Urine Microscopic Examination

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PRINCIPLE

Increased amounts of sediment in urine may represent pathological conditions and therefore must be examined microscopically for identification. The sediment may be composed of cellular components (leukocytes, epithelial cells, bacteria, etc.), proteinaceous components (casts, mucus, etc.), or crystalline components. Differentiation and enumeration of these components in the microscopic exam provide the relevant information to the physician for diagnosis of pathological conditions.

SCOPE

All McLaren Health Care physicians, including McLaren Medical Group (MMG) Managed sites and practices managed by their subsidiary hospital performing Provider Performed Microscopic testing.

POLICY

1. Urine microscopic testing is a moderate complexity test. Staff must follow all Provider Performed Microscopy (PPM) guidelines. See Provider Performed Microscopy (PPM) procedure.

2. An online, image-based program called Med-Training Solutions is used to distribute competency and proficiency assignments, track test completion, test scores, and provide printable reports for documentation. An Email notification is sent to the Providers and provides an autologin link. The Provider clicks on this link to go directly to their test menu and assignments.

3. Results will be documented in the Med Training Solutions online program. Reports can be downloaded to PDF or copied to an Excel file. Real time printable reports and documentation are available by the POC administrators of the Med Training Solutions program.

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4. If staff does not meet the minimum requirements of 80% on the proficiency or competency, the staff will be reassigned training modules with review of testing procedures. Staff will repeat proficiency or competency testing.

5. The off-site POC Coordinator will assign the staff competency annually upon hire and each year thereafter. Alternate Proficiency material will be assigned 2 times per year to all staff performing PPM (Provider Performed Microscopy) testing.

6. All testing personnel must be tested for colorblindness before performing patient tests.

SPECIMEN

Fresh clean catch urinalysis specimen

SUPPLIES AND INSTRUMENTATION

Urinalysis centrifuge tubes
Plastic disposable pipets
Urinalysis microscope slide
Centrifuge
Microscope
Microscope coverslips

PROCEDURE

1. Preparation of sediment suspension

    a. Pour 12ml of well mixed urine into a urinalysis centrifuge tube.
    b. Parafilm or snap a centrifuge tube cap onto the tube.
    c. Load and balance in the centrifuge.
    d. Centrifuge at 1500 rpm for 5 minutes.
    e. Carefully decant the supernatant into a biohazard-designated sink or receptacle.
    f. Resuspend the sediment in the remaining supernatant.

2. Reading of the microscopic exam

    a. Apply one drop of the urine sediment to the slide and coverslip. Allow urine to settle for 30-60 seconds before examining.
    b. Rotate objectives on the microscope to bring the low power (10X) objective into use. Condenser should be down and the light filter in use for best contrast in reading.
    c. When low power exam is complete, rotate to the high dry (40X) objective and open the light filter. Perform the high-power exam.
    d. Count 10 fields and average the number per low or high-power field.

3. Reporting results of the microscopic exam.

    a. Components found on the low power (10X) exam.
        1. Epithelial cells - squamous, transitional, or renal are enumerated as number per low power field.
        2. Casts are enumerated as number per low power field; and are classified by type as hyaline, granular (course and/or fine), waxy, WBC, RBC, cellular, fatty, epithelial, or muddy brown.
        3. Crystals are most easily evaluated on low power. They are reported as present, and are classified by type as calcium oxalate, triple phosphate, uric acid, cholesterol, calcium phosphate, calcium carbonate, ammonium biurate, amorphous, bilirubin, cystine, leucine, or tyrosine.
        4. Pseudohyphae are most commonly detected on low power, but confirmation on high power is recommended. (Hyphae and exogenous fibers can look similar on low power.)

    b. Components found on high power (40X) exam.
        1. Leukocytes and erythrocytes (WBC's and RBC's) are enumerated as number per high power field.
        2. Bacteria should be graded as none, few, moderate, or many on high power exam.
            - None = No bacteria seen
            - Few= ≤ 10 bacteria per hpf
            - Moderate= 10 – 50 bacteria per hpf
            - Many= > 50 bacteria per hpf
        3. Budding yeast and hyphae are reported if present.
        4. Parasites such as Trichomonas should be identified and reported as present.
        5. Talcum powder (starch) contamination is identified on high power and reported as present.
        6. Spermatozoa is identified on high power and reported as present.
        7. Oval fat bodies are reported as present.

NOTES

1. Difficult identification of casts or crystals may be facilitated by use of urinalysis reference material or the Internet.
2. When excessive numbers of formed elements are present and quantitation is difficult or questionable, it should be noted on the report.
3. Suggested criteria for culture:
    - Positive leukocyte esterase
    - Positive nitrite
    - WBC > 10/hpf
    - Bacteria
    - Presence of yeast and/or hyphae

REFERENCE RANGES

WBC:	Negative. Occasional (<5/hpf)
RBC:	Negative. Occasional (<5/hpf)
Epithelial:	Negative. Few may be present in urine from males, larger numbers in urine from females.
Crystals:	Negative. Some crystals precipitate after the sample cools. Crystals are of little clinical significance except for cystine, leucine, tyrosine, and cholesterol. The type of crystal depends largely upon the PH of the freshly voided urine.
Bacteria:	Negative. Bacteria are of little significance except in fresh or catheterized specimens. Gram stain and culture may be utilized for identification.
Casts:	Negative.
Yeast:	Negative.

LIS NOTES

1. Results from microscope examination will be resulted into the patient's chart or Electronic Medical Record (EMR).
2. Microscopic Examination –shall be performed by the provider
3. Microscopic Examination is a Provider Performed Microscopy (PPM) test and performance follows the Provider Performed Microscopy (PPM) procedure.

LIMITIATIONS

- Specimen not obtained by "clean catch" method and thus contains elements from sources other than the urinary tract (e.g., vaginal discharge, penile discharge)
- Specimens that are held unrefrigerated for more than 2 hours
- Specimen not centrifuged long enough or longer than 5 minutes
- Urine extremely dilute so no sediment obtained, or not enough elements available in amount of urine tested.
- Specimen not examined with proper lighting or focusing
- Microscope not functioning properly, e.g., lens dirty
- Examiner fails to recognize the elements on the slide

REFERENCES

Brunzel, Nancy A., Fundamentals of Urine and Body Fluid Analysis, W. B. Saunders Company, 1994, pages 205 - 262.
Henry, J. B., et. al., Clinical Diagnosis and Management by Laboratory Methods, W. B. Saunders Company, 1996, pages 438 - 448.
Haber, M.H., et. al., Color Atlas of Urinary Sediment, CAP Press, 2010
Massachusetts General Hospital-Pathology Service, Urine Sediment Test Procedure

9/17 Performed by provider, PPM test
1/18 PPM Scope
1/19 Update criteria WBC's to >10/hpf
2/19 Update procedure
6/19 MTS Program