How to Improve Existing Technology

• Better surgeon control of target offset
• Expand treatment options
• Easier/more reliable WF capture and data transfer
• Enhance Safety
  – Reduce operator error
• Improve Efficacy (UCVA, QoV)
  – Refine the nomogram, especially for re-treatments
  – Better registration
  – Control the micro-environment
  – Refine the algorithm/ablation profile
  – Improve flap creation
• Base treatment on adaptive optics manifest refraction
Safety – BCVA

BCVA WFG LASIK at 3 mos.

Change in Lines of Vision

Better BCVA

n=211
Safety – Operator Error
Improve Refractive Accuracy

Achieved MSE

Attempted MSE

90% +/- 0.50D

Nomogram adjustment

Healing response/micro-environment/WF capture/etc.

n=211
Improve Cylinder Accuracy

Cylinder Correction

91% +/- 0.50D

n=211
Improve WF Accuracy

\[ y = 1.00x - 0.01 \] \[ r^2 = 0.92 \]

- Mean Difference
  \[ 0.02 \pm 0.49 \text{ D} \]
- 76% within 0.5 D
- \( n = 178 \)

Accommodation
Modulate the Healing Response

Ablation profile
Medications
Control the Microenvironment
Improve Registration Technique
Registration

10% of eyes > 20% undercorrection

Data from Julian Stevens
Don’t Induce HOA

% of Eyes

WFG LASIK
n=150

Conventional LASIK
n=300

More higher order aberrations after surgery

Change in Higher Order Aberrations (µ)

0.06µ 0.16µ

6mm pupil analysis
Improve Correction of HOA

6mm pupil analysis

Change in HOA vs Preop HOA graph showing a trend towards increasing HOA postoperatively.
Better Flap Creation

Change in low light Contrast Acuity – 3 Mo

Mean Difference:
Mech  +0.05 LM (loss)
Femto -0.02 LM (gain)

p<0.001
Don’t Neglect Surface Ablation

Change in low light Contrast Acuity – 3 Mo

Mean Difference:
PRK 0.05 LM (gain)
LASIK 0.02 LM (gain)

p=0.07

W-PRK (n=47)
W-LASIK (n=40)
Refracting with Adaptive Optics