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A-Z Health Guide from WebMD: Medical Tests

Urine Test



Test Overview

A urine test measures several different components of urine, a waste product made by the [kidneys](#). A routine urine screening test may be done to help find the cause for many types of symptoms. The test can provide information about your overall health and clues to many conditions.

The [kidneys](#)  remove waste material, minerals, fluids, and other substances from the blood for elimination in the urine. Therefore, urine can contain hundreds of different bodily waste products. Many factors, such as diet, fluid intake, exercise, and kidney function, affect what is in your urine.

More than 100 different tests can be done on urine. A routine urinalysis usually includes the following tests.

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- **Color.** Many factors affect urine color, including fluid balance, diet, medications, and disease. The intensity of the color generally indicates the concentration of the urine; pale or colorless urine indicates that it is dilute, and deep yellow urine indicates that it is concentrated. Vitamin B supplements can turn urine bright yellow. Reddish brown urine may be caused by certain medications; by blackberries, beets, or rhubarb in the diet; or by the presence of blood in the urine.
- **Clarity.** Urine is normally clear. This test determines the cloudiness of urine, also called opacity or turbidity. Bacteria, blood, sperm, crystals, or mucus can make urine appear cloudy.
- **Odor.** Urine usually does not smell very strong, but has a slightly "nutty" (aromatic) odor. Some diseases can cause a change in the normal odor of urine. For example, an infection with *E. coli* bacteria can cause a foul odor, while [diabetes](#) or starvation can cause a sweet, fruity odor.
- **Specific gravity.** This measures the amount of substances dissolved in the urine. It also indicates how well the kidneys are able to adjust the amount of water in urine. The higher the specific gravity, the more solid material is dissolved in the urine. When you drink a lot of liquid, your kidneys should produce greater-than-normal amounts of dilute urine (low specific gravity). When you drink very little liquid, your kidneys should make only small amounts of concentrated urine (high specific gravity).
- **pH.** The [pH](#) is a measure of how acidic or alkaline (basic) the urine is. A urine pH of 4 is strongly acidic, 7 is neutral (neither acidic nor alkaline), and 9 is strongly alkaline. Sometimes the pH of urine may be adjusted by certain types of treatment. For example, efforts may be made to keep urine either acidic or alkaline to prevent formation of certain types of [kidney stones](#).
- **Protein.** Protein is normally not detected in the urine. Sometimes a small amount of protein is released into the urine when a person stands up (this condition is called postural proteinuria). Fever, strenuous exercise, normal pregnancy, and some diseases, especially kidney disease, may also cause protein in the urine.
- **Glucose.** Glucose is the type of sugar usually found in blood. Normally there is very little or no glucose in urine. However, when the blood sugar level is very high, as in uncontrolled diabetes, it spills over into the urine. Glucose can also be present in urine when the kidneys are damaged or diseased.
- **Nitrites.** Bacteria that cause a [urinary tract infection \(UTI\)](#) produce an enzyme that converts urinary nitrates to nitrites. The presence of nitrites in urine indicates a UTI.
- **Leukocyte esterase (WBC esterase).** Leukocyte esterase detects leukocytes ([white blood cells \[WBCs\]](#)) in the urine. The presence of WBCs in the urine may indicate a urinary tract infection.
- **Ketones.** When fat is broken down for energy, the body produces by-products called ketones (or ketone bodies) and releases them into the urine. Large amounts of ketones in the urine may signal a dangerous

condition known as [diabetic ketoacidosis](#). A diet low in sugars and starches (carbohydrates), starvation, or prolonged vomiting may also cause ketones in the urine.

- **Microscopic analysis.** In this test, urine is spun in a centrifuge so the solid materials (sediment) settle out. The sediment is spread on a slide and examined under a microscope. Types of materials that may be found include:
 - **Red or white blood cells.** Normally blood cells are not found in urine. Inflammation, disease, or injury to the kidneys, ureters, bladder, or urethra can cause blood in urine. Strenuous exercise (such as running a marathon) can also cause blood in urine. White blood cells are often a sign of infection, cancer, or kidney disease.
 - **Casts.** Some types of kidney disease can cause plugs of material (called casts) to form in tiny tubes in the kidneys. The casts can then get flushed out into the urine. Casts can be made of different types of material, such as red or white blood cells, waxy or fatty substances, or protein. The type of cast can provide clues about the type of kidney disease that may be present.
 - **Crystals.** Healthy people often have only a few crystals in their urine. However, a large number of crystals, or the presence of certain types of crystals, may indicate kidney stones or a problem with how the body is using food (metabolism).
 - **Bacteria, yeast cells, or parasites.** Normally there are no bacteria, yeast cells, or [parasites](#) in urine. Their presence can indicate an infection.

Why It Is Done

A urine test may be done:

- To screen for a disease or infection of the [urinary tract](#). Symptoms that may lead to a urine test include discolored or foul-smelling urine, pain during urination, difficulty urinating, flank pain, blood in the urine (hematuria), or fever.
- To monitor the treatment of certain conditions such as diabetes, kidney stones, a urinary tract infection (UTI), [hypertension](#), or some types of kidney or liver disease.
- As part of a routine physical examination.

How To Prepare

Do not eat foods that can discolor the urine, including blackberries, beets, and rhubarb. Do not exercise strenuously before a urine sample is taken.

Tell your health professional if you are menstruating or within a few days of starting your menstrual period. Your health professional may want to postpone the urine test, depending on the suspected problem.

Because certain medications can discolor the urine, your health professional may instruct you to stop taking the medications prior to the test. Medications that can discolor the urine include vitamin B, phenazopyridine (Pyridium), rifampin, and phenytoin (Dilantin). Be sure to tell your health professional if you are taking [diuretics](#), which may affect the test results.

Talk to your health professional about any concerns you have regarding the need for the test, its risks, how it will be done, or what the results will indicate. To help you understand the importance of this test, fill out the [medical test information form](#) (What is a [PDF](#) document?).

How It Is Done

A routine urine test can be done in your health professional's office, clinic, or lab. You may also be asked to collect a urine sample at home and bring it with you to the office or lab for testing.

Clean-catch midstream urine collection

This collection method prevents contamination of the sample.

- Wash your hands to make sure they are clean before collecting the urine.
- If the collection container has a lid, remove it carefully and set it down with the inner surface up. Avoid touching the inside of the container with your fingers.
- Clean the area around your genitals.
 - A man should retract the foreskin, if present, and clean the head of his penis thoroughly with medicated towelettes or swabs.
 - A woman should spread open the folds of skin around her [vagina](#) with one hand, then use her other hand to clean the area around her vagina and [urethra](#) thoroughly with medicated towelettes or swabs. She should wipe the area from front to back to avoid contaminating the urethra with bacteria from the [anus](#).
- Begin urinating into the toilet or urinal. A woman should continue to hold apart the folds of skin around the vagina while she urinates.
- After the urine has flowed for several seconds, place the collection container into the stream and collect about 2 fl oz (59 mL) of this "midstream" urine without interrupting the flow.
- Avoid touching the rim of the container to your genital area, and avoid getting toilet paper, pubic hair, stool (feces), menstrual blood, or other foreign matter in the urine sample.
- Finish urinating into the toilet or urinal.
- Carefully replace the lid on the container and return it to the lab. If you are collecting the urine at home and cannot get it to the lab within an hour, refrigerate it.

Double-voided urine sample collection

This collection method reflects the type of urine your body is producing right now.

- Empty your bladder by urinating into the toilet or urinal. Do not collect any of this urine.
- Drink a large glass of water and wait about 30 to 40 minutes.
- Follow the instructions above for collecting a clean-catch urine sample.

The urine sample is then sent to a lab for analysis.

How It Feels

Collecting a urine sample does not normally cause any discomfort.

Risks

There are no risks associated with collecting a urine sample.

Results

A urine test measures several different components of urine, a waste product made by the [kidneys](#). Normal results may vary from lab to lab.

Color	Normal:	Pale to dark yellow
	Abnormal:	Many foods and medications can affect the color of the urine. Colorless urine may be caused by conditions such as long-term kidney disease or uncontrolled diabetes . Dark yellow urine can be caused by conditions such as dehydration . Reddish urine can be caused by blood in the urine.
Clarity	Normal:	Clear
	Abnormal:	Cloudy urine can be caused by pus (white blood cells), blood (red blood cells), sperm, bacteria, yeast, crystals, mucus, or a parasite infection (such as trichomoniasis).
Odor	Normal:	Slightly "nutty" (aromatic) odor

	Abnormal:	Some foods (such as asparagus), vitamins, and antibiotics (such as penicillin) can cause urine to develop an unusual odor. A sweet, fruity odor may be caused by uncontrolled diabetes. A urinary tract infection (UTI) can cause a foul odor. Urine that smells like maple syrup can indicate maple syrup urine disease, a condition caused by the body's inability to break down certain amino acids .
Specific gravity	Normal:	1.005–1.035
	Abnormal:	Abnormally high specific gravity indicates very concentrated urine, which may be caused by not drinking enough liquid, loss of too much liquid (excessive vomiting, sweating, or diarrhea), or substances (such as sugar or protein) in the urine. Abnormally low specific gravity indicates dilute urine, which may be caused by drinking excessive amounts of liquid, severe kidney disease, or the use of diuretics .
pH	Normal:	4.5–8.0
	Abnormal:	Some foods (such as citrus fruit and dairy products) and medications (such as antacids) can affect urine pH . A high (alkaline) pH can be caused by prolonged vomiting, a kidney disease, some urinary tract infections, and asthma . A low (acidic) pH may be a sign of severe lung disease (emphysema), uncontrolled diabetes, aspirin overdose, prolonged diarrhea, dehydration, starvation, drinking an excessive amount of alcohol, or drinking antifreeze (ethylene glycol).
Protein	Normal:	None
	Abnormal:	Protein in the urine usually indicates kidney damage or disease that can be caused by conditions such as an infection, cancer, high blood pressure , diabetes, systemic lupus erythematosus (SLE) , or glomerulonephritis . Protein in the urine can also be caused by heart failure , leukemia , poison (lead or mercury poisoning), or a condition during pregnancy that results in high blood pressure (preeclampsia).
Glucose	Normal:	None
	Abnormal:	Intravenous (IV) fluids can cause the presence of glucose in the urine. Excess glucose in the urine is often caused by uncontrolled diabetes. Other conditions that may cause glucose in urine include an adrenal gland problem, liver damage, brain injury, certain types of poisoning, and certain types of kidney diseases that decrease their ability to reabsorb glucose from the urine. Healthy pregnant women can have glucose in their urine which is normal during pregnancy.
Ketones	Normal:	None
	Abnormal:	Ketones in the urine can indicate poorly controlled diabetes, a very low-carbohydrate diet, starvation (including disorders that result in poor nutrition such as anorexia nervosa or bulimia), alcoholism, or poisoning from drinking rubbing alcohol (isopropanol). Ketones are often found in the urine when a person does not eat (fasts) for 18 hours or longer. This may occur when a person is sick and avoids food or vomits for an extended period of time. Low levels of ketones are sometimes found in the urine of a healthy pregnant woman.
Microscopic analysis	Normal:	Very few or no red or white blood cells or casts are seen. No bacteria, yeast cells, or parasites are present. A few crystals are usually normal.
	Abnormal:	Red blood cells in the urine may be caused by kidney or bladder injury, kidney stones, a urinary tract infection (UTI), inflammation of the kidneys (glomerulonephritis), a kidney or bladder tumor, or systemic lupus erythematosus (SLE). White blood cells (pus) in the urine indicate a urinary tract infection, bladder tumor, inflammation of the kidneys, systemic lupus erythematosus (SLE), or inflammation under the foreskin of the penis or in the vagina.

	<p>Depending on the type, casts can indicate inflammation or damage to the tiny tubes in the kidneys, poor blood supply to the kidneys, metal poisoning (such as lead or mercury), heart failure, or a bacterial infection.</p> <p>Excessive amounts of crystals, or the presence of certain types of crystals, can indicate kidney stones, damaged kidneys, or problems with metabolism. Some medications and certain types of urinary tract infections can also increase the number of crystals in urine.</p> <p>Bacteria in the urine indicate a urinary tract infection (UTI). Yeast cells or parasites (such as the parasite that causes trichomoniasis) can indicate an infection of the urinary tract.</p>
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What Affects the Test

Factors that can interfere with your test and the accuracy of the results include:

- Blood from a woman's menstrual period.
- Medications, such as diuretics or high doses of vitamin C (ascorbic acid) taken with certain [antibiotics](#) (such as tetracycline).
- Some antibiotics, such as erythromycin and trimethoprim (Trimplex).
- [Contrast material](#) used in an [X-ray](#) test.

What To Think About

- Some urine tests can be done using a home test kit. For more information, see the medical test [Ketones](#) or [Home Test for Urinary Tract Infections](#).
- In some cases, the amount (volume) of urine produced in 24 hours may be measured. Most adults produce 1.3 qt(1.2 L) to 1.6 qt(1.5 L) of urine each day, with a normal range of about 1 qt(1 L) to 2 qt(2 L) per day. Children produce about 0.3 qt(0.3 L) to 1.6 qt(1.5 L) per day.
- Other substances that may be measured during a urine test include:
 - [Bilirubin](#), a compound formed by the breakdown of red blood cells and normally eliminated from the body in stool. Bilirubin is not normally found in urine. If it is present, it usually means the liver is damaged or the flow of bile from the gallbladder is blocked. For more information, see the medical test [Bilirubin](#).
 - Urobilinogen, a compound formed by the breakdown of bilirubin and eliminated from the body mostly in stool. Only small amounts of urobilinogen are normally found in urine. Urobilinogen in urine can be a sign of liver disease ([cirrhosis](#), [hepatitis](#)) or blockage of the flow of bile from the liver or gallbladder.
 - Bence Jones protein, an abnormal protein found in the urine of about 50% of people with a rare type of cancer called [multiple myeloma](#). A urine test is usually done when multiple myeloma is suspected. The protein test done during a routine urine test does not usually detect Bence Jones protein.
- Collecting a urine sample from a small child or baby may be done by using a special plastic bag with tape around its opening. The bag is attached around the child's genitals until he or she urinates (usually within an hour). Then the bag is carefully removed. To collect a urine sample from a very sick baby, a health professional may insert a urinary catheter through the [urethra](#) or a needle through the baby's abdomen directly into the bladder (suprapubic tap).
- To reduce the chance of contaminating the urine sample with bacteria (other than the bacteria causing the infection), a health professional may collect a urine sample by inserting a thin flexible tube (called a urinary catheter) through the urethra into the bladder. Catheterization is sometimes done to collect urine from a person in the hospital who is very ill or unable to provide a clean-catch sample (such as a child). This method reduces the risk that the sample will be contaminated, but it may occasionally cause a urinary tract infection (UTI).
- If an abnormal result is found during a urine test, additional tests may be done, such as a urine culture, X-ray of the kidneys (intravenous pyelography or IVP), or cystoscopy. For more information, see the medical tests [Urine Culture](#), [Intravenous Pyelogram \(IVP\)](#), and [Cystoscopy](#).

Credits

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