

# Hematuria

**Hematuria** (*haematuria*) is the presence of erythrocytes or other parts of blood in the urine.

Hematuria can be either **microscopic** (visible only in light microscopy or urinalysis) or **macroscopic**. However, red discoloration can be caused by other several reasons:

- hemoglobin
- myoglobin
- porphyrins
- drugs (rifampicin, sulfonamides, pyruvium, etc.)
- food (e.g. red beet-root)
- sample contaminated by gynecology bleeding

## Macrohematuria

When the blood in the urine is visible, the urine probably contains more than 1 mL of blood in 1 litre of urine. Macrohematuria is classified by when it occurs during urination. It can obviously help to localize the origin of bleeding:

- **initial hematuria** - bleeding occurs during the onset of urination (and therefore the problem is probably in urethra or prostate)
- **total hematuria** - bleeding is present throughout urination (problem in bladder, ureter, or kidneys)
- **terminal hematuria** - bleeding occurs in the end of urination (problem in bladder or prostate)

The origin of erythrocytes can be examined by phase contrast microscopy (PCM) and the proportion of dysmorphic and isomorphic red blood cells. If a sample contains more than 80% dysmorphic red blood cells, there is a very high possibility that they are of glomerular origin. If a sample contains less than 20% dysmorphic erythrocytes, then it probably is non-glomerular bleeding or origins from lower urinary tract.

## Microhematuria

The American Urological Association (AUA) has defined microhematuria as three or more red blood cells per high-power microscopic field in urinary sediment from two of three properly collected urinalysis specimens<sup>[1]</sup>.

## Differential Diagnosis

What are the most common causes of hematuria?

- renal injury
- urinary stone disease
- renal or bladder cancer
- renal malformation or polycystic renal disease
- inflammation of the kidney, urethra, bladder, or prostate - pyelonephritis, cystitis, interstitial nephritis, glomerulonephritis, renal tuberculosis
- Alport syndrome
- toxic injury
- renal infarction
- blood clotting disorders, coagulopathy
- nephrosclerosis
- arterial hypertension

## Examination

**History** is the first examination. We ask the patient about drug abuse (alcohol, tobacco), exposure to toxic substance, kidney stones, injuries, infections, recent illness, sexually transmitted disease (STD) exposure, urinary habits and his recent medication.

**Urine test strips** can be very quick examination (e.g. for screening) and can show presence of leukocytes, hemoglobin, protein or glucose in a urine sample.

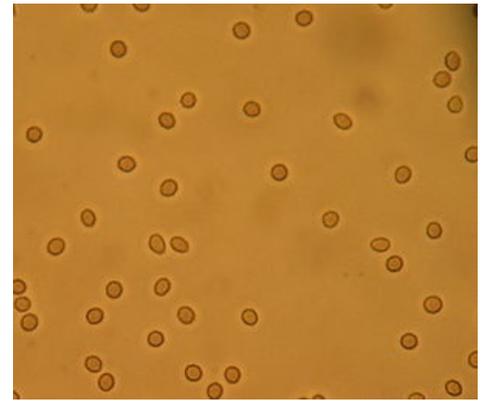
**Urine sediment** is a microscopic examination. If leukocytes and erythrocytes are found in a sample, it is suspicious for some inflammation. Crystalluria can mark urinary stone disease. If urine casts (cylinder-shaped formations of cells and proteins) are found, there is probably a pathology inside the tubules of the kidneys.

**Erythrocytes morphology** in phase contrast microscopy measures amount of dysmorphic and isomorphic red blood cells as described above.

**Papanicolaou-stained urine cytology** can show cancer of the lower urinary tract.

**Intravenous pyelogram (IVP)** is an X-ray of the urinary tract and can show urinary stones or urotelial tumors.

**Cystoscopy** is endoscopic examination of the urinary bladder and can be diagnostic and therapeutic at the same time.



Microscopic hematuria: Red blood cells in a urine sample seen under the microscope.



Macroscopic hematuria and sediment after centrifugation.

# Links

## Related Articles

## Bibliography

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## References

1. GROSSFELD, - WOLF, J S - LITWAN, M S. , et al. Asymptomatic microscopic hematuria in adults: summary of the AUA best practice policy recommendations. *Am Fam Physician* [online]. 2001, vol. 63, no. 6, p. 1145-54, Available from <<http://www.ncbi.nlm.nih.gov/pubmed/11277551>>. ISSN 0002-838X.

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