

URINALYSIS LABORATORY**Case 1:**

76 year-old woman who has smoked heavily all her life, presents with right back pain. There is a strong family history of kidney stones, and she passed a kidney stone 20 years ago, but has been stone free since then. Examination shows a patient in moderate distress. There is right costo-vertebral angle tenderness. Abdomen was tender to palpation on the right side without rebound. Bowel sounds were present.

Laboratory:

BUN 20, Cr 1.5

Urinalysis – 3+ blood, no protein, microscopic as follows.

Slide 1. Squamous epithelial cells with non-dysmorphic red blood cells.

1. What is the most likely cause(s) of her hematuria?

Main differential diagnosis between

- 1) transitional cell cancer (smoker) that is obstructing a ureter.***
- 2) recurrent kidney stone.***

Non-dysmorphic RBC's makes this more likely due to non-glomerular source or urologic.

2. What if the patient has a history of recurrent urinary tract infections, is febrile, with a urine pH of 8.0, and had the following on urine sediment?

Slide 2. Triple phosphate crystal.

Patient has a UTI with a struvite stone that is obstructing a ureter.

Case 2:

52 year-old alcoholic man found down by the police and brought in to the Emergency Department. Further history not obtainable.

Physical Examination: BP 100/62, P 122, R 10 and deep, afebrile. Obtunded. Fruity odor to breath.

Laboratory:

Na 140, Cl 90, HCO₃ 12, BUN 42, Cr 5.0, pH 7.12

Urine sediment shows the following.

Slide 3. Calcium oxalate crystals (low power – 10x).

Slide 4. Calcium oxalate crystals (high power – 40 x).

1. What is the cause of the patient's acid-base disturbance?

Ethylene glycol, which is metabolized by alcohol dehydrogenase to oxalic acid or oxalate.

Case 3:

President Bush develops flu-like symptoms and hemoptysis while visiting Kuwait. Symptoms do not improve with antibiotics prescribed for bronchitis. He denies any sinus congestion or foot drop. BP is 162/98, P 98, T 100.5. Lungs show rales throughout both lung fields. There is no rash or joint swelling. CXR shows bilateral diffuse pulmonary infiltrates.

Laboratory:

BUN 28, Cr 2.4

Urinalysis – 2+ protein, 3+ blood, sp gr 1.020, microscopic exam as shown.

Slide 5. Dysmorphic RBC's.

Slide 6. RBC cast.

1. What type of kidney disease does President Bush have?

Nephritic syndrome given the predominant finding of hematuria with dysmorphic RBCs and RBC casts.

2. What is the most likely cause of this syndrome?

Pulmonary-renal syndrome: Goodpasture's, Wegener's granulomatosis, microscopic PAN.

Case 4:

A 32 year old black woman with known diabetes, hepatitis C antibody positive, chronic active hepatitis B (HB_sAg +), and lupus, presents to the Emergency Department with increasing lower extremity edema over the past month. She denies any chest pain, shortness of breath, jaundice, rash, or worsening joint pains.

Physical Examination: BP 124/74, P 92, afebrile. Patient appears chronically ill and older than stated age. Lungs – clear. Heart – no extra heart sounds. Abdomen – protuberant, ? fluid wave present. Extremity – 2+ edema to knees.

Laboratory:

BUN 20, Cr 1.4, albumin 2.5

Urinalysis – sp gr 1.025, 3-4+ protein, no blood, microscopic exam as shown.

Slide 7. Hyaline casts.

Slide 8. Oval fat body.

Slide 9. Maltese cross on polarization of oval fat body and lipid droplets.

1. What renal syndrome does the patient have? What is in the differential diagnosis?

Nephrotic syndrome.

Differential diagnosis:

Diabetic nephropathy

MPGN secondary to hepatitis C

Membranous glomerulopathy secondary to hepatitis B

***Lupus nephritis
FSGS secondary to HIV***

2. How does the urinalysis and urine sediment help in narrowing down the differential diagnosis?

Lack of RBC's in the urine makes MPGN from hepatitis C and lupus nephritis less likely, although membranous from lupus is still possible.

Case 5.

26 year-old white man who uses intravenous drugs was treated with nafcillin and gentamicin for endocarditis. He was also hepatitis C and HIV positive. Four weeks into the treatment of his endocarditis he was noted to have a serum creatinine of 4.2. Examination is remarkable for needle tracks on his arms, no rash, no edema. Urinalysis showed 1+ protein, sp gr 1.010, no blood, and the following.

Slide 10. Granular casts.

Slide 11. Renal tubular epithelial cells.

1. What is the cause of his renal failure?

ATN from gentamicin nephrotoxicity, because of the presence of granular casts and RTE's.

2. What if his urine sediment showed this instead, what would be the cause of renal failure?

Slide 12. WBC's and WBC cast.

AIN from nafcillin because of the presence of pyuria.

Case 6.

54 year old black man presents with back pain that has been getting worse over the past month. He has otherwise been healthy. Exam shows punch tenderness along his lumbar spine. No edema.

Laboratory:

Na 138, Cl 116, HCO₃ 24, BUN 32, Cr 3.8, glucose 84

Ca 14.2, albumin 3.2, Hgb 10

Urinalysis – sp gr 1.020, 2+ glucose, no protein, 3+ SSA, 5-10 WBC/hpf.

1. What is the significance of the SSA?

SSA is a protein precipitation method which will detect all proteins, while urine dipstick will detect predominantly albumin. Dipstick neg protein and SSA + for protein usually indicative of non-albumin protein, most commonly myeloma protein. Supported by the negative anion gap, ARF, glycosuria, hypercalcemia, and anemia.

2. What is the significance of the glucosuria?

Presence of glucose in the urine when serum glucose is < 150-180 is indicative of tubular dysfunction.