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Owner:	*Sally Kramer: Manager - Lab Science Tech - SJ*
Policy Area:	*Lab / Hematology*
Standards:	
Applicability:	*St. Anthony Hospital* *St. Clare Hospital* *St. Francis Hospital* *St. Joseph Medical Center*

Synovial Fluid Crystal Identification, R-W-HEM-1407-03

PURPOSE

To provide instruction for crystal examination and identification in synovial fluid.

BACKGROUND

Crystal analysis may assist in the diagnosis of inflammatory processes resulting in an arthritic state. The primary crystals seen in synovial fluid are Monosodium urate (uric acid) crystals, indicative of gout, and Calcium pyrophosphate crystals, associated with cases of pseudo-gout. Other crystals such as cholesterol, corticosteroids (from drug injections) and calcium oxalate may also be seen.

SPECIMEN REQUIREMENTS

FLUID TYPE:	Synovial fluid aliquot in EDTA Joint aspiration, submitted on swab, slide, or wet mount
HANDLING:	Deliver ASAP to lab. Storage: 2-8ºC. Specimen held for 1 week
VOLUME:	Minimum volume: 1.0 ml
ALIQUOT:	An aliquot in an EDTA tube for cell count is preferred
STABILITY:	24 hours, if performed from refrigerated EDTA aliquot

REAGENTS/EQUIPMENT

Microscope with polarizing filter, analyzer, and red-plate compensator.
Glass slides, cover slips, clear nail polish
Diluent (hematology analyzer diluent or saline)

QUALITY CONTROL

Known positive slides for synovial crystals or reference materials are available at the bench for review and

comparison. Positive slides can also be obtained by making slides from the Manual Body Fluid Count QC (see package insert for which vials have crystals in them).

Patient specimen slides are to be examined by two different techs. The examinations must agree on crystal absence or presence and identification. Document both resulting techs under Lab Comments (Yellow Box) in the LIS before Final Verifying the specimen.

INSTRUCTIONS

1. Place a drop of fluid on a glass slide and cover with a coverslip.
2. If the sample is received as a swab, or as particulate matter from a joint, do not reject the specimen. Add several drops of diluent to a plastic tube. Re-suspend the swab or matter in the tube. Mix well. Place a drop on a slide and cover with a coverslip.
3. Examine the slide on the microscope on 10X or 50X after aligning it for polarized light. **Note:** If not previously installed, refer to Technical Notes section of this procedure for installation of the polarizing unit.
4. Push in the metal handle for the analyzer filter located on the right side of the microscope head (Nikon Eclipse 50i).
5. Scan the patient slide for crystals. **Note:** Crystals appear as birefringent rod, rectangular, rhomboid or needle-shaped forms varying in size from 1-20 microns in length or up to 4 microns in width. They may be intracellular or extracellular. Crystals may appear yellow or blue depending on the orientation of the crystal to the axis of the compensator plate.
6. Align the top plate (compensator) of the polarizer so that the crystal aligns parallel with one of the axis arrows on the polarizing unit. Move the swing handle to the side with the arrow.
7. Identify the crystal based on the color that is observed when the crystal is parallel to the arrow.
8. If unsure about crystal identification, examine a known "Positive" crystal slide and/or use available reference materials for comparison.

INTERPRETATION

Crystals are identified as follows:

Monosodium Urate (Gout) Crystals

Crystals are YELLOW when aligned parallel with the arrow. If the swing handle is moved to the opposite side, the crystal turns BLUE.

Note: Description by CAP: Monosodium Urate crystals are yellow when oriented parallel to the compensator and blue (negative birefringence) when oriented perpendicular to the compensator.

Calcium Pyrophosphate Dihydrate (Pseudo-Gout)

Crystals are BLUE when aligned parallel with the arrow. If the swing handle is moved to the opposite side, the crystal turns YELLOW.

Note: Description by CAP: Calcium pyrophosphate dehydrate crystals (pseudo-gout) are often rhomboid, rod-like, or rectangular, and display weak positive birefringence (blue when parallel to the compensator.)

Other Crystals

- Cholesterol Crystals - extracellular crystals that appear as flat, rectangular plates with notched corners.

- Calcium Oxalate Crystals - appear as double pyramids or envelopes and can be identified in the synovial fluid of patients with primary oxalosis or chronic renal failure
- Corticosteroid Crystals - primarily intracellular crystals that appear as flat, variable shaped plates or may closely resemble MSU or CPPD crystals.

Note: "Other" crystals should be reported in the "Crystals Other" field in the LIS.

NORMAL VALUES

- CRYS GOUT: none
- CRYS PSEUD: none

PROCEDURAL NOTES

1. Attaching the polarizer unit:
    - Push in the analyzer handle or bar on the microscope headpiece.
    - Set the polarizer unit over the lower lamp with the ¼ wave plate in the open position.
    - Rotate the polarizer unit until a totally dark field is viewed through the oculars.
    - Close the ¼ wave plate. The field should now be magenta/pink.
    - Lock down the polarizer by tightening the outer screws.

ORDERING AND RESULTING

1. Synovial fluid crystals are ordered in the LIS as Crystal, Synovial Fluid and are not part of the Synovial Fluid Cell Count Panel.
2. Results are reported in the LIS as follows:

    Crystals Gout Uric Acid: (present or absent)
    Crystals Pseudogout: (present or absent**)**
    Crystals other than gout or pseudogout are reported in the "Crystals Other" field
3. At least two techs examining the crystal examination specimen are required in order to report results. If a second tech cannot be found in a timely manner, the results should be preliminary verified until a second tech is found. When resulting the specimen, before Final Verifying in the LIS, make sure to document both techs involved under Lab Comments (Yellow Box) in the LIS.

REFERENCES

Susan King Straasinger, "Urinalysis and Body Fluids", Third Edition, 1994, F.A. Davis Company.

Kjeldsberg & Knight. Body Fluids. ASCP, Chicago, 1982.

Henry, John B. Clinical Diagnosis and Management by Laboratory Methods, 17th ed. WB Saunders Co, Philadelphia: 1984, pp. 467-472.

Brunzel, Nancy A., Fundamentals of Urine and Body Fluid Analysis, 2nd Edition, 2004, Elsevier. pp. 350-353.

Galagan KA, Blomberg D, Glassy EF, et al., eds. Color Atlas of Body Fluids: An Illustrated Field Guide Based on Proficiency Testing. Northfield, Ill.: College of American Pathologists; 2006.

Attachments:

No Attachments

Approval Signatures

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Applicability

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