

Urinalysis Lab

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BIO 2312: Human Anatomy and Physiology 2

(2:30-5:00) Tuesday

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11/23/2021

Introduction:

What is urinalysis? Urinalysis is the analysis of a urine sample, it is an important diagnostic tool. A standard urinalysis includes the assessment of the color, appearance of urine, odor, pH level, and test for bacteria or other germs. Urine tests are often done to check for: kidney problems, urinary tract infections, or diabetes.

The Urinary system is a system that consists of different organs that work together to filter blood and create urine as a waste product. The organs that make up the urinary system are the kidneys, renal pelvis, ureters, bladder, and the urethra. Waste products are left behind in our bowels and blood after we eat our food and absorb nutrients from it. The kidney and urinary system aid the body in the elimination of urea, a type of liquid waste. When protein-containing foods are broken down, urea is created as a byproduct which then travels into the kidneys. The kidney also has other significant functions like controlling the blood pressure, the production of the hormone erythropoietin (erythropoietin is a hormone that regulates the red blood cell production in our bone marrow), and regulates acid-base balance and fluid conservation. After entering the kidneys, urea is removed by small filtering units known as nephrons. Urea, along with water and other waste substances, forms urine, which then flows through the nephrons and down the renal tubules of the kidney. The urine then travels down the ureters to the bladder, where the ureter muscles tense and release, forcing the urine downward and away from the kidneys. The ureters secrete little volumes of urine into the bladder every 10 to 15 seconds. Bladder a hollow organ in the lower belly is held in place by pelvic bones and other ligaments, When the bladder is full, the brain sends a

signal to the bladder to tighten, squeezing the urine out of the bladder, and another signaling the sphincter to relax, allowing urine to pass through. Sphincters are circular muscles that contract which helps keep urine from leaking out. For this lab we will conduct a urine analysis. There are 3 ways to analyze urine: the visual test, the microscopic test, and the dipstick test. The visual test examines the color and clarity of the urine. Urine can be a range of hues, frequently ranging from light to dark or amber. The color of urine might suggest disease, for example, red colored urine can indicate a disease or injury to a section of the urinary system, or yellow-brown or greenish urine can indicate bilirubin in the urine. Clear, slightly cloudy, cloudy, or turbid urine are the words used to describe urine clarity. Normal urine can be clear or cloudy due to mucus, sperm, or other factors, but cloudy urine can also be caused by red or white blood cells, and bacteria, indicating that extra tests should be performed and needs more attention. Microscopic tests are performed when anomalous findings in physical or chemical tests. The microscopic test can see cells from the urinary tract, crystals, germs, parasites, tumor cells, and blood cells. This test is frequently used to confirm whether the other findings are correct or not. The dipstick test uses a thin plastic stick with strips of chemicals on it and is placed in the urine. The chemical strips change color if certain substances are present or if their levels are above the normal level. The dipstick checks for the pH level and if your pH is high it can indicate kidney or urinary tract disorder, protein and if you have high levels of protein it can indicate kidney problems, sugar glucose in urine is usually low but if there are any detections it calls for a follow up testing for diabetes, ketones like with sugar any detections calls for a follow up test for diabetes, Bilirubin if there is bilirubin in the urine it can indicate liver damage, and blood

if there is blood in your urine it requires additional testing, it might indicate kidney damage, infection, kidney or bladder stones, cancer or blood disorders. (<https://www.mayoclinic.org/tests-procedures/urinalysis/about/pac-20384907>)

The goal of this lab is to evaluate three urine samples and compare them to see if any of them have anomalies.

Materials/Methods

In this experiment, three distinct urine samples were compared and evaluated.

For this experiment the materials needed are: disposable gloves, pH test strips, timer, stirring rod, clean beakers, microscope, normal urine, abnormal urine 1, and abnormal urine 2. In this experiment we will be conducting the urinalysis in 3 ways: visual test, microscopic test, and chemical test. In the visual test we check for the color of the urine, the clarity of the urine, and the odor. For the microscopic test we look for red and white blood cells, bacteria, crystals, germs, parasites, etc. and for the dipstick we check for certain substances in the urine for example ketones, proteins, glucose, pH level etc. Urine's pH ranges from 4.5 to 8.0, with an average of 6.0 and can increase or decrease depending on what type of food you eat.

Results/Data

Physical characteristics	Normal Urine	Abnormal Urine 1	Abnormal Urine 2
Color	Pale yellow	Pale deep amber	Light amber
Clarity	Clear	Cloudy	Somewhat Cloudy
Odor	Aromatic	Aromatic	Aromatic

Urine Sample	Glucose	Bilirubin	Ketone	Specific Gravity	Blood	pH	Protein	Urobilinogen	Nitrite	Leukocyte
Normal urine	Negative	Negative	Negative	1.025	negative	6.5	Negative	Normal 0.2	negative	negative
Abnormal Urine 1	Positive	Negative	negative	1.030	Small trace	6	Positive (2000mg)	Normal 0.2	negative	negative
Abnormal Urine 2	positive	Negative	15mg/dl	1.005	Large trace	8.5	Positive (300mg)	Normal 0.2	negative	negative

Discussion/conclusion

Each sample we analyzed yielded different results, but having a control, such as normal urine, was useful in comparing the different samples. For normal urine the visual test the results were color=pale yellow, clarity=clear, and odor as aromatic. This is normal so far and has no signs of any diseases or infections etc. For Abnormal urine 1 the results were color=pale deep amber, clarity= cloudy, and odor as aromatic urine that are cloudy can be from mucus, sperm etc but you would need more tests to make sure its not an infection or inflammation. For Abnormal urine 2 the results were color= light amber, clarity= somewhat cloudy, and odor as aromatic which is similar to abnormal urine 1 and just like urine 2 more tests should be done to confirm that the cloudy urine is normal and not a sign of infection or inflammation.

For the chemical/dipstick test the first test was for glucose normal urine tested negative for glucose which means that it is normal, but Abnormal urine 1 and 2 tested positive for glucose this indicates that they have diabetes. Usually for urine they have low concentration of glucose which after being tested doesn't appear on the dipstick but

if there are positive indications of glucose it means that the person has diabetes. The second test was for bilirubin all 3 urine tested negative which shows that the bilirubin level was normal. If bilirubin came out positive this can indicate biliary tract infection, or liver disease. The third test was for Ketones normal urine and abnormal urine 1 tested negative for ketones but abnormal urine 2 showed a small trace of ketones which should be tested further to make sure it's nothing serious. Ketones in urine shows that your body doesn't have enough glucose which then burns fats and in critical cases can indicate Diabetic ketoacidosis. The fourth test was for specific gravity in this case all three indicated normal levels. For specific gravity the normal range is from 1.001 to 1.035 and as shown in the table all the specific gravity falls between the normal range. The fifth test was for blood, the normal urine tested negative for blood, abnormal urine 1 came out with a small trace of blood and finally abnormal urine 2 showed large traces of blood. Normally blood should not be in urine but if there is it can indicate serious health problems such as kidney disease, cancer, and bladder or kidney stones. IF blood is tested positive more tests should be done to investigate the cause for the positive results. The sixth test was for the pH level and all three came out normal. The normal pH range is 4.5-8 and as seen in the data all the samples fall between these numbers. The seventh test was for protein, for the normal urine protein test came out negative but Abnormal urine 1 and 2 tested positive. Normally proteins should not test positive but if it does it can indicate kidney damage and should be treated soon. The eighth test was for Urobilinogen and all three samples tested normal for urobilinogen. If urobilinogen did test positive it could indicate hepatitis, liver damage, or hemolytic anemia The ninth test was for nitrate and all three samples tested negative for nitrate. If nitrate test came out

positive it could indicate bacterial infection in the urinary tract. The final test was for leukocytes and like test number 9 all three samples tested negative for leukocytes. If the test came out positive it could indicate UTI.

UTI what is it ? UTI (urinary tract infection) is an infection in any part of the urinary system but most common infections are in the bladder and the urethra. UTI is caused by germs such as bacteria that overpower the body's defenses in the urinary tract. UTIs are called different names depending on where they occur. Some examples are cystitis which occurs in the bladder, urethritis which occurs in the urethra and pyelonephritis which occurs in the kidney. UTI can develop in people of any age and sex the following factors listed can increase the chances of developing UTI: sexual intercourse, poor hygiene, pregnancy, menopause, diabetes and many more. Some symptoms of UTI are strong urges to urinate, pain/burning sensation when urinating, abdominal pains, bloody cloudy or strong odor in urine. Some measures to reduce the risk of UTI are drinking water frequently, urinating after sex, and proper hygiene. Since UTI is caused by bacteria the most common treatment is antibiotics. One fact about UTI is that women are at greater risk of developing UTI.

Reference

<https://medlineplus.gov/urinalysis.html>

<https://www.medicalnewstoday.com/articles/189953#diagnosis>

<https://www.mayoclinic.org/tests-procedures/urinalysis/about/pac-2038490>

[7](https://www.stanfordchildrens.org/en/topic/default?id=anatomy-of-the-urinary-system-85-P01468)

<https://www.stanfordchildrens.org/en/topic/default?id=anatomy-of-the-urinary-system-85-P01468>

<https://www.hopkinsmedicine.org/health/wellness-and-prevention/anatomy-of-the-urinary-system>