

# The Clinical Relevance of Hematuria

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**Urogynecology**

UNIVERSITY OF COLORADO

# DISCLOSURES

None

# Learning Objectives

1. Diagnose hematuria in adolescent girls and women and develop a differential diagnosis for the cause
2. Formulate an evidence and age-based strategy for evaluating adolescents and women with hematuria
3. Develop appropriate referral strategies for a hematuria work-up



# Three most important questions

- How to diagnosis hematuria
- What to do if present
- How to follow-up



# Case #1

54yo G2P2, healthy, postmenopausal female with complaints of urinary urgency, frequency and urgency incontinence.

Voiding frequency	every 1 hour
Nocturia	x3
Urgency incontinence	2-3 times daily
Dysuria	denies
Heamturia	denies

PMH:	none
PSH:	hysterectomy
Social hx:	No Tobacco, ETOH, illicit
Family hx:	None
Meds:	none

Normal physical and pelvic exam

# Case #2

37yo female who presents for her annual exam. She is doing well and denies any urinary symptoms

PMH: GERD

PSH: BTL

Social hx: Tobacco 3PPD x 25 years, social ETOH, no illicits

Family hx: mom with breast CA

Meds: none

Normal physical and pelvic exam



# Case #3

67yo G3P3 presents with blood noted on her toilet after voiding. She denies dysuria, urgency, frequency or abdominal pain.

PMH: HTN, Hypercholesterolemia, obesity

PSH: Appy and Chole

Social hx: Former smoker quit in 1989, social ETOH, no  
illicits

Family hx: mom with breast CA

Meds: none

Normal physical and pelvic exam



# Case #4

18yo G0 who presents for blood in her urine. She noted bloody urine after her cross-country meet 2 days ago.

PMH: None

PSH: None

Social hx: Runner. On the school cross country team,

Non-smoker no ETOH, no illicit

Family hx: NC

Meds: none

Normal physical and pelvic exam





# Bladder cancer

- Approximately 80,000 new cases are diagnosed annually
- Over 15,000 deaths annually
- Fourth most common cancer in adults
- Represents 90-95% of all urothelial carcinomas

# Gender differences in bladder cancer

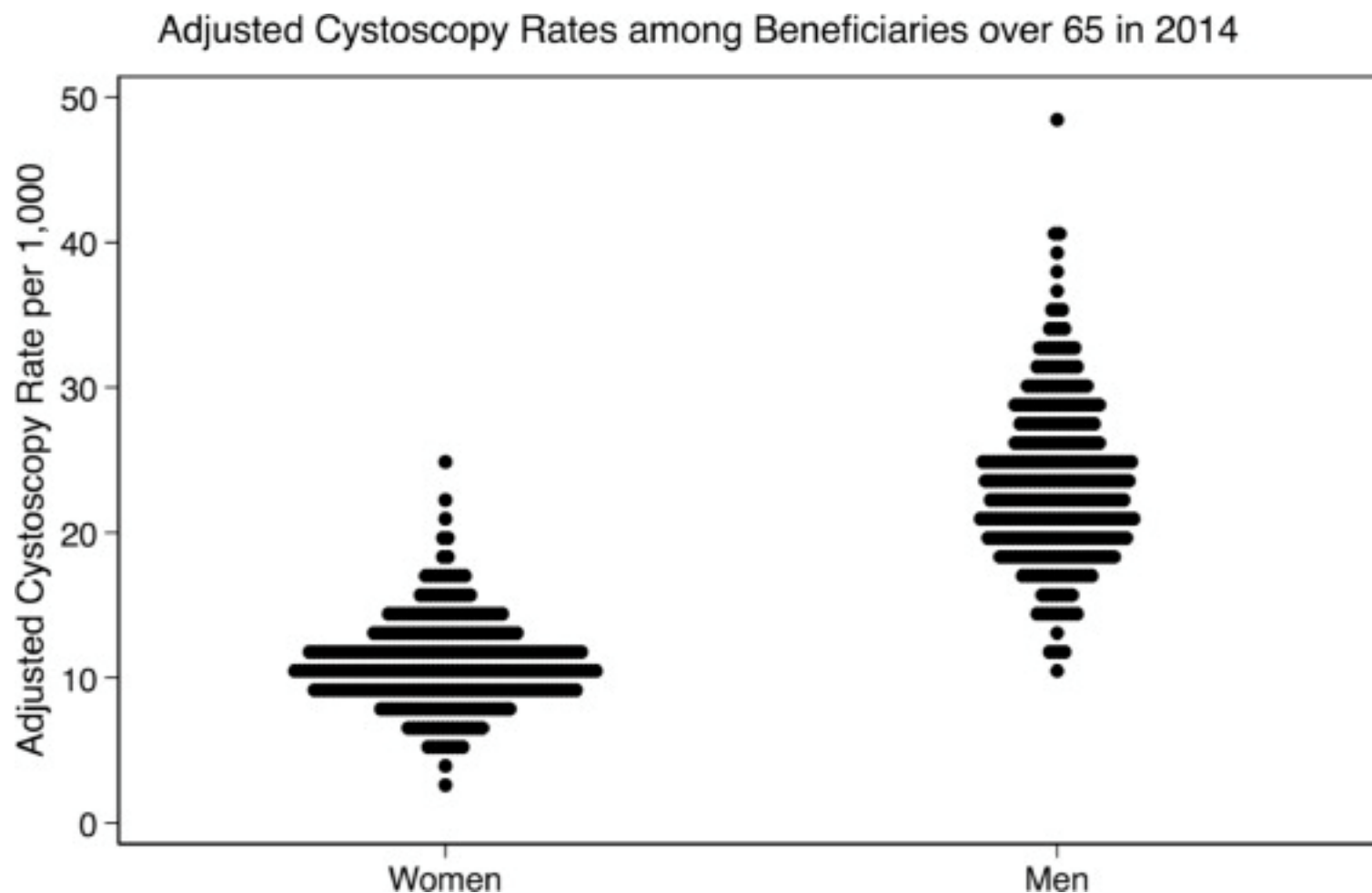
- Less prevalent in women ~23% of new bladder ca cases  
2% of all cancer cases
- Higher incidence of advanced stage disease diagnosed in women compared to men (31%-43% vs 26%-28%)
- Lower 5-year survival 77% in women versus 82% in men

# Reasons for delayed diagnosis of bladder cancer in women

- Patient failure to seek care
- Misdiagnosis (presumed UTI)
- Delayed referrals
- Less likely to undergo cystoscopy
- Failure to refer for evaluation



# Disparities in cystoscopy in women versus men



# Risk factors of urologic malignancy

- Increasing age
- Active or former smoker
- Exposure to chemicals or dyes
- Irritative voiding symptoms
- Pelvic irradiation
- Hematuria

85% of bladder cancer and 98% of upper tract urothelial cancer initially present with hematuria; increased risk with greater than 25 RBC/HPF

# Types of hematuria

- Gross hematuria
- Microscopic hematuria
- Asymptomatic microscopic hematuria

# Which of the following meet criteria for microscopic hematuria?

- a. 1+ blood on urine dipstick
- b. 1-2 RBC/ HPF on urine microscopy
- c. 3+ blood on urine dipstick
- d.  $\geq 3$  RBC/ HPF on urine microscopy



# American Urological Association guidelines

- Updated in 2012
- Women ≥ 35 with a single, positive, properly collected specimen with 3 or more red blood cells per high-power field with no obvious benign
- Recommended work-up
  - CT-Urogram
  - Cystoscopy
  - Evaluation of renal function (eGFR, BUN, Creatinine)
- Grade C evidence
  - inconsistent observational studies
  - small sample sizes





# Diagnosing microscopic hematuria

## ⚠️ UA Complete Urinalysis (No Culture

Collected: 2/12/2019 09:45 Status: Final result [View](#)

Specimen Information: Urine, clean catch

	2/12/19 0945
Color Urine	Yellow
Appearance Urine	Clear
Specific Gravity Urine	1.017
pH Urine	5.0
Protein Urine	Negative
Glucose Urine	Negative
Ketones Urine	Negative
Bilirubin Urine	Negative
Blood Urine	Negative
Nitrite Urine	Negative
Urobilinogen Urine	<2.0
Leukocyte Esterase Urine	Negative
White Blood Cells Urine	0-5
<b>Red Blood Cells Urine</b>	<b>4-10 !</b>
Squamous Epithelial Cells	Occasional
Mucus	Many
Non Squamous Epithelial Cells	Occasional



# Issues with laboratory reporting

## ⚠ UA Complete Urinalysis (No Culture Reflex)

Collected: 2/12/2019 09:45 Status: Final result Visible to patient: Yes (MHC)

Specimen Information: Urine, clean catch

	Ref Range & Units
Color Urine	
Appearance Urine	Clear
Specific Gravity Urine	1.001 - 1.035
pH Urine	5.0 - 8.0
Protein Urine	Negative mg/dL
Glucose Urine	Negative mg/dL
Ketones Urine	Negative mg/dL
Bilirubin Urine	Negative
Blood Urine	Negative
Nitrite Urine	Negative
Urobilinogen Urine	<2.0 EU/dL
Leukocyte Esterase Urine	Negative
White Blood Cells Urine	0 - 5 /HPF
Red Blood Cells Urine	0 - 3 /HPF
Squamous Epithelial Cells	Occasional /HPF
Mucus	/HPF
Non Squamous Epithelial Cells	Occasional /HPF

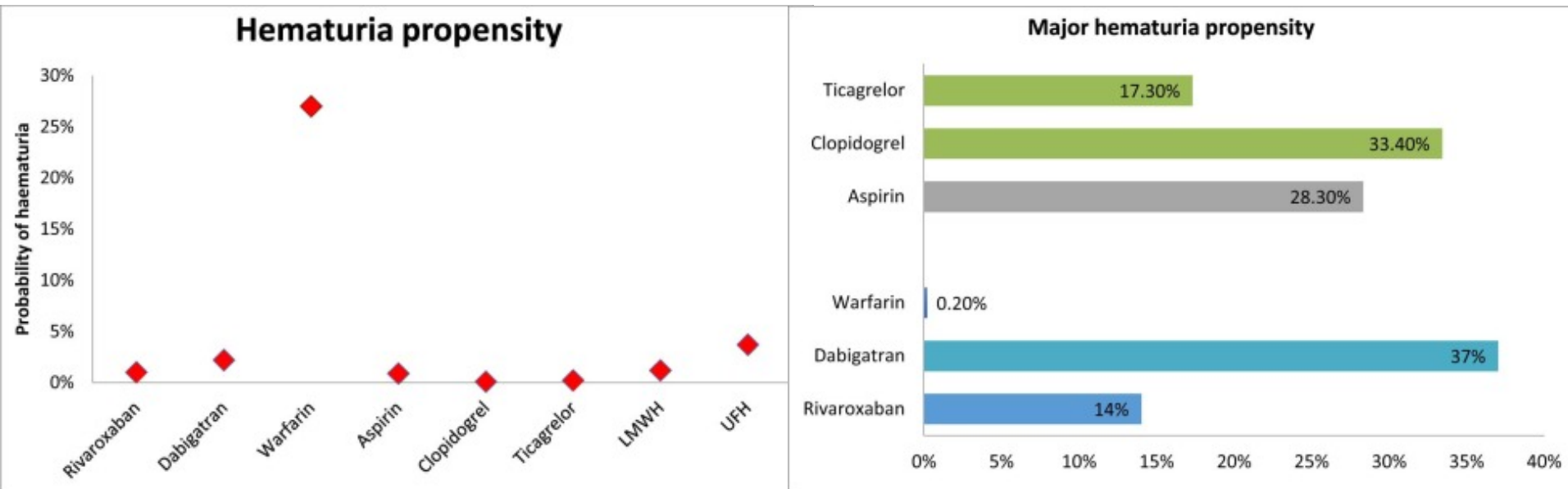
# Differential diagnosis for hematuria

- Urinary tract infection
- Urolithiasis
- Medical renal disease
- Trauma
- Menstruation
- Vigorous exercise
- Anticoagulation

# Causes of hematuria in children

- UTI
- Trauma
- Perineal irritation
- Sickle cell disease/trait,
- Nephrolithiasis
- Adenovirus
- Glomerulonephritides
- Malignancy
- Ureteral pelvic junction obstruction
- Coagulopathies
- Drug-induced cystitis.

# Anticoagulation and hematuria



# Incidence of urinary tract cancer in patients with hematuria

- Population studies estimate risk of 0.01% to 3% overall
- 0%- 0.07% in patients < 40 years
- 1% to 8.3% in patients > 40 years

# Malignancies by age, location, and hematuria type

Age Range (y)	Location	Gross Hematuria	Microscopic Hematuria (%)	Total Malignancies (%) (%)
≤40 (n = 168)	Upper tract	0	0	0
	Bladder	0	0	0
41-50 (n = 232)	Upper tract	0	0	0
	Bladder	1 (0.4)	0	1 (0.4)
51-60 (n = 290)	Upper tract	2 (0.7)	0	2 (0.7)
	Bladder	12 (4.1)	1 (0.3)	13 (4.4)
61-70 (n = 250)	Upper tract	1 (0.4)	0	1 (0.4)
	Bladder	11 (4.4)	2 (0.8)	13 (5.2)
≥71 (n = 183)	Upper tract	1 (0.5)	0	1 (0.5)
	Bladder	8 (4.4)	0	8 (4.4)
Total (n = 1123)	Upper tract	4 (0.4)	0	4 (0.4)
	Bladder	32 (2.8)	3 (0.3)	35 (3.1)
All		36 (3.2)	3 (0.3)	39 (3.5)

38.5% (n= 15) of the malignancies were in women

Commander CW. Urology 2017

# Recommended imaging for hematuria

Radiologic procedure	Rating	Comments	RRL <sup>b</sup>
CT abdomen and pelvis without and with contrast (CT urography)	9	Must include high-resolution imaging during excretory phase.	☼☼☼☼
X-ray intravenous urography	6	If CT urography unavailable	☼☼☼
X-ray retrograde pyelography	6	For patient with contraindication to iodinated contrast or strong suspicion of urothelial lesion, to clarify abnormality suspected on CT or IVU	☼☼☼
Ultrasound kidneys and bladder retroperitoneal	5		0
MRI abdomen and pelvis without and with contrast (MR urography)	5	For patients with contraindication to iodinated contrast.	0
CT abdomen and pelvis without and with contrast	5		☼☼☼☼
MRI abdomen and pelvis without and with contrast	3		0
Arteriography kidney	2		☼☼☼
X-ray abdomen and pelvis (KUB)	2		☼☼



# Advantages & limitations of imaging for microscopic hematuria

## PROS

- Increased sensitivity to detect upper tract urothelial carcinomas and renal cell carcinoma compared ultrasound or cystogram

## CONS

- Higher doses of ionizing radiation relative to other modalities.
- Malignancy risk increases linearly with radiation dose
- Nephropathy rates from 2% - 20–30% in low and high-risk patients
- High costs

# U.S. Preventive Services Task Force

(2011)

- The current evidence is insufficient to assess the balance of benefits and harms of screening for bladder cancer in asymptomatic adults
- Inadequate evidence that screening improves disease-specific or overall morbidity or mortality.
- Changed recommendation from D (the harms outweighed the benefits) to an I (insufficient evidence)



# ACOG and AUGS recommendations

- Asymptomatic, low-risk, never-smoking women aged 35 - 50 years undergo evaluation only if they have more than 25 red blood cells per high-power field
- Encourage organizations producing future guidelines to perform sex-specific analysis of the data and produce practical sex-specific recommendations

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# Summary

- Microscopic hematuria is a risk factor for bladder cancer
- AUA recommendations may result in over-evaluation of low-risk women
- ACOG/AUGS recommendations may decrease the risk of over-evaluation
- More prospective studies that include women are needed







Thank You

Questions?

