

## Audience

This definition is prepared for a council of medical and non-medical professionals. The council includes physicians, investors, attorneys, and insurance professionals who are determining the scope of treatment for a new clinic. The council is considering a list of medical conditions and the possible financial risks associated with treatment of them. They will be preparing a set of guidelines for medical staff to follow before treating a patient in the clinic. Therefore, the definition includes both mild and extreme cases of kidney stones and uses terms that non-medical professionals understand. Little focus is given to therapy and prevention for the purposes of this audience.

1. Prescription for Nutritional Healing (third edition) by Phyllis A. Balch, CNC and James F. Balch M.D.
2. National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) of the National Institutes of Health (NIH) URL <http://www.niddk.nih.gov/index.htm>
3. An article by Rufus Green M.D. What Every Man & Woman Should Know About Kidney Stones URL [http://www.urologyinstitute.com/html/kidney\\_stones.html](http://www.urologyinstitute.com/html/kidney_stones.html)

# Kidney Stones

Kidney stones are accumulations of mineral salts or crystals that form inside the kidney or urinary tract as a result of a urologic disorder. Depending on its size and shape, a kidney stone can lodge anywhere along the urinary tract, cause extreme pain, and restrict urinary flow.

**Size and Shape.** Larger stones found have ranged from the size of a fingernail to a golf ball; smaller stones may be the size of a microscopic spec and may pass through the urinary track undetected. The shape of a stone may contribute to the pain. A stone is more likely to lodge in the urinary tract and cause blood in the urine if it is jagged; a smooth stone is more likely to pass undetected or with minor irritation. *See figure 1.*

*Figure 1. Actual shapes and sizes of kidney stones.*

**The Urinary Tract.** The urinary tract (also know as the urinary system) consists of the kidneys, ureters, bladder, and urethra. *See figure 2.* The function of the kidneys is to remove extra water and waste from the blood and convert these to urine. They stabilize the blood by supplying it with the proper balance of salt and other substances, and produce hormones that help build strong bones and form red blood cells. The function of the ureters is to carry urine from the kidneys to the bladder.

*Figure 2. The urinary tract.*

**Incidence.** Kidney stones occur most frequently in male Caucasians aged 30-50, or in their twenties if prone to kidney stones. The second highest occurrence is in female Caucasians, while children, (with the exception of Asian children), and other racial groups rarely form stones. In the United States, kidney stones occur more frequently in the southeastern and southwestern states known as the sunbelts, possibly because of the likelihood of dehydration. In families with the hereditary tendency to absorb too much calcium, stones are likely to occur and to be calcium based.

An estimated 10 percent of Americans will develop kidney stones. For unknown reasons, the number of people with kidney stones has increased over the past 20 years in the United States. The stones are not merely a modern day disorder since they have been found inside an Egyptian mummy thought to have been alive 7,000 years ago, and also found in the United States among the skeletal remains of one thought to have lived 3,500 years old.

**Reoccurrence.** A person who had a kidney stone is more likely to form another. Adult males have an estimated 50 percent of reoccurrence within 8 years of the first occurrence.

**Causes.** Normally urine contains the substances of uric acid, phosphates, and calcium oxalate that are kept in suspension by secretions and natural mechanisms that control the pH of the urine. The secretions and mechanisms may be overwhelmed or immunity may become depressed disrupting the natural balance of the urine. When the urine's pH becomes unbalanced, the substances may begin to crystallize and the crystals may clump together.

**The Make-up of Stones.** To help determine what disruption of the natural body function caused the stone to occur, the substance of the stone can be examined. Prevention therapy specific to the disorder can be prescribed based on the consistency of the stone. Four kinds of kidney stones and their known causes are:

**Calcium**– About 80% of all stones are made up of calcium oxalate. The tendency to absorb too much calcium can be hereditary. High levels of blood calcium may lead to the metabolic disorder hypercalciuria—an excessive absorption of calcium, often caused by an intake of calcium in the form of a vitamin supplement or a calcium-fortified acid-indigestion aid and less often caused by dairy foods, recent studies show. Other conditions such as Crohn's disease, irritable bowel syndrome, people who have had an intestinal bypass operation, and people who take the HIV protease inhibitor drug called "indinavir".

**Uric acid stones** – These stones form when the volume of urine excreted is too low and/or when blood levels of uric acid are too high, such as in the case of gout.

**Struvite** – These stones are caused by infection and unrelated to metabolism. Women with reoccurring urinary tract infections often develop this type of stone.

**Cystine stones** – These stones are formed due to a metabolic condition that is hereditary. The condition causes too much of the amino acid cystine to be produced, which the urine cannot dissolve.

**Signs and Symptoms.** "Silent stones" are those that cause no pain or obstruction, and may pass through the urinary tract undetected. Milder cases may mimic other ailments such as the stomach flu or gastrointestinal disorders. In serious cases patients may suddenly experience pangs of extreme pain without previous knowledge of a health condition. Symptoms may include:

- Acute pain (at the kidney or radiating from the upper back to the lower abdomen and groin)
- Profuse sweating
- Frequent urination
- Pus and blood in the urine
- Odorous or cloudy urine
- Absence of urine
- Chills and fever

**Diagnosis.** X-ray or ultrasound are used to diagnose kidney stones and to help determine the size and location of stones and the extent of urinary obstruction. A special x-ray test called an IVP (intravenous pyelogram) may be used to scan the urinary tract.

**Treatment.** 95% of kidney stones can be treated without surgery requiring skin incision. Most kidney stones will pass through the urinary tract by drinking plenty of water, 2-3 quarts a day. A doctor may ask a patient to use a special strainer to catch the stone and bring it in for analysis.

Surgery should be considered in circumstances that are more serious such as, if the stone:

- doesn't pass after a reasonable amount of time and causes constant pain.
- is too large to pass on its own or is caught in a place where it is unlikely to pass.
- restricts urinary flow.
- causes reoccurring urinary tract infection.
- damages tissue or causes constant bleeding.
- has grown larger as shown by follow-up x-rays.

Types of treatment include:

**Extracorporeal shockwave lithotripsy (ESWL)** – In this most frequently used procedure, the patient reclines (on a cushion or in a tub of water) while a device creates shock waves outside of the body travel through the skin and body tissues until they hit the dense stones. The stones break down into sand-like particles and are easily passed through the urinary tract in the urine. There are several types of ESWL devices. During this treatment either x-rays or ultrasound is used to help the surgeon monitor the stone during treatment. For most types of ESWL procedures, anesthesia is needed, recovery time is short, and most people can resume normal activities in a few days.

**ESWL complications** –Blood will occur in the urine for a few days after treatment. Bruising and minor discomfort of the back or abdomen from the shock waves are also common. Patients should avoid taking aspirin and other drugs that affect blood clotting for several weeks before treatment.

Another complication may occur if the shattered stone particles cause discomfort as they pass through the urinary tract. In some cases, the doctor will insert a small tube called a stent through the bladder into the ureter to assist the fragments to pass. Additional treatments may be needed if the stone did not completely shatter.

**Percutaneous Nephrolithotomy-lithotripsy (PCN)** – This treatment is often used when the stone is quite large or in a location that does not allow effective use of ESWL.

During PCN, a tiny incision is made in the back directly into the kidney. Using an instrument called a nephroscope, the surgeon locates and removes the stone. For large stones, some type of energy probe (ultrasonic or electrohydraulic) may be needed to break the stone into small pieces. Generally, patients stay in the hospital for several days and may have a small tube called a nephrostomy tube left in the kidney during the healing process. An advantage of PCN over ESWL is that the surgeon removes the stone fragments instead of relying on their natural passage from the kidney. Anesthesia is needed for this procedure and recovery time may be 2 weeks.

**Ureteroscopy** – This procedure may be used for stones that reside in the mid- and lower-ureter. No incision is made in this procedure. Instead, the surgeon passes a small fiberoptic instrument called a ureteroscope through the urethra and bladder into the ureter. The surgeon then locates the stone and either removes it with a cage-like device or shatters it with a special instrument that produces a form of shock wave. A small tube or stent may be left in the ureter for a few days to help the lining of the ureter heal. Anesthesia is needed for this procedure and recovery time may be a few days.

Before fiber optics made ureteroscopy possible, physicians used a similar "blind basket" extraction method. But this outdated technique should not be used because it may damage the ureters.