

LASERS IN MEDICINE

Corrective Laser Eye Surgery

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3/24/99

SUMMARY

- **Overview on How the Eye Works**
- **Refractive Eye Surgery**
- **PRK and LASIK**
- **Excimer Laser**
- **Glaucoma**
- **Lasers Used to Treat Glaucoma**
- **Conclusion**

HOW THE EYE WORKS

- **Cornea Bends Light Rays onto Retina**
- **Light is Bent Two More Times by the Lens**
- **Nearsightedness and Farsightedness(Dot to Disc Representation)**

REFRACTIVE SURGERY

- **What is Refractive Surgery?**
Surgery to Improve Eye Focus in Myopia, Hyperopia, and Astigmatism.
- **What Types of Procedures are Used?**
Radial Keratotomy(RK)
Photorefractive Keratectomy(PRK)
LASIK
- **Probability of 20/20 Vision: 90%**
- **Probability of 20/40 Vision: 97%**
- **Chance of Significant Haze: 3%**
- **Need for Additional Operation: 10%**
- **Chance of Infection: 0.03%**

PRK SURGERY

- **What Does PRK Accomplish?**
Reshapes the Cornea with Laser Energy Applied to the Front Surface, Flattening the Cornea.
- **How Does PRK Work?**
Uses an Excimer Laser to Remove Small Amounts of Corneal Tissue.
- **How Long is the Procedure?**
The Laser Pulses the Eye Between 15-40 Seconds.
The Whole Procedure Lasts Between 10-20 Minutes.
- **Other Notes on PRK:**
Only One Eye Can be Done at a Time.
Drops are Used to Numb the Eye.
FDA Approved.

LASIK SURGERY

- **What Does LASIK Surgery Accomplish?**
Reshapes the Underlying Corneal Tissue with an Excimer Laser, Flattening the Cornea.
- **How Does LASIK Surgery Work?**
An Incision is Made to Lift the Front of the Cornea, then the Excimer Laser is Used as in PRK.
- **How Long Does the Procedure Last?**
Again the Laser Pulses 15-30 Seconds.
The Entire Procedure Lasts About 15 Minutes.
- **Other Notes on LASIK:**
Procedure is Relatively Painless.
The Front Corneal Surface is Preserved Leaving a Smooth Surface for Incoming Light Rays.
Has Not Been FDA Approved.

EXCIMER LASER

- **What is an Excimer Laser?**
Composed of Two Words: EXCited and diMER.
Dimer Refers to Argon-Fluoride Molecules in an Excited State.
- **How Does it Work?**
Uses Pulses of 10ns at a Frequency of About 50Hz.
Laser can Remove as Little as .25 microns of Tissue.
After Each Pulse the Mechanical Iris Slowly Opens Toward the Final Goal.
This Process Lasts About 20 Seconds.
- **How Many Layers or Thickness of Tissue Must be Removed?**
Munnerlyn's Formula:

GLAUCOMA

- **What is Glaucoma?**
Glaucoma is a Disease which can Lead to Blindness.
- **What Happens in the Eye?**
Intraocular Pressure Becomes to High and can Lead to Damaging the Optical Nerve.
- **What can be Done Surgically?**
Lasers can be Used to Create Tiny Openings in the Iris to Allow Fluids to Drain Properly.

LASERS FOR GLAUCOMA

- **Laser Peripheral Iridotomy(LPI)**
Produces a Small Hole or Holes in the Iris(Less than 0.5mm).
Uses the YAG Laser.
- **YAG Laser**
Uses Photodisruption.
- **Argon Laser Trabeculoplasty(ALT)**
Delivers Short Bursts of Laser Energy to the Fluid Drainage Area.
Laser Energy Shrinks the Fibers in the Spongy Tissue of the Drainage Area Causing Adjacent Holes to Occur.
Usual Settings are: 1.0 joule, 50 micron spot size, 0.1 second duration, 70-100 applications.

CONCLUSION

- **Laser's can be a Great Solution for Corrective Eye Surgery**
- **Laser Surgery is Surgery, and Therefore Risks are Involved**
- **Other Options for Correcting Myopia and Glacoma Should be Explored**
- **Technological Advances in Medicine Constantly Improve Surgery**