Urinalysis and Body Fluids

Unit 2; Session 5

Crystals Found in the Urine
Microscopic Examination - Part A, an Overview

Microscopic Sediment - Urine Crystals

• Urine crystals not found in freshly voided urine.
  • Formation based on
    • Temperature (as specimen cools or is refrigerated)
    • Increased solute concentration, (as indicated by increased specific gravity)
    • pH (acid crystals, alkaline crystals, and some??)
  • Broadly categorized by pH,
    • However, some deviate

Microscopic Sediment - Urine Crystals

• Clinical Significance
  • MOST are NOT clinically significant
  • All have been implicated in calculi / kidney stone formation.
  • Generally, clinically significant crystals are present in freshly voided urine.
  • Patient drugs / medication may cause formation of urine crystals
    • Ampicillin
    • Hypaque
    • Renografin

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### Microscopic Sediment - Urine Crystals

#### Classification
- Normal and Abnormal
  - Normal Acidic crystals
  - Normal Alkaline crystals
  - Abnormal crystals - metabolic origin or iatrogenic origin (usually seen in acidic urine)
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- Microscopic Sediment - Urine Crystals

#### Identification Characteristics
- Effect of temperature and pH
  - Amorphous urates form in the refrigerated acid urine; will dissolve with heat
  - Amorphous phosphates form in refrigerated alkaline urine; will dissolve in acetic acid – so will RBCs
  - All abnormal crystals are found in acid urine
- pH ** (acid, alkaline or neutral?)
- Morphology (what is the shape and color?)
- Solubility
  - (acid crystals are soluble / go into solution in alkaline environment and alkaline crystals will disappear if the pH becomes acid)

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#### Identification characteristics
- Polarization and birefringence
  - Aids in crystal identification
  - Uses two polarizing filters that darken the field
  - Crystals that polarize light will reverse the filter's effect.

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#### Identification characteristics
Polarization (cont.)

Microscopic Sediment
- Urine Crystals

- Birefringence

Microscopic Sediment
- Urine Crystals

- Quantitation
- UA Reporting Standardization Guide
  - High Power Field (hpf)
  - Semi-quantitative terms
    - Trace
    - 1+
    - 2+
    - 3+
    - 4+
    - packed
Microscopic Sediment
- Urine Crystals

• Summary
  - Urinary crystals may be of no significance or may accompany metabolic disorders.
  - Urinary crystals may be present in acidic or alkaline urine.
  - Microscopic evaluation of urine is important for detection of crystals, because no chemical test detects the presence of crystals.
  - Solubility studies and the use of polarized and compensated light help to identify crystals and differentiate them from artifacts.
  - They are reported using semi-quantitative terms.

UP DATE References
- Lillian Mundt & Kristy Shanahan, Graff's Textbook of Urinalysis and Body Fluids, 2nd Ed.
- Susan Strassinger & Marjorie Di Lorenzo, Urinalysis and Body Fluids, 5th Ed.
- Mary Haber, MD, A Primer of Microscopic Urinalysis, 2nd Ed.