

# Burnback: The Role of Pulse Duration and Pulse Energy on Fiber Tip Degradation During High-Power Laser Lithotripsy

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## Disclosures:

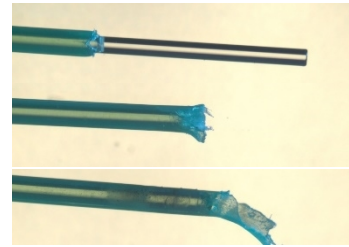
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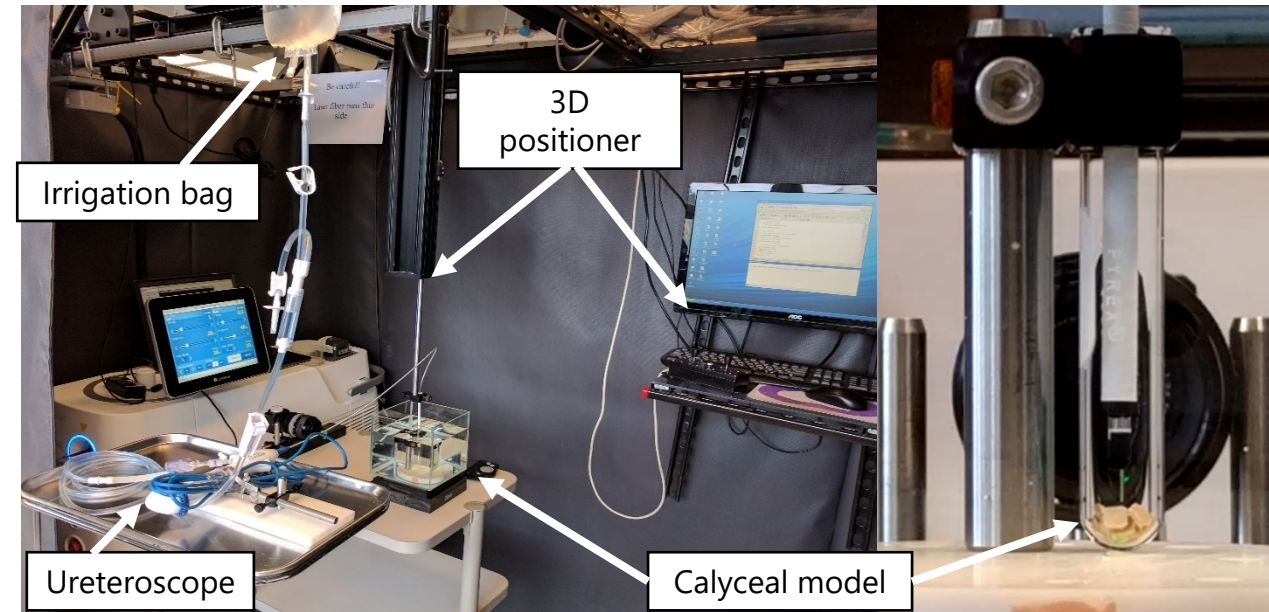
# Introduction & Methods

- High-power holmium lasers are becoming increasingly popular for ureteroscopic laser lithotripsy and dusting technique.
- Settings and power selection may impact **fiber-tip degradation** and lithotripsy efficiency.



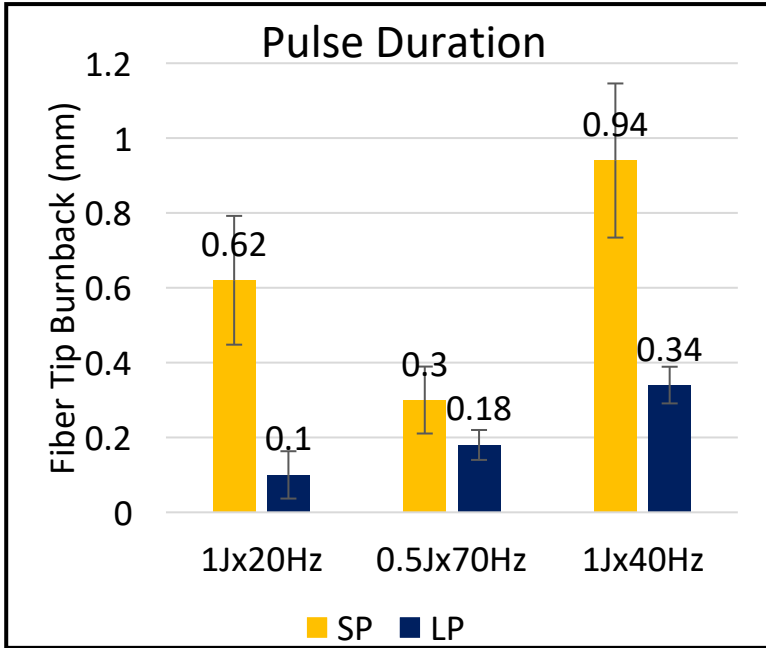
**AIM:** We investigated the effect of pulse duration and pulse energy on fiber-tip degradation when using high-power settings for popcorn laser lithotripsy.

## Experimental Setup

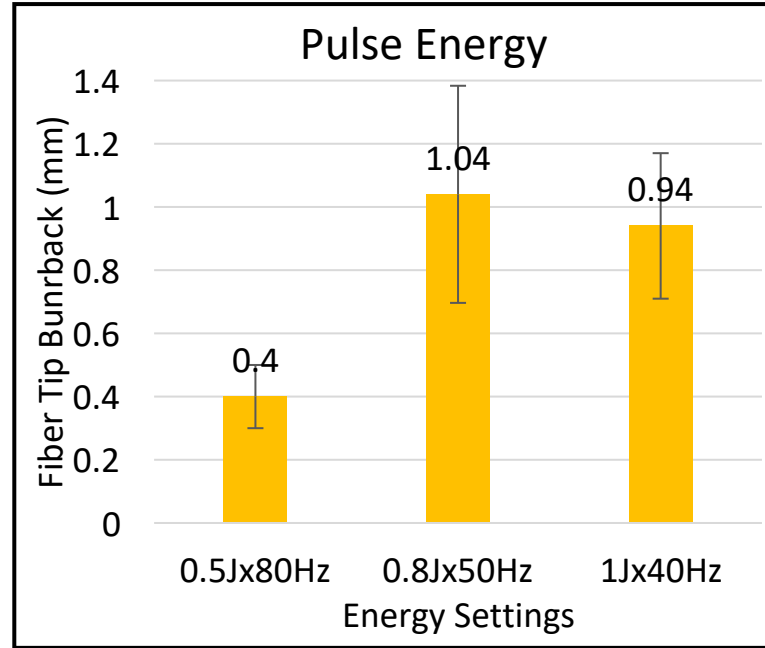


- BegoStones fragmented in a glass bulb using a 120W Ho:YAG laser in a popcorn model
- We tested long pulse (LP) vs. short pulse (SP) at 1.0Jx20Hz (20W), 0.5Jx70Hz (35W), and 1.0Jx40Hz (40W)
- 40 W settings (0.5Jx80Hz, 0.8Jx50Hz, and 1.0Jx40Hz) at SP were also tested
- Pulse duration was measured using a photodetector and peak power calculated
- Experiments were conducted for 4 minutes and fiber-tip length measured before and after using a digital caliper

# Results & Conclusions



**LP results in less tip degradation at all 20W and 40W settings tested**



**When testing SP at 40W settings: 0.5Jx80Hz resulted in least burnback**

	Pulse duration (μs)		Peak Power (kW)	
	SP	LP	SP	LP
Pulse Energy				
0.5J	206	244	2.4	2.0
0.8J	235	318	3.4	2.5
1.0J	265	390	3.8	2.6

**Absolute difference in peak power between LP and SP was lowest at 0.5J**

## TAKE HOME MESSAGES

- LP mode results in less fiber burnback for all power settings tested.
- High-power 40W settings can be utilized with less burnback if low pulse energy (0.5 J) is used.
- Understanding these parameters can improve the longevity of the laser fiber and improve procedural efficiency.