Crystal Exam

Principle

Microscopic examination of synovial fluid for the presence of crystals is used in the diagnosis of crystal-induced arthritis. The primary crystals seen in synovial fluid are monosodium urate, which is found in cases of gout, and calcium pyrophosphate, which is associated with cases of pseudogout. Cholesterol crystals, crystals of apatite (the major mineral found in cartilage), and corticosteroid crystals resulting from drug injections also may be seen.

In this procedure, fluid is examined unstained, under both direct and compensated polarized light. By examining the refractive properties of the crystals under compensated polarized light, it is possible to differentiate between the two different crystals, monosodium urate and calcium pyrophosphate.

Safety

All specimens, reagents and controls should be handled as though capable of transmitting infectious diseases. Wear appropriate personal protective equipment when running patient samples or performing scheduled maintenance. Refer to: Policy and Procedures Safety Manual Infection Control and Procedures 11-085-01.

Materials and Reagents

Microscope with Polarizer

- This accessory is to be used with **Nikon Eclipse 50i microscope** located in the area of the laboratory where body fluid analysis is performed.
- This microscope has been fitted with the *C-IA intermediate tube with analyzer* located directly below the eyepiece tube.

Reference slide of known monosodium urate crystal
Cytology Funnel and Caps
Cytospin Centrifuge
Sterile Transfer Pipet
Cytology Clips

Specimen

Synovial fluid submitted in a liquid EDTA tube or a plain red top tube is the preferred specimen.

<u>Powdered</u> EDTA, oxalate, lithium heparin should **NOT** be used as an anticoagulant, since each may be associated with crystal formation. If the specimen is received in a specimen cup, transfer the fluid to a red top tube with no anti-coagulant or an EDTA tube and centrifuge.

Procedure

Step	Action
1	Centrifuge specimen for 10 minutes at 3000 rpm.
2	Using a disposable pipette, remove and discard about 90 – 95% of the supernatant.
3	If there is a pellet of sediment, re-suspend it in the remaining fluid.
4	Place a small droplet of the remaining fluid or re-suspended sediment on a glass microscope slide. Float a coverslip on the drop.
5	Perform microscopic exam under routine light and polarized light. See following section for instructions on use of polarizing filter.
6	Evaluate for the presence of typical uric acid or calcium pyrophosphate crystals at low and high power.
7	You **MUST SCAN** the entire slide from one end of the coverslip to the other including stuff that squirts out from under the coverslip edge.
8	View the reference slide that is positive for MSU crystals to ensure proper functioning of the polarizer. Resolve any discrepancies and document before releasing patient results.

Set Up and Use of Polarizer

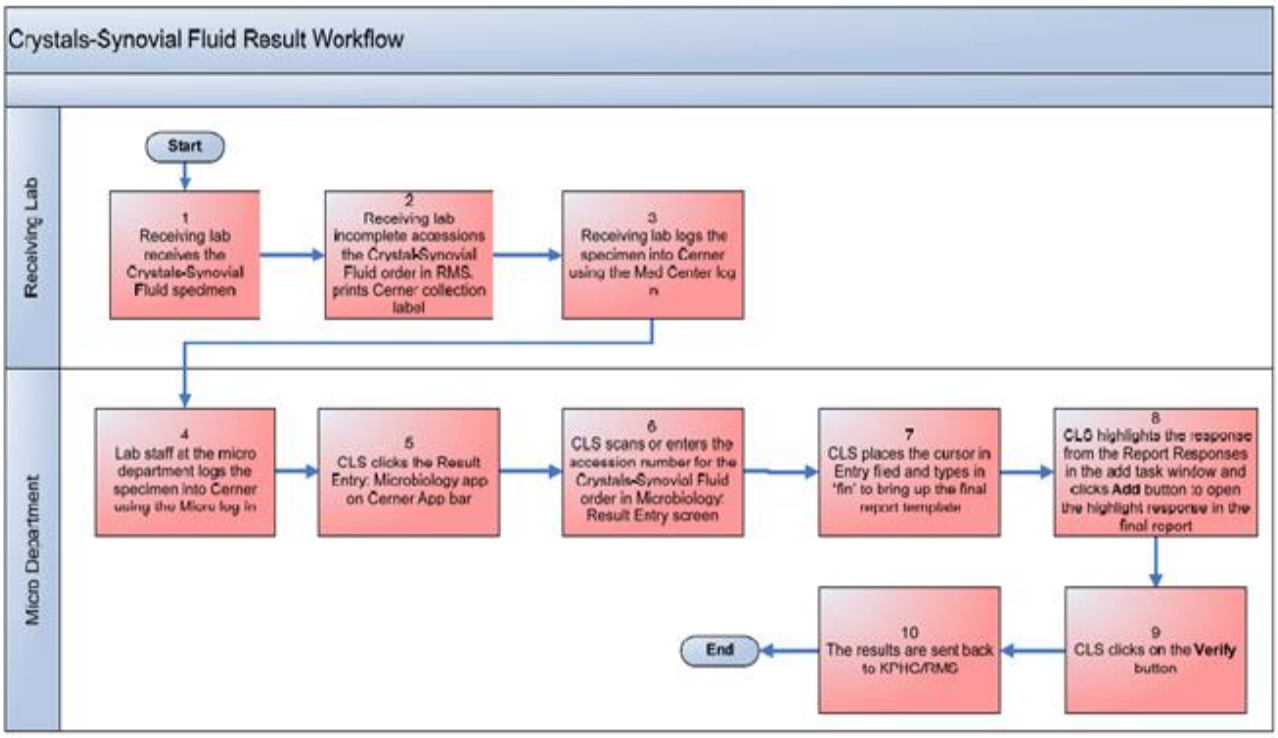
Step	Action
1	Select microscope IR 052129 located in the area where body fluids are analyzed.
2	Remove the polarizer from the storage box and place the polarizer over the illuminator. It will be necessary to remove the IR cut filter.
3	Orient the polarizer so that the words ***Nikon C-TP*** are at 6 o'clock.
4	Although there is a small hexagonal clamp screw it is not necessary to tighten it as long as you keep the polarizer in the aforementioned orientation.
5	Place the slide with the prepared specimen on the stage.
6	Swing the orientation handle to the far **left**. The background of the field should be rose colored.
7	Find at least 1 crystal oriented North-South and another oriented East-West.
8	With the orientation handle in the **left** position, MSU crystals (gout) with their long dimension in the **N-S** direction should appear **yellow.**
9	Move the orientation handle to the extreme right position. Now the N-S crystals should be blue and E-W yellow if they are MSU.
10	Be sure to test the crystals with the orientation handle in both positions.

11	Use a reference slide containing known MSU crystals to familiarize yourself with the procedure and ensure the microscope and polarizer are functioning correctly.
12	The color change in calcium pyrophosphate is the reverse of monosodium urate.
13	Refer to the supplemental guide entitled “Crystal Analysis” for further photomicrographs and instructions.

Result Reporting

For detailed instructions of entering results, please refer to Laboratory Informatics – Cerner Genlab Policies & Procedures Manual, “*Result Entry in the Microbiology Module*” LIS.SCPMG.005 document.

Step	Action
1	In Cerner go to Microbiology Result Entry
2	Scan or type specimen barcode
3	Click the **Entry** field
4	Type **fin** and press **Enter**
5	Type the **Response Value** and press **Enter.** If needed, type additional **Response Values** and press **Enter** after each. **Response Value:** a. Press F2 b. Click the radio button to select one of the following filters c. Under Filter; click Report Responses d. Response List will pop-up e. **<u>Select appropriate response for number</u>** Few = ≤ 2 cells / HPF Mod = 3-9 / HPF Many = ≥ 10 cells / HPF **<u>Select appropriate response for location</u>** Intra C = intra-cellular crystals Extra C = Extra-cellular crystals In and Ex = Both Intra and Extra **<u>Select appropriate type</u>** CHO = Cholesterol CPPD = Calcium Pyrophosphate Dehydrate MSU = Monosodium Urate
6	To save result, click **Perform**. Check and verify for correctness of entered results.
7	Then click **Verify** to release results.



Result Reporting, continued

Note: if crystals appear to be present but you are unable to identify, enter:
"unable to classify, specimen submitted to pathology for identification."

When submitting a specimen to pathology for identification please send the following:

- The specimen
- A printout of the result from Cerner
- The transmittal from ED if the specimen is submitted from the Emergency Department. If the patient is an outpatient and no transmittal is available, please print out the original order for "Crystal Analysis, Body Fluid" from Health Connect and submit it to pathology.

Reference Range

Crystals are not present in normal synovial fluid.

Reference

Kjeldsberg, Carl R., Knight, Joseph A., *Body Fluids: Laboratory Examination of Amniotic, Cerebrospinal, Seminal, Serous & Synovial Fluids, 3rd Edition,* ASCP Press, Chicago, Il, 1993.

Document History Page

Change type: New, Major, Minor etc.	Changes Made to SOP – describe	Name of responsible person/date	Med. Dir. Reviewed/ Date	Lab Manager reviewed/ date	Date change Implemented
Major	1) Updated the procedure format. 2) Updated result reporting section to reflect the changes for new LIS, Cerner. And added Cerner workflow diagram.	Julius Salomon 04/14			
Minor	Updated format and revised index number.	Julius Salomon, 7/1/17			