

# LASER ENERGY



The Ablation Science Behind Laser Energy and How the HeartLight X3 Catheter is Used to Create RAPID, Contiguous, Transmural Lesions

## OVERVIEW

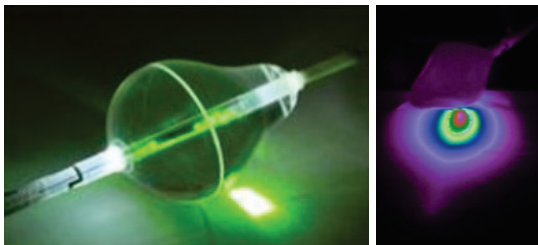
### Catheter Information

The HeartLight X3 Catheter has a glass fiber optic that runs the length of the catheter which transmits the 980nm near-infrared laser energy. The laser energy exits the shaft of the catheter perpendicularly and projects a 30° arc ablative footprint. The position of the energy is adjustable distally, proximally, and rotationally over 360° in both the clock and counter-clock direction.



### Laser Energy

Laser energy generates heat within the myocardial tissue as it is absorbed. It is titratable from 5.5–15 Watts and the energy density is uniform across the 30° arc. The 980nm laser was chosen for its specific absorption characteristics with myocardial tissue. The laser fiber does not need to be in contact with the tissue to create a lesion — the compliant balloon pushes the blood out of the way to expose the tissue for ablation.



### RAPID Mode Ablation

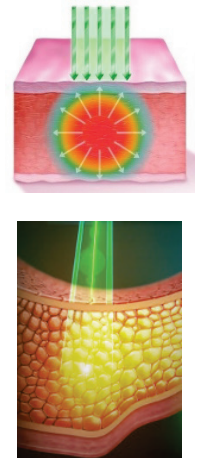
During RAPID mode the laser fiber is driven by a motor allowing for contiguous lesion creation. The motor rotates the fiber at 2.25° per second, eliminating the need for manual overlap. Time exposure of the laser energy to the myocardial tissue is controlled and optimized to create transmural lesions. The laser energy can be applied for a continuous 360 degrees.



## LESION DATA

### Lesion Creation

Laser energy creates a lesion by optically penetrating the tissue. It is directed downward and subsurface, with the nucleus of heat about 2mm below the surface. Heat generation begins here and is then conducted to the surrounding tissue, creating a transmural lesion. The fluid circulating within the balloon helps cool the tissue interface, enabling heat generation within the tissue instead of at the surface like an RF catheter.



### Dosing

The laser energy can be titrated from 5.5–15 Watts based on the thickness of the tissue you are ablating, and the level of tissue contact or exposure. Lesions are created using lower wattages than other modalities such as RF due to the ability to optically penetrate the tissue and begin lesion creation about 2mm below the surface. With RF, about 90% of the power is absorbed within the first 1–1.5mm of tissue. RF is limited by the surface area of the tip, the force to generate and maintain contact, and the depth of penetration.

Power (Watts)	Time (sec)
5.5W	30s
7.0W	30s
8.5W	30s
8.5W	20s
10W	20s
12W	20s
13W RAPID	continuous
15W RAPID	continuous

