



# LaproClear

## A Laparoscopic Lens Cleaning Device

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### CLINICAL PROBLEM

15 million laparoscopic (minimally invasive) surgeries are performed per year.



**Figure 1: Laparoscopic Surgery.** The Surgeon relies on a laparoscope (stick-shaped camera) to see during the operation.

The scope lens frequently becomes obscured with bodily fluids, causing:



longer operation time



higher hospital costs



workflow interruption

### REGULATION & PATENTS

**Regulatory Pathway:** LaproClear qualifies as a Class II Device, thus it will require 510(k) premarket notification.

**Patent Potential:** This is a useful, novel, and non-obvious design with no risk of patent infringement

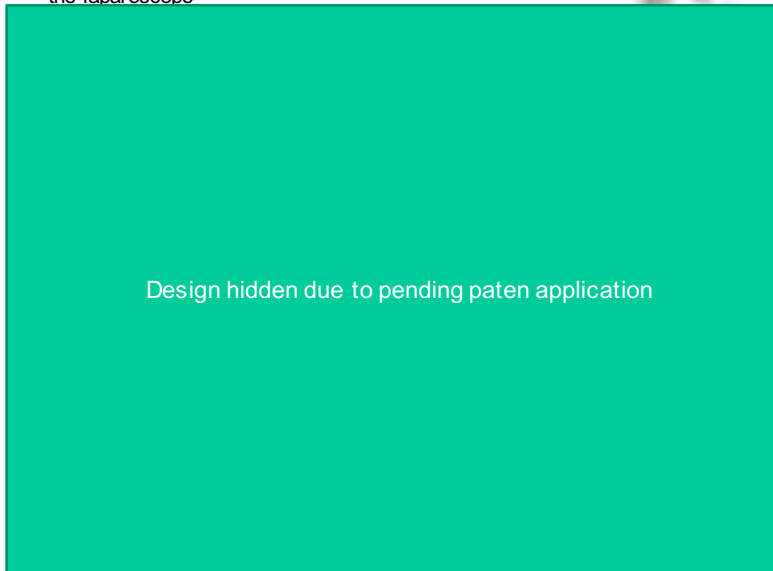
Current patented products include:

- *Clarify*: an external surfactant cleaner requiring scope removal
- *ClickClean*: a clear protective layer that shifts once smudged
- *Floshield*: a device that pumps CO<sub>2</sub> in front of the lens to redirect smoke, fog, or other small particles

### DEVICE DESIGN

#### Design Objectives:

1. Effectively cleans lens without removing the laparoscope
2. Fits within the 12mm inner diameter of trocar
3. Biocompatible: is made of safe materials
4. User-friendly controls: can be operated easily with the hand already holding the laparoscope

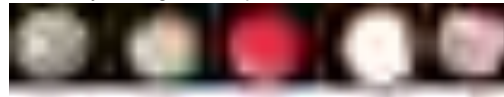


### DEVICE FUNCTIONALITY

**In Vitro:** Butter and steam to simulate surgical conditions on large-scale model

- Demonstrated full efficacy in as little as 1-2 wipes

**In Vitro:** Blood efficacy testing with LaproClear device



**Figure 5: Blood Efficacy Testing Images Camera View.**

- a) No wiper b) Wiper attached c) Dipped in blood d) Wiped once e) Wiped 4 times
- Device able to clear lens when obscured by non-coagulated blood in 4 wipes
  - Device fails after blood coagulates on laparoscope or the device

#### In Vivo:

- Porcine laparoscopic surgery
- Device completely cleared the lens after ~15 wipes

### MARKET & COST

**Market:** Laparoscopic surgeries are more common



**Figure 5:** Proportion of bariatric surgery that was performed laparoscopically by year (worldwide)

**Estimated manufacturing cost: \$8.60 per device**

- Sale price estimated to be in the range of \$30-50
- Cheaper than competitor products, which are \$80-\$120
- Insignificant cost relative to total cost of operation

**Reimbursement:** this device will not be taken home or repeatedly used, thus it cannot be reimbursed by Medicare or Medicaid.

### FUTURE WORK

#### Biocompatibility

- Determine sanitizing requirements
- Find better biocompatible and anticoagulant materials
- Determine ideal wire material

#### More in vivo testing

- Quantitatively measure cleaning efficacy
- Clinical testing

#### Bringing to Market

- File patent application
- FDA approval
- Design alterations for large-scale manufacturing

### ACKNOWLEDGEMENTS

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