



# ENGINEERING AND UROLOGY SOCIETY

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**A COMPARISON OF SINGLE USE AND REUSABLE SMALL CORE SIZED  
HOLMIUM:YAG LASER FIBERS:  
IS THERE A DIFFERENCE IN THE RISK OF FIBER FAILURE?**

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**Introduction:** Prior studies show that Holmium:YAG laser fibers are susceptible to failure when energy is transmitted in a deflected fiber, as occurs during lower pole flexible ureteronephroscopy. It is unknown whether failure is due to mechanical stress from fiber deflection, sterilization effects on the fiber, or propagation of laser energy into cladding at the deflection site. This study was designed to determine the contribution of these factors to fiber failure, as well as to identify differences in the risk of fiber fracture with single use and reusable small core sized (200-272  $\mu\text{m}$ ) Holmium laser fibers.

**Methods:** Single use and reusable small core-sized Holmium laser fibers were tested.

Single use fibers included the

- Dornier Lightguide Super 200,
- Optical Integrity ScopeSafe 272,
- IQinc. LLF200TG-D, and
- IQinc. LLF273TG-D.

Reusable fibers included the

- Lumenis SlimLine 200,
- Sharplan 200,
- Laser Peripherals RBLF-200,
- IQinc. LFT273NT, and
- Convergent Optiview SMH1020F.

A Coherent VersaPulse 100 watt Holmium laser was used. Fibers were bent to 180 degrees at a diameter of 1.5 cm. The laser was fired at 1.5J, 10Hz for 30 minutes or until fiber fracture. Reusable fibers were sterilized for twenty cycles using the manufacturers' specifications. These fibers were retested after every five sterilization cycles. All testing was done with the fiber submerged in water.

**Results:** No fiber fractured with bending alone. Two of three Dornier Super 200 fibers tested fractured repeatedly within several laser pulses. The Laser Peripherals RBLF-200 fiber fractured during initial testing. Repeat testing and sterilization did not result in further fractures. Fibers fractured at the point of maximum bend and only after the laser was discharged. The remaining fibers did not fracture during initial testing. The reusable fibers did not fracture following repeated testing after 5, 10, 15, and 20 sterilization cycles.

**Conclusion:** The Dornier Super 200 Holmium laser fiber was the only fiber to fracture repeatedly. Use of this fiber during lower pole flexible nephroscopy may risk endoscope damage. The Laser Peripherals RBLF-200 fractured during initial testing but this result was not reproducible. Twenty cycles of steam sterilization did not cause any of the reusable fibers to fracture during repeat testing. The data implies that the cause of failure for the Dornier Super 200 fiber is propagation of laser energy into the cladding. Prior studies showed similar patterns of fiber failure, suggesting limitations of the ability of fibers to transmit laser energy in a deflected configuration. Future work will address other causes of fiber failure.