

Refractive & Cataract Update

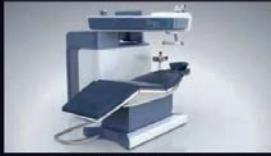
Part I

Laser Ablation Profiles

Marcela Espinosa
MD



Laser Ablation Profiles



MARCELA M. ESPINOSA-LAGANA, MD



The Excimer Laser

- "Excited Dimer" – Argon-Fluoride
- 193nm wavelength
- Vaporizes tissue
 - No / minimal thermal reaction
 - Minimal wound healing response
- Cornea "Sculpting"



EXCIMER LASER ABLATION PROFILES

NON REFRACTIVE EFFECT	Phototherapeutic effect
REFRACTIVE EFFECT	Myopic Hyperopic Astigmatic Presbyopic



EXCIMER LASER ABLATION PROFILES

NON REFRACTIVE

PHOTOTHERAPEUTIC KERATECTOMY (PTK)

A uniform amount of tissue is ablated without intended refractive change



PHOTOTHERAPEUTIC KERATECTOMY



EXCIMER LASER ABLATION PROFILES

PHOTOTHERAPEUTIC KERATECTOMY

Recurrent Erosions
Bullous Keratopathy
Band Keratopathy
Nodular Scarring in Keratoconus
Corneal dystrophies
Scars



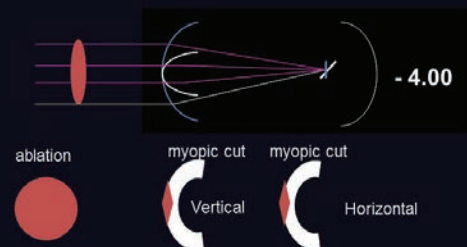
EXCIMER LASER ABLATION PROFILES

MYOPIC ABLATION

Greatest amount of tissue is removed centrally and progressively less removed toward the periphery



MYOPIA



'Laser Ablation Profiles'

(slides 1-8)

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MD

SIMPLE MYOPIA



EXCIMER LASER ABLATION PROFILES

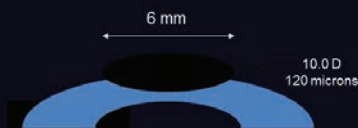
SINGLE ZONE
MYOPIC ABLATION

SPHERIC

$$\text{Central Ablation Depth} = \frac{D \times \text{mm}^2}{3}$$

D = Diopters of Myopia
mm² = Ablation zone diameter

SINGLE ZONE



EXCIMER LASER ABLATION PROFILES

HYPEROPIC ABLATION

Minimal amount of tissue is removed centrally, and progressively more stroma is ablated towards the periphery so that the central cornea is steepened

EXCIMER LASER ABLATION PROFILES

HYPEROPIC ABLATION

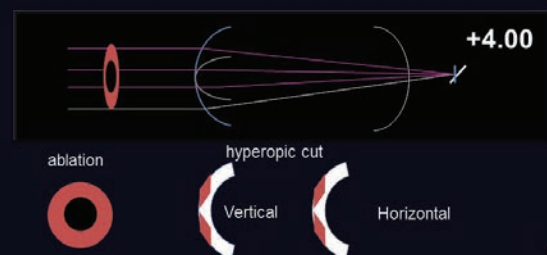
COMPONENTS

ABLATION - mid periphery

TWO BLEND ZONES - inner and outer

Hence: Large zones are required (8mm or greater)

HYPEROPIA



SIMPLE HYPEROPIA



EXCIMER LASER ABLATION PROFILES

ASTIGMATIC

Compound Myopic Astigmatism
Simple Myopic Astigmatism
Mixed Astigmatism
Simple Hyperopic Astigmatism
Compound Hyperopic Astigmatism

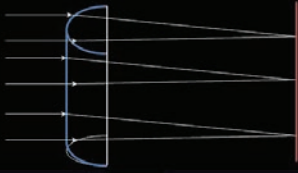
‘Laser Ablation Profiles’

(slides 9-24)

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CYLINDER

VERTICAL cylinder acts in HORIZONTAL PLANE



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EXCIMER LASER ABLATION PROFILES

ASTIGMATIC

EACH meridian is ablated differently

STEEP meridian is selectively **FLATTENED**

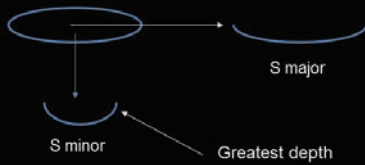
or

FLAT meridian is selectively **STEEPENED**

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MYOPIC ASTIGMATISM

ELLIPTICAL ABLATIONS



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SIMPLE Myopic Astigmatism



Vertical Horizontal

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SIMPLE Myopic Astigmatism



Simple Myopic Astigmatism

COMPOUND Myopic Astigmatism



Vertical Horizontal

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COMPOUND Myopic Astigmatism



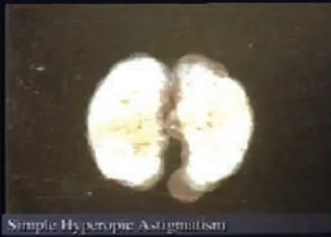
SIMPLE Hyperopic Astigmatism



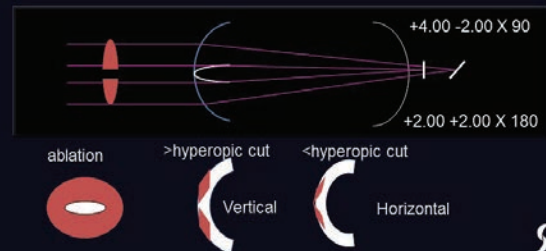
Vertical Horizontal

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SIMPLE Hyperopic Astigmatism



COMPOUND Hyperopic Astigmatism

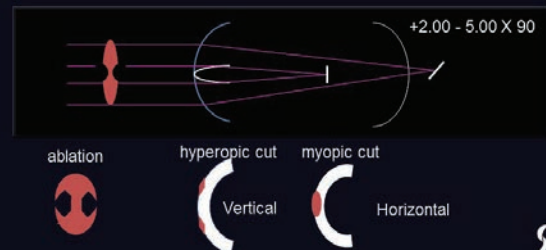


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COMPOUND Hyperopic Astigmatism



MIXED Astigmatism



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MIXED ASTIGMATISM

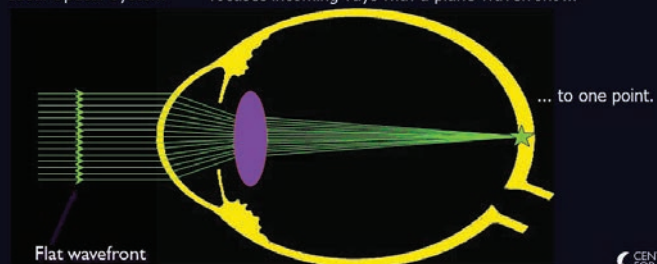


Wavefront treatment

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What is a WAVEFRONT ?

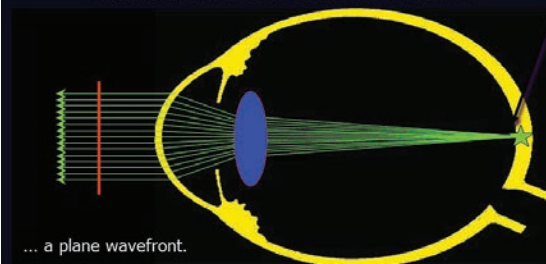
Ideal Optical System focuses incoming rays with a plane wavefront ...



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Wavefront - Perfect Optical System

Outgoing light rays from a focal point have again ...



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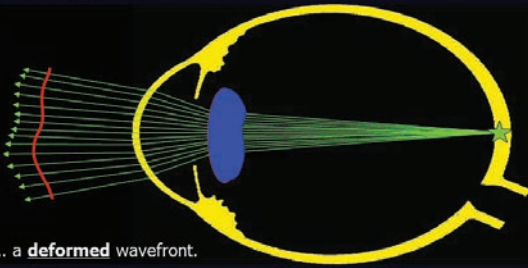
'Laser Ablation Profiles'

(slides 25-40)

Marcela Espinosa
MD

Wavefront - Not perfect Optical system

Outgoing light rays from a system with Aberrations have ...



... a deformed wavefront.

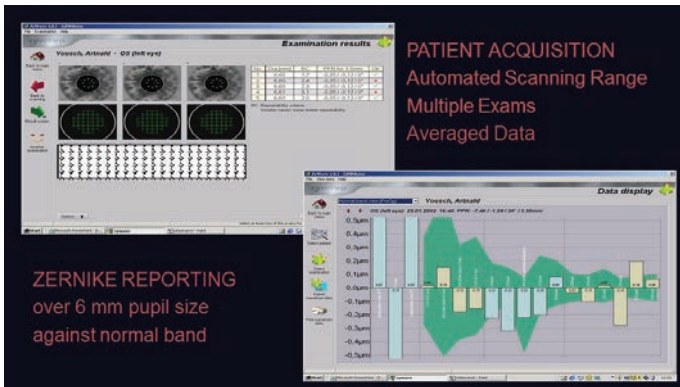
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Orbscan Acquisition Head

Zywave Acquisition Head



Diagnostic Workstation from Bausch & Lomb



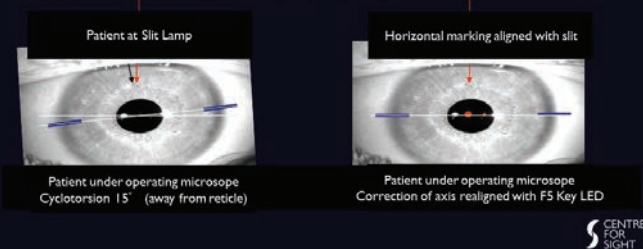
ABLATION & SHAPE

- ABLATIVE TECHNIQUES
 - Irreversible
 - Can be unforgiving
- Topography & Aberrometry – ESSENTIAL
- GOOD UNDERSTANDING - VITAL

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3-D IRIS RECOGNITION TRACKER

- ROTATIONAL TRACKING

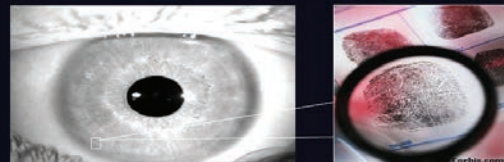


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Iris Recognition Eyetracker

Adapted for medical use from military technology
utilised for high level security control

1 out of 3,493..E24 or
1 out of 3,493,000,000,000,000,000,000,000



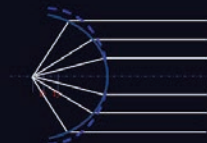
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Aspheric treatment

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Prolate Corneas

- All predators including humans have Prolate corneas



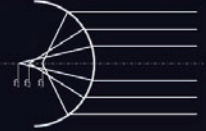
Eagles versus Frogs

- What is “PROLATE”???



Oblate corneas

- Frogs have Oblate corneas with a lot of spherical aberration
- Peripheral vision is better than central vision



Spherical Aberration & Night Vision

- Spherical Aberration (SA) increases with age
- Laser eye surgery traditionally increases SA
- SA more relevant in those with Big Pupils
- Relevance ?
 - Spherical aberration causes Night vision problems
- Not inducing Spherical Aberration will decrease night vision problems...

ABLATION PROFILES

Good Understanding Required

- How to alter corneal shape
- Alter refraction

Thank you

‘Laser Ablation Profiles’

(slides 41-45)

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MD

Refractive & Cataract Update Part I

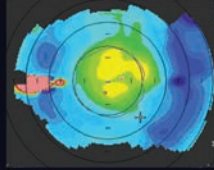
LASIK & SUPRACOR LASIK A Laser Solution for Presbyopia

Sheraz Daya
MD FACP FRCS(Ed) FRCOphth



LASIK and SUPRACOR LASIK

A laser solution for Presbyopia



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Presbyopia

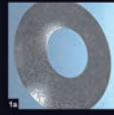
- Presbyopic Correction
 - PRESBYOPIA
 - Spectrum – Age & Lens
 - Young presbyopes – 42 to 55(to 60) year olds
 - Pre-cataract presbyopes – 55(to 60)+



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Presbyopia – Final frontier

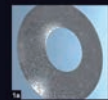
- PRESBYOPIA SOLUTIONS
- Corneal Approach
 - Laser surgery
 - Presbyopic Corneal Inlays
- Lens Approach
 - Accommodative
 - Multifocal



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Presbyopia - Cornea

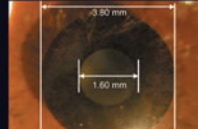
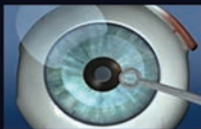
- INLAYS
- Acufocus
- Presbylens – Revision optics
 - 2mm diameter inlay inside a corneal pocket
 - Alters corneal shape to increase power centrally
- Presbia – Flexvue
 - 3mm wide, 20 microns thick
 - Refractive power



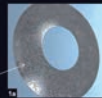
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Acufocus

- Works on pinhole principle
- Implant inserted under Corneal Flap
- Polymer – “Kynar”



Fenestrated

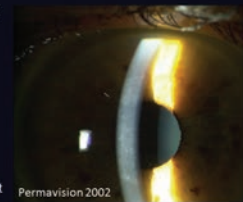


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Corneal Implants - Presbyopia

Implants

- History of problems with implants in the cornea
- Acufocus
 - Centration vital
- Complications
 - Flap issues – same as Lasik
 - Halos – possible
 - Decreased contrast (placed in non-dominant eye)



Permapvision 2002

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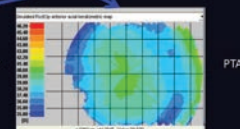
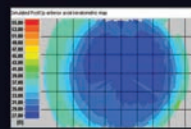
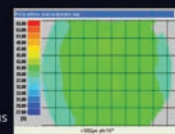
PRESBYOPIA - Cornea

- LASER SURGERY
- Monovision and Hyper-asphericity
- Intracor
- Presby-Lasik
- Supracor

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Presbyopia – Laser options

- MONOVISION
 - Limited
 - Acceptability & Magnitude
- ASPHERIC treatments
 - Improves image quality & depth of focus



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‘LASIK & SUPRACOR LASIK A Laser Solution for Presbyopia’

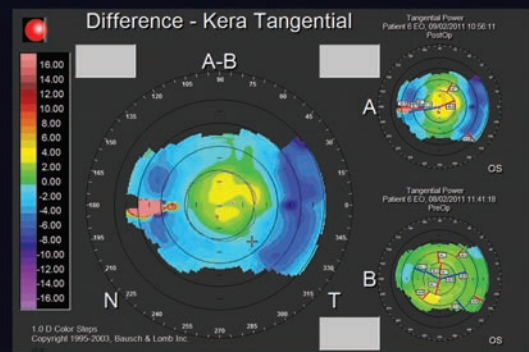
(slides 1-16)

Sheraz Daya

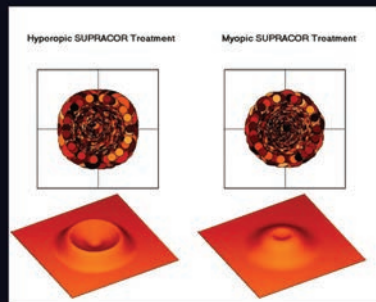
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Presbyopia – LASIK options

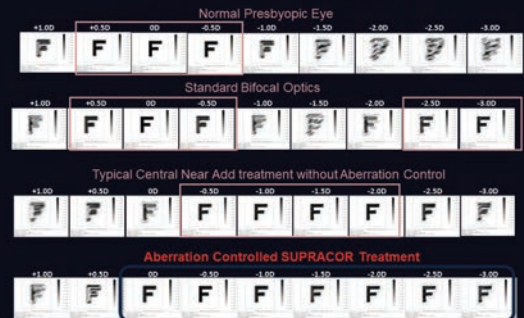
- Supracor
 - Multifocal cornea
 - Minute area of increased power
 - Enough to provide near acuity
 - Compromises distance minimally
 - Early Myopia – regresses
 - Adaptation required – like any multifocal procedure
 - Promotes corneal asphericity - desirable



What Is SUPRACOR?



What Is SUPRACOR?

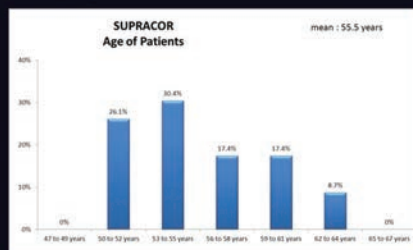


IntraLASIK Supracor



Clinical outcomes?

- CE study: Age

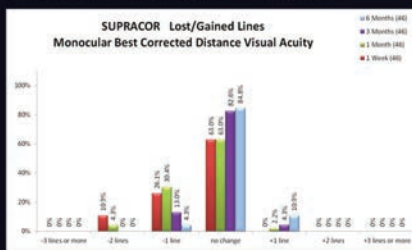


Stability – (target at -0.50D)



SAFETY - Monocular

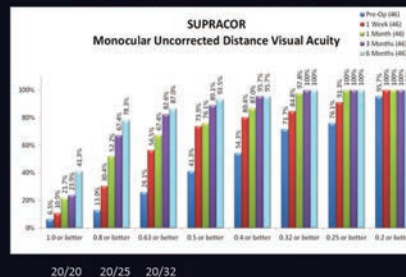
0% lost 2 lines cc vision. Initial losses mainly due to PEK



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EFFICACY – UDVA Monocular

87% see far sc 0.63 or better monocular (6M)



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EFFICACY – UCNA Monocular

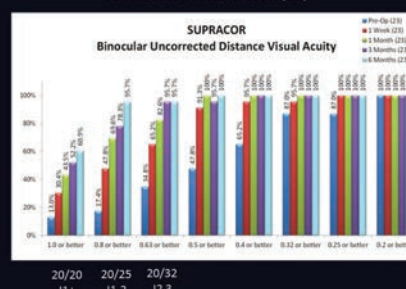
93.5% see near sc 0.63 or better monocular (6M)



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EFFICACY – UDVA Binocular

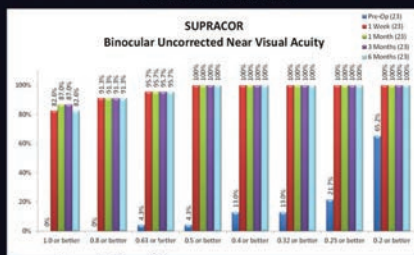
96% see distance sc 0.8 or better (6M)



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EFFICACY – UCNA Binocular

91% see near sc 0.8 or better



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What Patients Need to Know

Near vision good and retained

Distance VA – poor in 30%

- Initial gain – 2 to 3 weeks
- Slow gain – 3M (small number upto 6M)

Halos - temporary

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Poor UDVA- Temporary

- WHY ?

 1. Myopic overcorrection – intended
 2. Accommodation
 3. Multifocal Cornea - cortical adaptation
 4. Dry eye - temporary

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Supracor Summary

- Uncompromising BINOCULAR Solution
- One eye treated only
- NEAR – very good immediately and stable
- DISTANCE
 - a bit blurry at first – both eyes better
 - Big change 1 month, good at 3 months and very good 6 months - (cortical adaptation)
- NIGHT VISION
 - Some difficulty initially – gets better with time
- BINOCULAR – Visual independence

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‘LASIK & SUPRACOR LASIK A Laser Solution for Presbyopia’ (slides 17-24)

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