MULTIPULSE®

THULIUM FIBER LASER

JENA SURGICAL

LASER AT YOUR SIDE

MULTIPULSE® TFL

PRECISION YOU CAN SEE.
POWER YOU CAN CONTROL.

JenaSurgical introduces the next-generation **thulium fiber laser** intended for use in **surgical procedures,** including the dusting of calculi in the urinary and biliary systems and the incision or excision, resection, ablation, vaporization and coagulation of soft tissue. Developed by **JenaSurgical,** the MultiPulse TFL provides a wide range of pulse settings, fiber compatibility and energy delivery modes to meet the highest standards of modern laser surgery.

With **the highest peak power of 1,378 W available on the TFL market*,** the MultiPulse TFL introduces a new level of surgical efficiency, reduced retropulsion and enhanced control for the surgeon.

*Based on published information until 01/2026.

THROWBACK TO A DECADE OF THULIUM LASER TECHNOLOGY

JenaSurgical has been advancing surgical laser technology since 2013, starting with the **MultiPulse Tm+1470,** an early continuous-wave **thulium fiber laser** operating at 1,940 nm. Developed for soft tissue applications, it reflected early clinical interest in thulium-based procedures such as **ThuLEP** for the treatment of BPH.

As laser technology evolved, Thulium Fiber Lasers gained broader clinical adoption by 2018, particularly in endourology and urinary stone management.

In 2025, JenaSurgical presents the **MultiPulse TFL** – a compact and adaptable system that integrates the **VEGA Effect®,** designed to support precise control and surgical performance in lithotripsy and soft tissue interventions.

FEATURES

EXCELLING IN SOFT TISSUE & STONE TREATMENT
with the VEGA Effect®

VEGA EFFECT®
Smarter, more effective energy delivery

DIRECT COOLING
Resulting in lower power consumption

1,378 W
PEAK POWER

OPTIMIZED CONTROL
Eight pulse durations for tailored performance

VEGA EFFECT®

VEGA EFFECT®

Inspired by Vega – the brightest star in the Lyra constellation and a guiding light for explorers throughout history – the **MultiPulse TFL** introduces the **'VEGA Effect®'**: a symbol of clarity, precision and reliability in the surgical field. Just as Vega has helped navigators find their way, this advanced thulium fiber laser leads the way in laser lithotripsy to create minimal retropulsion and help surgeons to succeed in even the most complex procedures.

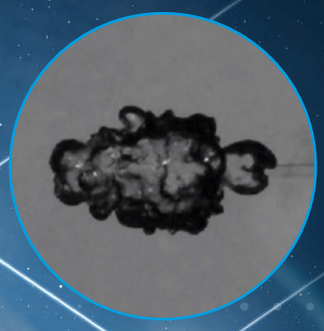
WHY BUBBLE DYNAMICS MATTER

Every laser pulse triggers a cascade of micro-explosions beneath the surface of the fluid. But with the MultiPulse TFL, the behaviour of these vapor bubbles is not just different – The MultiPulse TFL sets new standards in **TFL Bubble Dynamics.**

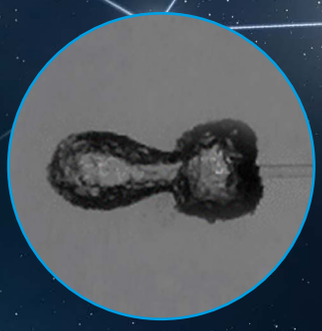
Conventional TFLs consume a considerable share of their energy in forming and sustaining a vapor bubble. Because the bubble collapses while the laser pulse is still being delivered, the efficiency of energy transfer to the target is reduced. The concurrent implosion of the bubble and vaporization of the surrounding medium further destabilize its structure, resulting in an unpredictable shape.

By contrast, the **VEGA Effect®** produces a **more stable and longer-lasting conical cavitation** that markedly **enhances energy transmission and procedural control.** The rapidly formed vapor channel enables a greater proportion of energy to reach the target before collapse, driven by the concentrated pulse profile.

HIGHSPEED CAMERA TEST IN-VITRO



Traditional TFL Bubble Dynamics with low peak power

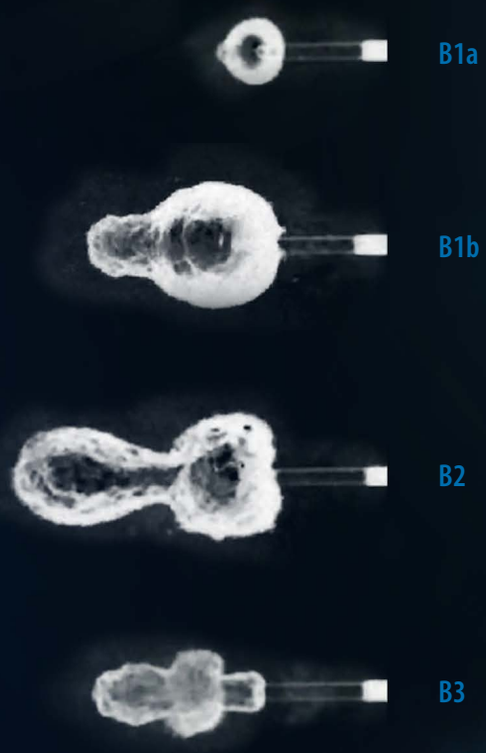


MultiPulse TFL Bubble Dynamics thanks to the VEGA Effect®

TFL BUBBLE DYNAMICS

PROVEN PERFORMANCE. BUILT ON PHYSICS.

The VEGA Effect® generates a more elongated conical cavitation bubble. This "laser highway" guides the laser energy more effectively, with each pulse delivering energy precisely along the targeted pathway, **optimizing the physical efficiency of energy transfer.**



PRIMARY VAPOR BUBBLE (B1): THE LASER'S DRILL

B1a forms when a tiny layer of water flashes into vapor. It stretches forward (B1b) as the vaporization pushes faster than the surrounding pressure, creating a long, conical TFL channel. This "laser highway" guides the laser light straight to the stone with almost no energy loss.

SECONDARY BUBBLE (B2): THE GUIDED REBOUND

When B1 collapses, water rushes back in. This creates B2, a smaller, elongated bubble that channels the flow toward the fiber—like a guided rebound that keeps the energy focused on the stone.

RING VORTICES (B3): NATURE'S SHOCK ABSORBER

The delayed collapse of each bubble causes shock absorption, which reduces retropulsion effects on the stone. MPT's bubbles not only help to keep the stone steady but also create a subtle inward "attractive" flow that helps pull the stone toward the fiber. This stabilization is especially valuable in tight spaces like the ureter.

TREATMENTS

VEGA EFFECT® FOR LITHOTRIPSY

PRECISION IN MOTION

The VEGA Effect® optimizes the balance between effective stone disintegration and minimal retropulsion. It generates a unique (as shown before) bubble dynamics and a controlled cavitation effect. Integrated into the MultiPulse TFL, this reduces yes pressure, supports a stable attraction and enables precise targeting with enhanced procedural impact on hard stones.

Implosion-Driven Stone Attraction
The collapse of the unique elongated conical cavitation bubble creates a momentary suction effect, drawing the stone toward the fiber rather than pushing them away. This minimizes retropulsion and keeps the stone in the laser's focus.

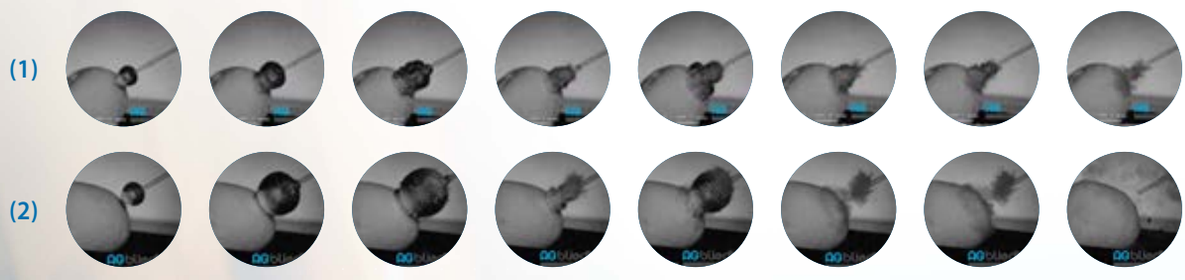
Faster Bubble Formation = More Dust
Higher Peak Power as up to 1,378 W leads to a much faster initial expansion of the bubble resulting in an enhanced energy transfer of laser to the stone. At the same time, the direct energy transfer improves targeting accuracy while reducing the fragmentation into larger, more difficult-to-remove particles.

IN PRACTICE, THE VEGA EFFECT® DELIVERS

Finer stone dust with fewer residual fragments

Lower retropulsion, less stone chasing

More precise energy delivery in restricted anatomical regions



Comparison of Traditional TFL (1) and the MultiPulse TFL featuring the VEGA Effect (2) in Lithotripsy

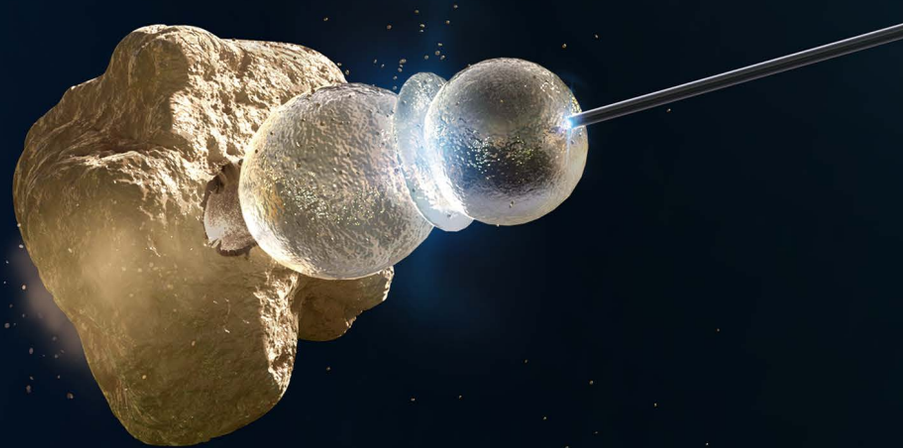
FEATURES

MAXIMUM DISINTEGRATION, MINIMAL RETROPULSION

- Unique Bubble Dynamics – paving the "laser highway"
- Controlled Cavitation Effect – guiding stones toward the fiber

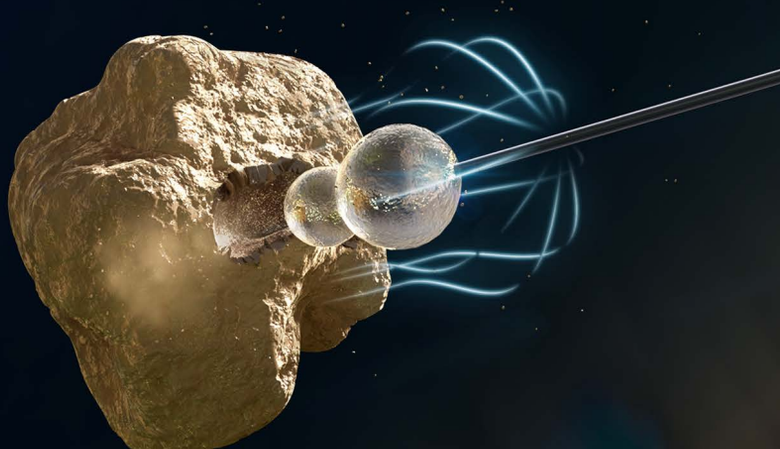
ENHANCED DUSTING EFFICIENCY

- Faster Dusting – thanks to better energy transfer
- Finer Dusting – with fewer fragments
- Less risk of retreatment



MINIMIZED RETROPULSION

- Stones stay in place – with momentary suction
- Shorter procedure time – by preventing stone loss



VEGA EFFECT®
FOR SOFT TISSUE

VEGA EFFECT® FOR SOFT TISSUE - NOT JUST CUTTING BUT CUTTING SMARTER

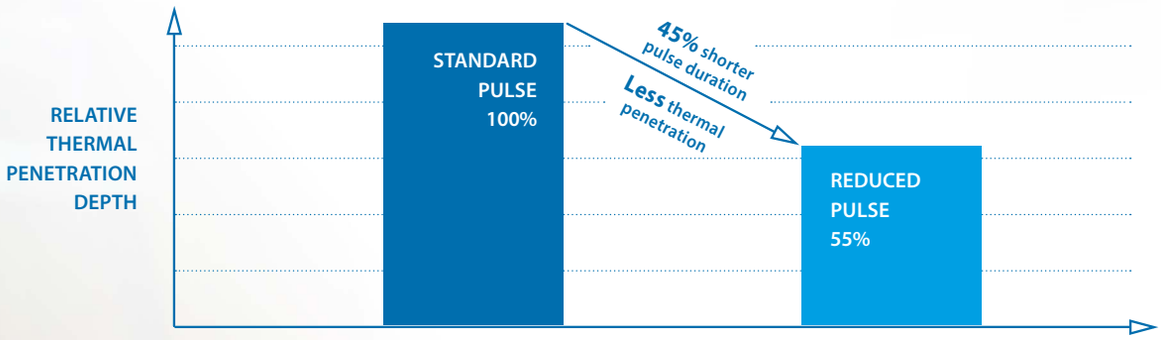
In soft tissue surgery, control over thermal effects is key to achieving clean incisions, minimal collateral damage and optimal healing. The VEGA Effect® brings a new level of finesse to laser-tissue interaction – enabling effective tissue removal while reducing carbonization.

WHY IT MATTERS – THERMAL MANAGEMENT YOU CAN TRUST

The VEGA Effect® allows for efficient energy absorption at the water-rich tissue interface, leading to effective cutting without excessive heat spread.

REDUCED CARBONIZATION AND THERMAL DAMAGE

By minimizing peak temperatures and heat diffusion, the VEGA Effect® lowers the risk of necrosis and other energy-related complications, supporting better clinical outcomes.



Impact of the VEGA Effect® on Thermal Penetration

IN PRACTICE, THE VEGA EFFECT® BRINGS

Precise cutting with controlled coagulation

Reduced risk of necrosis and collateral damage

Reduced carbonization

BENEFITS

PRECISION IN EVERY PULSE

The MultiPulse TFL combines state-of-the-art technology with an intuitive design, creating a powerful, efficient tool for surgical excellence.

PRECISION IN EVERY PULSE

- **Vertical Screen -** Provides a better workflow visualization.
- **Intuitive Interface -** Touchscreen controls with pre-set treatment modes for quick, easy operation.
- **Real-Time Feedback -** Provides immediate adjustments to fine-tune performance, ensuring optimal outcomes.
- **1,378 W of High Peak Power -** Right at Your Fingertips: Featuring front-facing connections putting full laser performance exactly where you need it.
- **Compact Design -** Engineered to fit seamlessly into any operating room without compromising functionality.

USABILITY THAT ELEVATES YOUR PRACTICE

The MultiPulse TFL, inspired by the brilliance of the star Vega, combines cutting-edge design, intuitive usability and the innovative VEGA Effect® to push Thulium Fiber Laser technology to new frontiers – setting a new standard for surgical excellence.

ABSTRACT

HIGH-PEAK TFL ENABLES SUSTAINED CONICAL CAVITATION WITH LOWER RETROPULSION IN STONE LITHOTRIPSY: EX VIVO ULTRA-HIGH-SPEED IMAGING VERSUS BASELINE TFL AND LONG-PULSE/LOW-PEAK HO:YAG Kanne M.C., Schmitz U., Luximun Y., Contreras P., Gerullis H.

INTRODUCTION & OBJECTIVES

Laser-induced cavitation at the fiber tip governs how efficiently optical energy interacts with the stone and how much the stone is displaced. A published mechanistic model predicts that Thulium Fiber Laser (TFL) pulses can form elongated, conical "channel-like "bubbles, whereas Ho:YAG more often yields rounded ones. We investigated whether a next-generation high-peak TFL (same wavelength/beam geometry, higher peak power) produces more sustained conical cavitation than baseline TFL or long-pulse/low-peak Ho:YAG, and whether this correlates with reduced stone motion in a standardized bench model.

MATERIALS & METHODS

In a degassed water tank we synchronized ultra-high-speed imaging (≤ 500 kfps) with photodiode-tracked laser pulses from 3different energy-sources: high-peak TFL (1kW peak), baseline TFL, and long-pulse/low-peak Ho:YAG. Outcomes included bubble length, width, shape-index, nucleation time, vapor-phase duration, forward-tip advance and stone displacement. Model predictions derived a priori from measured optical power, absorption, and beam waist were compared with observed image sequences.

RESULTS

At equal pulse energy, high-peak TFL produced earlier nucleation, longer continuous vaporization, and a distinctly conical bubble than baseline TFL. Tip-tracking showed a longer, sustained vapor channel per pulse and markedly lower stone displacement. Long-pulse/low-peak Ho:YAG created only short, blunt elongation with shape index≈1 and limited channel persistence. The observed timings and geometries were consistent with model predictions of phase-transition-dominated dynamics.

CONCLUSIONS

Next-generation high-peak TFL produces more sustained conical cavitation than baseline TFL or Ho:YAG. Ultra-high-speed imaging confirms a predictive link between pulse peak power and cavitation morphology. Increasing peak power within TFL stabilizes aconical, channel-forming vapor core that minimizes over-expansion and subsequent collapse, leading to less retropulsion compared to baseline TFL and Ho:YAG at identical energy. These findings provide a mechanistic surrogate for improved energy coupling to the stone while avoiding retropulsion. This physical advantage is expected to translate into more stable working conditions during stone lithotripsy; prospective clinical trials however are needed to confirm these findings.

TECHNICAL SPECIFICATIONS

MultiPulse TFL	
Laser Source	Thulium Fiber Laser
Wavelength	1,940 nm
Emission Mode	Continuous | Pulsed
Power	Up to 200 W (CW)
Pulse Energy	Up to 6 J
Repetition Rate	CW to 2,500 Hz
Pulse Duration	0.1 - 12 ms in single pulse mode Unlimited in CW mode
Cooling	Internal cooling cycle
Control Panel	10.1" LCD display, vertical
Device Accessories	Bare fibers (reusable and single use) availabe in following diameters: 200, 272, 365, 400, 550, 600, 800, 1000 µm
Electrical Requirements	100–240 VAC - 50/60 Hz – 2,400 VA
Dimensions and Weight	47 cm x 68 cm x 108 cm (W x D x H) | 125 kg
Population	Patients affected by urological and biliary conditions suitable for endoscopic or minimally invasive treatment

FDA

FDA 510(k) cleared under K253100

DEVICE CERTIFIED ACCORDING TO MEDICAL DEVICE REGULATION (EU) 2017/745 (MDR)

SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE

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