Urinalysis

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Urinalysis

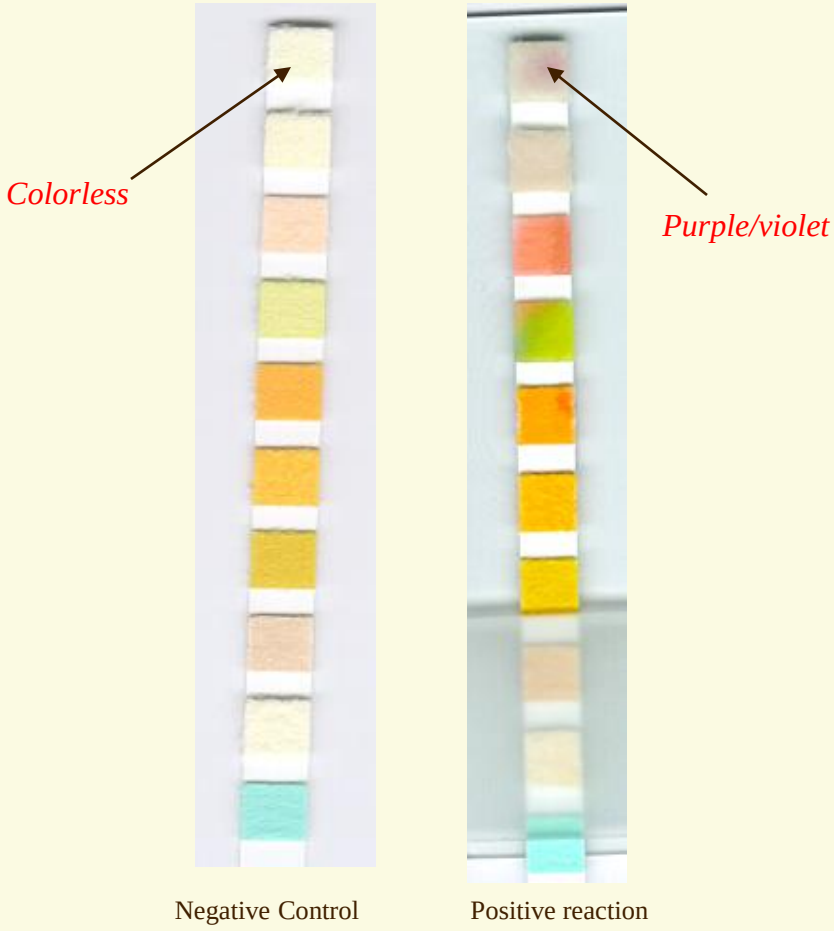
Description:

- A chemical test for the detection of urinary tract disorders in asymptomatic patients. Four chemical tests are of particular importance in the diagnosis of UTI.

These are:

Test	***Detection of***
Nitrite test	bacteriuria
Leucocyte esterase	pyuria
Heme	haematuria
tetrabromphenol test	proteinuria

Urinalysis: Leucocyte Esterase (LE) (1)



Negative Control Positive reaction

Function:

- The dipstick leucocyte esterase (LE) test, by detecting pyuria, is an indirect test for bacteriuria.

Sensitivity & Specificity:

- When compared with culture (culture with $1x10^8$ cfu/L), LE has a sensitivity of 72-97% and a specificity of 64-82%
- able to detect 5-15 cells/μL of urine

Specimen:

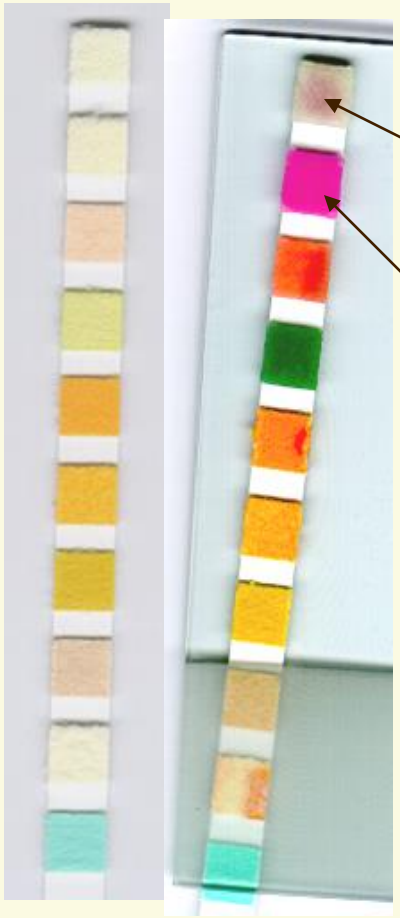
- The sensitivity of this test can be improved by obtaining first-morning specimens, rather than by performing random collection.

Urinalysis: Leucocyte Esterase (LE) (2)

- *False Positive*
  - vaginal contamination

- *False Negative*
  - high glucose
  - high specific gravity
  - cephalexin, cephalothin , tetracycline
  - nitrofurantoin gives a brown colcour to the urine masking the colour reaction.
  - high concentrations of oxalic acid cytstals

Urinalysis: Nitrite Reduction



Negative Reaction Positive Reaction

Function:

- The nitrite test detects the presence of any microorganisms in urine that are capable of converting the substrate nitrate to nitrite.

Sensitivity & Specificity:

- The nitrite test has variable sensitivity (35-85%), but acceptable specificity (92-100%).

Specimen:

- The sensitivity of this test can be improved by obtaining first-morning specimens, rather than by performing random collection

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Urinalysis: Nitrite Reduction

Interpretation:

- Pink spots or pink edges should not be interpreted as a positive result.
- Only uniform pink colour development should be interpreted as a positive result. Suggesting the presence of $>10^8$ cfu/L
- Negative result does not imply the absence of significant bacteriuria

Urinalysis: Nitrite Reduction

Organisms with a positive Nitrite Reduction Test:

- This includes all members of the family *Enterobacteriaceae*

Organisms with a negative Nitrite Reduction Test:

- This includes all members of the family *Micrococcacae (*eg Streptococcus, Staphylococcus) and *Pseudomonaceae* (eg Pseudomonas)

Urinalysis: Heme Test

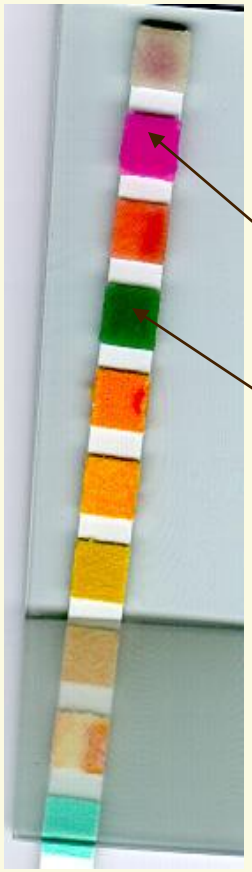
Function:

- The heme test detects the presence of red blood cells in urine.

Sensitivity & Specificity:

- Heme test has a sensitivy of 91-100% and a specificity of 65-99%

Urinalysis: Tetrabromphenol Test



Negative reaction

Positive reaction

Function:

- The tetrabromphenol test detects proteinuria

Sensitivity & Specificity:

- The tetrabromphenol test has a sensitivity and a specificity of both 91-100%.

Urinalysis: Tetrabromphenol Test

- False Positive
  - Urine specimen contaminated with antiseptics and detergents
  - skin cleansers containing chlorhexidine may also produce false positive results.

Urinalysis: False Positives/Negatives

False-positive and false-negative urinalysis are due to a variety of factors, including:

A. *Specimen*

- Specimen collection and the timing of collection,
- Microorganisms,
- Interfering substances including:
  - Urobilinogen, glucose, ascorbic acid, drugs, urine cells and bacteria
- Physical properties including:
  - Specific gravity, pH, concentration,
- Biological factors including:
  - Exercise, cold exposure, prolonged recumbence, medical illness.

B. *Patient*

- In asymptomatic men and asymptomatic women under the age of 60 the nitrite test has a positive predictive value of <10%.

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