

## **Blood in the urine (hematuria)**

Hematuria refers to the presence of blood in the urine. It is important to investigate the cause of hematuria because rarely, it is caused by a serious condition, such as bladder cancer. Hematuria may be visible (called gross hematuria, when the urine appears brown or red) or may be seen only with a dipstick or microscopic examination of the urine (called microscopic hematuria).

**Gross hematuria or discolored urine** — Gross hematuria is suspected when the urine is red or brown. Very small amounts of blood in the urine can cause a color change, so the presence of discolored urine does not usually mean that a large amount of blood has been lost.

In women, the urine may be discolored due to vaginal bleeding. If this is suspected, a urine specimen should be obtained with a catheter or after the woman has inserted a vaginal tampon and washed the genital area thoroughly. If blood remains in the specimen, it is likely to be from a urinary and not a vaginal source.

The use of certain medicines, rare diseases, and eating beets can also cause the urine to be red or brown.

**Microscopic hematuria** — Hematuria may be discovered when blood is found during urinalysis, a test for several abnormalities in the urine done for other purposes. Urinalysis may be done for screening, to determine if there are abnormalities in a person who has no symptoms, or to check for abnormalities in a person who has pain with urination, urinary frequency, or other concerns.

**Transient or persistent hematuria** — When hematuria is found, it is important to determine if blood is present all the time (persistent hematuria), or is a temporary event (transient hematuria). Repeat urine specimens on several days may be needed to make this determination. Persistent hematuria, as well as transient or intermittent hematuria in men over the age of 50, requires evaluation to determine the cause.

Transient microscopic hematuria is a common problem in adults. This was shown in one study of 1000 young men who had yearly urinalyses between the ages of 18 and 33; hematuria was seen in 39 percent on at least one occasion and 16 percent on two or more occasions. No obvious reason could be identified in most men. By comparison, persistent hematuria is more likely to be a symptom of an underlying disease.

### *Symptoms*

By itself, hematuria rarely causes symptoms. One exception is when the bladder has so much blood in it that clots form, and the flow of urine is blocked. This can cause pain at the site of the blockage in the lower pelvis. Symptoms usually come from the cause of the hematuria, and vary depending on the condition:

- **Glomerulonephritis:** If glomerulonephritis is not severe, it may not cause any symptoms. If symptoms appear, they can include swelling, especially in the lower extremities, reduced urination, and high blood pressure.
- **Kidney or bladder infection:** Symptoms depend on the site of infection, but can include intense pain on one side of the mid-back, fever, shaking chills, nausea and vomiting, pain above the pubic or bladder region, foul-smelling urine, the need to urinate more often than normal, and pain or discomfort during urination.
- **Prostate infection:** There can be pain in the lower back or in the area between the scrotum and anus, pain during ejaculation, blood in the semen, and, sometimes, fever and chills.
- **Tumor in the kidney or bladder:** Most kidney and bladder cancers grow without causing any pain or discomfort. When symptoms develop, the most common are abdominal pain, more frequent urination and pain at the end of urination.
- **Kidney stones:** When a kidney stone becomes trapped in one of the ureters (the narrow tubes connecting each kidney to the

- bladder), it can cause severe pain in the back, side or groin, nausea and vomiting, or painful and frequent urination.
- **Bleeding disorders:** Bleeding disorders tend to cause abnormal bleeding throughout the body, not just into the urine. Depending on the specific bleeding problem, symptoms can include abnormal bruising, prolonged bleeding from cuts, bleeding in the skin, bleeding into the joints or gastrointestinal tract (causing black, tarry stools or bright red blood in the stool), or gum bleeding even with gentle flossing or brushing.
  - **Trauma:** There often will be signs of traumatic injury to the body surface, such as bruises, swelling, punctures and open wounds.

*Causes* — a number of different conditions can cause hematuria. Some of the most common are:

- Bladder infection (also called urinary tract infection or acute cystitis)
- Inflammation, infection, or cancer of the prostate gland (for men)
- Kidney disease or infection
- Cancer of the bladder or kidney
- Urinary tract infection: Hematuria can be caused by an infection in any part of the urinary tract, most commonly the bladder (cystitis) or the kidney (pyelonephritis).
- Kidney stones
- Tumors in the kidney or bladder
- Exercise: Exercise hematuria is a harmless condition that produces blood in the urine after strenuous exercise. It is more common in males than females.
- Trauma: Traumatic injury to any part of the urinary tract from the kidneys to the urethral opening (the connection between the bladder and the outside world) can cause hematuria.
- Drugs: Hematuria can be caused by medications, such as blood thinners, including heparin, warfarin (Coumadin) or aspirin-

type medications, penicillins, sulfa-containing drugs and cyclophosphamide (Cytosan).

- **Glomerulonephritis:** Glomerulonephritis is a family of illnesses that are characterized by inflammation of the glomeruli, the filtering units of the kidneys. Glomerulonephritis is a rare complication of certain viral and bacterial infections (including strep throat). It can also occur in people with certain autoimmune diseases, systemic lupus erythematosus (lupus or SLE) and vasculitis. Sometimes there is no identifiable cause.
- **Bleeding disorders:** These include the family of hemophilias.

Other conditions or diseases can sometimes cause hematuria, related to other medical conditions or medications. No cause is found in some people with transient hematuria.

### *Diagnosis*

Your health care professional will want a sample of your urine to confirm that you have hematuria. In women, blood can get into the urine during menstruation. Your doctor may want to repeat the urine test between periods.

Once it has been confirmed that you have hematuria, he will ask about your medical history and your family's medical history, especially any history of kidney disease, bladder problems or bleeding disorders. Your doctor also will ask about any recent trauma or strenuous exercise, recent viral or bacterial infections, the medications you take, and your symptoms, including more frequent urination, pain with urination and pain in your side.

Your doctor also will examine you. He or she will take your temperature and blood pressure, and will see if you have pain or discomfort in your side or over your bladder. The doctor may recommend that women undergo a pelvic examination, and men undergo a prostate examination.

Your doctor will ask you for a fresh urine sample for a urinalysis. Urine is analyzed in the laboratory to look for protein, white cells and red cells to identify a kidney or bladder infection, or kidney inflammation (glomerulonephritis).

Then, depending on the suspected cause of your hematuria, additional testing may include:

- Urine culture: In this test, a sample of urine is monitored to see if bacteria grow. This test is used to confirm a kidney or bladder infection.
- CT scan of the kidneys, ureters and bladder: In this X-ray test, a dye (also called a contrast medium) is injected into an arm vein. The dye collects in the kidneys and is excreted in the urine, providing an outline of the entire urinary system. An IVP is particularly helpful for identifying kidney stones, though other problems, such as a tumor, can be detected with this test.
- Ultrasound: This test uses sound waves to help establish whether a kidney mass is a non-cancerous (benign), fluid-filled cyst or a solid mass, such as a cancerous tumor. Ultrasound also can identify kidney stones.
- Cystoscopy: In this test, the doctor inserts a flexible telescope into the urethra and passes it into the bladder to inspect the bladder lining for tumors or other problems. This test usually is done with local anesthesia and sedation.
- Blood tests: These can check for signs of urinary tract infection, kidney failure, anemia (which often accompanies kidney problems), bleeding disorders, or abnormally high levels of blood chemicals that can encourage the formation of kidney stones.

Additional testing for conditions causing kidney inflammation (such as lupus) may be recommended, depending on the findings of the routine blood and urine tests.

Evaluation — There are a number of tools available to determine the cause of hematuria. Not all are required for every patient. Decisions about whether to perform various diagnostic tests are based on many factors, such as the patient’s history and age, and the preliminary findings from urinalysis.

- History — there are often clues from the patient’s history that point to a specific diagnosis. For example, pain during urination suggests bladder infection, while pain on one side of the lower back suggests a kidney stone. The medical history will be considered before deciding which tests, if any, is needed.
- Analysis of urine — Laboratory analysis of the various components of the urine gives important clues about the cause of hematuria. This may include urine cytology, in which cells of the bladder and urinary tract, found in a sample of urine, are analyzed. In some cases, urine tests may be repeated every few months for several years.
- Blood tests — Blood tests may be used to look for evidence of kidney or other diseases that can cause hematuria.
- CT scans — Computed tomography, or CT scan, is a radiologic test that examines the structure of the kidneys, ureters, and bladder. Kidney stones or abnormalities of the kidneys, ureter, and bladder can usually be seen with a CT scan. A dye is usually injected into a vein in the hand or arm during the test, which highlights any possible abnormalities.
- Kidney ultrasound — Ultrasonography of the kidney is an alternative to CT scan, and is preferred for people who are allergic to the contrast dye used in CT. Ultrasound uses sound waves to create a picture of the kidney’s structure.
- Cystoscopy — Cystoscopy is a procedure that may be done in an office setting or as a day surgery procedure. A small tube with a camera is inserted into the bladder through the urethra,

where urine usually exits the body. A numbing gel is applied before the tube is inserted, which decreases discomfort.

The physician examines the lining of the bladder to determine if there are any abnormalities. If abnormal tissue is seen, a biopsy can be taken. The biopsy is examined with a microscope to determine if abnormal or cancerous cells are present. Biopsy is only done during surgery, after a patient receives sedative medication to prevent pain.

- Renal biopsy — a small piece of tissue from the kidney is removed and is examined for signs of kidney disease. A full description of renal biopsy is available separately.

Follow up testing — if no cause is found, follow-up urine cytology and urinalyses is recommended for patients at high risk for cancer. A number of factors increase a person's risk of bladder cancer; include age greater than 50 years, cigarette smoking, and chemical exposure. Some healthcare providers also recommend repeat ultrasonography and cystoscopy at one year in high-risk patients with persistent hematuria. On the other hand, low-risk patients with persistent microscopic hematuria of unknown causes can usually be followed with periodic urinalysis and urine cytology.

### *Expected Duration*

How long hematuria lasts depends on its underlying cause. For example, hematuria related to strenuous exercise typically goes away on its own within 24 to 48 hours. Hematuria resulting from a urinary tract infection will end when the infection is cured. Hematuria related to a kidney stone will clear after the stone is passed or removed.

### *Prevention*

To prevent hematuria related to strenuous exercise, switch to a less-intense exercise program. In general, you can help to prevent other

forms of hematuria by following a lifestyle that fosters a healthy urinary tract:

- Stay well hydrated. Drink about eight glasses of fluid daily (more during hot weather).
- Avoid smoking cigarettes, which are linked to urinary tract cancers.

## **Treatment**

The treatment of hematuria depends on its cause. In general, people with exercise-related hematuria do not need any treatment other than to modify their exercise programs. People with drug-related hematuria will improve if they stop taking the medication that caused the problem. Antibiotics typically will cure infection-related hematuria. For other causes of hematuria, treatment may be more complex:

- *Kidney stones:* Smaller stones sometimes can be flushed from the urinary tract by drinking lots of fluids. Larger stones may require surgery or lithotripsy, a procedure that breaks up the stone.
- *Trauma:* Treatment depends on the type and severity of injuries. In severe cases, surgery may be necessary.
- *Tumor in bladder or kidney:* Treatment is determined by the type of cancer and how much the cancer has spread (its stage), as well as by the patient's age, general health and personal preferences. The primary types of treatment are surgery, chemotherapy, radiation therapy and immunotherapy, a type of treatment that stimulates the immune system to fight cancer.
- *Glomerulonephritis:* Treatment may include antibiotics to treat any infection, medications called diuretics that help to increase the amount of urine excreted from the body, medications to control high blood pressure and dietary changes to reduce the work of the kidneys. However, children who develop glomerulonephritis after a streptococcal infection often recover



without any treatment. If it is caused by an autoimmune disorder, such as lupus, medications to suppress the immune system, including corticosteroids or cyclophosphamide (Cytoxan, Neosar), may be prescribed.

- *Bleeding disorders:* Treatment depends on the specific type of bleeding disorder. Patients with hemophilia can be treated with infusions of clotting factors or with fresh frozen plasma, a type of transfusion that provides missing factors.

Call your doctor immediately if you notice blood in your urine or if your urine turns the color of cola. You should also call your health care professional if you have fever or pain in the lower abdomen or side.

### *Prognosis*

Most people whose hematuria is related to exercise, medication, kidney stones, urinary tract infection or prostatitis have an excellent outlook for complete recovery.

Children with hematuria resulting from glomerulonephritis usually recover completely if their illness is mild or if it develops after a strep infection.

Adults with glomerulonephritis are less likely to recover on their own, although the outlook depends on the specific type of glomerulonephritis. More severe forms of the disease eventually can lead to chronic kidney failure.

For people with kidney or bladder cancer, the outlook depends on the stage and type of tumor. In general, if a kidney or bladder tumor is diagnosed early, the cancer often can be cured.

Although people with hemophilia may have repeated bleeding episodes (including bleeding into joints, internal organs and other parts of the body), recent advances in treatment have achieved a near-normal lifespan for many patients.

