MICROSCOPIC URINE MANUAL EXAM

PURPOSE

To provide work instructions for the performance of manual microscopic analysis of urine sediment

BACKGROUND

Urine microscopic analysis is performed when blood, nitrite, leukocyte esterase, protein are positive or if urine appearance is anything other than clear. It is also performed at SJMC lab to confirm unusual microscopic elements that have been detected on the iQ200 microscopic instrument or specifically requested by the physician.

SPECIMEN COLLECTION

Minimum of 10ml of fresh urine, collected in a clean container or added to transport preservative tubes.

LIMITATIONS

1. Testing must be done within 2 hours of receipt of specimen if specimen is not refrigerated. If there is a delay the specimen must be refrigerated or added to preservative, boric acid. Significant delays (>24hrs) can cause degeneration of certain cellular elements such as WBC's or casts and overgrowth of bacteria.

2. Urine volume can significantly affect microscopic quantification, urines with less than 5 ml, must be footnoted with a variance statement. Using the TV code, add the PF1/ P footnote. Urines that are QNS to centrifuge will have a comment added that the microscopic was performed on unspun urine.

SUPPLIES

Urisystem slides with coverslips or chambers.

STEPS

1. Manual microscopy, either automated or manual is to be performed when the following criteria has been met on the Urinalysis instrument:

    - Blood, trace or more
    - Leukocyte esterase, 1+ or more
    - Nitrite is positive
    - Protein, 1+ or more
    - Clarity, anything other than clear

2. Add 10-12mls of well mixed urine to a KOVA tube, cap and centrifuge at 2000RPM for 5-10 minutes.

3. After centrifuging is completed, place a KOVA pipette into the bottom of the tube and discard the supernatant above the bulb of the pipette into the sink.

4. Mix the sediment well by squeezing the top of the pipette several times.

5. Discard the first drop of sediment and deliver the next drop into the notched groove of one segment of the UriSystem slide. The slide will fill automatically by capillary motion. Add more drops if necessary to fill the slide segment. Slight overfill will not affect the results.

6. Use the urine microscopic guide in this work instruction to identify and quantitate urine microscopic elements. For identification of other elements that are unusual or not listed, refer to the resource books available at the urinalysis bench or the IRIS atlas.

7. Normal urine sediment is not free of cells or casts but may contain a limited number of formed elements. A precise definition of normal is hard to define, but the presence of one or two blood cells per high power fields, one or two leukocytes and a few epithelial cells is not necessarily considered abnormal. The urine of mature females may also contain large numbers of squamous epithelial cells from the vaginal walls. An occasional hyaline cast may also be a normal finding.

8. Sperm seen on the microscopic exam will be reported regardless of age or sex of the patient. On all females, if sperm is seen or suspected, a second tech must review the slide or iQ results before results are verified. First verify that the specimen has been labeled correctly.
   When a second tech is not immediately available and:
   - If the patient is expected to be admitted to an inpatient bed, wait for a second tech opinion and call a preliminary verbal result if the patient is <16 years old >80 years old or thought to be in a vulnerable environment. Enter a final result if the second tech has confirmed the initial result.
   - If the patient is not expected to be admitted and a second tech is due < 2hours, wait on the second opinion and call a preliminary verbal result (using age ranges above). Enter a final result if second tech has confirmed the initial result.
   - If the patient is not expected to be admitted and a second tech is not due in <2 hours, consider sending the urine sample to SJMC for a stat review. Once the second opinion is complete and matches the first review, verify the result with a comment that indicates: Confirmed by two techs.
   - If the second opinion does not match the first, request a manager/MTC or pathologist to review ASAP.

9. All urines that have a microscopic exam that is either ordered or reflexes to a microscopic, must enter 4 mandatory fields. These are: RBC's, WBC's Epithelial cells and bacteria.

10. Urine specimens that are positive for nitrite, leukocyte esterase and have greater than 4 WBC's/hpf will also be set up for a urine culture if a reflexive test has been ordered or culture if indicated has been ordered.

11. Microscopic findings must always correlate with the macroscopic (chemistry) results.

    - If there is a presence of protein, casts, RBC's and many epithelial cells can be seen on the microscopic exam.
    - A positive occult blood on the chemistry test, RBC's are also seen on the microscopic unless there is hemolysis.
    - If RBC's are seen on microscopic, but the chemistry result is negative or if the chemistry is positive and the microscopic is negative perform the Hemastix test or use Multistix to confirm the chemistry result.
    - Positive leukocyte esterase would be an indication of WBC's and should also be found on the microscopic.
    - Positive nitrite would indicate the presence of bacteria. The bacteria should be seen on the microscopic exam.
    - A urine that has a cloudy appearance may have cellular structures or bacteria present on the microscopic.
    - Low specific gravity (hypotonic) can cause RBC's to lyse.
    - If the specimen is not centrifuged or decanted properly, there may be a discrepancy between the chemistry strip and the microscopic results.
    - The specimen is compromised.

    If these microscopic/macroscopic correlations are not seen, the urinalysis will be repeated. A reason for the discrepancy must be noted under the footnote section. This is a free text section. Add comments about why there is a discrepancy, for example, specimen too old or not refrigerated. If there is any question about the quality of the specimen, the urine should be recollected.

Sediment element	Magnification	Description	Quantification
RBC	40X	Pale discs, approx. 7 microns in diameter	0-2 3-5 6-10 11-25 26-50 TNTC

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WBC	40X	Round granular 7-12 microns in diameter, twice the size of RBC's	0-4 5-10 11-25 26-50 TNTC
BACTERIA	40X	Rods or cocci in chains (appear like beads in a row)	NONE Few 1+ 2+ 3+ 4+
EPITHELIAL CELLS	40X	Large irregular membrane and well defined central nucleus	0-4 5-8 9-15 16-30 TNTC
Sediment element	**Magnification**	**Description**	**Quantification**
Transitional epithelial cells	40X	Smaller than epithelial cells with a less irregular membrane	NONE 1-5 6-10 11-25 26-50 TNTC
Renal epithelial cells	40X	Smaller than transitional cells, round and regular cell membrane	NONE 1-5 6-10 11-25 26-50 TNTC
Yeast, hyphae or budding	40X	Egg shaped	NONE or PRESENT
Mucous	40X	Appears as strands either individually or in clumps	NONE or PRESENT
Trichomonas	40X	Same size as a WBC with motile flagella	NONE or PRESENT
Spermatozoa	40X	Elongated head with long thin tail	NONE or PRESENT

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CASTS	Count on 10X ID on 40X	Parallel sides, round or blunted ends, vary in shape and size	NONE 0-2 3-5 6-10 11-20 >20
Hyaline Cast	Count on 10X ID on 40X	Colorless, homogeneous, semi-transparent	See above
Granular cast	Count on 10X ID on 40X	Contains fine or coarse granules	See above
WBC cast	Count on 10X ID on 40X	Cast with formed WBC's inside the cast	See above
RBC cast	Count on 10X ID on 40X	Cast with formed RBC's inside the cast May contain hemoglobin	See above
Broad, Waxy casts	Count on 10X ID on 40X	Waxy, yellowish, wide Can mean renal failure	See above
Cylindroid cast	Count on 10X ID on 40X	Tapers to a slender tail	See above
Sediment	**Magnification**	**Description**	**Quantification**
Crystals from Acid urine			NONE 1+ 2+ 3+ 4+
Uric Acid	40X	Yellow/brown, flat diamond, needle , hexagonal plates or rosettes	See above
Amorphous urates	40X	Yellow-red granules	See above
Acid urates	40X	Brown spheres	See above
Calcium oxalate	40X	Refractile, colorless Octahedron or dumbbell shape. "Envelopes"	See above
Bilirubin	40X	Red-brown needles or granules. Bilirubin is positive	See above
Crystals from Alkaline urine			NONE 1+ 2+

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			3+ 4+
Triple phosphate	40X	Colorless, 3-6 sided prisms "coffin-lid" forms	See above
Ammonium biurate	40X	Yellow spheres	See above
Calcium phosphate	40X	Stellate prisms	See above
Calcium carbonate	40X	Colorless spheres or dumbbells	See above
Amorphous	40X	Small particulate sediment	None or present
Abnormal crystals			NONE 1+ 2+ 3+ 4+
Cystine	40X	Colorless, refractile, hexagonal plates	See above
Tyrosine	40X	Yellow, sometimes black needles in sheaves,rosettes	See above
Leucine	40X	Yellow, speres with radial striations	See above
Sulfapyridine	40X	Arrowheads	See above
Sediment	**Magnification**	**Description**	**Quantification**
Sulfathiazole	40X	Symmetrical crystals appearing as sheaves of wheat with central binding, rosettes or hexagonal plates	See above
Ampicillin	40X	Long, slender needles	See above
Cholesterol	40X	Large, flat plates with notched corner	See above
Radiographic dyes	40X	Colorless, needles	See above
Starch granules	40X	Donut shapes,maltese cross	See above
Oval fat bodies	40X	Highly refractile,yellow brown, maltese crosses, sometimes found within other cells.	None or present

REFERENCE

1. Sister Laurine Graff, A Handbook of Routine Urinalysis, 1983. Philadelphia, PA.
2. Strasinger, Susan Urinalysis and Body fluids, ed. 4. Philadelphia, PA, 2001