# Urinary sediment microscopy

**Confirms or rules out urinary infections to a great extent**
**Prevents to miss out renal and/or urinary affections**
**Helps with inconclusive or discrepant clinical findings**

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Dr.med.SIGMUND Peter, GP in Gamlitz, Austria

## Background

A complete examination of the urine (urine status) consists of its assessment in terms of color, opacity and smell, the dipstick test and the evaluation of the urinary sediment. The dipstick serves as a preliminary test under everyday conditions.

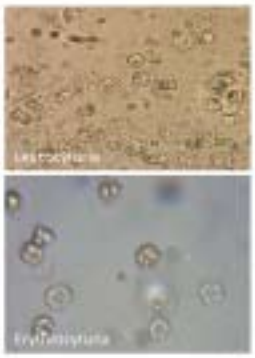
Urinary infections can be safely ruled out in the absence of white blood cells in the sediment, even if the dipstick test area for leucocytes (esterase reaction) shows positive results. The gold standard of diagnosing urinary infections is the quantitative urine culture. Acutely sick patients immediately require a highly specific urinary sediment microscopy in order to detect bacteriuria and leukocyturia, while less urgent cases allow waiting for the results of the urinary culture.

A positive reaction in the blood-sensitive area of a dipstick (peroxidase reaction) can only be verified as erythrocyturia by examining the sediment, which also allows a first quantitative evaluation. Assessing the erythrocyte morphology requires advanced nephrological expertise, which usually exceeds the capacity of primary care settings. In addition, urinary sediment microscopy allows us to see other physiological as well as pathological components like cylinders (casts of renal tubules), squamous cell-, kidney- or urinary epithelia, crystals or spermatozoa, as well as bacteria, fungi or trichomonads.

The use of dipstick-testing alone however could lead to an incorrect diagnosis due to their low sensitivity and specificity. I.e. a variety of interfering chemical reactions can for instance falsely indicate the presence of leucocytes and the high sensitivity for erythrocytes can lead to false positive reactions. The lack of microscopic evidence for leucocytes rules out urinary tract infections with a high level of certainty and prevents unwarranted antibiotic treatment.

Patient with dysuria, abdominal or lower-back pain , unclear complaints

**Dipstick test validity**
1/3 false positive
1/3 false negative



## Material and Methods

**Dipstick sieve – Sorting out microscopically relevant urine samples**


All test areas negative, no anamnestic or clinical suspicious findings: No further examination required

One or more areas on the dipstick test positive: indication for specific microscopic and/or bacteriological urine analysis

**Preparation of urine sediment:**

Sample quantity 12ml ➤ Centrifugate (1500 revs/min, 5 minutes ➤ Macroscopic inspection of quantity and colour ➤ pour out supernatant urin in one move ➤ re-suspend sediment with remaining urin ➤ apply one small drop on the slide ➤ cover with coverslip (air bubble-free)

## Analysis

1. **Overview at a 100fold** magnification of sediment components in each field of view.
2. Pay special attention to leucocytes, erythrocytes and bacteria.
3. A higher incidence of squamous epithelia cells indicates contamination from the outer genitalia (no mid-stream urine).
4. Check for crystals, cylinders, other kinds of epithelia.
5. **Interpretation at a 400fold** magnification:

| | |
|---|---|
| Leucocytes | normal value 1-4/field of view |
| Erythrocytes | normal value 1-4 |
| Squamous epithelia | normal value 0-15 |
| Urothelium | normal value 0-1 |
| Hyaline cylinders | sporadically normal |
| Other cylinders | always abnormal |

## Conclusion

- **With appropriate training the correct interpretation of urinary sediment components is easy to learn.**
- **Microscopy in a primary health care setting shows high diagnostic accuracy in the hands of experienced staff.**

**Video** Urinary sediment Ordination Dr. Sigmund
https://youtu.be/0k0l-nLn_E

**Poster**
urinary sediment components
https://www.nephrokor.at/10194269/Harnsedimente_Poster.pdf

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