

# The International Kidney Stone Institute: Research in Stone Disease

## *Case for Financial Support*

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### **Mission**

The International Kidney Stone Institute (IKSI) is a charitable organization established to raise funds for clinical and basic science research, and education for the prevention, detection, and management of kidney stone disease. Further, it is the goal of the International Kidney Stone Institute to promote the highest standards of urological clinical care.

### **Vision**

The vision of IKSI is to eliminate the suffering caused by kidney stone disease.

### **What is Kidney Stone Disease?**

Kidney stones can develop in both kidneys. Kidney stones form from various types of minerals in the urine. Stones can be rough, smooth, small or very large, and are extremely painful and very damaging to kidney tissue. Stones can form at any age and result in a lifetime of constant severe pain and continuing treatment, much of which provides only nominal relief. Recent research has delivered an exciting burst of progress toward a cure but there is not yet a cure.

### **The International Kidney Stone Institute Researchers and their Collaborators Lead the Way in Kidney Stone Research with Significant Accomplishments**

- First use of shock wave lithotripsy to treat stone patients in the United States
- Training of over 500 urologists in the techniques of shockwave lithotripsy (SWL)
- First center for independent evaluation of lithotripsy devices
- Major referral center for minimally invasive surgery to remove stones
- Founded the largest Midwest clinical laboratory for urine and blood chemistries for stone patients
- First use of computerized tomography (CAT scans) to identify mineral composition of stones
- First evidence that mineral deposits in kidney tissue are sites of stone formation
- NIH grant awards in lithotripsy research of over 14 million dollars (since 1994)
- NIH support in metabolic stone disease of over 8 million dollars (since 1998)
- IKSI research team includes over 40 physicians, cell and molecular biologists, physiologists, physicists and biomedical engineers at ten major Universities and clinical centers worldwide
- Team members (both program investigators and fellows) Brian Matlaga, M.D. and Nicole Miller, M.D. were awarded the Olympus Best Overall Paper (out of 1,600 papers) entitled "Calcium oxalate stones are frequently attached to Randall's plaque" published in *The Journal of Urology* in May 2006

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### Funding the Cure

IKSI researchers and their collaborators have been very successful in gaining competitive funding from the National Institutes of Health (NIH). This funding has sustained the laboratories of our researchers and collaborators for over thirty years, helping them drive toward discovery—unlocking a flood of new ideas and scientific challenges. Our research effort has grown and we are poised to expand our studies to areas that promise significant benefits from new treatment protocols and the ultimate cure of the disease.

In order to expand and accelerate the research of IKSI, its investigators have initiated efforts to achieve funding from public and private foundations to supplement the NIH support in which they and their collaborators have already successfully competed.

IKSI believes there are three key areas that must be supported in the search for the cure of kidney stone disease:

#### **I. Basic Science and Clinical Research on the Origins and Treatment of Stone Disease**

##### ***A. Randall's Plaque and the Prevention of Stone Formation***

Randall's plaque is a mineral deposit in the kidneys of patients with calcium oxalate stones, the most common type of kidney stone. IKSI researchers and their collaborators have established that plaque deposits are the primary event in stone formation and that the stones most patients pass are merely secondary overgrowth on plaque. If the cause of plaque could be determined and plaque prevented, most kidney stones would never occur. For this reason, IKSI researchers have targeted the mechanism of plaque formation as a main research goal and propose to undertake studies of this matter at the cellular, molecular and gene level so that new treatments can be devised and stone disease can be prevented.

*"We think that plaque may well be bone formation in kidney tissue, just as atherosclerosis is bone formation in the great vessels, and we want to prove this and find ways to stop it."*

Andrew P. Evan, Ph.D.  
IKSI Founder and Director  
Indiana University School of Medicine

##### ***B. Improving Lithotripsy***

Lithotripsy is a non-surgical procedure that uses machine generated shock waves to crush kidney stones into sand-like particles that can more easily pass out of the body. It is the treatment of choice among urologists worldwide. However, because lithotripsy treatment increases the risk of kidney damage and can be associated with significant side effects, researchers at IKSI are focused on all aspects of the injurious effects of lithotripsy. Our research into the fundamental mechanisms of shock wave effects on stones and kidney tissue is essential to improving both the treatment protocols for lithotripsy patients and lithotripter devices.

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*“The exciting part for me is not only knowing that we are using the safest and most effective lithotripter in the country, but that, because of our research, we are able to help in the design and development of the most effective new machines.”*

James E. Lingeman, M.D.  
IKSI Founder and Director  
Methodist Urology

### ***C. Genes and Diet Act Together to Cause Most Kidney Stones***

Kidney stones form from minerals in the urine and the composition of the urine is controlled by the interactions between who we are (our genes) and what we eat. On the whole, compared to normal people, stone formers lose much more of the calcium they eat in their urine and that extra calcium leads directly to stones forming over Randall’s plaque. The genetic condition that causes such high urine calcium also places them at great risk for bone disease if calcium is removed from their diet, so they face a life-long dilemma – stones or bone disease, or even both. Right now our only treatments are indirect and only partially effective because understanding the genetic calcium disorder that causes stones and bone disease is incomplete. Because 15 million Americans form stones, and this number is increasing, such research is an urgent matter.

*“In the genomic age it seems a pity we have not already solved the problem of stone formation; it is about time.”*

Fredric L. Coe, M.D.  
Renal Stone Development Program Leader  
University of Chicago

## **II. Educational Initiatives in Kidney Stone Disease**

IKSI is dedicated to serve as a resource to physicians, researchers, patients and the general public. In order to facilitate our educational goals, IKSI will focus on two immediate initiatives:

### ***A. IKSI – 2008 International Urolithiasis Research Symposium***

The sharing of knowledge among scientists, researchers, and physicians worldwide directed toward improving diagnosis, enhancing treatment, and leading to the cure of kidney stone disease is facilitated by IKSI through our seminars.

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After the first highly successful International Urolithiasis Research Symposium in November 2006, IKSI will once again sponsor an international symposium on the biology of stone disease and the treatment and medical management of stone patients on April 17<sup>th</sup> and 18<sup>th</sup>, 2008. The symposium includes a formal scientific forum for physicians and scientists to share their most current research.

#### ***B. IKSI – Website***

The IKSI website can be accessed at [www.iksi.org](http://www.iksi.org). IKSI has developed an on-line reference and resource database with the most current information on kidney stone disease by concentrating on three key areas:

- Research...toward a cure
- Clinical Resources...unsurpassed patient care
- Education...for Patients, Physicians and Researchers

Of particular importance, education of the patient through interaction with physicians and acquiring knowledge from the world-wide web and other resources, such as attending seminars and workshops is critical to the disease's management. The IKSI website concentrates on educating patients in the prevention, detection, and management of kidney stone disease. The website, designed to be "patient-friendly", allows a multitude of information to be available to the public.

### **III. Infrastructure to Drive Scholarship and Excellence in Stone Disease Research**

#### ***A. Endowed Named Professorships and Fellowships***

The research effort in stone disease must capture the imagination of our best physicians, scientists, and researchers. Every effort must be made to encourage young scientists to pursue the challenges of stone research, and to give our finest established investigators the time necessary to guide competitive, high-yielding research. The Institute will support this effort through the establishment of perpetuating resources to fund salaries and expenses.

#### ***B. Programmatic Giving***

There are many ways to give. We welcome contributions to our general fund and/or donations to support specific research projects. For more information, or to make a donation, please visit our website at [www.iksi.org](http://www.iksi.org) or contact **Hillary McCarley** at 317-962-0647.