Urinalysis and Body Fluids

Unit 2; Session 3

WBCs in the Urine Microscopic

Microscopic Sediment - White Blood Cells

- **White Blood Cells**
  - WBCs can enter anywhere in the urinary system (diapedesis).
  - Men 0-2 /hpf; Women < 5 /hpf
  - Increased numbers (pyuria / leukocyturia)
    - Without bacteria
      - Inflammation - trauma / certain disease states / appendicitis / pancreatitis / malignancy / allergic reaction / dehydration / stress / fever
      - Non-infectious irritation to urinary structures
    - With increased bacteria
      - Likely infection - UTI

Quantitating WBC in urine
- Ave. number seen in 10-15 hpf
- This example 11-20 WBC/hpf
Microscopic Sediment – White Blood Cells

• Detection
  • High dry objective (10x ocular + 40x objective = 400x total mag.)
  • Fine adjustment

• Description
  • Grayish-blue / yellowish-green in color – depending on microscope
  • ↑ 10-12 microns in diameter, but affected by specific gravity of urine
  • Fine cytoplasmic granulation, rough surface, may have irregular edges.
  • Usually polymuclear, but may be mononuclear, but often hard to see detail.

Microscopic Sediment – White Blood Cells

• WBCs – larger than RBCs
• WBCs – smaller than renal epithelial cells.
• WBCs – usually neutrophils
• WBCs – may be in clumps

Microscopic Sediment – White Blood Cells

• Neutrophil is predominant
  • Identify under high power
  • Glitter cells
    • Hypotonic urine
    • Brownian movement
    • Swell; granules sparkle
    • Pale blue if stained
    • Nonpathologic

http://www.agora.croesemont.qc.ca/urinesediments/2mdsceng/d12d002.html
Microscopic Sediment – White Blood Cells

• Eosinophils
  • Hansel stain preferred over Wrights to demonstrate presence of eosinophils in urine.
  • Increases seen in variety of conditions,
    • Drug-induced interstitial nephritis
    • Renal transplant rejection / acute graft rejection
    • Most allergic reactions, schistosomiasis, & acute allergic interstitial nephritis

• Mononuclear cells – more rarely encountered than segmented neutrophils
  • Lymphocytes
  • Monocytes
  • Macrophages
  • Histiocytes
  • Differentiate from renal tubular epithelial (RTE) cells
    • Lymphocytes may resemble RBCs; seen in early transplant rejection
    • May need to refer to cytodiagnostic testing

• Lymphocytes
  • Occasionally seen in normal sediment
  • Increased numbers reported in acute allergic interstitial nephritis, graft rejection, etc.
  • Requires special staining (PAP) to verify identity
Microscopic Sediment

- White Blood Cells

**Monocytes**
- Also can be found in conditions listed for lymphocytes
- Also requires special staining to verify identity

**Macrophages**
- Usually of normal size with inclusions in cytoplasm
- Occasionally enlarged with one or more smaller cells engulfed.
- Seen in acute inflammatory processes
- ***When filled with fat droplets would be called oval fat bodies.***

Microscopic Sediment

- White Blood Cells

**Review of identification**
- Grayish-blue sheen, @ 10-12 microns in diameter
- Polynuclear neutrophils most seen
  - Fine cytoplasmic granulation, rough surface, may have irregular edges.
- Few lymphs seen as well, but hard to ID

**Enhancement techniques**
- Stains
  - Sternheimer-Malbin for general
  - Hansel for eosinophils
  - Toluidine blue
  - PAP
- Microscopy
  - Light microscope
  - Phase contrast

Microscopic Sediment

- White Blood Cells

- Phase contrast
Microscopic Sediment – White Blood Cells

- WBC / leukocytes

This slide has higher level of magnification than normally used in routine examination.

Microscopic Sediment – White Blood Cells

WBCs, RBCs, cell debris, bacteria

References

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