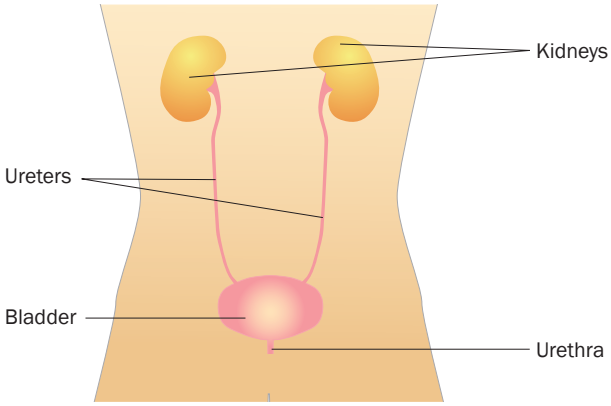
KidneyStone
PREVENTION GUIDE

WHAT ARE THE KIDNEYS?
The kidneys are a pair of organs shaped like kidney beans that lie on either side of the spine just above the waist. Each kidney is about the size of a fist. Inside each kidney are tiny tubes (tubules) that filter and clean the blood, taking out the waste products and making urine. The urine that is made by the kidney passes through two tubes called the ureters into the bladder. The kidneys also make substances that help control blood pressure and the production of red blood cells.



WHAT IS A KIDNEY STONE?
Kidney stones are crystal-like structures formed in various parts of the urinary tract. They are made of salts, minerals and other substances normally found in the urine that adhere together and build up on the inner surfaces of the urinary system.

The four most common types of kidney stones are:

- Calcium: 85% of stones are composed predominantly of calcium compounds. Excess calcium in the urine is the most common cause of calcium stone production.
- Uric acid: These stones may form if the uric acid level in the urine is high, or too much uric acid is excreted in the kidney and doesn't remain dissolved.
- Struvite: Bacteria in the urinary tract release chemicals and neutralize acid in the urine. This enables bacteria to grow more quickly which may cause a urinary tract infection. Infection affects the chemical balance of the urine, which may form a struvite stone.
- Cystine: Some people inherit a rare, congenital condition that results in large amounts of cystine (an amino acid in protein) in the urine, which may cause cystine stones.

WHAT CAUSES A KIDNEY STONE?
Urine is made up of a normal chemical balance of water, salts, minerals and other substances. A change in this balance can lead to kidney stone formation. The most common cause of kidney stones is decreased fluid intake (dehydration). When you become dehydrated, the salts, minerals and other substances in the urine are more likely to stick together and form a stone.

WHAT ARE THE SYMPTOMS?
Kidney stones can be as small as grains of sand or as large as golf balls. They are often painless in the kidney but may cause sudden, severe pain as they travel from the kidneys to the bladder. The pain may be steady or come in waves and may be associated with nausea or vomiting. Stones can block the flow of urine or cause bleeding so the urine looks pink or red.

WHAT ARE THE RISK FACTORS?
Approximately one person in 200 will form a kidney stone this year, totalling more than one million cases in the United States. Kidney stones strike typically between the ages of 20 and 40. Once a person gets a stone, there is a 50% chance of another stone forming in five to 10 years. Studies have found the following risk factors for kidney stones:

- Age
- Gender
- Race
- Season
- Activity level
- Family history and genetics

HOW ARE KIDNEY STONES DIAGNOSED?
Most often, kidney stones are found on an x-ray or sonogram taken on someone who complains of blood in the urine or sudden pain. These diagnostic images give the doctor valuable information about stone size and location. The doctor may decide to scan the urinary system using a special x-ray test called an intravenous pyelogram (IVP).

Your doctor may ask you to collect your urine for 24 hours. The analysis of this sample will help to evaluate why your kidney stones are forming, and whether you may have more stones in the future.

WHAT TREATMENT OPTIONS ARE AVAILABLE?
Approximately 80% of the stones will pass spontaneously, while the remaining 20% will need treatment.

Stones nearly always form in the kidney, where they may remain without symptoms and do not require treatment. Or they may break loose and try to pass with the normal flow of urine through the urinary tract. If a stone becomes obstructed in the urinary system, your doctor will probably suggest medical treatment:

- Extracorporeal Shock Wave Lithotripsy (ESWL): Uses shock waves that pass easily through the body but are strong enough to break up a kidney stone.
- Ureteroscopy: The physician passes a thin tube (ureteroscope) up the urinary track and uses instruments to remove the stone or break it up for removal.

Stone Analysis is an essential step in the treatment of kidney stones.

Knowledge of the chemical structure and core of the stone can prove helpful in the planning of medical treatment.

If your physician requests a 24-hour urine analysis, a variety of treatment options may be recommended for any abnormal conditions found.

Please refer to the chart below.

HOW CAN I PREVENT KIDNEY STONES?

Each patient is different, but here are some basic guidelines to prevent future stones:

- Drink enough water to produce at least 2.5 liters of urine per 24-hour period.
- Follow your physician's advice on any diet or lifestyle changes.
- Take your medications every day and in the amounts prescribed by your doctor.
- Follow-up routine chemistries indicate whether medications and diets are working. Always collect urine samples at your doctor's requests.
- If you pass any stone material, be sure to give it to your doctor for analysis.
- Be sure to have periodic x-rays to monitor the growth or formation of new stones, as your doctor recommends.

ADDITIONAL RESOURCES

American Urological Association (AUA)
www.urologyhealth.org

The Mayo Clinic
www.mayoclinic.org

The Urology Channel
www.urologychannel.com

Urohealth.org
www.urohealth.org

UroToday.com
www.urotoday.com

TESTS OFFERED BY BOSTWICK LABORATORIES

Bostwick Laboratories offers a number of tests to help analyze your kidney stones and assist in preventing them in the future. Ask your doctor which tests he feels are right for your situation.

Kidney Stone Analysis
Your kidney stones are analyzed to determine the chemical structure, to ensure proper treatment.

UroMax24® (24-Hour Urine Analysis)
Bostwick Laboratories offers an easy-to-use, take-home kit for patients to perform this test. The sample is analyzed by our medical technologists and the findings are reported to your physician, along with a detailed patient education report.

ABOUT BOSTWICK LABORATORIES

Bostwick Laboratories® is a full-service reference laboratory specializing in uropathology.

Dr. David G. Bostwick and our staff of veteran pathologists are dedicated to the diagnosis, treatment and management of prostate cancer, kidney disease, cancer of the bladder and other urologic conditions.

These internationally-renowned board-certified pathologists use the most technologically advanced testing available to ensure accuracy.

Our quick turnaround on reports affords you and your doctor the time you need to choose the best course of treatment.

Treatment Options

Abnormal 24-Hour Urine Test Results	INCREASE FLUID INTAKE	REDUCED ANIMAL PROTEIN DIET (fish, red meat, poultry)	REDUCED OXALATE DIET	REDUCED SALT DIET	REDUCED FAT DIET	REDUCE DAIRY INTAKE	ALLOPURINOL	BINDING AGENTS (magnesium, ferrous sulfate, ortho-phosphatase)	BINDING AGENTS (tiopronin, penicillamine, alpha-mercaptopropionyl glycine)	CALCIUM SUPPLEMENTS	CITRATE SUPPLEMENTS	MAGNESIUM SUPPLEMENTS (caution when used in patients with renal insufficiency)	PHOSPHATE SUPPLEMENTS	POTASSIUM SUPPLEMENTS	THIAZIDE THERAPY	REDUCE URINE ACIDITY (potassium citrate, sodium bicarbonate, potassium bicarbonate, citric acid)	REPEAT 24 HR URINE TESTING (weeks or months after treatment)	MONITOR URINE pH	BLOOD TESTS	RADIOGRAPHIC STUDIES (IVP, KUB, CT, US, MRI)
ABNORMALLY LOW pH	X	X														X			X	
HIGH SODIUM	X			X													X			X
HIGH URIC ACID	X	X		X			X				X					X	X	X	X	X
HIGH CALCIUM	X	X	X	X	X						X		X		X	X	X		X	X
HIGH PHOSPHORUS	X	X		X													X		X	X
LOW MAGNESIUM	X											X					X		X	X
HIGH OXALATE	X	X	X	X	X			X		X						X	X		X	X
LOW CITRATE	X	X		X							X			X	X	X	X	X	X	X
HIGH SULFATE	X	X																		X
HIGH CYSTINE	X	X				X			X							X	X	X		X

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