Corneal Transplantation: Current and Future Techniques

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The Cornea

- Epithelium
- Stroma
- Descemet's
- Endothelium
Scleral Damage
Limbal Stem Cell Loss
Donor Tissue

North Suburban Eye Specialists

DALK
Outer layers of cornea

EK
Inner layer of cornea

KLAL
Limbal region of eye
ALK: Anterior Lamellar Keratoplasty
DSEK: Descent’s Stripping Endothelial Keratoplasty
PKP: Penetrating Keratoplasty
KLAL: Keratolimbal Allograft
Changes in Corneal Transplantation
What is a Femtosecond Laser?

- Near-infrared pulses used to cut tissue with minimal collateral tissue damage
- One quadrillionth of a second (a millionth of a billionth of a second) (1 fs = 10\(^{-15}\) s)
What is a Femtosecond Laser?
FEMTO LDV Crystal Line

Photodisruption, Optical Breakdown

Cutting Plane

“other Femtolasers”

Crystal Line Laser Optics

Short focal length
Large numerical aperture
Small spot size - less “shock-wave“ effect

2 µm
Results of the two different concepts in photodisruption process

Pulse Energy: 2 µJ
Pulse Width: 930 fs

Pulse Energy: 30 nJ
Pulse Width: 250 fs
DEATH!

Apoptosis

Necrosis
Apoptosis
FAS Ligand immunofluorescent staining