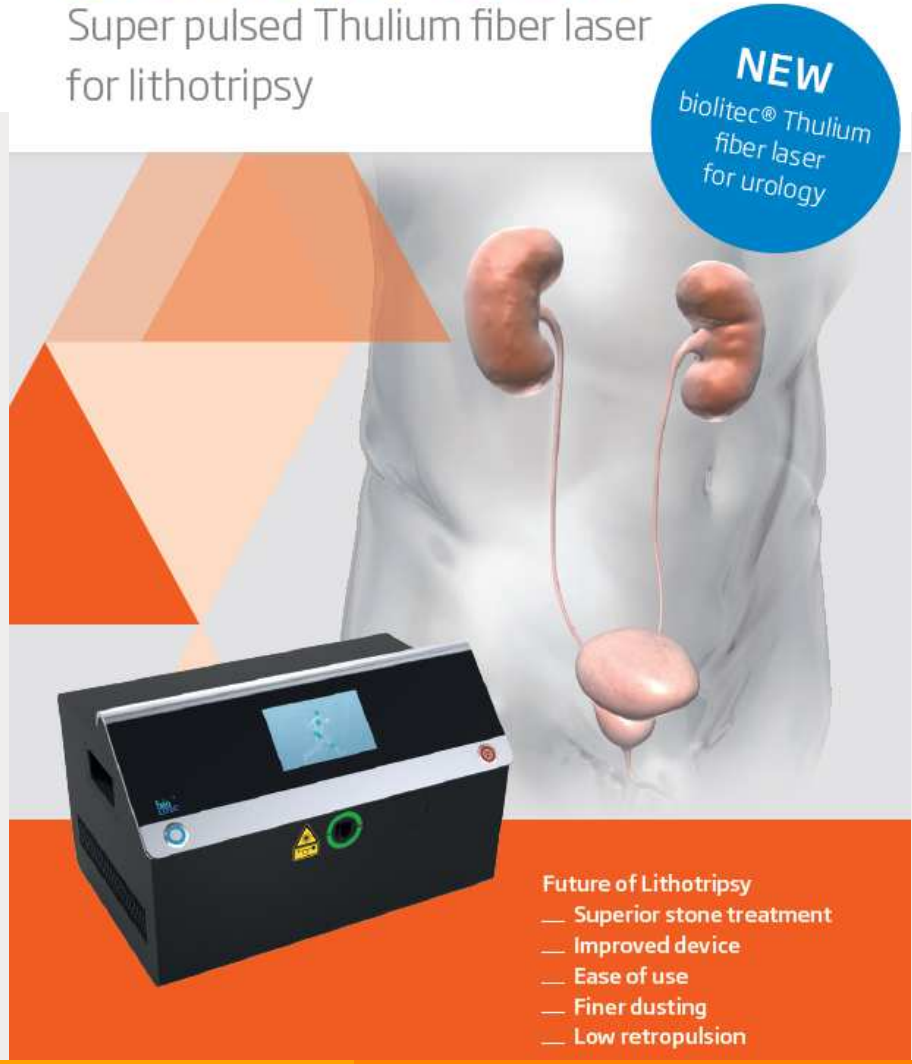
Biolitec Leonardo® Duster Treating Urology Stones



Duration: 30 minutes	Biolitec Leonardo Duster	Participants: HCP's	Presenter: Product & Marketing Team

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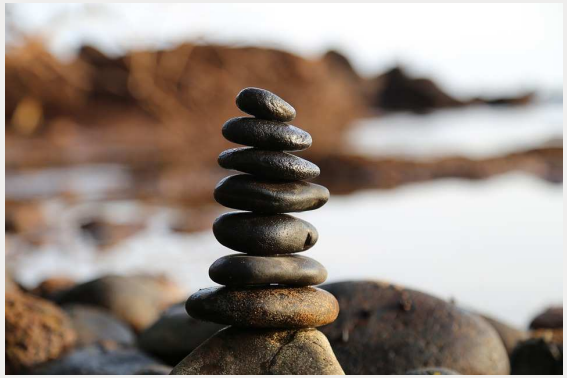
I. The Problem

II. The Treatment Options

III. Leonardo Duster- Thulium fiber laser from biolitec

Creator: Shidlovski | Credit: Getty Images/iStockphoto




Climate change and kidney
Ambient temperature as a contributor to kidney stone formation: implications of global warming
Robert J Fakheri, David S Goldfarb
Affiliations + expand
PMID: 21451456 DOI: 10.1038/ki.2011.76
Free article
Abstract
Nephrolithiasis is a common disease across the world that is becoming more prevalent. Although the underlying cause for most stones is not known, a body of literature suggests a role of heat and climate as significant risk factors for lithogenesis. Recently, estimates from computer models predicted up to a 10% increase in the prevalence rate in the next half century secondary to the effects of global warming, with a coinciding 25% increase in health-care expenditures. Our aim here is to critically review the medical literature relating stones to ambient temperature. We have categorized the body of evidence by methodology, consisting of comparisons between geographic regions, comparisons over time, and comparisons between people in specialized environments. Although most studies are confounded by other factors like sunlight exposure and regional variation in diet that share some contribution, it appears that heat does play a role in pathogenesis in certain populations. Notably, the role of heat is much greater in men than in women. We also hypothesize that the role of a significant human migration (from rural areas to warmer, urban locales beginning in the last century and projected to continue) may
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The Stone Belt- Urolithiasis & Nephrolithiasis

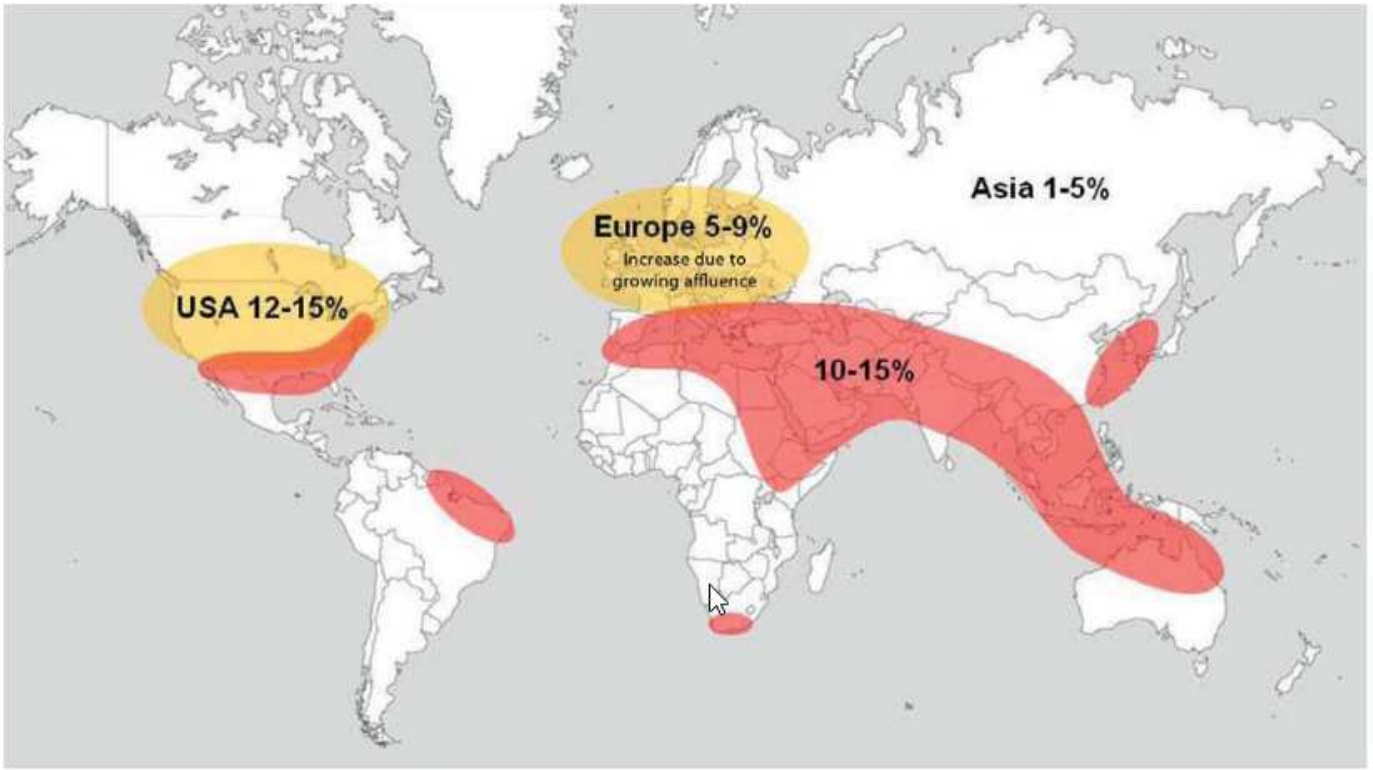


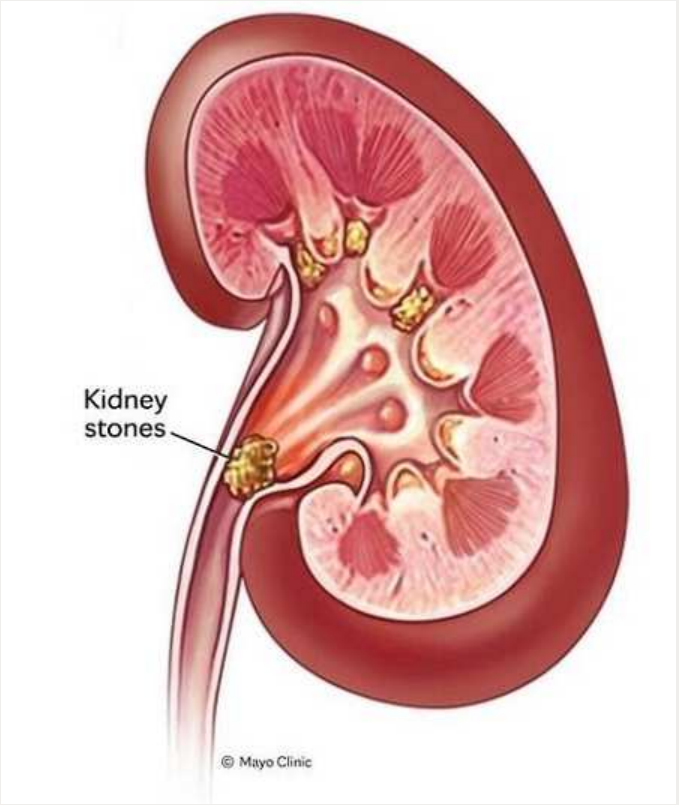
Figure 2: The so-called stone belt (red) extends all the way around the world and is characterized by urinary stone prevalence of 10 to 15%. In this zone the climatic and social conditions are conducive to stone formation. Some stones are associated with poverty, others with affluence. In Europe and the USA, there has been a sharp, almost exclusively affluence-related rise in the occurrence of calcium oxalate and uric acid stones. Climate simulations for the USA indicate that the stone belt will move northwards in the coming two decades (12).

Deutscher Ärzteverlag GmbH, R.D.Ä. (2015) *Urolithiasis (06.02.2015)*, *Deutsches*. Available at: http://dx.doi.org/10.3238/arztebl.2015.0083 (Accessed: 04 November 2024).

The Problem

Nephrolithiasis or Urolithiasis

- Hard mineral and salt deposits
- Either at Kidney, bladder or ureter
- Calcium stone are the most common one. Uric acid, struvite, and cystine are other types



The Problem

Prevalence

- 12% of the world population
- Most common condition affecting the urinary system

Treatment options

__ Medication and drink fluids (<0.5cm)

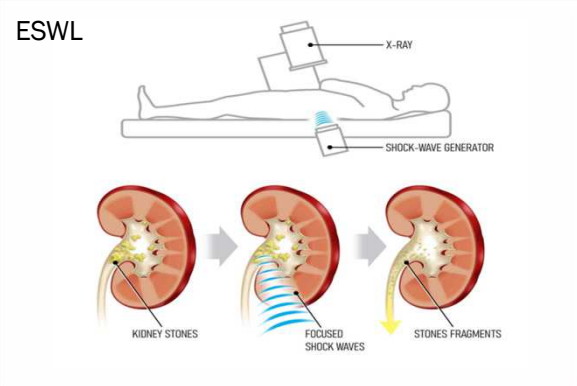
Intervention:

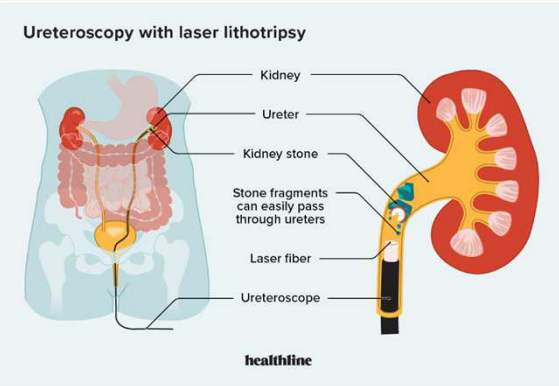
__ Shockwave lithotripsy (ESWL)

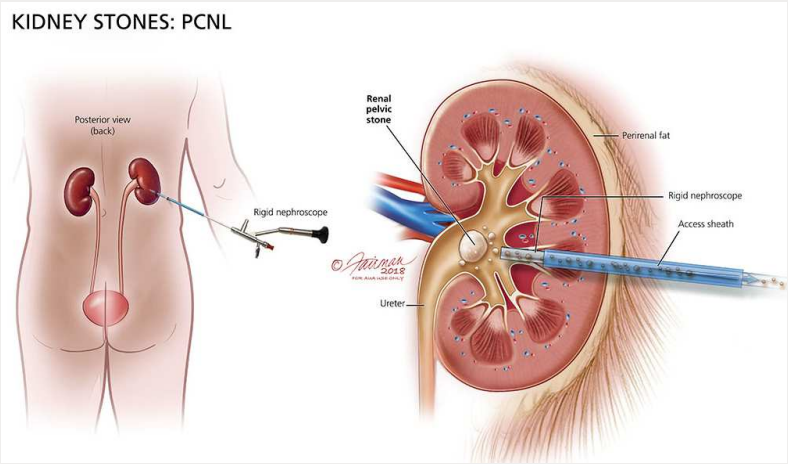
__ Ureteroscopy/RIRS

__ Percutaneous nephrolithotomy (PCNL)

__ Open surgery

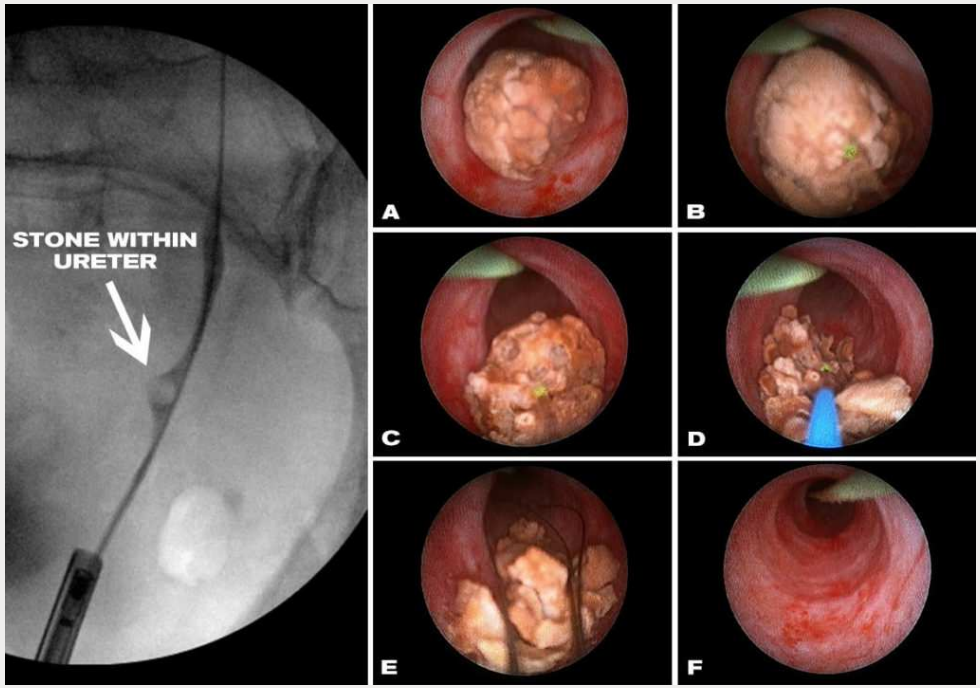






Reference:
ESWL Picture: https://zurology.com/extracorporeal-shock-wave-lithotripsy/
PCNL Picture: https://www.urologyhealth.org/urology-a-z/k/kidney-stones
RIRS Picture: https://www.healthline.com/health/ureteroscopy-with-laser-lithotripsy

The Solutions



Ureteroscopy with laser lithotripsy advantages

- Effective with high success rate
- Minimal invasive
- Can work on multiple stones
- Same laser for soft tissue application

Image source: https://www.dcurology.net/procedures/ureteroscopy-with-laser-lithotripsy.php

The Current standard:

Holmium YAG laser- Current gold standard

__ High power (140W)

__ Wavelength 2100 nm

__ Safety profile

__ All stone types can be disintegrated

The New Solutions- Leonardo Duster

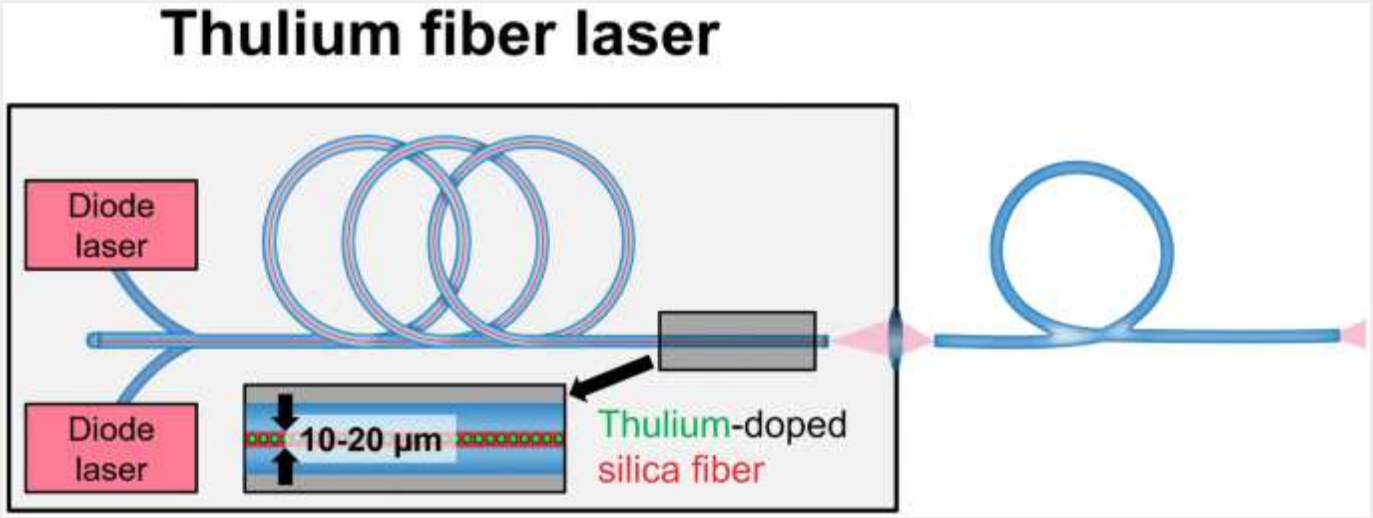
Thulium fiber laser- Revolution in Lithotripsy

- Low energy per pulse (as low as 0.025J)
- High frequency range (as high as 2000 Hz)
- Small core fibers (as low as 150 micron)
- Uniform beam profile
- Symmetrical and constant energy pulse
- Wavelength 1940 nm

How does it work?

Thulium fiber laser- Revolution in Lithotripsy

Working principle



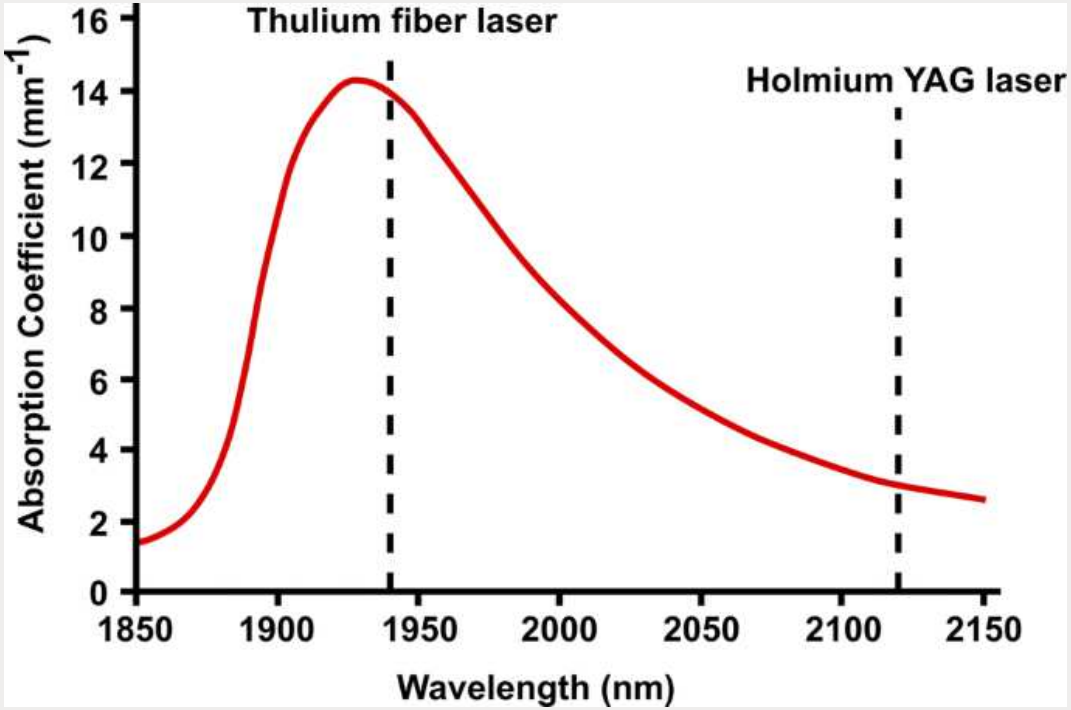
Source. https://link.springer.com/article/10.1007/s00345-019-02654-5

The Solution

Side by side comparison -Thulium fiber laser and Holmium YAG laser

Wavelength-

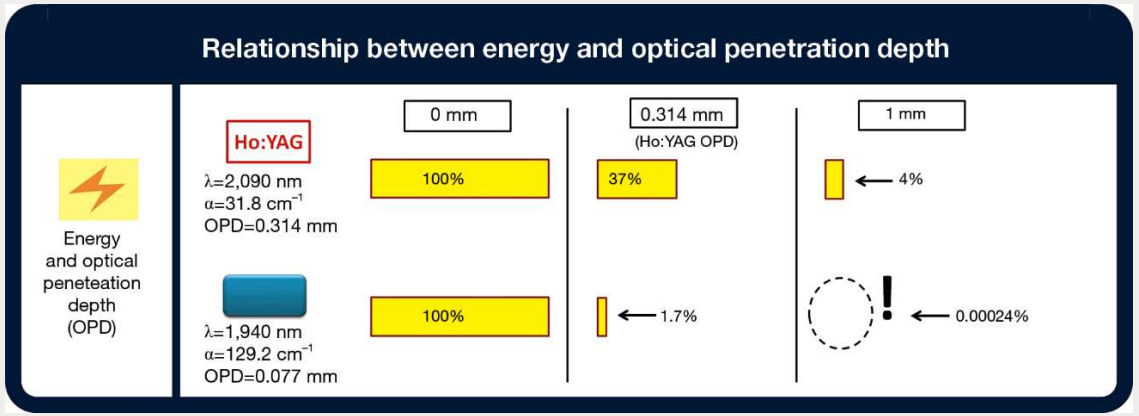
More absorption coefficient in water for Thulium fiber laser compared to Holmium YAG laser.



Source. https://tau.amegroups.org/article/view/28326/html

The Solutions

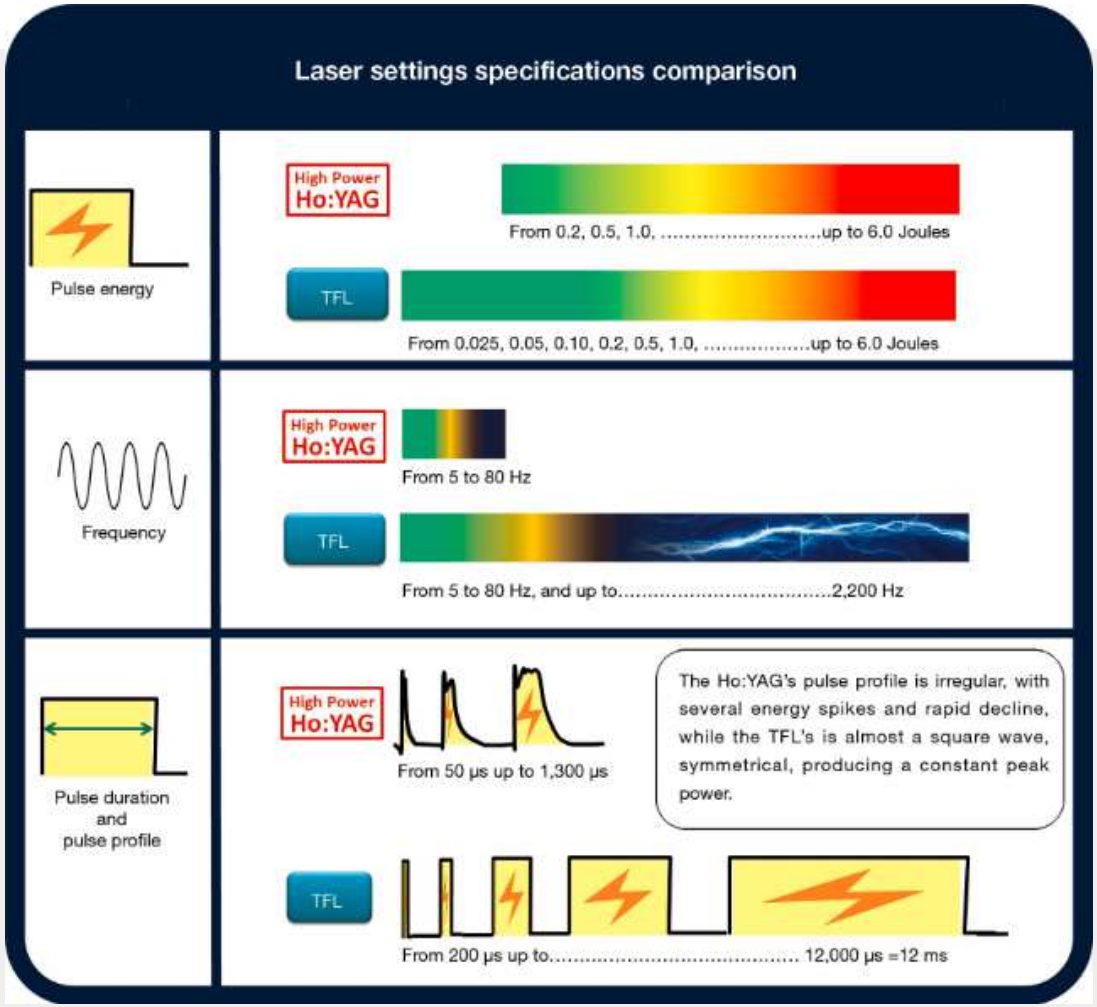
Penetration depth four times lower for Thulium Fiber laser when compared with Holmium YAG laser.



Source. https://tau.amegroups.org/article/view/28326/html

The Solution

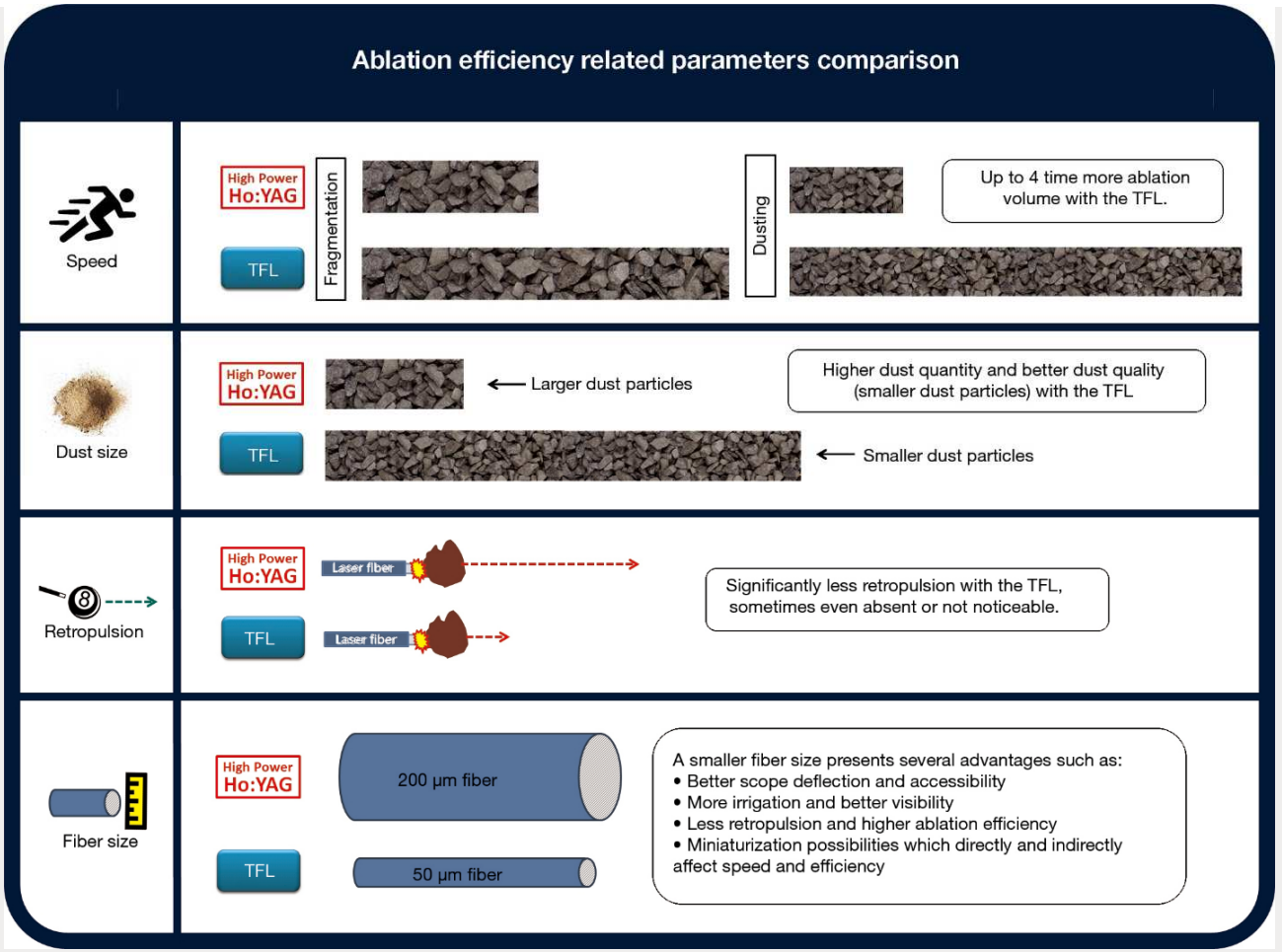
- Pulse energy
- Frequency
- Pulse duration and pulse profile



Source. https://tau.amegroups.org/article/view/28326/html

The Solutions

- Ablation speed
- Dust size
- Retropulsion
- Fiber size.



Source. https://tau.amegroups.org/article/view/28326/html

The Solutions

Advantage overview:

- Low pulse energy and high frequency
- Low retropulsion
- Small core fibers
- Compact device with low noise
- Air cooling
- No need of additional basket removal

Parameter	Holmium:YAG laser (Lumenis Pulse 120H)	Thulium fiber laser (IPG Medical, Superpulse)
Wavelength	2120 nm	1940 nm
Pulse energy range	0.2–6.0 J	0.025–6.0 J
Pulse duration range	0.05–1 ms	0.05–12 ms
Pulse shape	Dictated by the pumping pulse	Electronically modulated
Maximum pulse frequency	120 Hz	2000 Hz
Maximum average power	120 W	60 W
Lowest proximal laser fiber core diameter	≥ 200 µm	≥ 150 µm
Cooling system	Low-power generators: self-contained water-cooling system with fan High-power generators: vapor-compression refrigeration system	Fan
Resistance to external shocks	Low	High

Source: Thulium fiber laser: the new player for kidney stone treatment? A comparison with Holmium:YAG laser Olivier Traxer and Etienne Xavier Keller

Leonardo Duster- Thulium fiber laser from biolitec

- Similar features like other Thulium fiber lasers
- Bare fibers from 150 micron to 1000 microns

Specifications

Model	LEONARDO® Duster
REF	TFL1940nm60W
Wavelength	1940 nm ± 3 nm
Max average power	60 Watt
Max peak power	600 Watt
Pulse energy	0.02 – 6 J
Aiming beam	Laser diode, green 525 nm (adjustable) < 1mW, class 3R (brightness adjustable)
Treatment mode	CW / Pulse
Pulse duration	40 µs to 50 ms
Repetition rate	1 to 2500 Hz
Power supply	110 – 240 VAC, 50/60 Hz
Dimensions (H × W × D)	37.8 cm × 57.7 cm × 36.8 cm
Weight	41 kg

All laser sets incl. 3 safety goggles, foot switch, power cord and manual.
Trolley or carrying case can be supplied upon request.
Fiber sizes ranging from 150 to 1000 microns are available.

Treatment parameters

User defined parameters: Pulse energy, Frequency and Pulse duration (Short, Medium and Long)

Stone treatment is mostly in Short pulse.

__ Dusting parameters:
Low pulse energy and High frequency (0.05J-0.2J * 100-400 Hz)[1]

__ Fragmentation parameters:

High pulse energy and Low frequency (0.4J-4J * 14Hz-40 Hz) [1]

1. Glossary of pre-settings given by laser companies: no consensus! Alba Sierra · Mariela Corrales · Adrià Piñero· Merkourios Kolvatzis· Bhaskar Somani · Olivier Traxer