

Lab 9: Urinalysis

Name: _____

PID (last 4): _____

Sec: _____

Introduction

For a regular urinalysis, your urine is tested both chemically and by microscopic exam. Chemical examination uses a "dipstick" to reveal the pH (acidity) and concentration of your urine, while simultaneously testing for several chemicals at once. Some chemicals indicate that blood in general and white blood cells in particular might be present, a sign of a urinary infection, kidney stones, or other problems.

Microscopic examination can show red blood cells, white blood cells, bacteria, crystals, skin cells that might have contaminated the sample, and, rarely, parasites in your urine. In some cases, the way the cells look offers your doctor clues about whether they entered your urine from the bladder or the kidney.

(<http://www.health.harvard.edu/diagnostic-tests/urinalysis.htm>)

Dipstick Chemical Analysis

Nitrite

A positive nitrite test indicates that bacteria may be present in significant numbers in urine. Gram negative rods such as E. coli are more likely to give a positive test.

(<http://library.med.utah.edu/WebPath/TUTORIAL/URINE/URINE.html>)

Urobilinogen

A small presence of urobilinogen is normal and is formed from bilirubin by the action of the intestinal bacteria. Bilirubin is a substance which is produced by the breakdown of red blood cells. The majority of urobilinogen is excreted in the stool but a small amount is reabsorbed into circulation. Thus traces of urobilinogen may be normally present in the urine. Most of the urobilinogen is re-excreted again by a normal liver. In the presence of liver tissue damage like viral hepatitis, secondary hepatitis or cirrhosis of the liver one may find an increased amount of urobilinogen in the urine. A large amount of urobilinogen may be present in blood disorders such as hemolytic anemia, pernicious anemia or other forms of anemia.

(<http://www.informedcenters.com/Urinalysis.htm>)

Protein

Normally, only small plasma proteins filtered at the glomerulus are reabsorbed by the renal tubule. However, a small amount of filtered plasma proteins and protein secreted by the nephron (Tamm-Horsfall protein) can be found in normal urine. Normal total protein excretion does not usually exceed 150 mg/24 hours or 10 mg/100 ml in any single specimen. More than 150 mg/day is defined as proteinuria. Proteinuria > 3.5 gm/24 hours is severe and known as nephrotic syndrome.

Dipsticks detect protein by production of color with an indicator dye, Bromphenol blue, which is most sensitive to albumin but detects globulins and Bence-Jones protein poorly.

Precipitation by heat is a better semiquantitative method, but overall, it is not a highly

sensitive test. The sulfosalicylic acid test is a more sensitive precipitation test. It can detect albumin, globulins, and Bence-Jones protein at low concentrations.
(<http://library.med.utah.edu/WebPath/TUTORIAL/URINE/URINE.html>)

pH

The glomerular filtrate of blood plasma is usually acidified by renal tubules and collecting ducts from a pH of 7.4 to about 6 in the final urine. However, depending on the acid-base status, urinary pH may range from as low as 4.5 to as high as 8.0. The change to the acid side of 7.4 is accomplished in the distal convoluted tubule and the collecting duct.
(<http://library.med.utah.edu/WebPath/TUTORIAL/URINE/URINE.html>)

Blood

Greater-than-normal numbers of red blood cells in the urine may indicate trauma or inflammation such as:

Acute tubular necrosis, cystitis, glomerulonephritis, interstitial nephritis, pyelonephritis, kidney trauma, kidney tumor, kidney stones, prostatitis.
(<http://www.nlm.nih.gov/medlineplus/ency/article/003582.htm>)

Ketones

Ketones (acetone, acetoacetic acid, beta-hydroxybutyric acid) resulting from either diabetic ketosis or some other form of calorie deprivation (starvation), are easily detected using either dipsticks or test tablets containing sodium nitroprusside.
(<http://library.med.utah.edu/WebPath/TUTORIAL/URINE/URINE.html>)

Bilirubin

Bilirubin is a yellowish pigment found in bile, a fluid produced by the liver. Large amounts of bilirubin in the body can lead to jaundice. This test may be done to diagnose liver or gallbladder problems since bilirubin is not normally found in the urine. Increased levels of bilirubin in the urine may be due to: biliary strictures, cirrhosis, gallstones in the biliary tract, hepatitis with associated biliary obstruction, surgical trauma affecting the biliary tract, tumors of the liver or gall bladder.
(<http://www.nlm.nih.gov/medlineplus/ency/article/003595.htm>)

Glucose

Less than 0.1% of glucose normally filtered by the glomerulus appears in urine (< 130 mg/24 hr). Glycosuria (excess sugar in urine) generally means diabetes mellitus. Dipsticks employing the glucose oxidase reaction for screening are specific for glucose but can miss other reducing sugars such as galactose and fructose. For this reason, most newborn and infant urines are routinely screened for reducing sugars by methods other than glucose oxidase (such as the Clinitest, a modified Benedict's copper reduction test).
(<http://library.med.utah.edu/WebPath/TUTORIAL/URINE/URINE.html>)

Leukocytes

A positive leukocyte esterase test results from the presence of white blood cells either as whole cells or as lysed cells. Pyuria can be detected even if the urine sample contains damaged or lysed WBC's. A negative leukocyte esterase test means that an infection is unlikely and that, without additional evidence of urinary tract infection, microscopic exam and/or urine culture need not be done to rule out significant bacteriuria.
(<http://library.med.utah.edu/WebPath/TUTORIAL/URINE/URINE.html>)

Specific Gravity

Specific gravity (which is directly proportional to urine osmolality which measures solute concentration) measures urine density, or the ability of the kidney to concentrate or dilute the urine over that of plasma. Dipsticks are available that also measure specific gravity in approximations. Most laboratories measure specific gravity with a refractometer.

Specific gravity between 1.002 and 1.035 on a random sample should be considered normal if kidney function is normal. Since the sp gr of the glomerular filtrate in Bowman's space ranges from 1.007 to 1.010, any measurement below this range indicates hydration and any measurement above it indicates relative dehydration.

If sp gr is not > 1.022 after a 12 hour period without food or water, renal concentrating ability is impaired and the patient either has generalized renal impairment or nephrogenic diabetes insipidus.

Any urine having a specific gravity over 1.035 is either contaminated, contains very high levels of glucose, or the patient may have recently received high density radiopaque dyes intravenously for radiographic studies or low molecular weight dextran solutions.

(<http://library.med.utah.edu/WebPath/TUTORIAL/URINE/URINE.html>)

Record Urinalysis Results Here: (0.75 POINTS)

	Patient A	Patient B	Patient C	Other Sample
Nitrite				
Urobilinogen				
Protein				
pH				
Blood				
Ketones				
Bilirubin				
Glucose				
Leukocytes				
Specific Gravity				

Questions:

1. What does Specific Gravity measure? (0.25 POINTS)
2. Why may protein be present in urine? (0.25 POINTS)
3. Nitrites in urine indicate the presence of what? (0.25 POINTS)

4. Two questions:

A. If you patient has diabetes meilitus, which two values would your expect to be abnormal? **(0.5 POINTS)**

B.Would they be high or low? **(0.25 POINTS)**

5. For patients A, B, and C:

What parameters were abnormal for each patient?

Patient A: **(0.25 POINTS)**

Patient B: **(0.25 POINTS)**

Patient C: **(0.25 POINTS)**

In your opinion, what is the most likely reason for these abnormalities?

Patient A: **(0.5 POINTS)**

Patient B: **(0.5 POINTS)**

Patient C: **(0.5 POINTS)**

What additional tests would you choose to perform on the patients to strengthen the diagnosis and why? **(0.5 POINTS)**