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# KTP versus Holmium

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## Overview

Laserscope (LSCP) has recently been promoting a Photoselective Vaporization of the Prostate (PVP) technique with the Niagara Laser—a frequency-doubled Nd:YAG (532-nm) KTP system. It has already been proven that the holmium ablation (HoLAP) technique does everything that PVP claims to do. In addition, the holmium laser fragments stones and provides all the benefits of being a versatile multi-application system.

## Advertised claims

### *LSCP Statement*

PVP is a minimally-invasive procedure that can be performed using a standard cystoscope under endoscopic visualization, in an outpatient setting. It is easy to learn and perform with an average operative time of under 20 minutes.

### *Lumenis Response*

These benefits are comparable to holmium ablation. The holmium ablation technique is not to be confused with enucleation, which has a more difficult learning curve. Holmium ablation has been proven as an easy to learn outpatient procedure, with a laser time averaging about one minute per gram of tissue removed. Also, KTP uses water as the irrigating fluid. Holmium uses saline as the irrigant, which reduces the possibility of fluid absorption.

*Note: Vaporization/ablation techniques are generally not considered particularly efficient for the rapid removal of large amounts of tissue. So, larger prostates may be completely vaporized with both wavelengths but removing all obstructing tissue will take longer than removing a smaller amount of tissue. Both wavelengths may be used to create a channel or ablate tissue to capsule, with surgical time dependent upon the amount of tissue removed.*

### *LSCP Statement*

PVP works by delivery of laser energy through specially-designed fiber optic delivery devices to quickly and gently vaporize tissue and remove it completely and bloodlessly.

### *Lumenis Response*

These benefits are comparable to holmium ablation. Using this technique, the holmium laser energy is delivered endoscopically through a 550-micron DuoTome SideLite™ Delivery Device. The “Moses effect”, which allows laser penetration up to 0.5 mm in tissue, provides controlled ablation and hemostasis with minimal risk of surrounding tissue damage. The side-firing device delivers the red aiming beam and treatment energy at a 70° angle in relation to the fiber tip so the endoscope can simply be moved back and forth until the prostatic tissue is ablated and an adequate channel is created.

### *LSCP Statement*

PVP comes with few, if any, side-effects, has low to no catheterization times, and shows immediate post-operative symptom relief with dramatic improvements in AUA symptom scores, flow rates, and post-void residuals.

### *Lumenis Response*

These benefits are comparable to holmium ablation. The procedure is a highly effective technique of instantly removing tissue, leading to immediate patient symptom relief and reduction of AUA symptom scores. Patients are routinely released in less than 24 hours, and without a catheter. Additionally, the procedure is performed with little, if any, fluid absorption or loss of blood.

## Spoken claims

### *LSCP Statement*

PVP shows a lower occurrence of retrograde ejaculation.

### Lumenis Response

Retrograde ejaculation is a side-effect that is dependent on technique, not on wavelength. It occurs when the sphincter muscle at the bladder neck is cut during a procedure regardless of the energy source used. Retrograde ejaculation for TURP has been reported to be around 85%. Less invasive techniques like ablation and incision will generally have lower rates of retrograde ejaculation. Rates of 32%<sup>1</sup> at 3 months for holmium ablation and 10%<sup>2</sup> at two years for holmium BNI have been reported. Retrograde ejaculation of 29% at 3 months to 9% at two years have been reported for PVP<sup>3</sup>.

### LSCP Statement

KTP laser light penetrates 1-2 mm instead of 0.5 mm. This helps reduce the procedure time when compared to holmium.

### Lumenis Response

While KTP does penetrate farther than holmium, the volume of ablated tissue for the two wavelengths is roughly equivalent. Ablation and vaporization of tissue works on the physical principle of photothermal interaction, which occurs in three steps: (1) tissue molecules absorb the laser light, (2) become excited, and (3) transform the additional energy into localized heating.

Table 1 summarizes the effects of various tissue temperatures, which can range from hyperthermia to melting. In order for tissue to be ablated, it must reach a temperature of 100° Celsius. A tissue temperature less than 100° gives a coagulative effect, which is not sufficient to vaporize or remove the tissue.

Because the mechanism for tissue absorption differs for the 532 and 2120 nm wavelengths, the temperature gradient created by a single pulse of laser energy is different as well. Assuming a spot size of 550 microns

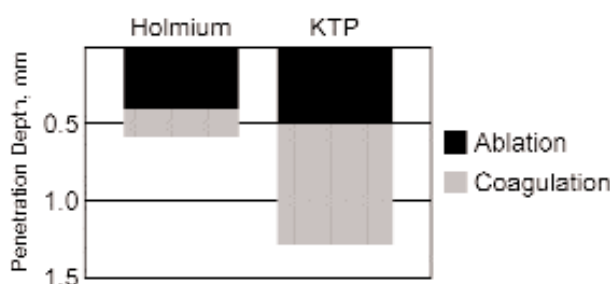
Temperature Threshold °C	Biological Effect
37°	Body temperature
45°	Hyperthermia
60°	Coagulation
100°	Vaporization
150°	Carbonization
300°	Melting

**Table 1: Biological effects of photothermal interaction.**

and pulse energy of 3 Joules for holmium (about 75W), and a spot size of 600 microns and pulse energy of 2 Joules for KTP (about 80W), the estimated ablation depth is 0.4 mm for holmium and 0.5mm for KTP, and the estimated coagulation depth is 0.6 mm for holmium and 1.3 mm for KTP (Figure 1).

In summary, tissue ablation is roughly equivalent with holmium and KTP. However, the 532-nm wavelength penetrates below the visible tissue surface. Because holmium provides a “what-you-see-is-what-you-get” tissue effect, there is less risk of thermal damage to surrounding tissue.

While both holmium and KTP are effective for treating BPH, holmium has the added versatility of performing across multiple specialties and treating other urology conditions including strictures, tumors and stones.



**Figure 1: At comparable power the volume of tissue ablated with Holmium and KTP is comparable.**



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