MICROHEMATURIA

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INTRODUCTION

- The American Urological Association defines microhematuria as three or more **red blood cells** (RBCs) per high-powered field under the microscope.

- Dipstick: Uses the peroxidase-like activity of hemoglobin to effect a color change.

- Isolated hematuria : early or mild IGAN and collagen IV or Alport syndrome spectrum disorder.

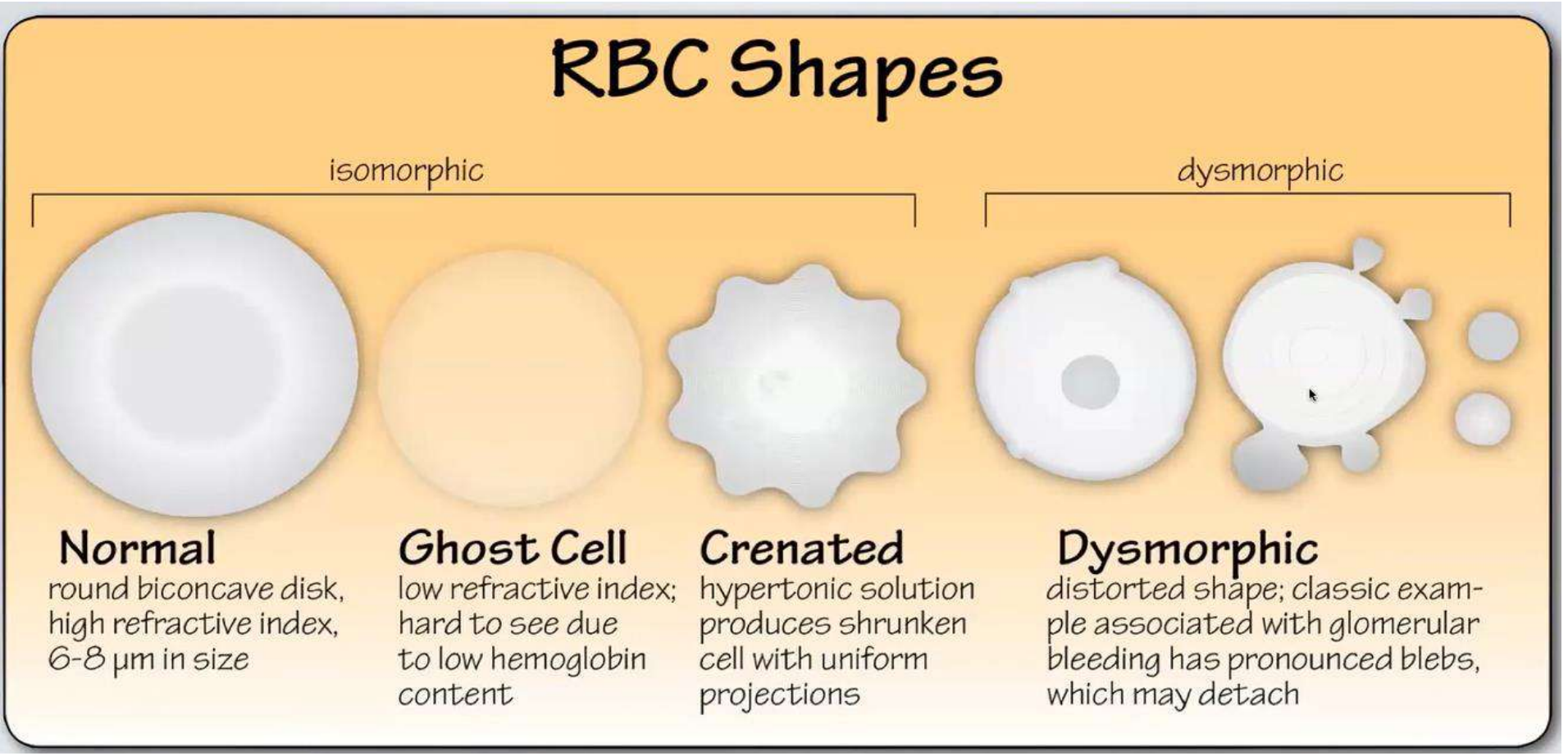
- Genetic testing is an important tool in the evaluation of microhematuria. Whole exome sequencing helps in diagnosing , guiding treatment and selection of kidney donor.

- Massive hematuria of glomerular origin produces AKI through different mechanisms:

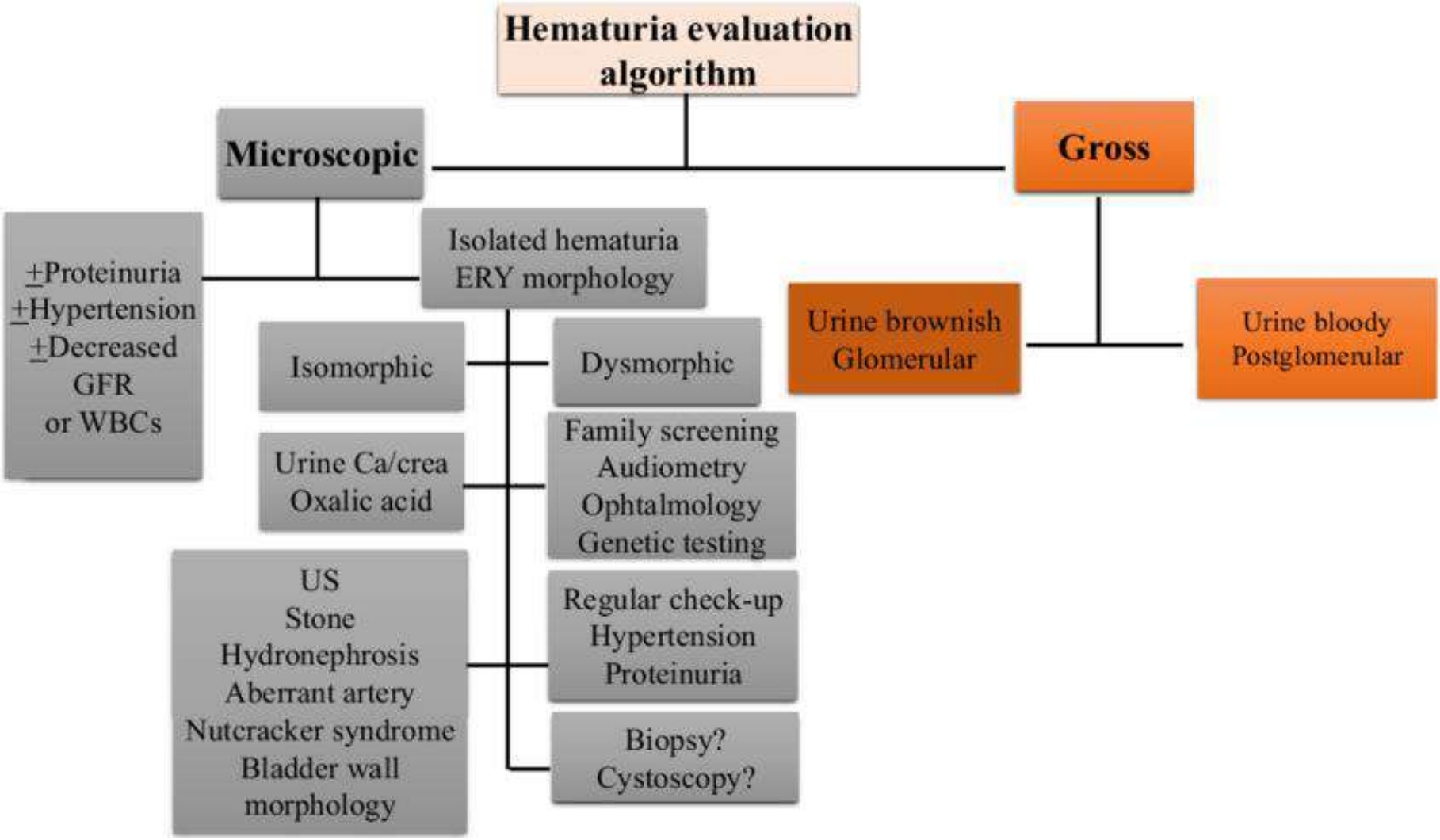
  (a) direct tubular damage due to intratubular obstruction of the blood casts,

  (b) direct tubular toxic effect of hemoglobin (Hb) and heme.

  (c) processes of erythrophagocytosis by the renal tubular cells.



MICKEY MOUSE RBC :- also called **acanthocytes** or G1 cells, appear as ring-shaped structures with two or more blebs (small bumps) protruding from the cell membrane, resembling Mickey Mouse's head and ears. It signifies glomerular injury.


Hematuria evaluation algorithm
Microscopic
Gross
±Proteinuria
±Hypertension
±Decreased GFR
or WBCs
Isolated hematuria
ERY morphology
Urine brownish
Glomerular
Urine bloody
Postglomerular
Isomorphic
Dysmorphic
Urine Ca/crea
Oxalic acid
Family screening
Audiometry
Ophtalmology
Genetic testing
US
Stone
Hydronephrosis
Aberrant artery
Nutcracker syndrome
Bladder wall morphology
Regular check-up
Hypertension
Proteinuria
Biopsy?
Cystoscopy?

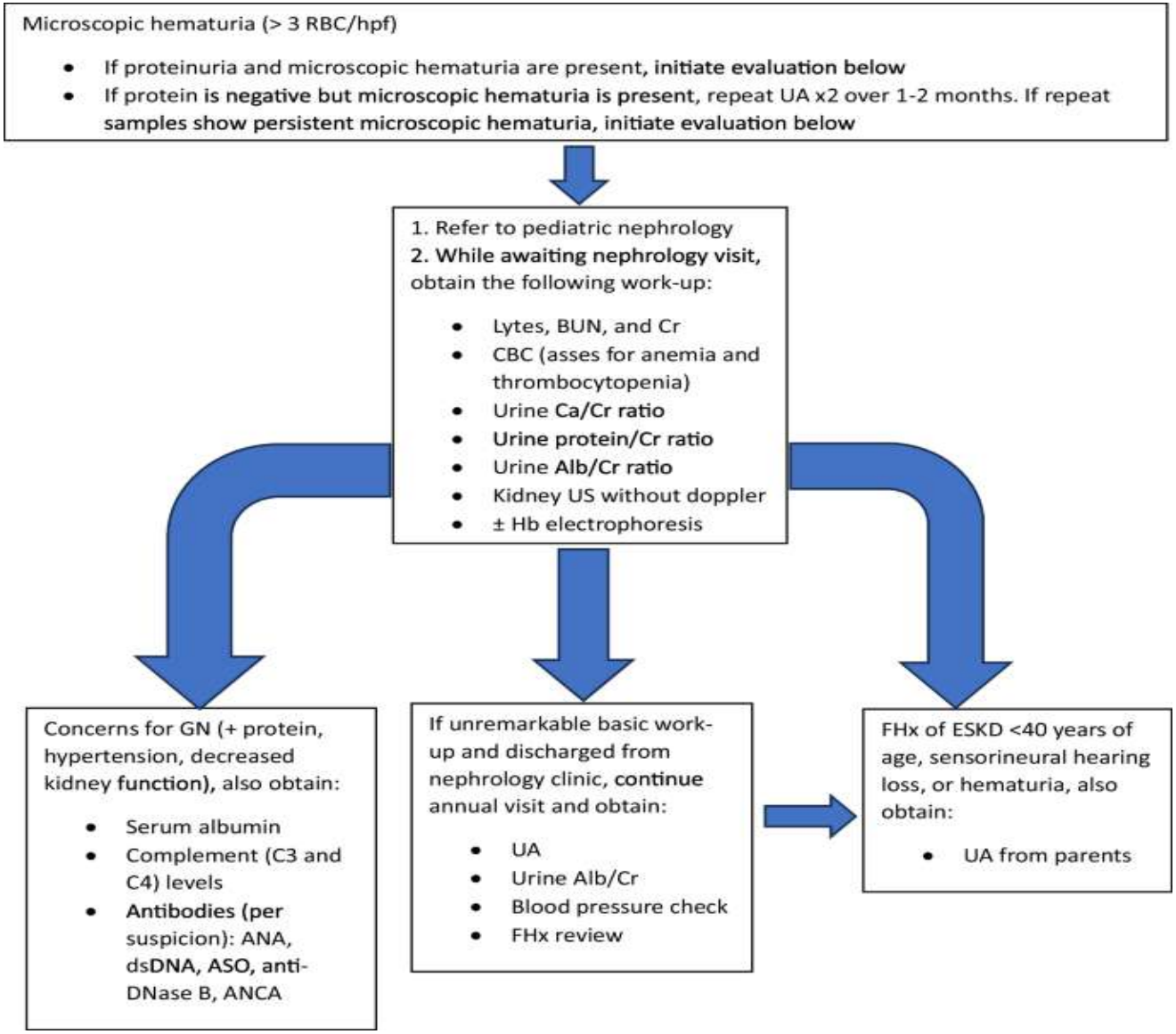
Pregnancy and Hematuria

MICROHEMATURIA

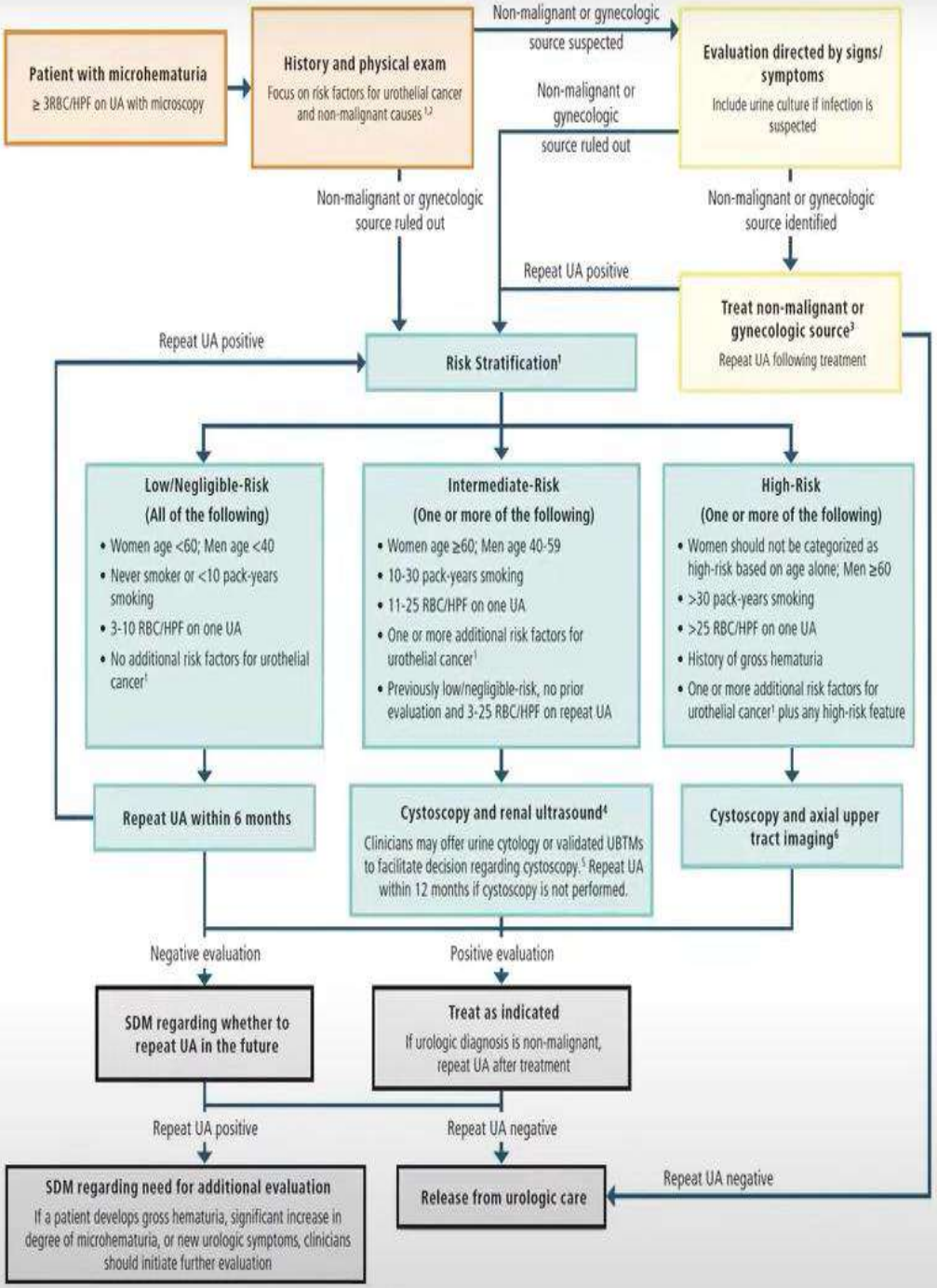
- Seen in 20% of pregnant women
- Defined as >3 RBC/HPF from two out of three clean mid-stream samples.
- Disappears in 75% of women post partum.
- Look for Dysmorphic RBC/Acanthocytes to identify significance.
- Microhematuria may be seen in Pre-Eclampsia too.
- Look for unmasking of Autoimmune Pathologies like Lupus.
- Associated Proteinuria, rise of creatinine should alert physician.
- Isolated Isomorphic hematuria - usually benign.

EVALUATION OF MICROHEMATURIA IN PAEDIATRIC POPULATION

- Prevalence of hematuria is 4-6%.
- Glomerular disease is the most common cause of hematuria in children.
- Recent sore throat or febrile illness should raise the possibility of post-streptococcal glomerulonephritis.



RISK STRATIFICATION FOR CYSTOSCOPIC EVALUATION IN MICROHEMATURIA



1. Additional risk factors include but are not limited to the following:
   - irritative lower urinary tract symptoms
   - prior pelvic radiation therapy
   - history of cyclophosphamide/ifosfamide chemotherapy
   - family history of urothelial carcinoma or Lynch syndrome
   - occupational exposure to benzene chemicals or aromatic amines
   - chronic indwelling foreign body in the urinary tract.

   Note, risk stratification and risk-based evaluation are the same for those on anti-platelet and anti-coagulation therapy as for those who are not.
2. If medical renal disease is suspected, consider nephrological evaluation, but pursue concurrent risk-based urologic evaluation.
3. There are non-malignant and gynecologic sources of hematuria that do not require treatment and/or may confound the diagnosis of microhematuria. Use careful judgment and patient engagement to decide whether to pursue microhematuria evaluation in the setting of such conditions.
4. Clinicians may perform cross-sectional imaging with urography or retrograde pyelograms if hematuria persists after negative renal ultrasound.
5. Intermediate-risk patients who decline cystoscopy following UBTMs should still undergo renal and bladder ultrasound.
6. MR urogram or non-contrast imaging plus retrograde pyelograms if contraindications to CT urogram.

HPF: high-power field
RBC: red blood cell
SDM: shared decision-making
UA: urinalysis
UBTM: urine-based tumor marker