LaproClear
A Laparoscopic Lens Cleaning Device
Heather Bowman¹, Alyssa Meyer², Ryan Pearce², Yushuan Peng¹
Biomedical Engineering, Materials Science¹, Mechanical Engineering², at Carnegie Mellon University, Pittsburgh, PA

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:
- Clearly: an external surfactant cleaner requiring scope removal
- ClickClean: a clear protective layer that shifts once smudged
- Flashield: a device that pumps CO₂ 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

MARKET & COST

Market: Laparoscopic surgeries are more common

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

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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