**Standard Operating Procedure**

**Title: Urinalysis with Microscopy**

**Purpose:**

To provide a standardized method for performing urinalysis with microscopy for the detection and quantification of cells, casts, crystals, and other components in urine.

**Scope:**

This procedure applies to laboratory staff performing urinalysis in clinical laboratories.

**Materials and Equipment:**

* Clean urine specimen container (sterile, if possible)
* Centrifuge tubes (10-12 mL capacity)
* Centrifuge
* Microscope slides and cover slips
* Micropipette (or Pasteur pipette)
* Microscopy stains (if needed)
* Standard light microscope
* **Gauze** (for urine collection assistance or cleaning purposes)
* **Towelettes** (for cleaning pipettes and general surface cleaning)
* **Liquichek Urinalysis Control** or **Quantimetrix Dropper Urine Control** (Normal and Abnormal, 10 mL each per test)

**Specimen:**

* Freshly collected urine specimen (preferably midstream clean catch).

**Procedure:**

**1. Specimen Collection and Handling:**

1.1. Ensure the urine sample is collected properly in a clean container. 1.2. Provide sterile **gauze** and **towelettes** to the patient for hygiene before and after urine collection (for clean-catch, midstream sample collection). 1.3. Process the urine within 2 hours of collection. If a delay is unavoidable, store the sample in a refrigerator (2–8°C) for up to 24 hours. 1.4. Mix the urine sample gently before analysis.

**2. Physical Examination:**

2.1. **Colour**: Visually inspect the urine sample and note the colour (e.g., yellow, amber, red). 2.2. **Clarity**: Observe the clarity of the urine (clear, cloudy, turbid).

**3. Chemical Analysis (Optional):**

3.1. Perform a dipstick test for chemical analysis, following the manufacturer’s instructions. Record results for:

* pH
* Protein
* Glucose
* Ketones
* Blood
* Leukocyte esterase
* Nitrite
* Bilirubin
* Urobilinogen
* Specific gravity

**4. Preparation for Microscopy:**

4.1. Pour 10-12 mL of well-mixed urine into a centrifuge tube. 4.2. Centrifuge the specimen at 1500-2000 RPM for 5 minutes. 4.3. Carefully decant the supernatant, leaving a small amount of urine (approximately 0.5 mL) with the sediment. 4.4. Resuspend the sediment by gently tapping the tube or using a pipette. 4.5. Use **towelettes** to clean the micropipette between samples to avoid contamination.

**5. Microscopic Examination:**

5.1. Place a drop of the resuspended sediment onto a clean microscope slide using a micropipette. 5.2. Cover the sample with a cover slip, avoiding air bubbles. 5.3. Examine the slide under low power (10x) and high power (40x) objectives.

**Look for the following elements**:

* **Cells**:
  + Red Blood Cells (RBCs): Count per HPF (high power field)
  + White Blood Cells (WBCs): Count per HPF
  + Epithelial cells (squamous, transitional)
* **Casts**:
  + Hyaline, granular, cellular, waxy casts (note type and quantity per LPF - low power field)
* **Crystals**:
  + Uric acid, calcium oxalate, triple phosphate, etc.
* **Bacteria, Yeast, and Parasites** (if present)
* **Miscellaneous**:
  + Mucus threads, spermatozoa, etc.

**6. Quality Control Using Liquichek or Quantimetrix Urine Controls:**

6.1. Include **Liquichek Urinalysis Control** or **Quantimetrix Dropper Urine Control** (Normal and Abnormal, 10 mL each) for every batch of tests or at the beginning of the testing day. 6.2. Prepare and process the controls exactly as you would a patient sample:

* Pour 10 mL of **Normal Control** and 10 mL of **Abnormal Control** into separate centrifuge tubes.
* Centrifuge each at 1500-2000 RPM for 5 minutes.
* Perform microscopic analysis following the same steps outlined in **Step 5**. 6.3. Record control results to ensure they fall within the acceptable ranges provided by the control manufacturer. If the results are out of range, do not report patient results until the issue is resolved.

**7. Reporting:**

7.1. Report findings under each category (e.g., RBCs, WBCs, casts, crystals) with quantification, as follows:

* Cells: 0-2, 2-5, 5-10, 10-20, >20 per HPF.
* Casts: Rare, occasional, few, moderate, or many per LPF.
* Crystals: Identify and describe based on shape and presence.
* Microorganisms: Presence or absence, with approximate quantification if possible.

**8. Quality Control:**

8.1. Include positive and negative controls where applicable (e.g., using known samples with specific findings). 8.2. Regularly calibrate the microscope and centrifuge. 8.3. Perform and document proficiency testing at regular intervals.

**Safety Precautions:**

* Wear appropriate personal protective equipment (PPE), including gloves and lab coat.
* Dispose of urine, gauze, and towelettes properly according to local biohazard waste regulations.
* Clean and disinfect work surfaces after the procedure.

**References:**

* Clinical and Laboratory Standards Institute (CLSI) guidelines.
* Manufacturer’s instructions for urine dipstick, **Liquichek** or **Quantimetrix controls**, and microscopy reagents (if applicable).