

The Cutting Edge of Optometry

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July 2021

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Administrative

- Financial disclosures: Telasight, inc., Allergan, inc.

Femtosecond Laser

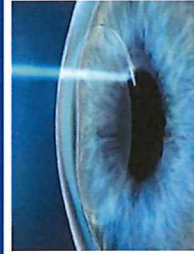
- 1053 nm wavelength (infrared), 10⁻¹⁵ second pulse
- Photodisruption
- Laser application creates bubble layer, flap lifted by separating adhesions between adjacent bubbles

Small Incision Lenticule Extraction (SMILE)

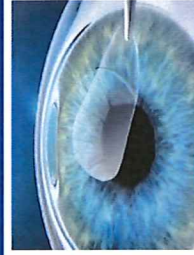
- Femtosecond laser
- Creates lenticule in stroma, no flap!
- Lenticule is removed from small partial thickness corneal incision

Small Incision Lenticule Extraction (SMILE)

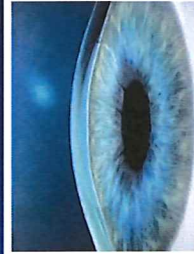
- Treats myopia and astigmatism
- Sphere: -1.00 D to -10.00 D, Cylinder: -0.75 D to -3.00 D, MRSE up to -10.00 D



A refractive lenticule and small incision are created inside the intact cornea – all in one step.

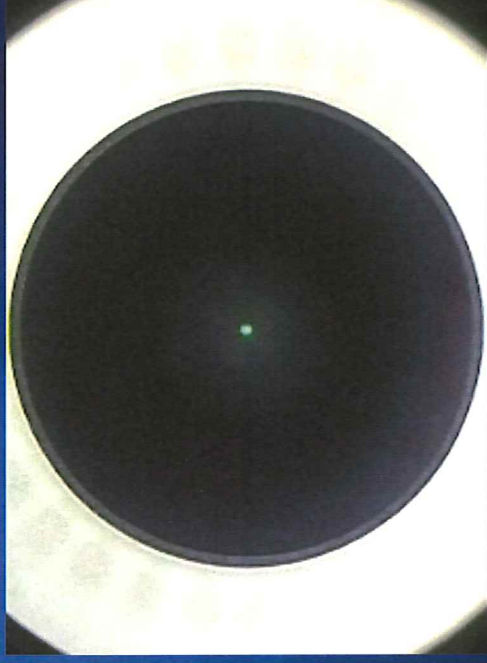


The lenticule is subsequently removed through this small incision, leaving the remainder of the superficial cornea intact.



Removing the lenticule changes the shape of the cornea, thereby achieving the desired refractive correction.

Small Incision Lenticule Extraction (SMILE)



Small Incision Lenticule Extraction (SMILE)

- FDA approved September 2016
- 98.5% of all patients achieved target refraction within the typical "satisfaction zone" (± 1.00 D)
- 93% of all patients achieved target refraction with a precision of ± 0.50 D

Small Incision Lenticule Extraction (SMILE)

- Post-op, topical steroid and antibiotic
- Retreat with PRK if needed

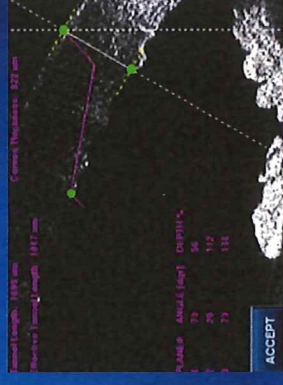
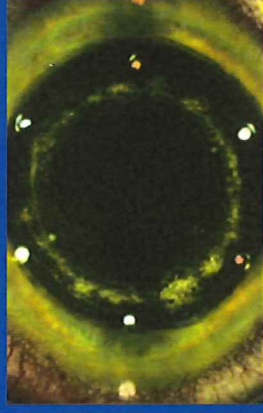
Femtosecond Laser Assisted Cataract Surgery (FLACS)

- Clear corneal incisions
- Anterior capsulotomy
- Limbal relaxing incisions
- Lens fragmentation



FLACS Advantages

- Precise capsulotomy
- Reproducible incisions

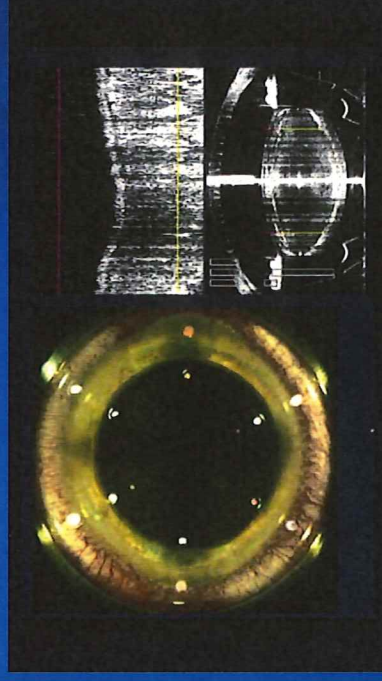


FLACS Disadvantages

- Longer procedure time
- Expensive
- Increased posterior capsule rupture

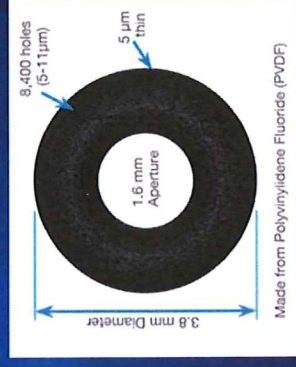
Femtosecond Laser Assisted Cataract Surgery (FLACS)

Video:



Kamra Inlay

- Opaque corneal inlay
- Placed in stroma, 250 μm
- Corneal flap or pocket created with femtosecond laser
- Creates pinhole effect

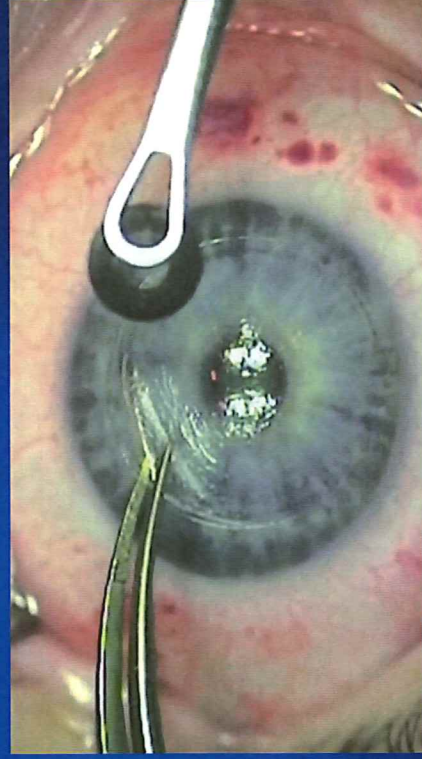


Kamra Inlay

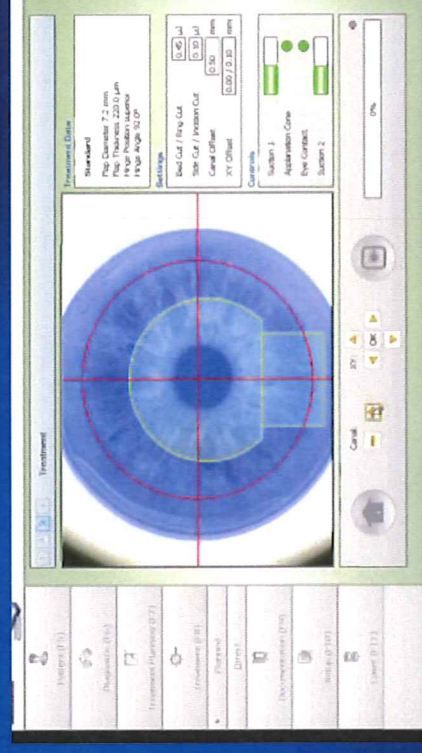
- Decreases size of blur circles
- Monocular
- Non-dominant eye



Kamra Video Flap

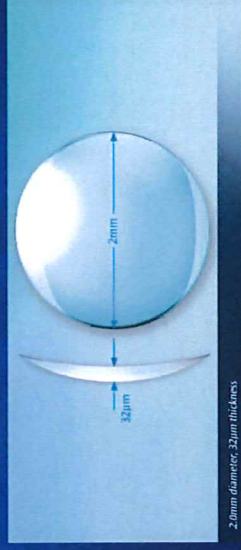


Kamra Video Pocket



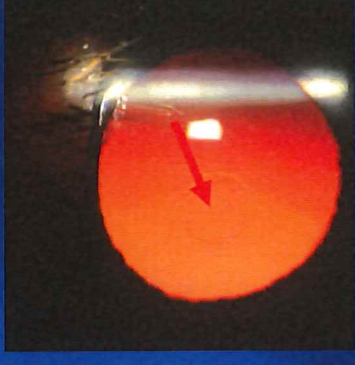
Raindrop Inlay

- Clear corneal inlay
- Changes anterior corneal curvature
- Placed in anterior stroma, 150um
- Induces spherical aberrations and increases depth of focus

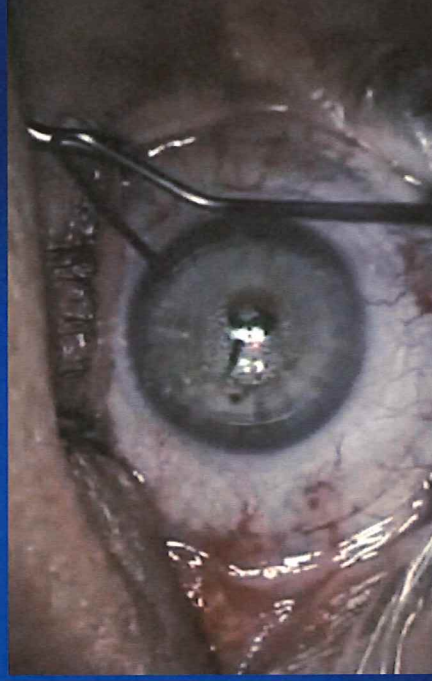


Raindrop Inlay

- Monocular
- Non-dominant eye
- RECALLED, 75% of patient developed corneal haze
- Company went out of business in 2018



Raindrop Video



Optometry

- KRS 320.210, excludes specifically, retina laser procedures, LASIK, PRK, nonlaser full thickness corneal excisions (excluding emergent paracentesis), and nonlaser surgical extraction of the crystalline lens
- SMILE, FLACS, and Kamra are all well within Optometry's scope of practice in Kentucky

Corneal Cross Linking

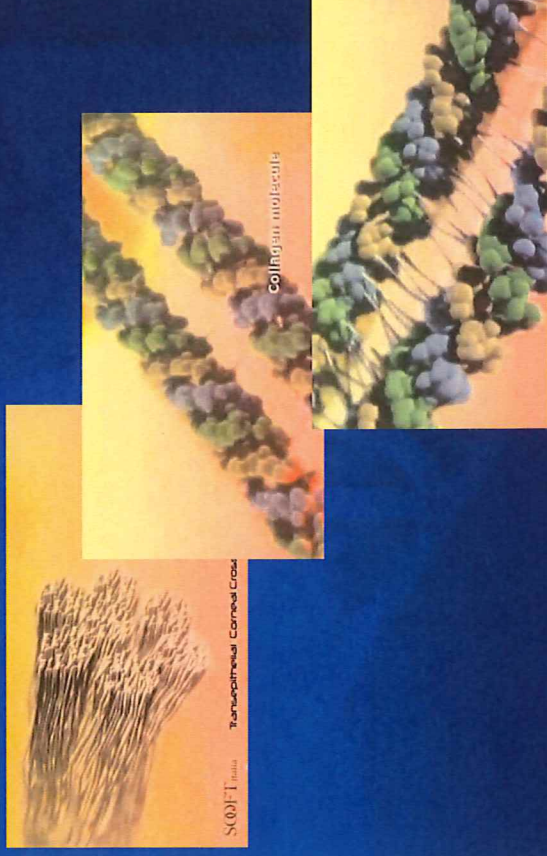
- UV light
- Riboflavin 0.1% (Vitamin B2)
- Standard vs Accelerated?
- Epithelium On vs Epithelium Off?
- FDA approval April 2016

Corneal Cross Linking

Indications:

- Keratoconus
- Pellucid Marginal Degeneration
- Post-LASIK Ectasia

Corneal Cross Linking

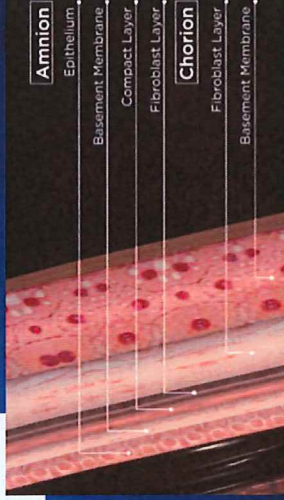


Corneal Cross Linking

Video:



Amniotic Membrane



Amniotic Membrane

- Pro-healing
- Anti-inflammatory
- Wet
- Dry



Amniotic Membrane Indications

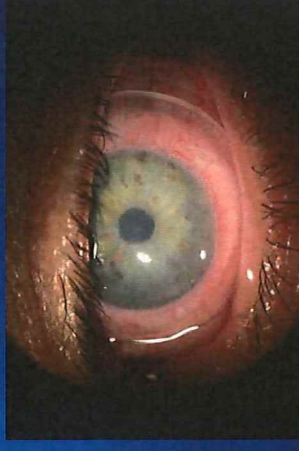
Diseases with Epithelial defects, Debridement Optional:

- Neurotrophic Ulcers
- POST-infectious corneal ulcer (Bacterial, Herpetic, Shield)
- Chemical/Thermal Burns
- Other non-healing Epithelial Defects

Amniotic Membrane Indications

Diseases with OUT Epithelial defects, NO Debridement:

- Filamentary Keratitis
- Severe Dry Eye/SPK
- Exposure Keratopathy
- Stevens-Johnson Syndrome



Amniotic Membrane Indications

Diseases with Abnormal Basement Membrane, After Debridement:

- Recurrent Corneal Erosions
- Epithelial Basement Membrane Dystrophy
- Salzmann's Nodular

Amniotic Membrane

Video:



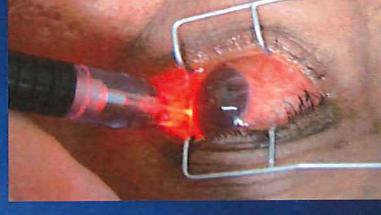
Amniotic Membrane

Mechanism video:



Trans-Scleral CycloPhotoCoagulation

- Mechanism: ablates ciliary body to reduce aqueous production and lower IOP



Trans-Scleral CycloPhotoCoagulation

- Minimally invasive
- 810nm diode laser
 - 18 - 24 spots per 360 degrees
 - Power: 1500 - 2500 mw
 - Duration: 1.5 - 3.0 seconds

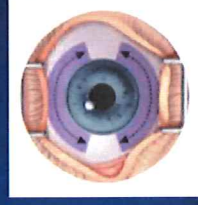
Target: Apply laser diode 1.2 mm posterior to limbus overlying the ciliary process on the sclera, avoiding 3 and 9 o'clock

Trans-Scleral CycloPhotoCoagulation

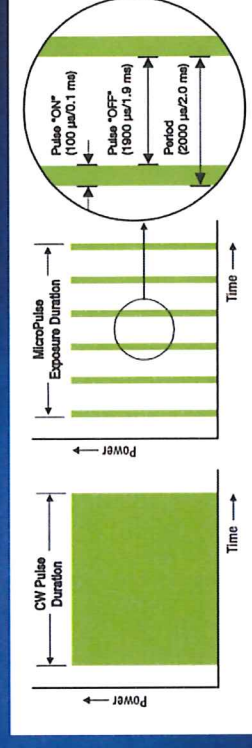
- Reserved for eyes with limited visual potential (HM or worse) and pain from elevated IOP
- Side effects include, reduced vision, chronic uveitis, hypotony, pain, CME, vitreous hemorrhage, and phthisis

Micropulse Trans Scleral CycloPhotoCoagulation

- Minimally invasive, uses short bursts of energy to minimize collateral tissue damage
- Less destructive than full power CPC
- 810nm diode laser
 - Continuous application
 - Power: 2000 mw
 - Duration: 120 seconds (60 seconds applied to each hemisphere) avoiding 3 and 9 o'clock
 - Frequency: micropulse



Micropulse CPC



Micropulse CPC

- Reduces IOP around 30%
- Effective 70% of the time
- Less risk of uveitis, hypotony, CME, and phthisis than continuous wave trans scleral cyclophotocoagulation
- Can be considered in eyes with good visual potential
- May be repeatable



Micropulse SLT

- 532 nm
- 1000 mW
- Fixed 300 micro spot size
- 300 ms
- 15% Duty cycle
- 360 degree confluent applications

Micropulse SLT

- Less inflammation
- Less discomfort
- Same initial effectiveness as SLT
- Long term outcomes?
- Repeatable?

	MLT	SLT	ALT
Wavelength	532 nm, 577 nm	532 nm	489/514 nm, 532 nm
Mechanism	Thermally effects - not destroys - pigmented TM cells	Selective destruction of pigmented TM cells without thermal or collateral damage	Shrinkage of TM with adjuvant stretching
Repeatable	Yes	Yes	No
Treatment Endpoint	No visible tissue reaction	Small bubbles	Blanching (mild) to bubbles (intense)
Post op inflammation	None	Yes	Yes
Spot Size	300 µm Constant spot to access narrow angles	400 µm	50 µm



Radio-frequency Skin Tightening

- Non-invasive
- 4 MHz monopolar radio-frequency device
- Skin rejuvenation



Radio-frequency Skin Tightening

Aging causes:

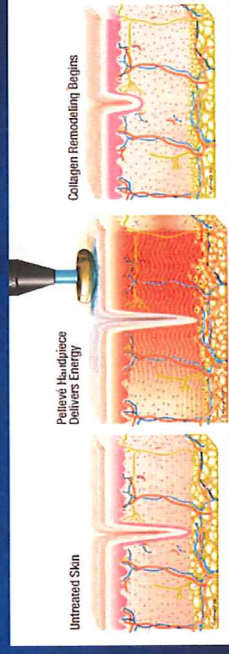
- Loss of collagen
- Loss of elastin
- Skin redundancy, laxity, and loss of elasticity
- Thinning of the dermis
- Atrophy of fat



Radio-frequency Skin Tightening

Mechanism:

- Tightens collagen
- Promotes synthesis of collagen and elastin
- Increases dermal thickness
- Reduces wrinkles



Radio-frequency Skin Tightening

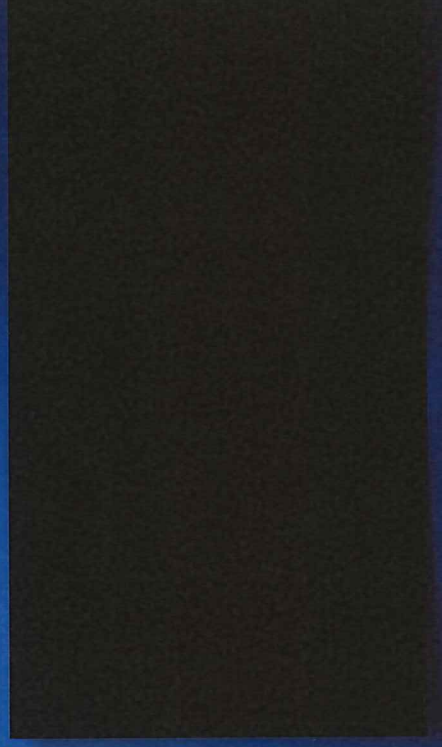
Indications:

- Dermatochalasis
- Periorbital rhytids
- Meibomium gland dysfunction?



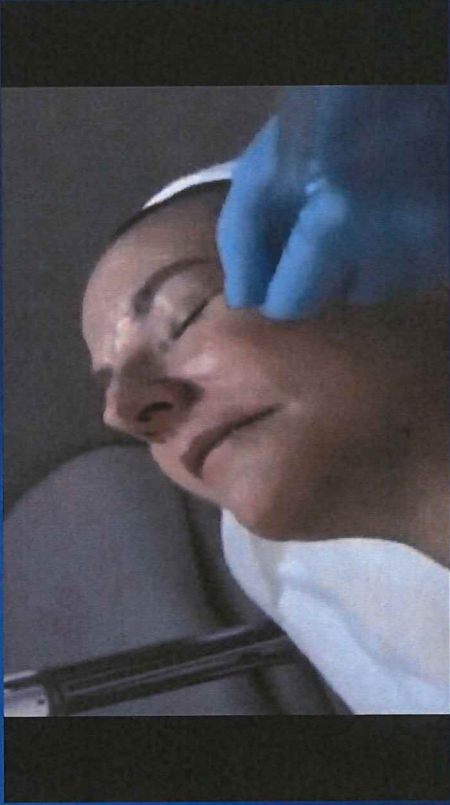
Radio-frequency Skin Tightening

Mechanism video:



Radio-frequency Skin Tightening

Video:



Radio-frequency Skin Tightening



Radio-frequency Skin Tightening

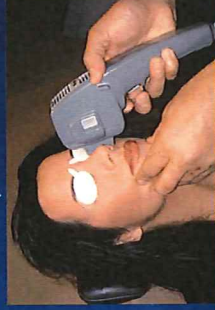


Radio-frequency Skin Tightening



Intense Pulsed Light

- Non-invasive
- Xenon flashlamp, 400 to 1200 nm, but filter restricts the wavelength to around 500 nm (not a laser)
- 8-20 J/cm²
- 18-24 pulses of light per treatment
- 1 treatment, every 4 weeks for 4 months
- Used currently for acne and rosacea in Dermatology Practices



Intense Pulsed Light

Mechanism:

- Abnormal blood vessels carry inflammatory mediators to tissue site
- Inflammatory mediators disrupt normal meibomian production
- Light is absorbed by red blood cells in telangiectatic blood vessels, which causes coagulation and the blood vessel to close
- IPL warms meibum, ideal time for gland expression
- 500 nm light kills bacterial on eye lids

Other Laser Procedures

- YAG Laser Vitreolysis
- YAG Laser Stromal Ablation for RCE
- Laser Trichiasis

Questions?

Thank You.



Special thanks to Donald Bennett O.D., M.D. for his contributions to this lecture