

Principle corneal shape pupil diameter

Diameter The smaller the diameter, The greater the correction (*Barraquer*)
Normal cornea is a prolate surface, steeper in the center and flatter in the periphery. Oblate surface like surface after myopic laser photorefractive keratectomy is flatter in the center and steeper in the periphery

The pupil diameter

The visually significant area of the corneal surface is approximately the area with the same diameter as the pupil size. The pupil diameter decreases with age. A large variation exists between people in any age group



The pupil size

Mesopic pupil

How to measure mesopic pupil ?

1-pupilmeter

2-pentacam

Cornea Volume:	62.1 mm ³	KPD:	+0.8 D
Chamber Volume:	260 mm ³	Angle:	52.3°
A. C. Depth (Int.):	3.87 mm	Pupil Dia:	3.01 mm
Enter IOP	IOP(Sum): +0.6 mmHg	Lens Th.:	

pupil size

In one large study, the average pupil size in individuals aged 20 and 80 years was 4.5 mm and 3.5 mm, respectively, in bright illumination. In dim illumination, the average pupil size in individuals aged 20 and 80 years was 8 mm and 5 mm, respectively. This finding is clinically important because most refractive lasers treat an area with a 6.5-mm diameter with a surrounding blending zone

Optical zone and pupil diameter

If the laser optical zone is smaller than the patient's dark-adapted pupil diameter, light will pass through the treated area (optical zone), partially treated area (blend zone) and possibly untreated area of the cornea, resulting in loss of contrast sensitivity and visual aberrations – starbursts, halos, and double vision. The greater the disparity between the optical zone and pupil size, the more severe the visual disturbances

Ideal optical zone

$$OZ = 1.1 \times \text{mesopic pupil}$$

$$OZ = 0.5\text{mm} + \text{mesopic pupil}$$

Ideal optical zone

Larger optical zone better than small optical zone

6.5 optical zone ----- Good .

Mixed astigmatism and hyperopia we need larger optical zone

Steep cornea small optical zone enough

Optical zone and Ablation Depth (AD)

AD = ablation depth

Munnerlyn formula

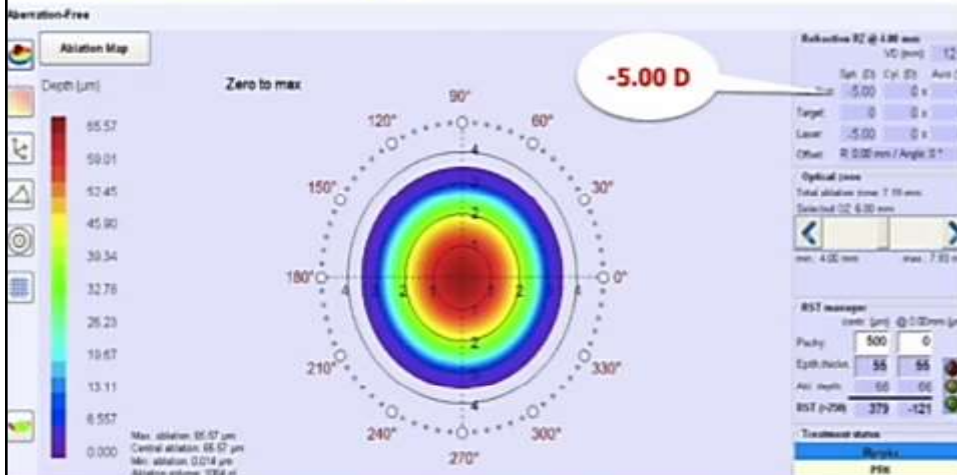
$$AD = 1/3 \times (OZ \text{ in mm})^2 \times \text{intended correction in dioptres}$$

Roughly per -1.00 D

6mm	13µm
6.5mm	15µm
7mm	17µm

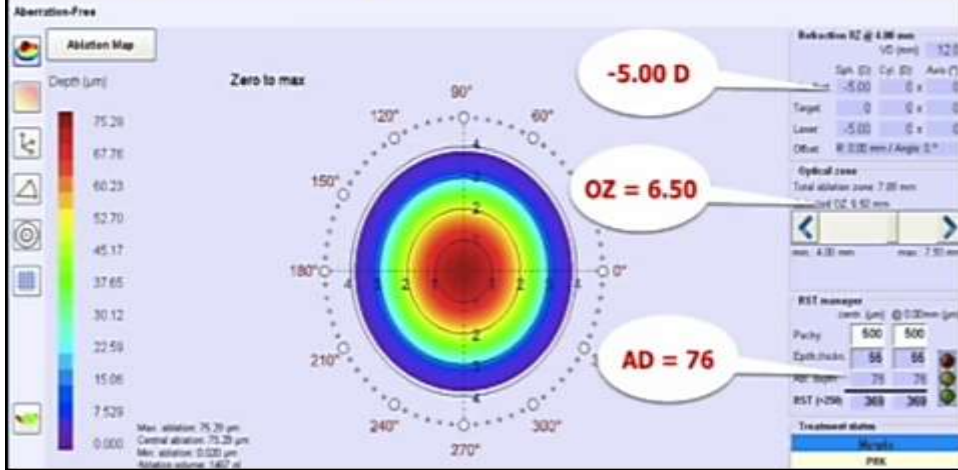
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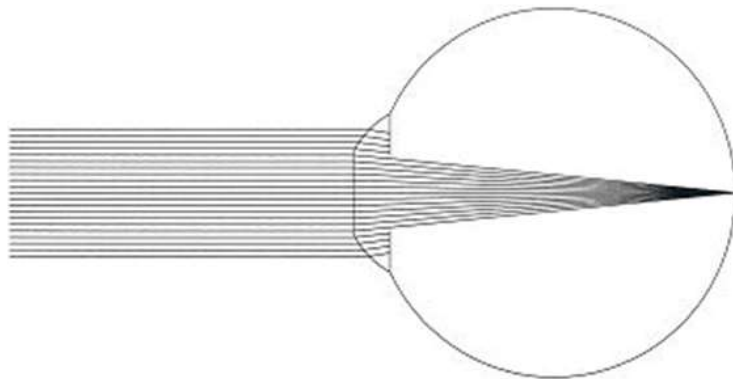


Optical zone and Ablation Depth (AD)

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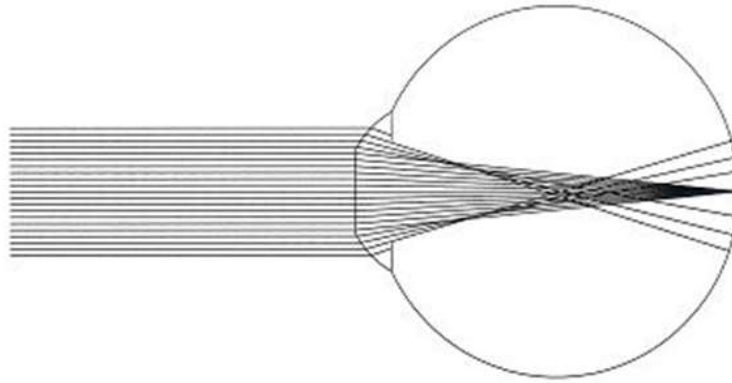
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LASIK Treatment
Pupil smaller than treatment

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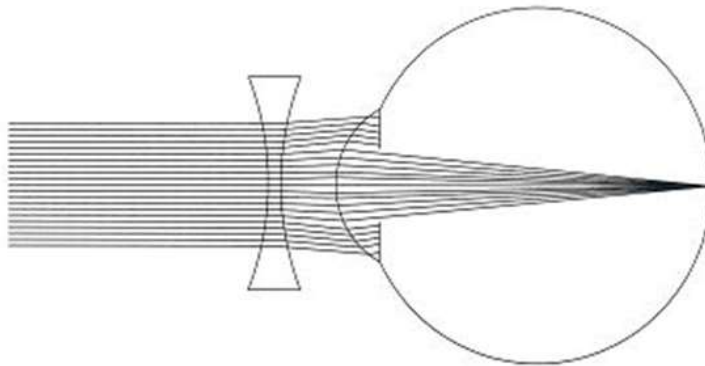
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**LASIK Treatment
Pupil larger than treatment**

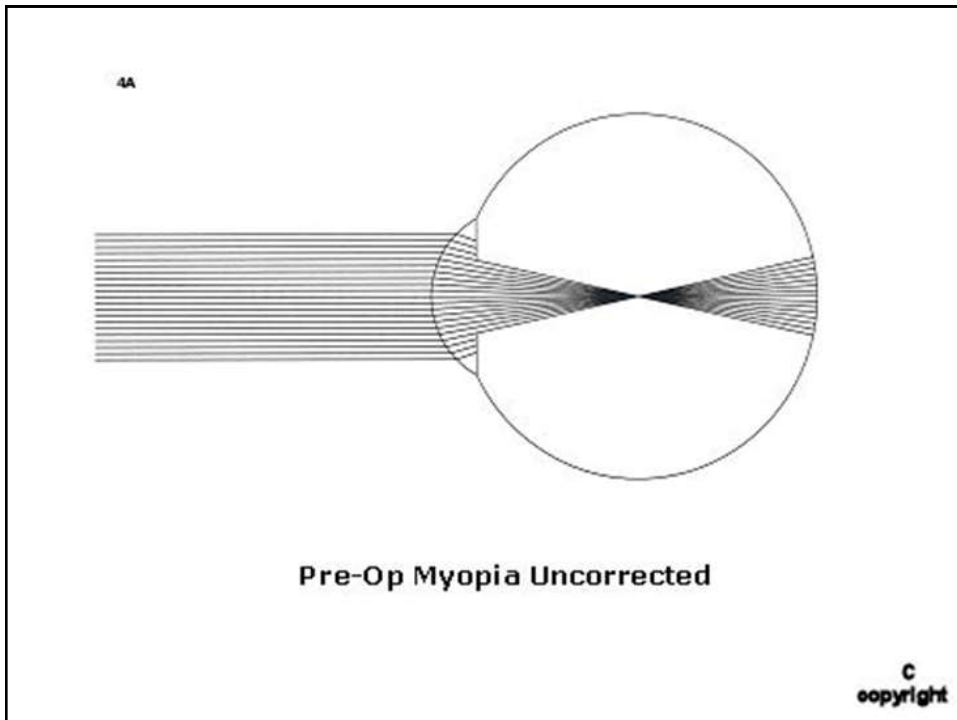
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Pre-Op Myopia Corrected by Glasses

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Take care

In reality, the optical zone may not be as large as intended due to healing responses (corneal remodeling and epithelial hyperplasia) after surgery and laser light reflection (loss of energy). The true optical zone after healing is called the “effective optical zone” or “functional optical zone”

++myopia ++++danger

The risk for night-time visual disturbances is further increased for patients with high myopia due to smaller effective optical zones associated with deeper ablations. If the ablation zone of the laser treatment is decentered, even an adequate effective optical zone for the pupil size may not cover the entire pupil diameter

Not the only factor

The importance of pupil size in refractive surgery is well-established. There are a small number of published studies that fail to find a correlation between night vision problems and large pupils like post lazik flate cornea encyctlorision

Home massage

- We have 5things
- Errores
- Diameter
- Depth of ablation
- Correction
- Complication
- Optical zone must be 2 mm larger than Mesopic pupil



