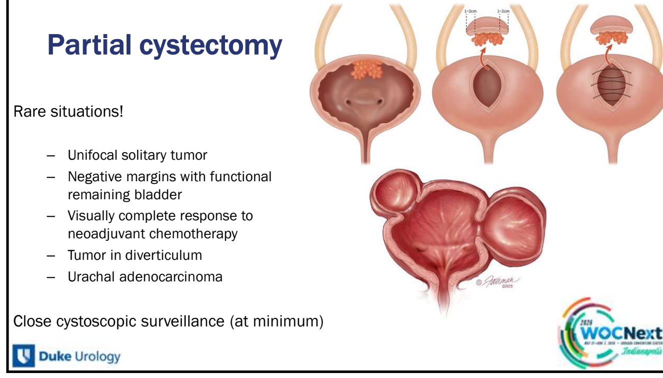

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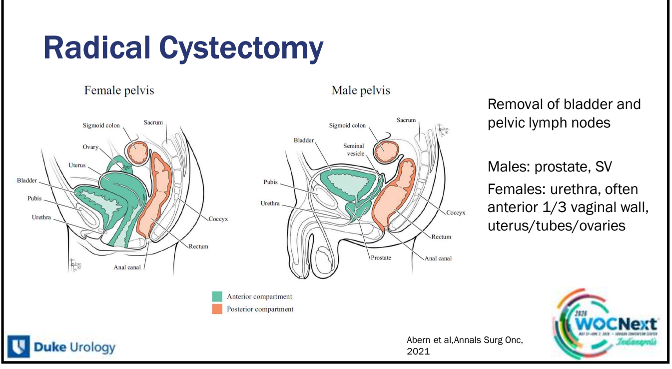

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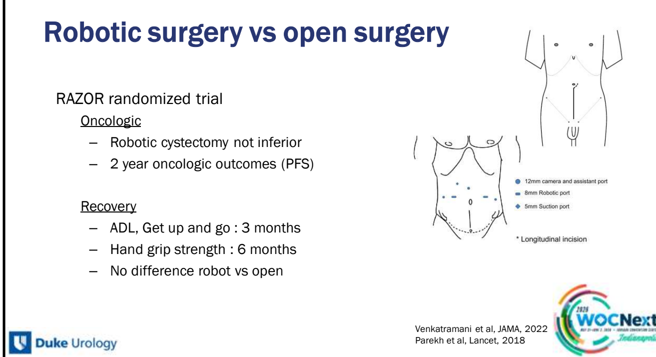

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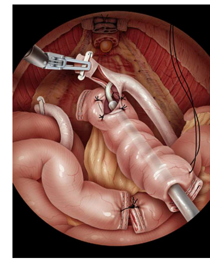
(fully!) robotic surgery vs open surgery



IROC randomized trial – UK 2017-2020

- N = 338 randomized Open vs. robotic with intracorporeal urinary diversion
- 89% ileal conduit
- Primary outcome: # days alive out of hospital in first 90 days
- 20 secondary outcomes
  - Survival
  - QOL/disability
  - Complications

Catto et al, JAMA, 2022

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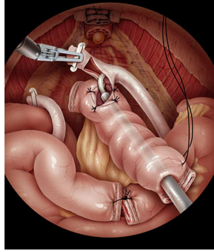
IROC Trial Findings



- No oncologic outcome differences
- # of days alive and out of the hospital within 90 days of surgery was 82 vs 80 (adjusted difference, 2.2 days *P* = .01).
- Lower Thromboembolic complications −6.5%[95%CI, −11.4%to −1.4%])
- Lower wound complications −11.7%[95%CI, −18.6%to −4.6%].
- Better QOL at 5 weeks (difference in mean European Quality of Life 5-Dimension −0.07 [95%CI, −0.11 to −0.03]; *P* = .003)
- Lower disability at 5 weeks (difference in WHO Disability Assessment Schedule 2.0 scores, 0.48 [95%CI, 0.15-0.73]; *P* = .003) and at 12 weeks (difference in WHODAS 2.0 scores, 0.38 [95%CI, 0.09-0.68]; *P* = .01); NS after 12 weeks

Catto et al, JAMA, 2022

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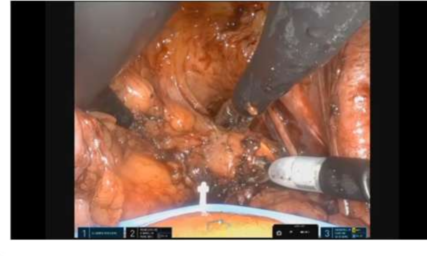
Partial cystectomy - example



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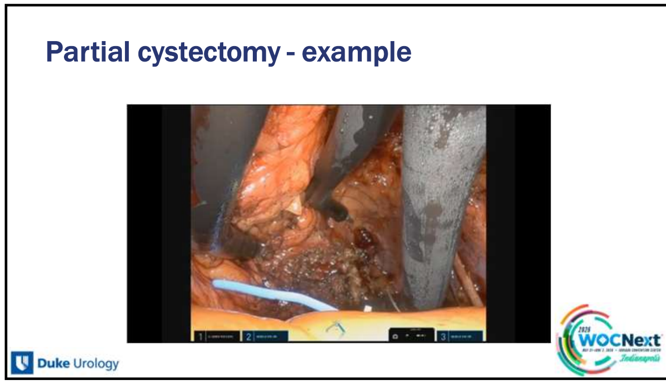

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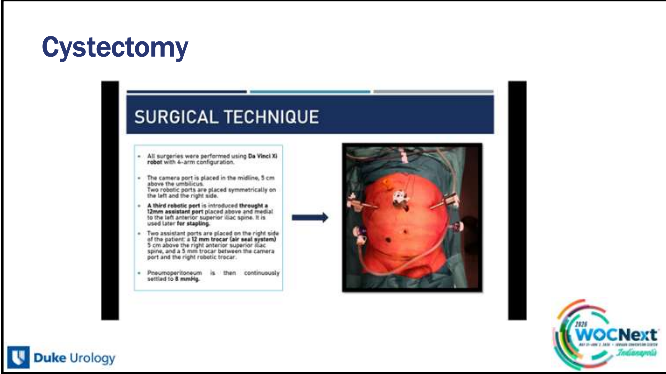

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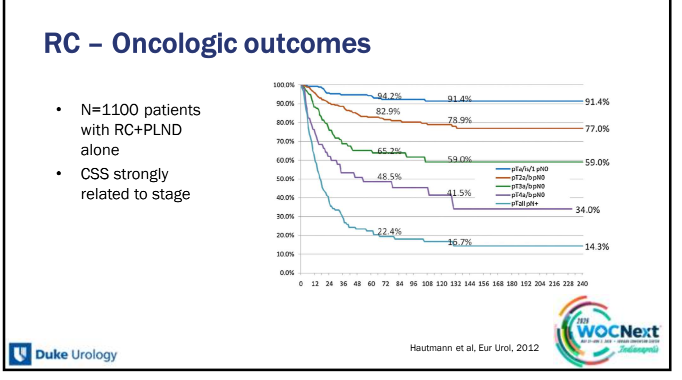

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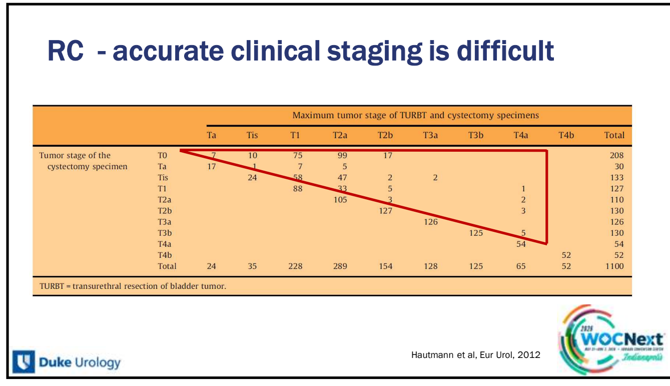

		Maximum tumor stage of TURBT and cystectomy specimens									
		Ta	Tis	T1	T2a	T2b	T3a	T3b	T4a	T4b	Total
Tumor stage of the cystectomy specimen	T0	7	10	75	99	17					208
	Ta	17	1	7	5						30
	Tis		24	58	47	2	2				133
	T1			88	33	5			1		127
	T2a				105	3			2		110
	T2b					127			3		130
	T3a						126				126
	T3b							125	5		130
	T4a								54		54
	T4b									52	52
	Total	24	35	228	289	154	128	125	65	52	1100

TURBT = transurethral resection of bladder tumor.

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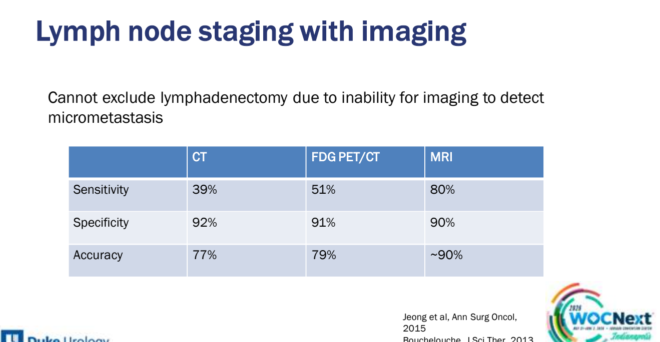

	CT	FDG PET/CT	MRI
Sensitivity	39%	51%	80%
Specificity	92%	91%	90%
Accuracy	77%	79%	~90%

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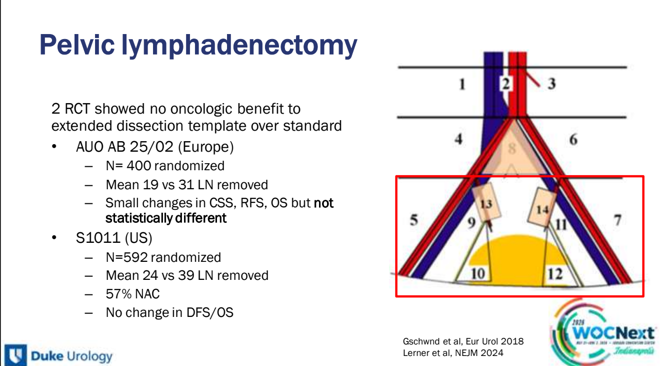

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Quality of lymph node dissection

- SEER registry n = 1260
- RC + LND for UC of bladder 1998-2002
- Survival associated with increased #LN

p < 0.0001

Wright et al, Cancer, 2008

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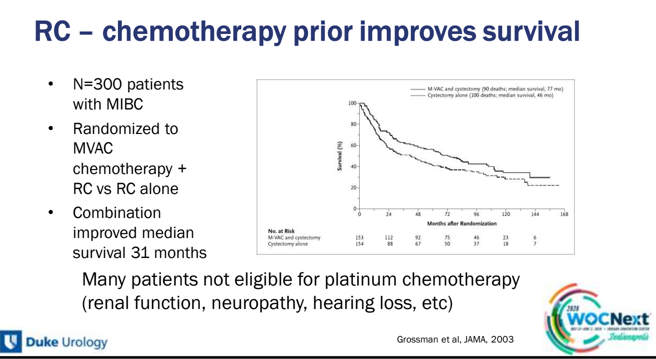
RC – chemotherapy prior improves survival

- N=300 patients with MIBC
- Randomized to MVAC chemotherapy + RC vs RC alone
- Combination improved median survival 31 months



Many patients not eligible for platinum chemotherapy (renal function, neuropathy, hearing loss, etc)

Grossman et al, JAMA, 2003

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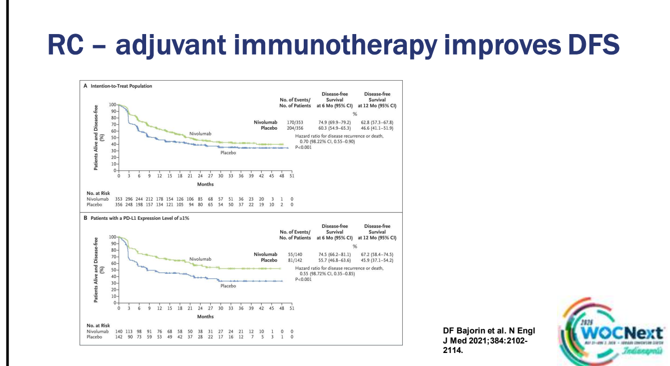
RC – adjuvant immunotherapy improves DFS



DF Bajorin et al. N Engl J Med 2021;384:2102-2114.

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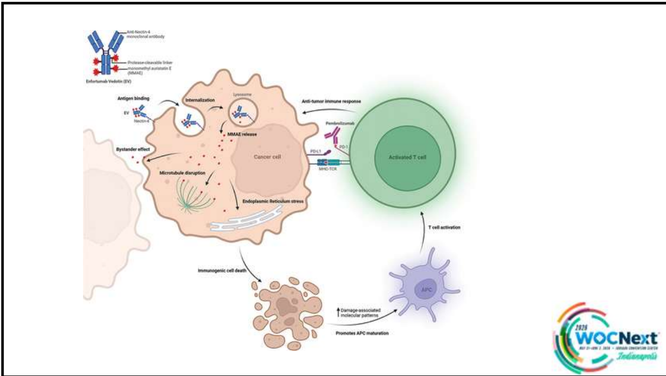

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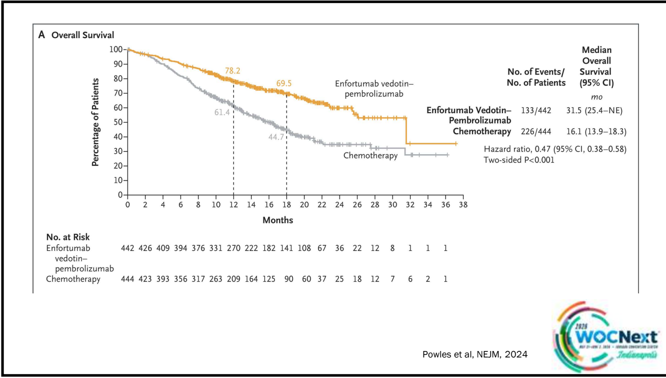

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Trial / setting	Cis eligibility	Comparator	Neoadj/adjuvant design	pCR (EV+pembro)	pCR (control)	Key EFS / OS notes*
KEYNOTE-905 / EV-303 (radical cystectomy)	Cisplatin-ineligible	Surgery alone	Periop EV+pembro vs cystectomy alone	57.1%	8.6%	Markedly improved EFS and OS vs surgery alone.
EV-304 / KEYNOTE-B15 (radical cystectomy)	Cisplatin-eligible	Cisplatin-based chemotherapy	Periop EV+pembro vs standard periop cisplatin-based chemo	55.8%†	32.5%†	Improved EFS and numerically better OS vs cisplatin chemo.
Review-level periop EV+pembro summary	Mixed MIBC cohorts	Historical cisplatin or surgery	Various perioperative EV+pembro regimens across early trials	~57%	–	pCR roughly doubles historical expectations.

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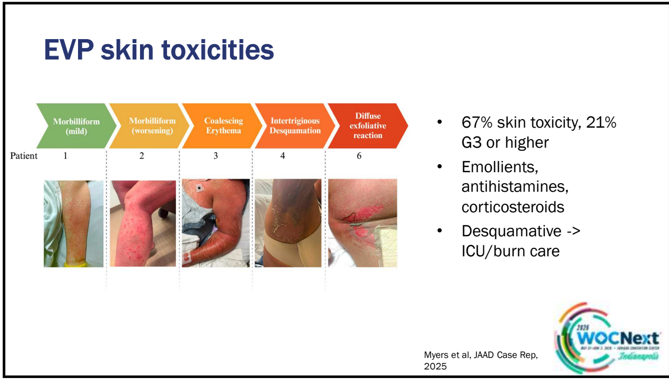
EVP skin toxicities



- 67% skin toxicity, 21% G3 or higher
- Emollients, antihistamines, corticosteroids
- Desquamative -> ICU/burn care

Myers et al, JAAD Case Rep, 2025

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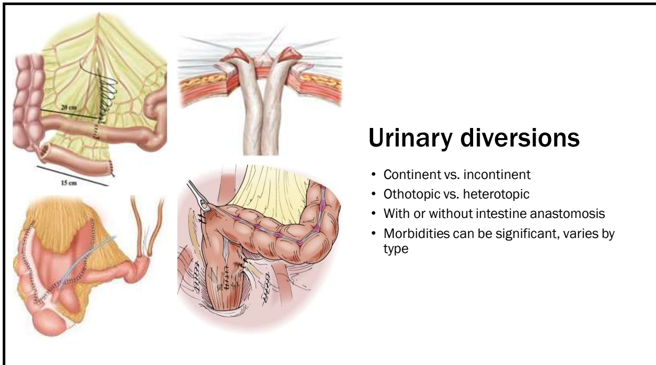

Urinary diversions

- Continent vs. incontinent
- Othotopic vs. heterotopic
- With or without intestine anastomosis
- Morbidities can be significant, varies by type

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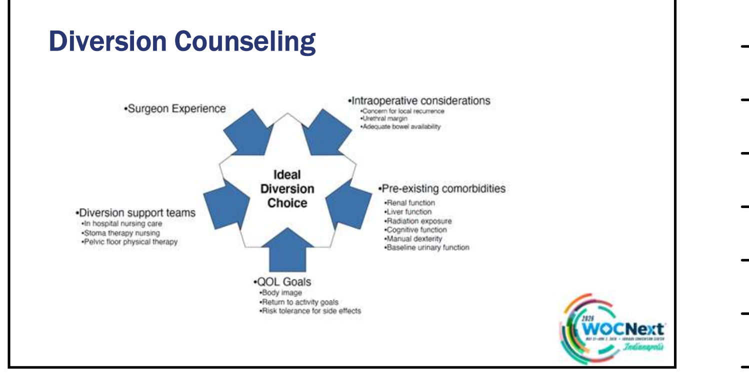
Diversion Counseling



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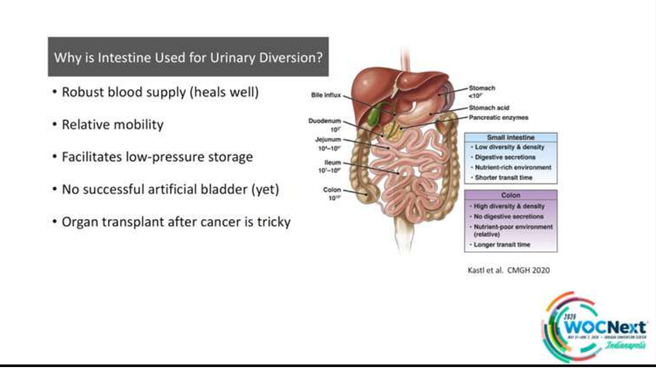

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Neobladder orthotopic diversion

- Adds 1-2 hours to radical cystectomy
- Specialized training
- Candidates:
  - No urethral tumor
  - Good renal function (GFR ≥ 45 ml/min) to avoid acidosis
  - No small intestinal disease (need 60-70 cm ileum)

a b c d

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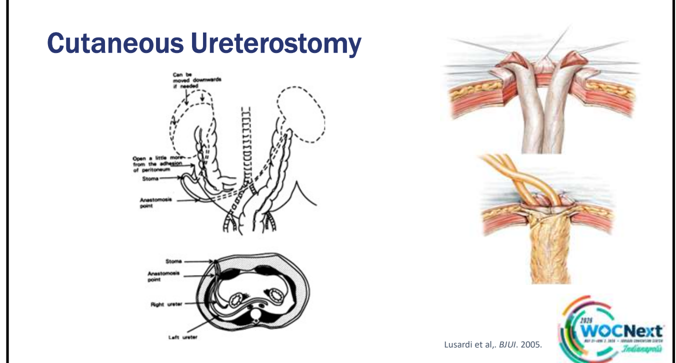

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Cutaneous Ureterostomy outcomes

- Renal function decline (>25%) = 43%
  - Series of 46 patients, 90 kidneys
  - 8.5 years of follow up
  - 9% rate of stents for hydronephrosis
- Comparison 35 patients IC vs CU
  - LOS 4 days shorter
  - Urine leak 14% vs. 0%
  - Operative time 70 minutes less

Kim et al,. *BJU Compass*. 2025
2025
Longo et al. BJUI. 2016

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Cutaneous Ureterostomy considerations

Risks

Benefits

Stomal stenosis

Long term renal fxn

LOS

Prolonged ileus, leak

Operative time

Practical considerations:

*Difficult to reach contralateral ureter in higher BMI

*Ideally suited to frail patients with bowel disease or solitary kidneys

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Metabolic acidosis

- Urine composition
  - 95% Water
  - 5% Waste (urea, ammonia, salts)
- Reabsorption of ammonia by intestine requires breakdown in liver (Costs HCO3-)
- Urinary chloride is reabsorbed in exchange for HCO3-

Cells of the ileal conduit
NH_4^+
2 Cl^-
Sodium-potassium-2chloride cotransporter
K^+
Na^+
CTFR chloride channel
Cl^-
Cl/HCO3 anion exchanger
HCO_3^-
$CO_2 + H_2O$
H^+
Na+/H+ cation exchanger NHE1
Na^+

Yartsev, Deranged Physiology, 2015

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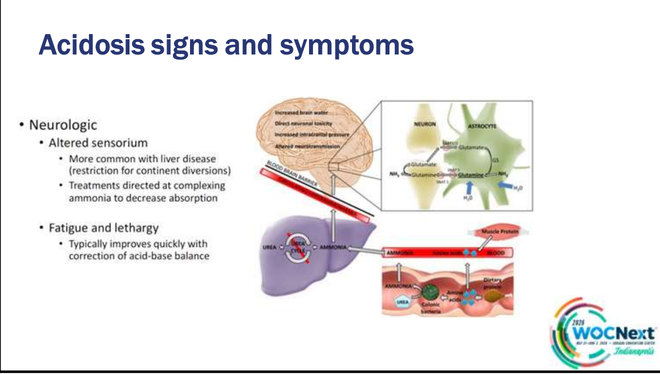

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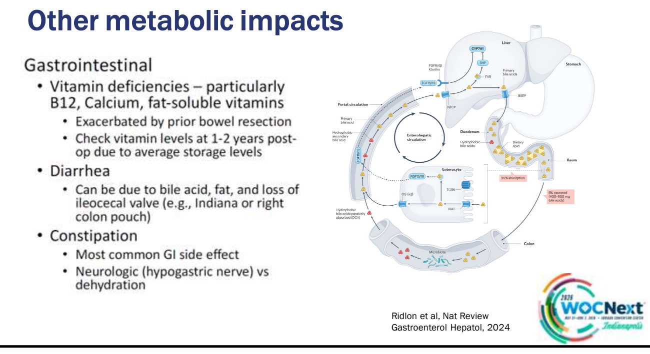

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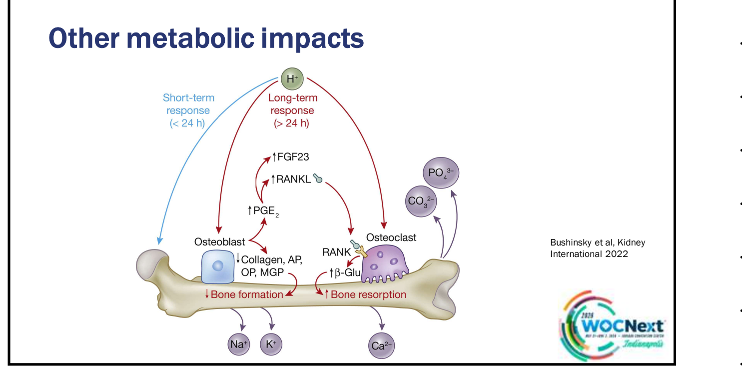

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QOL After Radical Cystectomy

CISTO: Radical Cystectomy vs Bladder-Sparing Therapy for Recurrent High-Grade NMIBC (12-Month Outcomes)

- Adults with recurrent high-grade NMIBC, eligible for both RC and BST:
- How do RC and BST compare in:
  - 12-month physical function (EORTC QLQ-C30)
  - QoL, mental health, financial toxicity
  - Cancer control and treatment-related harms

Gore et al, JCO 2025

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QOL After Radical Cystectomy

CISTO: Radical Cystectomy vs Bladder-Sparing Therapy for Recurrent High-Grade NMIBC (12-Month Outcomes)

Bladder-Sparing Therapy (BST)
- n = 371
- Treatments within 1 year:
  - Intravesical BCG: 29%
  - Intravesical gemcitabine + docetaxel: 54%
  - Pembrolizumab IV: 7%
  - Other/no additional therapy: 10%

Radical Cystectomy (RC)
- n = 199
- Time to surgery: mean 2.8 months
- Robotic RC: ~51%
- Ileal conduit diversion: ~79%

Gore et al, JCO 2025

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QOL After Radical Cystectomy

Standardized Average Treatment Effect

A EORTC Physical Functioning
B EORTC Physical Functioning (age <75 years, n = 358)
C EORTC Physical Functioning (age ≥75 years, n = 212)
D EORTC Emotional Functioning
E PROMIS Depression
F PROMIS Anxiety
G EORTC Role Functioning
H BCI Urinary Summary
I BCI Bowel Summary
Favors ← BST RC →
Time Since Enrollment (months)

Gore et al, JCO 2025

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QOL based on urinary diversion type

Single center experience 35% continent vs. 65% incontinent diversions (n=133)

- urinary stone formation, 34.8% versus 2.3% ($P < 0.001$);
- urostomy stricture, 13.0% versus 1.2% ($P = 0.007$)
- Among patients with continent urinary diversion…
  - Incidence of incontinence was 28.3%
  - 15.2% reported difficulty with self-catheterization
- No overall QOL difference!

Urh et al, Gyn Oncol 2013

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QOL based on urinary diversion type

TABLE 3. *IC vs NB QOC parameters in retrospective, cross-sectional studies*

References	Instrument/Method	No. Pts (diversion)	Results	Evidence Level
Bjerre et al[24]	Interview + self-designed questionnaire	38 (NB), 29 (IC)	Global satisfaction high + similar in 2 groups	III/B
Bjerre et al[25]	Self-designed questionnaire	49 (NB), 27 (IC)	No influence of operation type on regression analysis	III/B
Fujisawa et al[26]	SF-36	36 (NB), 20 (IC)	No differences in any scale score, physical + emotional functioning below American norm	III/B
Hobisch et al[27]	QLQ-C30 + self-designed questionnaire	69 (NB), 33 (IC)	QOL preserved to higher degree after orthotopic NB	III/B
Salinas Sanchez et al[28]	SF-36	21 (NB), 28 (IC)	QOL worse than in general population	III/B
Conde Redondo et al[29]	Self-designed questionnaire	27 (NB), 6 (IC)	Health related QOL higher after bladder substitution	III/B
Hara et al[30]	SF-36	48 (NB), 37 (IC)	No differences in any scale score, all pts generally satisfied with overall health + QOL	III/B
Dutta et al[31]	SF-36 + FACT-G	49 (NB), 23 (IC)	On multivariate analysis adjusting for age marginal QOL advantages with NB	III/B
Protogerou et al[32]	QLQ C-30 + self-designed questionnaire	50 (NB), 58 (IC)	No effect of urinary reconstruction type on QOL but effect on urinary + sexual function	III/B

Systematic review and meta-analysis of 9 studies (low level evidence)

No difference between ileal conduit and neobladder

Gerhar et al, J Urol 2005

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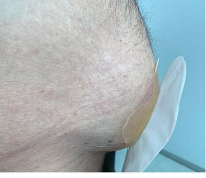
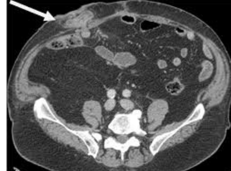
Parastomal hernia

CLINICAL



RADIOGRAPHIC ONLY (~30%)



Risk factors: BMI, prior laparotomy, prior abdominal hernia

Che et al, J WOCN 2025

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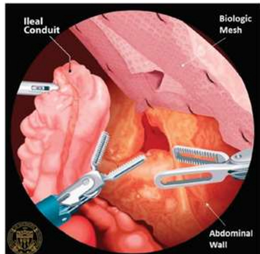
Parastomal hernia

Prophylactic mesh at time of IC
- Mixed evidence
- RCT of biologic mesh with no benefit (n=146) :
  - Radiological PSH-free in the mesh and control groups were 74% vs 75% at 1 year and 69% vs 62% at 2 years.
  - Clinical PSH 8 in each group
  - 5 patients required repair at 2 years FU
- Type of mesh and technique may affect benefit and risk



Djaladat et al, J Urol 2024
Rossin et al, J Pers Med, 2026

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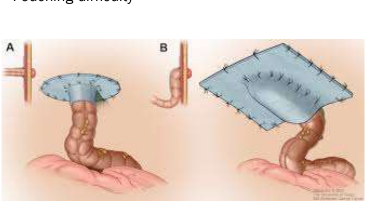
Parastomal hernia repair

Indications
- Bowel obstruction
- Urinary obstruction (stenosis, compression)
- Pouching difficulty

Techniques
- Laparoscopic/robotic and open
- Sugerbaker, keyhole



Smith et al, Plast Recon Res, 2022

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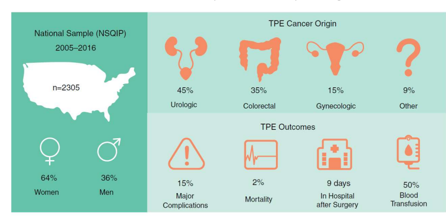
Radical surgery outcomes

Morbidity and mortality are significant



Duke Urology

Abern et al,Annals Surg Onc, 2021

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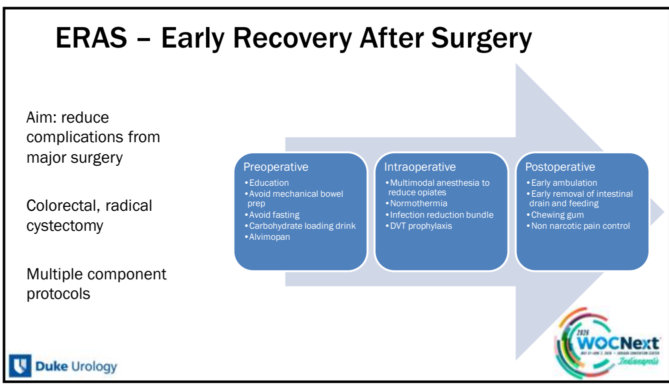

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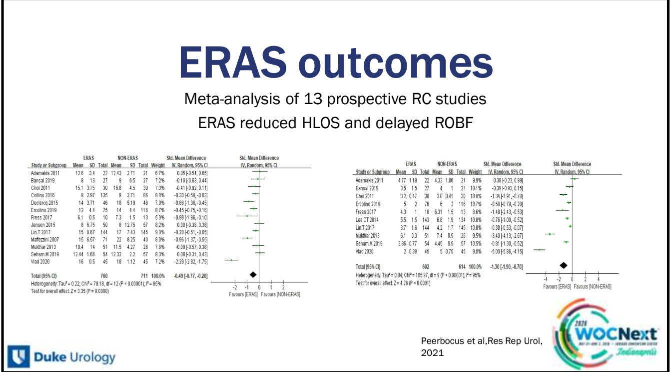

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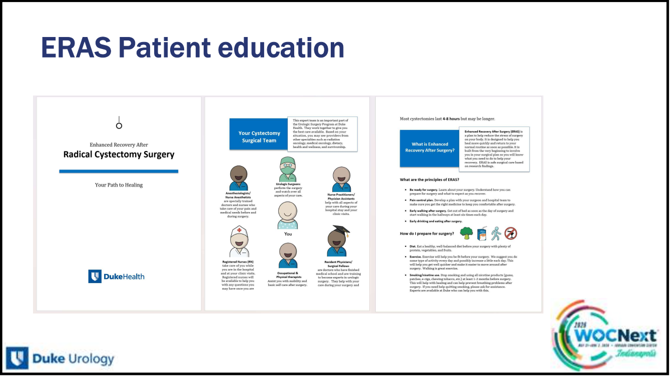

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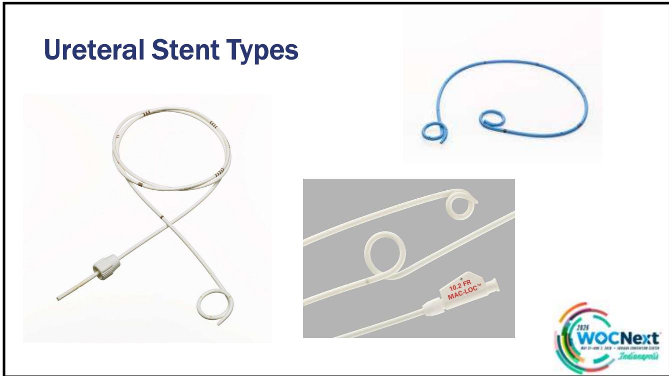

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Are ureteral stents necessary?

Study design

- Prospective database from a randomized perioperative perioperative fluid trial; 283 patients underwent open open RCUD at MSK between 2014–2018.
- Exposure: intraoperative ureteral stents (IOS) vs no IOS; 77/283 patients (27%) had no stents and 206/283 (73%) had stents.
- Primary endpoint: composite 30-day UEA complication — obstruction, leak, symptomatic UTI, sepsis, or intra-abdominal abscess.
- Two of six high-volume surgeons routinely omitted IOS, enabling comparison under a common ERAS pathway.

Kidneys

Ureter

Ileal Conduit

Stents

Donat SM et al,. *J Urol.* 2021;205:483–490.

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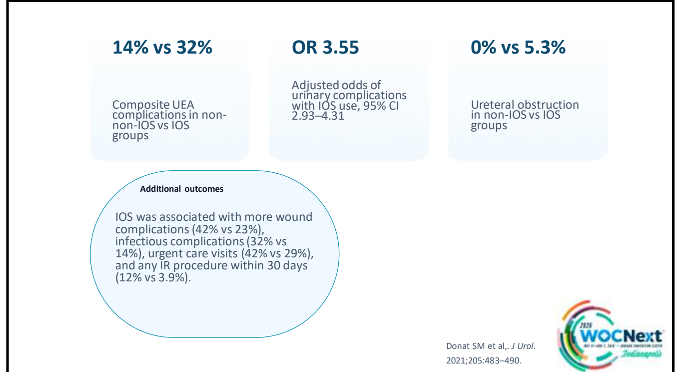

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Conclusions

- Invasive bladder cancer survival improved -> multimodal therapy
- Puts emphasis on QOL -> dictated largely by urinary diversion
- Team care, Robotic surgery, ERAS protocols reducing morbidity
- Be aware of survivorship issues
  - Hernias
  - Obstruction
  - Metabolic changes

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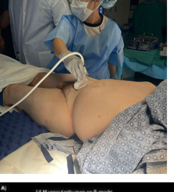
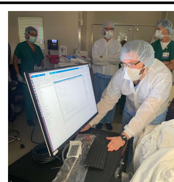
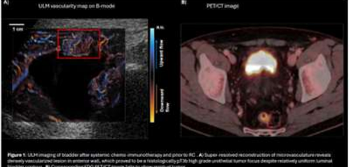
BLISS Study

- PI: Abern (urology) and Song (BioE) Duke University
- Super resolution micro-bubble contrast enhanced ultrasound:
  - Custom built 2D matrix ultrasound probe with 64*16=1024simultaneous elements
  - 10X vascular resolution compared to standard imaging
  - postprocessing for vascular mapping and biomarkers
- Aims
  - Develop 3D maps of the bladder with contrast enhanced surface ultrasound
  - Determine accuracy vs histology in patients undergoing RC
  - Develop vascular profiles of treated vs residual bladder cancer after immunotherapy







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Thank you for your attention

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REFERENCES & RESOURCES

- Powles T, Valderrama BP, Gupta S, et al. Enfortumab Vedotin and Pembrolizumab in Untreated Advanced Urothelial Carcinoma. *N Engl J Med*. 2024;390(10):875-888.
- Vigneswaran HT, Schwarzman LS, Madueke IC, David SM, Nordenstam J, Moreira D, Abern MR. Morbidity and Mortality of Total Pelvic Exenteration for Malignancy in the US. Ann Surg Oncol. 2021 May;28(5):2790-2800.
- Catto JWF, Khetrapal P, Ricciardi F, et al. Effect of Robot-Assisted Radical Cystectomy With Intracorporeal Urinary Diversion vs Open Radical Cystectomy on 90-Day Morbidity and Mortality Among Patients With Bladder Cancer: A Randomized Clinical Trial. JAMA. 2022 Jun 7;327(21):2092-2103.
- Gore JL, Wolff EM, Nash MG, Comstock BA, et al. Twelve-Month Results From the CISTO Study Comparing Radical Cystectomy Versus Bladder-Sparing Therapy for Recurrent High-Grade Non-Muscle-Invasive Bladder Cancer. J Clin Oncol. 2026 Feb;44(4):274-285.
- Djaladat H, Ghoreifi A, Tejura T, Miranda G, Cai J, Sheybaee Moghaddam F, Aldana I, Sotelo R, Gill I, Bhanvadia S, Schuckman A, Desai M, Aron M, Daneshmand S, Duddalwar V. Prophylactic Use of Biologic Mesh in Ileal Conduit (PUBMIC): A Randomized Clinical Trial. J Urol. 2024 Jun;211(6):743-753.
- Grossman HB, Natale RB, Tangen CM, Speights VO, Vogelzang NJ, Trump DL, deVere White RW, Sarosdy MF, Wood DP Jr, Raghavan D, Crawford ED. Neoadjuvant chemotherapy plus cystectomy compared with cystectomy alone for locally advanced bladder cancer. N Engl J Med. 2003 Aug 28;349(9):859-66.

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