

October 23, 1981

# News

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\* \* \*Kidney stone classification and  
selective therapy work

DALLAS--The pain is excruciating. Some people say that it is worse than childbirth. Many people live in constant dread of passing their next kidney stone.

Now, a scientist at The University of Texas Health Science Center at Dallas is reporting success in suppressing formation of stones. Dr. C.Y. Pak, director of the General Clinical Research Center and professor of Internal Medicine at the health science center says the method involves careful diagnosis and selective therapy tailored to the various causes of kidney stone formation.

Results of Pak's work are published in the October issue of the "American Journal of Medicine" article "Selective Therapy of Recurrent Nephrolithiasis." Another article relating to his work, "A Cautious Use of Sodium Cellulose Phosphate in the Management of Calcium Nephrolithiasis," is published in the October issue of "Investigative Urology."

The problem of nephrolithiasis or renal (kidney) stone disease has existed since antiquity, says Pak. Some stones form from crystalline calcium salts, others from minerals. Beginning in the kidneys, they are rough and spiny and when they move through the urinary tract they may be expelled or they may obstruct urine flow and require emergency surgery.

Effective treatment has been slow in coming, says Pak, and, to date, the causes have been virtually unknown. Even today, persons having a history of kidney stones can, while undergoing the traditional treatments, expect as high as a 70 percent chance of recurrence.

Helping to reduce this 70 percent recurrence rate has been the goal of the ongoing study Pak originally started at the National Institutes of Health in 1968. He has continued the study at the health science center since 1972, supported by NIH's Special Center of Research (SCOR) project and the General Clinical Research Center.

Because the causes for kidney stones have not previously been well-defined -- indeed, the 1981 edition of Taber's Cyclopedic Medical Dictionary cites that the "cause of most kidney stones is unknown" -- Pak says all cases have traditionally been treated the same.

As an endocrinologist, he says he began questioning this rationale because he believed there must be many causes for the disorder, all ultimately relating to the body's endocrine or hormonal system.

"We decided to take a very logical look at the problem," Pak explained. "Our first goal was to define the causes. To do this, we began looking at cases individually."

Working with 241 patients, the scientists found that most could be categorized by the mineral make-up of the stones they suffered from. Formers of calcium stones, resulting from high calcium in the urine, comprised the largest group.

In the high urinary calcium group the researchers arrived at three types. The first, called resorptive hypercalciuria, occurs when there is an excessive resorption or destruction of the bone. The most common cause of this disorder, Pak explained, is an excess of parathyroid hormone resulting from a tumor on the parathyroid gland. Surgery to remove the tumor can usually correct the problem.

The second category is absorptive hypercalciuria. In simple terms, Pak says the disorder is caused by an increased absorption of calcium from food, by far the most common cause of kidney stones in the test group. Some of these patients have more severe variations of the disorder than others. Depending on the severity, treatment may range from simply modifying the diet to long-term drug therapy.

(over)



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The third type is classified as renal hypercalciuria. "This results from a defect in the kidney that causes these patients to leak calcium into their urine," Pak explained. "It is also correctable with drug therapy."

Patients suffering from kidney stones made up of another mineral, called oxalate, comprise a second group. The disorder is called hyperoxaluria and there are a variety of causes.

"The most common cause relates to patients who suffer from a bowel disease or abnormality," Pak explained. "Persons who have small bowel disease, intestinal resections or small bowel inflammations may excrete excesses of oxalate into their urine."

"Persons who have had intestinal bypass surgery for morbid obesity are also candidates for these kinds of stones," Pak explained.

Another broad group the researchers define as high urinary uric acid or hyperuricosuria. Often this is the result of too much meat in the diet. But it can also be a genetic problem.

Pak says about ten percent of the patients he treats show no metabolic abnormality.

"In these patients we can't find anything metabolically wrong. But we do find an important acquired problem."

"Most don't like to drink water. Their urine volume is very low and we think stone formation is caused by urinary concentration from inadequate fluid intake. These patients have to learn to drink more fluids."

Detecting the causes of renal stone disease is very simple, Pak says the total workup involves only three visits.

At the first visit, the patients are asked to collect a 24-hour urine sample while on their customary diet and fluid intake. They are then asked to follow a diet that is restricted in calcium and sodium for one week. At the end of the week another 24-hour urine sample is collected.

The urine samples are analyzed for calcium, oxalate, uric acid concentration and other common constituents.

At the third collection, a test Pak calls "fast and load" is done. The first urine sample is taken after a patient has fasted 10-12 hours. The patient is then asked to drink a "milk shake" containing one gram of calcium and another collection is taken.

"The fasting test can tell us if the patient has renal hypercalciuria. If the calcium in the urine is high when they are fasting and blood calcium is normal, this indicates that they are leaking calcium into the urine."

"If the urinary calcium level, after the patient has taken large amounts of calcium by mouth, is abnormally high, this finding provides indirect evidence of excessive calcium absorption."

Pak says the blood tests for parathyroid hormone, calcium and uric acid readings are also part of the workup.

Symptoms for kidney stones are bloody urine, pain and infection. And Pak says the disorder is much more common than originally thought, hospitalizing one out of every 1,000 Americans yearly.

"Not only do these people have to contend with the pain and expense of their disorder, many have trouble keeping a job and maintaining a family," Pak explained.

Robert Whittington, who has absorptive hypercalciuria, is a prime example of the effects of the disorder.

As a young man, Whittington was a typical All-American "steak and potatoes" eater. Not knowing that his body could not tolerate large quantities of calcium, his dinners would often consist of a large glass of milk, meat, potatoes or beans and ice cream for dessert.



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The kind of food Whittington believed was appropriate for a young, active person cost him years of pain and hospitalizations for renal kidney disease. He says the constant threat of stones put a hardship on every facet of his life.

For 16 years following his first operation to remove a kidney stone, he had surgery about every two years. His case is one of numerous misdiagnoses resulting in years of ineffective treatment.

Whittington now follows a treatment plan developed by Pak. By modifying his diet, increasing his fluid intake and following Pak's drug regimen he has been free of kidney stones for eight years.

For research in the future, Pak hopes to conduct studies to separate effective treatment from a possible placebo effect. To do this he plans to conduct randomized studies and to follow patients who don't follow drug therapy programs but do modify their fluid intake and diet.

"Our point is this. Even if the placebo effect does exert a great influence, we believe our approach is a rational one, justifiable on the basis of reduced potential side effects.

"Because we are selecting a treatment directed at causes of renal stone disease, the possibilities for side effects, we think, should be less than if the patients are treated more randomly. Moreover, the possibility that the treatment we've selected takes care of the total patient rather than just the stone formation, we think, makes it superior to traditional methods."

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