# Definition of hematuria

- Simply: presence of blood in the urine!
- Hematuria versus red urine ?
- Common causes for red urine:
  - **Hematuria**
  - **Myoglobinuria**
  - **Hemoglobinuria**
  - **Anthocyanin in beets and blackberries**
  - **Medications Rifampicin, Phenolphthalein, …etc**

# Classification of hematuria: Gross vs. microscopic

- Gross Hematuria:
  - Or macroscopic (seen by naked eye!)
  - Initial, totally, or terminal
  - Painful versus painless
- Microscopic hematuria
  - The recommended definition of microscopic hematuria is *three or more* red blood cells per high-power microscopic field in urinary sediment from *two of three* properly collected urinalysis specimens.

# Microscopic hematuria: The dipstick test

- Urine dipstick detects heme in urine: RBCs, hemoglobin & myoglobin in urine.
- False positive:
  - Myoglobinuria or hemoglobinuria
  - Povidine
  - Baterial peroxidase
- False negative:
  - Reducing agents such as ascorbic acid

# Classification of hematuria: Medical versus surgical!

- Medical: IgA nephropathy, post-infection GN, membranous GN, H.S purpura, coagulopathy, hemophilia, papillary necrosis, vascular disease, emobli to the kidney ...etc

*The presence of significant proteinuria, red cell casts or renal insufficiency, or a predominance of dysmorphic red blood cells in the urine should prompt an evaluation for renal parenchymal disease or referral to a nephrologist*

- Surgical causes:
  - **Malignancies: bladder, renal, ureter, renal pelvis.**
  - **Stone disease**
  - **Infection**
  - **Inflammatory: interstitial cystitis, drug-induced (cyclophosamide)**
  - **Trauma**
  - **BPH, prostate cancer**

# Prevalence

- In five population-based studies: the prevalence of asymptomatic microscopic hematuria varied from 0.19 percent to 16.1 percent.

- In older men, who are at a higher risk for significant urologic disease, the prevalence of asymptomatic microscopic hematuria was as high as 21 percent.

# Hematuria is not always abnormal

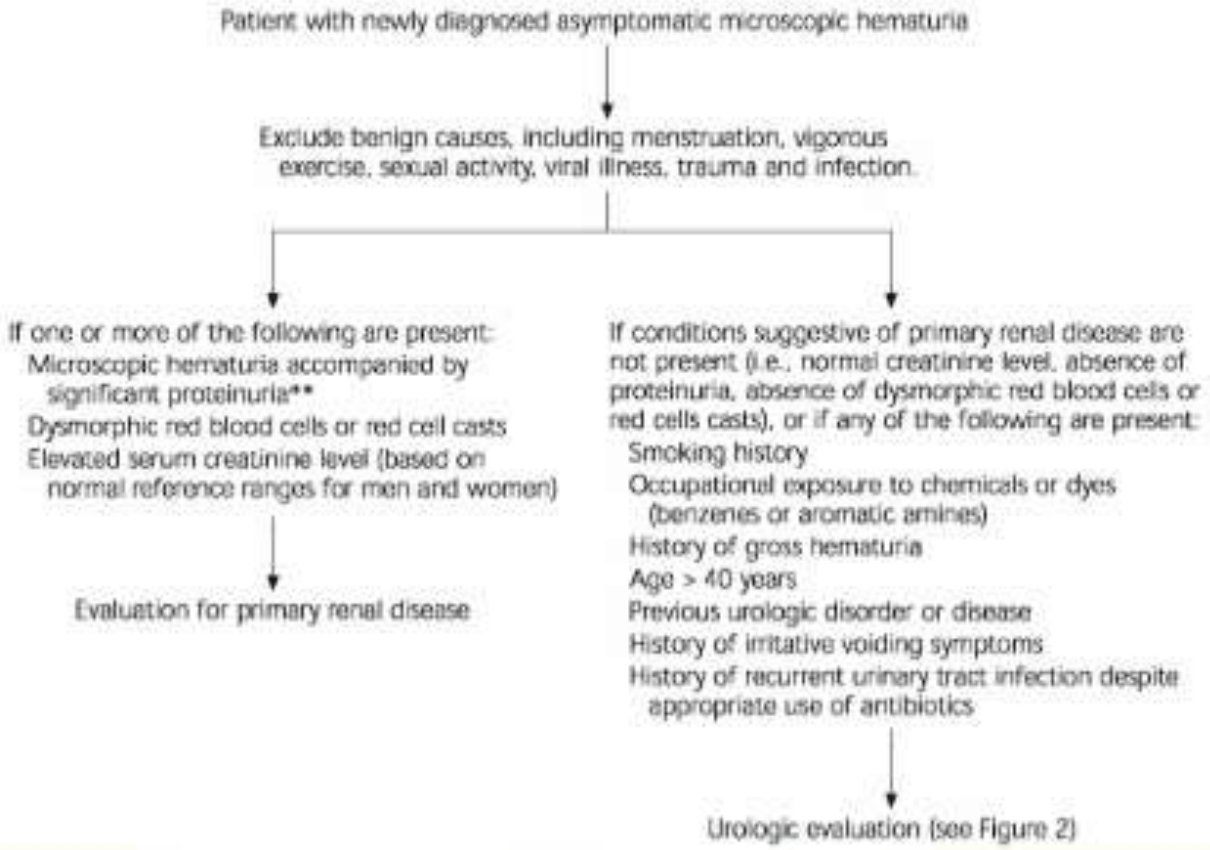
- A few RBC can be found in normal people.
- 40% of soliders has microscopic hematuria on at least one occasion and 15% on 2 or more occasions.
- Transient hematuria:
  - **Rigorous exercise**
  - **Sexual intercourse**
  - **Menstrual contamination**

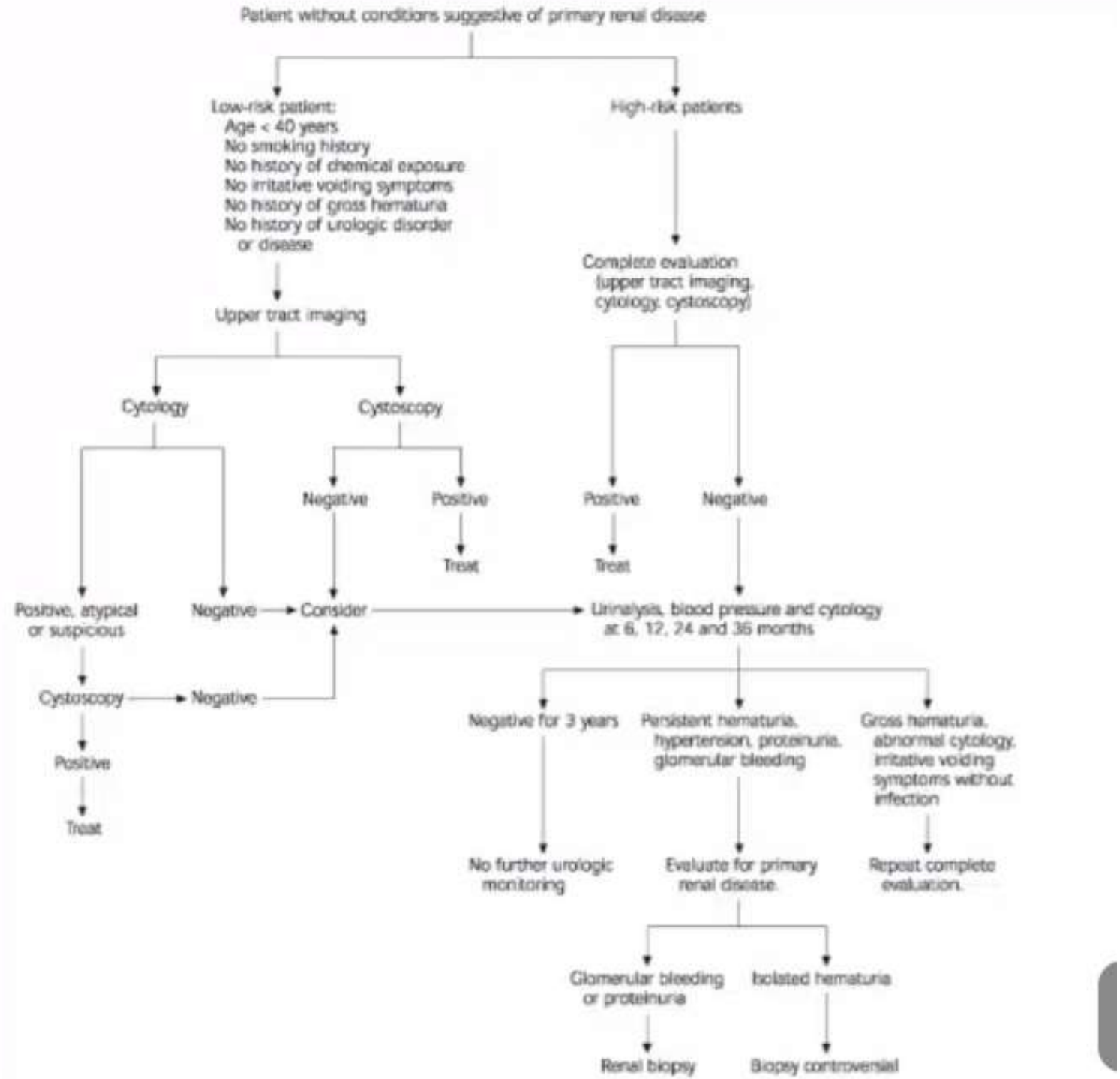
# Approach to hematuria

- History
  - Age
  - Sex
  - Smoking
  - Characteristics of hematuria
  - History of clots
  - Occupational exposure to carcinogen
  - Irritative symtpoms, obstructive symtpoms
  - Medications: cyclophosphamide
  - History of instrumentation, exercise, catheterization, recent menstruation, recent throat infection

# Risk Factors for Significant Disease in Patients with Microscopic Hematuria

- Smoking history
- Occupational exposure to chemicals or dyes (benzenes or aromatic amines)
- History of gross hematuria
- Age >40 years
- History of urologic disorder or disease
- History of irritative voiding symptoms
- History of urinary tract infection
- Analgesic abuse
- History of pelvic irradiation


Patient with newly diagnosed asymptomatic microscopic hematuria
Exclude benign causes, including menstruation, vigorous exercise, sexual activity, viral illness, trauma and infection.
If one or more of the following are present:
Microscopic hematuria accompanied by significant proteinuria**
Dysmorphic red blood cells or red cell casts
Elevated serum creatinine level (based on normal reference ranges for men and women)
Evaluation for primary renal disease
If conditions suggestive of primary renal disease are not present (i.e., normal creatinine level, absence of proteinuria, absence of dysmorphic red blood cells or red cells casts), or if any of the following are present:
Smoking history
Occupational exposure to chemicals or dyes (benzenes or aromatic amines)
History of gross hematuria
Age > 40 years
Previous urologic disorder or disease
History of irritative voiding symptoms
History of recurrent urinary tract infection despite appropriate use of antibiotics
Urologic evaluation (see Figure 2)


Patient without conditions suggestive of primary renal disease
Low-risk patient:
Age < 40 years
No smoking history
No history of chemical exposure
No irritative voiding symptoms
No history of gross hematuria
No history of urologic disorder or disease
High-risk patients
Upper tract imaging
Complete evaluation (upper tract imaging, cytology, cystoscopy)
Cytology
Cystoscopy
Negative
Positive
Positive
Negative
Treat
Treat
Positive, atypical or suspicious
Negative
Consider
Urinalysis, blood pressure and cytology at 6, 12, 24 and 36 months
Cystoscopy
Negative
Positive
Treat
Negative for 3 years
Persistent hematuria, hypertension, proteinuria, glomerular bleeding
Gross hematuria, abnormal cytology, irritative voiding symptoms without infection
No further urologic monitoring
Evaluate for primary renal disease
Repeat complete evaluation
Glomerular bleeding or proteinuria
Isolated hematuria
Renal biopsy
Biopsy controversial

*Urothelial cancers, the target of a cytologic examination, are the most commonly detected malignancies in patients with microscopic hematuria*

*Intravenous urography, ultrasonography and computed tomography are used to evaluate the urinary tract in patients with microscopic hematuria. Because of lack of impact data, evidence-based imaging guidelines cannot be formulated*

*Cystoscopic evaluation of the bladder (complete visualization of the bladder mucosa, urethra and ureteral orifices) is necessary to exclude the presence of bladder cancer*