



It has a *low-volume* 2-gram (40 mg) starting dose.¹

FORTESTA
(testosterone) Gel e

FULL PRESCRIBING INFORMATION >

IMPORTANT SAFETY INFORMATION AND INDICATION
INDICATION
FORTESTA® (testosterone) Gel is an androgen indicated for replacement therapy in adult males for conditions associated with

[Print This Article](#)

<< Return to [Better Lithotripsy On the Horizon: An Interview with James E. Lingeman, MD](#)

Better Lithotripsy On the Horizon: An Interview with James E. Lingeman, MD

[Delicia Honen Yard](#)

November 15 2011

A leading authority on kidney stone disease, James E. Lingeman, MD, of Indiana University Health, updates Renal & Urology News on the state of urinary stone treatment, including a possible rebirth of extracorporeal shock wave lithotripsy and the pursuit of the “holy grail” in flexible ureteroscopy.

Extracorporeal shock-wave lithotripsy (ESWL) has been the gold standard for the treatment of urinary-tract stones, but are we moving away from that approach in favor of flexible ureteroscopy or another technique?

Dr. Lingeman: Shock wave lithotripsy is still probably the most common treatment done in the U.S. for most stones. The peculiar circumstance here is that while we always assume that technology is going to improve, that hasn't been the case with lithotripsy. And the reason is that the companies that built these machines starting back in the 1980s didn't really understand how they worked, so it was hard for them to improve them.

Dornier, which is a German company [www.dornier.com], built the first lithotripter, and did a brilliant job. When they tried to change it and improve it, they were unable to improve it because they didn't understand the basic physics of how it worked. In fact, it got worse, progressively, as they tried to change things. It changed, but not for the better.

The reason we know that [the attempted improvements] were on the wrong track is that we [Dr. Lingeman and fellow researchers at Indiana University School of Medicine] have had a grant from the National Institutes of Health for about 20 years looking at the basic science of shock wave physics and how it works. And we've learned a lot of things that the original developers have only recently acknowledged to be correct about the way in which lithotripsy works.

Now that we've gained so much knowledge since the lithotripter first came into use in the early 1980s, can't we just make our own improved version?

Dr. Lingeman: We actually are thinking about building our own lithotripter. There is one very small company in Germany [trtlc.com], headed by an engineer who started with Dornier 30 years ago. He's attended some of our research meetings and understands what we want. He has built and is marketing a machine in the United States that is, we feel, a better concept than the other machines.

What makes it better?

The original lithotripter, which we actually still use at Methodist Hospital—we've tried others; they haven't worked as well so we kept the old one—has a very wide focus so that when the shock wave is targeted on the kidney stone, there's a large area [receiving shock waves]. That makes it relatively easy to hit the stone. Most newer machines have very small focal zones, and because patients breathe and the kidney therefore moves during treatment, it becomes quite a challenge to keep the shock wave targeted on the stone. So that's a problem.

A second problem is that the newer lithotripters have much higher pressures in their focal zone, and this is damaging to renal tissue, particularly if you're missing the stone much of the time as you do with small focal zones.

What we've learned from our research is you don't need these high pressures to break up kidney stones. The Lithogold, manufactured by TRT, employs a broad focal zone but with low pressures in the focal zone. It produces minimal tissue effects on the kidney, but still breaks up stones so it's a better balance between safety and efficacy, in my opinion.

Where does flexible ureteroscopy fit into the picture?

Dr. Lingeman: Ironically, in the field of ureteroscopy, there have been steady advancements over the last two decades more along the lines of what we would expect to happen with medical technology. As the endoscopes that we've used have gotten smaller, they've gotten better. We have very good lasers and other devices that we use with these, and as it turns out, you can now basically treat most stones [with flexible ureteroscopy].

Ureteroscopy started around the same time as shock wave lithotripsy, and at that time our instruments were large and rigid—inflexible—so you couldn't get them up into the kidney. You could only treat stones in the lower ureter. But now these instruments are flexible and they're small. We can run them up into the kidney. Now, any stone that you can treat with ESWL, you can treat with flexible ureteroscopy and a laser. Ureteroscopes have become increasingly popular, and the technology is much, much less expensive than ESWL.

So why even bother improving ESWL?

Dr. Lingeman: For properly selected patients, ESWL is attractive because it is non-invasive. Both ESWL and ureteroscopy typically are done under anesthesia, so there's not much difference there. Some people say you can do ESWL with just a sedative, but in the United States, few patients are treated that way. Almost everybody goes to sleep. This way, the doctor can control the patient's respiration and therefore the movement of the kidney, so the stone is hit more effectively and the results are better.

A significant disadvantage of flexible ureteroscopy is that we usually have to leave a ureteral stent afterwards, because passing our telescopes through the small ureter tubes can cause swelling, which may result in temporary obstruction. To prevent that, we leave a stent, typically for a few days to a few weeks. Stents are irritating. Most patients dislike them, so that's a disadvantage of ureteroscopy.

Are any other techniques used to treat urinary tract stones?

Dr. Lingeman: For most patients, the common procedures are ESWL and ureteroscopy. Patients with large stones—greater than 2 cm—are treated with another minimally invasive procedure called percutaneous stone removal. It goes by several different names, but that's a good generic name for it. We make a 1 cm incision in the flank and insert a tube into the kidney, which allows us to insert our endoscope directly into the kidney. The advantage of that procedure is we can use larger instruments and we can remove stones much more efficiently that way.

How popular is percutaneous stone removal?

Dr. Lingeman: It actually was introduced a couple of years before ureteroscopy. It's been around for a long time, and the techniques have been refined over the years. It's increasing slowly in popularity as more physicians become more comfortable doing it. Most urologists don't do the procedure because it is more complicated technically. Fortunately, most kidney stones are relatively small and can be treated successfully with either ESWL or ureteroscopy. It's a very rare patient that would need a traditional type of open surgery these days.

What about medical expulsive therapy?

Dr. Lingeman: Medical expulsive therapy is the use of medications to facilitate stone passage. Most kidney stones are small and will pass on their own, albeit not without some discomfort for the patient. There is evidence to suggest that certain medications will help the stone pass more quickly if the stone is not too large. Now,

understand that medical expulsive therapy is not an established indication for these medications, according to the FDA.

What sort of medications would be used for this?

Dr. Lingeman: Primarily alpha blockers. They are used for hypertension and for benign prostatic hyperplasia, but there's some evidence that suggests these agents might be helpful in passing ureteral stones.

What is your opinion?

Dr. Lingeman: I use alpha blockers. Most urologists do. But there has not been a well-done-enough study to qualify these drugs to have this indication added by the FDA. The FDA requires high-quality data, and I don't believe such data exist. Most of the trials that have been published to date are small trials from Europe, and I would not classify the data as definitive. I would say it's suggestive; these drugs are quite safe, so we commonly use them because if there is some evidence to suggest that they're helpful, then it seems like it's a reasonable thing to do.

Would you like to see more studies in this area, or do you think researchers' time is better spent elsewhere?

Dr. Lingeman: We do need more data—especially U.S. data. There are ongoing trials. I would say that most of the studies that have been published on this have been positive studies, meaning that they have found a benefit.

How do you see stones being treated in five or 10 years?

Dr. Lingeman: Well, the holy grail for us in urology is finding a stent that doesn't hurt. Some people tolerate the stents quite well, but many are miserable with them. It's completely different than with vascular stents. The inside of the urinary tract is very sensitive. The stents are temporary, fortunately, but they can interfere with the patient's ability to work and function. Companies have spent tens of millions of dollars trying to find a more comfortable stent. If we could find a stent that didn't hurt, then I believe that most patients would be best managed with flexible ureteroscopy and the holmium laser.

Why is that?

Dr. Lingeman: Because the ESWL machine might come only once or twice a month to your hospital, so if you have a stone, you have to wait, whereas most hospitals have flexible ureteroscopes; they're continuously available.