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Micro urinalysis test

health centersdigestion center Picture of urine dipstick and color box instructions; photo courtesy of iStock A urinalysis is simply an analysis of the urine. It is a very common test that can be performed in many healthcare settings, including doctors' offices, urgent care facilities, laboratories, hospitals, and even at home. A urinalysis test collects a urine sample from the patient in a specimen cup. Usually, only small amounts (30-60 mL) may be required for urinalysis testing. The sample can be analyzed in the medical clinic or sent to a laboratory to perform the tests. Urinalysis is abbreviated UA. UA is in general easily available and relatively inexpensive. It is also a simple test and can provide many useful information about various diseases and conditions. Some physicians refer to urinalysis as "a poor man's kidney biopsy" because of the plethora of information that can be obtained about the health of the kidney or other internal diseases by this simple test. Urine can be evaluated by its physical appearance (color, cloudiness, odor, clarity), also referred to as a macroscopic analysis. It can be also analyzed based on its chemical and molecular properties, including microscopic assessment. Urinalysis is ordered by doctors for several reasons, including the following: Routine medical evaluation: general yearly screening, assessment before surgery (preoperative assessment), admission to hospital, screening for kidney disease, diabetes mellitus, hypertension (high blood pressure), liver disease, etc. Assessing particular symptoms: abdominal pain, painful urination, flank pain, fever, blood in the urine (hematuria), or other urinary symptoms. Diagnosing medical conditions: urinary tract infections, kidney stones, uncontrolled diabetes (high blood sugars), kidney impairment, muscle breakdown (rhabdomyolysis), protein in urine (proteinuria), drug screening, and kidney inflammation (glomerulonephritis). Monitoring disease progression and response to therapy: diabetes-related kidney disease, kidney impairment, lupus-related kidney disease, blood pressure-related kidney disease, kidney infection, proteinuria, and hematuria Pregnancy testing Macroscopic urinalysis is the direct visual observation of the urine, noting its quantity, color, clarity, or cloudiness, etc. Normal urine is typically light yellow and clear without any cloudiness. Obvious abnormalities in the color, clarity, and cloudiness may suggest the possibility of An infection (cloudy urine) Dehydration (dark urine color) Liver disease ("bilirubin," a digestive substance secreted by the liver, stains urine a tea or cola color) Blood in the urine (hematuria -- visible may indicate urinary tract infection, stones, tumors, or injuries) Breakdown of muscle (orange- or tea-colored urine) Certain medications may also change the color of urine (for example, phenazopyridine, a urinary antiseptic and pain reliever). Very foamy urine may represent large amounts of protein in the urine (proteinuria). The microscopic urinalysis is the study of the urine sample under a microscope. It requires only a relatively inexpensive light microscope. Cells and cellular debris, bacteria, and crystals in the urine (crystalluria) can be detected by microscopic examination to confirm the dipstick color change (see above) and further clinical clues. Health Screening Tests Every Woman Needs See Slideshow Urinalysis can disclose evidence of diseases, even some that have not caused significant signs or symptoms. Therefore, a urinalysis is commonly a part of routine health screening. Urinalysis is commonly used to diagnose a urinary tract or kidney infection, to evaluate causes of kidney failure, and to screen for the progression of some chronic conditions such as diabetes mellitus and high blood pressure (hypertension). It also may be used in combination with other tests to diagnose some diseases. Additional tests and clinical assessments are often required to further investigate the findings of urinalysis and ultimately diagnose the causes or specific features of underlying problems. For example, urine infection is generally diagnosed based on the results of urinalysis. However, urine culture is often ordered as a follow-up test to confirm the diagnosis and to identify the bacteria that may be causing the infection. Other examples include kidney stones, inflammation of the kidneys (glomerulonephritis), or muscle breakdown (rhabdomyolysis). Interpretation of urinalysis is generally based on reviewing all the components of the test and correlating it with the clinical signs and symptoms of the patient and the physical examination. The results are reviewed and interpreted by the doctor who ordered the test. Many types of doctors may order a urinalysis in their practice. Because of easy availability, relatively nominal cost, simplicity of performing the test, and quick turnaround time, UA is done in many settings by a variety of doctors. Most frequently, UA is ordered by internists, family practitioners, emergency-room physicians, obstetricians and gynecologists, nephrologists (kidney specialists), urologists, rheumatologists, and possibly less often by many other specialists. Urinalysis is done by collecting a urine sample from a patient. The optimal sample tends to be an early morning urine sample because it is frequently the most concentrated urine produced in the day. Typically, no fasting is required before the collection of urine samples and routine medications can be taken before the test unless otherwise instructed by the ordering physician. Methods of collection are slightly different for female and male patients. For females, the patient is asked to clean the area around the urethra with a special cleansing wipe, by spreading the labia of the external genitals and cleaning from front to back (toward the anus). The cleaning hand is then used to maintain the spread while the cup is held by the other hand to collect the sample. For men, the tip of the penis may be wiped with a cleansing pad before collection. The urine is then collected in a clean urine specimen cup while the patient is urinating. It is best to avoid collecting the initial stream of urine. After the initial part of the urine is disposed of in the toilet, then the urine is collected in the urine container provided. Once about 30 mL to 60 mL (roughly 3 to 5 tablespoons) are collected in the container for testing, the remainder of the urine may be voided in the toilet again. This is called the midstream clean catch urine collection. The collected urine sample should be taken to the laboratory for analysis, typically within one hour of collection. If transportation to the lab could take more than one hour, then the sample may be refrigerated. In some patients who are unable to void spontaneously or those who are not able to follow instructions, other methods may be used, such as placing a catheter (a small rubber tube) through the outside opening to the bladder (urethra) to collect the sample directly from the bladder. The urine test strip is a narrow plastic strip that has several squares of different colors attached to it. Each small square represents a component of the test used to interpret urinalysis. The entire test strip is dipped in the urine sample and color changes in each square are noted. The color change takes place after several seconds to a few minutes from dipping the strip. If read too early or too long after the urinalysis strip is dipped, the results may not be accurate. Each color change on a particular square may indicate specific abnormalities in the urine sample caused by a certain chemical reaction. The reference for color changes is posted on the plastic bottle container of the urine test strips. This makes for an easy and quick interpretation of the urinalysis results by placing the strip next to the container and comparing its color changes to the reference provided. The squares on the dipstick represent the following components in the urine: Specific gravity (concentration of urine) The acidity of the urine (pH levels) Protein in the urine (proteinuria), mainly albumin Glucose (sugar) in the urine (glycosuria) Ketones in the urine (ketonuria), products of fat metabolism Hemoglobin/blood in the urine (hematuria) Leukocyte esterase (suggestive of white blood cells in urine) Nitrite (suggestive of bacteria in urine) Bilirubin (possible liver disease or red blood cell breakdown) Urobilinogen (possible liver disease or etodolac [Lodine] medication) The presence or absence of each of these color changes on the strip provides important information for clinical decisions. After the dipstick test strip is dipped in urine briefly and completely, the reading is done within a few minutes. Each one of the squares on the box has next to it the time that is recommended for its interpretation (for example, whether there is a change in color on the square). The squares are placed in similar order on the box, from the ones requiring the shortest time to read of 30 seconds to the ones with the longest time to read of two minutes. This arrangement is based on result time and makes it easier to quickly read and interpret any color changes by simply scanning the strip from the shortest (glucose) to the longest (leukocytes). By clicking Submit, I agree to the MedicineNet's Terms & Conditions & Privacy Policy and understand that I may opt out of MedicineNet's subscriptions at any time. Microscopic urinalysis is done by simply pouring the urine sample into a test tube and centrifuging it (spinning it down in a machine) for a few minutes. The top liquid part (the supernatant) is discarded. The solid part left in the bottom of the test tube (the urine sediment) is mixed with the remaining drop of urine in the test tube and one drop is analyzed under a microscope. The sediment is examined through the microscope under low power to identify what are called casts, crystals, squamous (flat) cells, and other large objects. The examination is then performed through the microscope at higher power to further identify any cells, bacteria, and clumps of cells or debris called casts. The main advantage of a urine test strip is that they are convenient, easy to interpret, and cost-effective. They can be analyzed within minutes of urine collection in the doctor's office or in the emergency room to provide valuable information. However, what can be learned from a dipstick is limited by the design of the dipstick. The main disadvantage is that the information may not be very accurate, as the test is time-sensitive. It also provides limited information about the urine, as it is a qualitative test and not a quantitative test (for example, it does not give a precise measure of the quantity of abnormality). Therefore, normal and abnormal values are not reported as part of urinalysis results. Epithelial cells (flat cells), and red and white blood cells may be seen in the urine. Sometimes cells, cellular debris, and casts are seen in the microscopic exam. Epithelial cells (cells in the lining of the bladder or urethra) may suggest inflammation within the bladder, but they also may originate from the skin and could be contaminated. Casts and cellular debris originate from higher up in the urinary tract, such as in the kidneys. These are materials shed from the kidney cell lining due to injury or inflammation and travel down through the urinary tubes. These usually suggest an injury to the kidney from an inflammation or lack of blood flow to the kidneys. Rarely, tumor cells can be in the urine suggesting a urinary tract cancer. Red blood cells can enter the urine from the vagina in menstruation or from the trauma of bladder catheterization. A high count of red blood cells in the urine can indicate infection, trauma, tumors, or kidney stones. If red blood cells seen under microscopy look distorted, they suggest the kidney as the possible source and may arise due to kidney inflammation (glomerulonephritis). Small amounts of red blood cells in the urine are sometimes seen in young healthy people and usually are not indicative of any disease. Urine is generally thought of as a sterile body fluid, therefore, evidence of white blood cells or bacteria in the urine is considered abnormal and may suggest a urinary tract infection such as bladder infection (cystitis), or infection of the kidney (pyelonephritis). White blood cells (WBC) may be detected in the urine through a microscopic examination (pyuria or leukocytes in the blood). They can be seen under a high power field and the number of cells is recorded (quantitative) as "rare, few, moderate, or many." White cells from the vagina or the opening of the urethra (in males, too) can contaminate a urine sample. Such contamination aside, the presence of abnormal numbers of white blood cells in the urine is significant. Other commonly performed urine tests are drug tests, pregnancy tests, and specific chemicals and proteins in the body, which are not a part of routine urinalysis. Urine drug screen is done routinely to check for drugs or their byproducts in the urine. There are many purposes for these tests including athletic screening, emergency room settings, drug detoxification programs, and school and employment screening. This test detects the presence of commonly used drugs such as: The urine pregnancy test is very common and it measures a hormone in the urine associated with pregnancy (beta-HCG or beta-human chorionic gonadotropin). This test can be done in medical settings, but numerous kits are available for home use. Other urine tests can also be used in the evaluation of many medical conditions. Examples include Urine culture (in determining the bacterial cause of urine infection) Urine creatinine (in assessing kidney disease) Urine total protein and albumin (in assessing kidney disease and protein loss from the kidney) Urine cytology (in evaluating for possible bladder or other urinary tumors) Urine calcium (in evaluating elevated blood calcium levels) 24-hour urine collection for proteins (in diagnosing causes of kidney impairment, diabetic-related kidney disease, lupus-related kidney disease) 24-hour urine collection for protein electrophoresis (for measuring different components of proteins in urine in evaluating multiple myeloma, and kidney inflammation with increased protein loss) 24-hour urine collection of catecholamine metabolites (in evaluating adrenal gland disease, difficult to treat high blood pressure) Foley, K.F., and J. Wasserman. "Are unexpected positive dipstick urine bilirubin results clinically significant? A retrospective review." Lab Med 45.1 Winter: 59-61. Ghadban, Rugheed. "Specific Gravity." Medscape.com. Feb. 11, 2014. Kasper, D.L., et al., eds. Harrison's Principles of Internal Medicine, 19th Ed. United States: McGraw-Hill Education, 2015. Weichhart, T., G.J. Zlabinger, and M.D. Saemann. "The Multiple Functions of Tamm-Horsfall Protein in Human Health and Disease: A Mystery Clears Up." Wien Klin Wochenschr 117(9-10) May: 316-322. Usually, you don’t have to do anything to prepare for a urinalysis. You may need to drink an extra glass of water if you don’t feel like you’ll be able to pee for the test. But drinking too much extra water can give inaccurate results.Let your provider know:If you’re currently getting your period (menstruating). Menstrual blood and vaginal discharge can interfere with certain urinalysis test results.If you have trouble peeing away from home, or shy bladder syndrome. They can give you options for providing a sample that’ll be comfortable for you.In certain circumstances, your provider might ask you to:Get the sample from your first pee in the morning.Avoid certain foods before the test.Stop taking certain medications that can affect the results. Only stop taking medications if your provider tells you to.What happens during a urinalysis?In most cases, you’ll provide a pee sample at your healthcare provider’s office or at a laboratory using the “clean catch” method. You or your healthcare provider can also collect a urine sample using a catheter (thin tube).For the clean catch method, your provider will give you a specimen cup, sterile wipes and specific instructions for collecting your urine sample. Your provider will tell you what to do with your sample after you’ve collected it. It’s important to wash your hands with soap and water before you collect the sample.Collecting a clean catch urine sample if you have labiaIf you have labia, collect your pee with the following steps:Start by sitting on the toilet with your legs spread apart.Using two fingers, spread your labia open. Use one sterile wipe to clean the inner folds of your labia, wiping from front to back.Use another sterile wipe to clean the opening to your urethra, where pee flows out of your body.Pee a small amount into the toilet.Stop the flow of pee and hold the specimen cup a few inches away from your urethra.Pee into the cup until it’s about halfway full or to the amount your provider recommends. It’s OK if you can’t fill it quite to halfway.Finish peeing into the toilet (if you need to).Collecting a clean catch urine sample if you have a penisIf you have a penis, collect your pee with the following steps:Use a sterile wipe to clean the head of your penis. If your penis is uncircumcised, first pull back your foreskin to ensure a thorough cleaning.Pee a small amount into the toilet.Stop the flow of pee and hold the specimen cup below your penis.Pee into the cup until it’s about halfway full or to the amount your provider recommends. It’s OK if you can’t fill it quite to halfway.Finish peeing into the toilet (if you need to).Collecting a urine sample with a catheterA healthcare provider can also collect a urine sample with a catheter. They’ll clean the area around the opening of your urethra with a germ-killing (antiseptic) solution and insert a catheter into your urethra. Your pee will drain into a sterile container and your provider will remove the catheter.What happens after a urinalysis?Your healthcare provider will send your sample to a lab for the urinalysis. In some cases, your provider may examine the sample and run dipstick tests on it immediately in their office. Urine Microscopic Examination is a laboratory test used to examine the physical, chemical, and microscopic characteristics of urine. The test helps to detect any abnormalities in the urine, which may indicate underlying health conditions. The procedure involves analyzing a small sample of urine under a microscope, which allows the technician to view the cells, bacteria, crystals, and other substances present in the urine. Urine microscopic examination is a laboratory test that analyzes a small sample of urine under a microscope to evaluate the physical, chemical, and microscopic characteristics of the urine. It helps to diagnose various health conditions, such as urinary tract infections, kidney disease, and bladder cancer. The test involves analyzing the color, clarity, pH, and specific gravity of the urine and identifying the type and number of cells, bacteria, and other substances present in the urine. Abnormal findings may indicate an underlying health condition.Here are some of the purposes of urine microscopic examination:Diagnose Urinary Tract Infections (UTIs): The test is used to identify bacteria, white blood cells, and other substances that indicate the presence of a UTI.Diagnose Kidney Diseases: The presence of red blood cells, white blood cells, and other substances in the urine can indicate kidney damage or disease.Monitor Kidney Function: The test can be used to monitor the progress of kidney disease and assess the effectiveness of treatment.Screen for Bladder Cancer: Abnormal cells in the urine may indicate the presence of bladder cancer.Evaluate Kidney Stones: The presence of crystals in the urine can indicate the formation of kidney stones.Diagnose Metabolic Disorders: The presence of glucose, proteins, and other substances in the urine can indicate metabolic disorders such as diabetes or proteinuria.Monitor Pregnancy: The test can be used to monitor the health of pregnant women and identify potential complications such as preeclampsia.Evaluate Autoimmune Diseases: The presence of antibodies in the urine can indicate autoimmune diseases such as lupus or glomerulonephritis.Overall, urine microscopic examination is a versatile and useful diagnostic tool that can provide important information about the health of the urinary system and the presence of various health conditions.Here are some reasons why urine microscopic examination may be ordered by a healthcare provider:To diagnose a urinary tract infection (UTI)To diagnose kidney diseaseTo monitor kidney functionTo screen for bladder cancerTo evaluate kidney stonesTo diagnose metabolic disorders, such as diabetes or proteinuriaTo monitor the health of pregnant women and identify potential complicationsTo evaluate autoimmune diseases, such as lupus or glomerulonephritisTo monitor the effectiveness of treatment for various health conditionsTo assess the risk of kidney damage from certain medications or medical conditionsTo evaluate the health of the urinary system in people with chronic conditions, such as hypertension or diabetesTo identify potential kidney problems in people with a family history of kidney diseaseTo assess the risk of developing kidney disease in people with risk factors, such as high blood pressure or diabetes.Overall, urine microscopic examination is a useful diagnostic tool that can provide valuable information about the health of the urinary system and the presence of various health conditions. It can help healthcare providers make an accurate diagnosis, monitor the progress of treatment, and identify potential complications.Here are some situations where a healthcare provider may order a urine microscopic examination:If a person is experiencing symptoms of a urinary tract infection (UTI), such as painful urination, frequent urination, or blood in the urine.If a person is experiencing symptoms of kidney disease, such as swelling in the legs, fatigue, or high blood pressure.If a person is being monitored for kidney disease, to assess the progress of the disease or the effectiveness of treatment.If a person has risk factors for kidney disease, such as high blood pressure, diabetes, or a family history of kidney disease.If a person is being monitored for bladder cancer, to assess the effectiveness of treatment or to screen for recurrence.If a person has a history of kidney stones or is experiencing symptoms of kidney stones, such as pain in the back or side.If a person is pregnant and needs to be monitored for potential complications, such as preeclampsia.If a person is being evaluated for an autoimmune disease, such as lupus or glomerulonephritis.If a person is being monitored for the effects of certain medications on the kidneys.If a person is being evaluated for a metabolic disorder, such as diabetes or proteinuria.Overall, a urine microscopic examination may be ordered in various situations where a healthcare provider needs to assess the health of the urinary system or diagnose certain health conditions.The sample required for a urine microscopic examination is a midstream clean-catch urine sample. Here are the steps for collecting this type of sample:Wash your hands thoroughly with soap and water.Clean your genital area with a cleansing wipe or towelette provided by your healthcare provider. Wipe from front to back to avoid contaminating the sample with bacteria from the anus.Start to urinate into the toilet bowl.After a few seconds, place a sterile collection cup under the stream of urine. Be careful not to touch the inside of the cup with your hands.Collect about 30 to 60 milliliters of urine, or the amount specified by your healthcare provider.Remove the cup from the stream of urine and finish urinating into the toilet bowl.Replace the lid on the collection cup.Wash your hands thoroughly with soap and water.Label the collection cup with your name, date of birth, and the date and time of the collection.Deliver the sample to the laboratory or healthcare provider as soon as possible. If you can’t deliver it immediately, store it in the refrigerator until you can.Overall, collecting a clean-catch urine sample is important to ensure that the sample is not contaminated with bacteria from the genital area, which could affect the accuracy of the results of the microscopic examination.Random sample: This is a diluted urine sample and may give an inaccurate interpretation of patient health. But is best to do microscopy to evaluate WBC or RBC.First Morning sample: This is the best sample for microscopy and urine analysis. This is the concentrated urine because of urine remained throughout the night in the urinary bladder. This will contains an increased concentration of analytes and cellular elements. Urine must have remained in the bladder for 8 hours is considered as the first-morning sample.Urine for sugar (Postprandial 2 hours): Postprandial 2 hours sample collected after 2 hours of high carbohydrate diet. Midstream clean catch urine: This sample is needed for the culture and sensitivity of urinary infection. The patient is advised to clean the urethra, then discard the first few mL of urine. Now midstream of the urine is collected in the sterile container.24 Hours of a urine sampleIn this case, discard the first urine and note the time.Now collect urine in the container for 24 hours and put the last sample in the container.Refrigerate the sample.This 24 hours samples are needed for measuring urea, creatinine, sodium, potassium, glucose, and catecholamines.Suprapubic collection of the urine sample: This is done in the patients who cannot be catheterized and the sample is needed for culture. This sample is collected by the needle.Catheter collection of urine: This is done by patients who are bedridden and can not urinate.Pediatric urine sample: In infants, special collection bags are made adherent around the urethra. Then urine is transferred to a container.The following are some of the tests that may be included in a urine microscopic examination:Urine sediment analysis: This test involves examining a urine sample under a microscope to look for cells, bacteria, crystals, and other substances that may indicate a urinary tract infection or other health condition.Red blood cell (RBC) count: This test measures the number of red blood cells in a urine sample, which may be elevated in cases of kidney stones, bladder cancer, or other urinary tract disorders.White blood cell (WBC) count: This test measures the number of white blood cells in a urine sample, which may be elevated in cases of urinary tract infections or other inflammatory conditions.Epithelial cell count: This test measures the number of epithelial cells (cells from the lining of the urinary tract) in a urine sample, which may be elevated in cases of bladder cancer or other urinary tract disorders.Bacteria and yeast culture: This test involves growing bacteria or yeast from a urine sample to identify the specific type of microorganism causing an infection.Crystals analysis: This test involves identifying crystals that may be present in a urine sample, which can provide information about the pH and composition of the urine and may indicate the presence of kidney stones or other urinary tract disorders.Casts examination: This test involves examining a urine sample under a microscope to identify casts (structures made of proteins or other substances), which may be present in cases of kidney disease or other urinary tract disorders.Overall, the specific tests included in a urine microscopic examination may vary depending on the healthcare provider’s reason for ordering the test and the patient’s individual health situation.The significance of a urine microscopic examination includes:Detecting Urinary Tract Infections: A urine microscopic examination is used to detect the presence of bacteria, white blood cells, and other indicators of a urinary tract infection.Evaluating Kidney Function: The test can help to identify the presence of casts, red blood cells, and other substances in the urine, which can be useful in evaluating kidney function.Diagnosing Certain Kidney Disorders: Urine sediment analysis can detect the presence of proteins, casts, and other substances that may indicate certain kidney disorders, such as glomerulonephritis.Monitoring Certain Medical Conditions: The test can be useful in monitoring certain medical conditions, such as diabetes, which can affect kidney function and urine composition.Detecting Pregnancy: A urine microscopic examination can detect the presence of hCG, a hormone produced during pregnancy, which can confirm the presence of a pregnancy.Assessing Urinary Tract Stones: The test can detect the presence of crystals, which may indicate the formation of urinary tract stones.Overall, a urine microscopic examination is a valuable diagnostic tool that can provide important information about a person’s urinary tract health and kidney function. The test can be used to detect and diagnose a variety of medical conditions, monitor treatment progress, and help healthcare providers make informed treatment decisions.Here is a table of normal urine findings: Characteristic NormalColor Pale or yellow Appearance ClearOdorMildly aromaticVolume 1200 to 2000 ml/24 hourspH 5 to 7Specific gravity 1.001 to 1.035Cast (hyaline)0 to 5 / HPFRed blood cells≤ 3 / HPFBlood Negative Rarely 2 to 3 RBCs/HPFWhite blood cells ≤2 to 5 HPFMale = 1 to 2 /HPFFemale = 0 to 5 /HPFSquamous epithelial cells≤ 15 to 20 / HPFYeast NegativeBacteria NegativeProtein Negative Glucose Random sample = Negative24 hours sample = 1 to 15 mg/dLKetones Urine = NegativeBilirubin Negative (o to 0.02 mg/dL)Urobilinogen NegativeRandom sample=