LASER TREATMENT FOR EYE

BY
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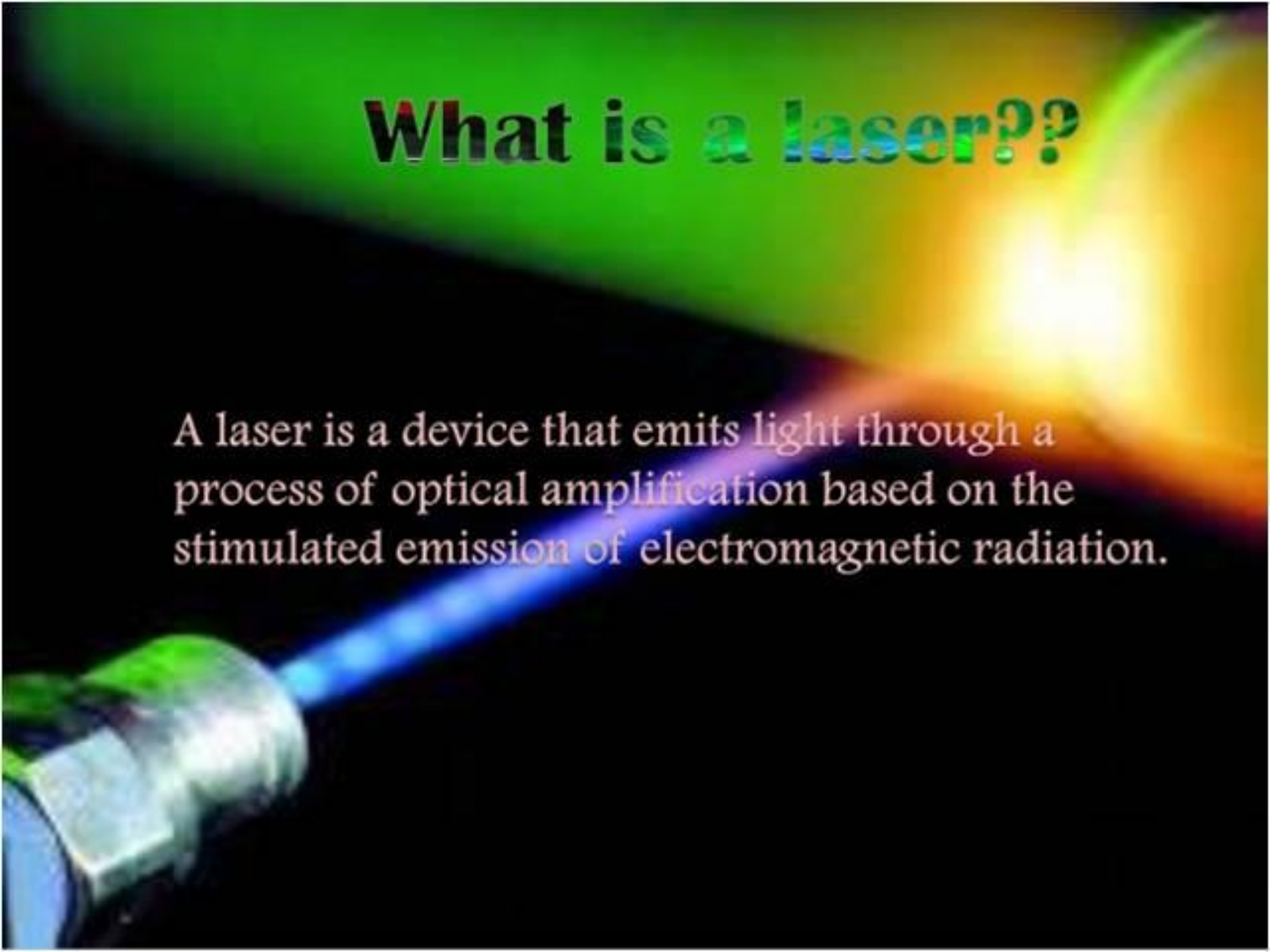
CERTIFYING SURGEON RR SITE

What is a laser??



A laser is a device that emits light through a process of optical amplification based on the stimulated emission of electromagnetic radiation.

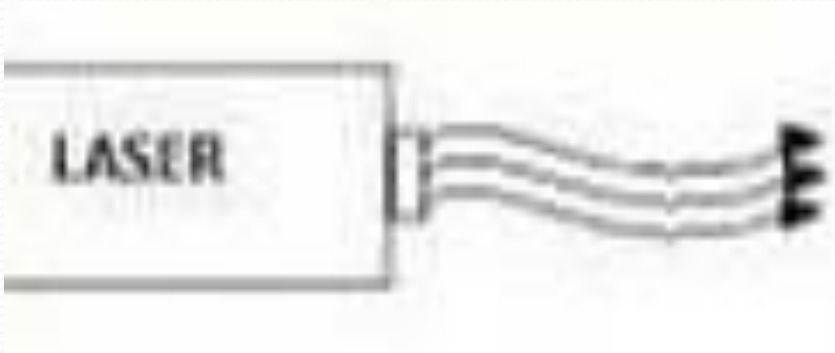

Laser
(light amplification by stimulated emission of radiation

Brief history

- 1950 Columbian Jose Barraquer developed microkeratome keratomileusis.
- 1970 Development of excimer laser origin of lasik laser.
- 1987 Dr Steven Trokel done the first laser surgery on patients eye

Properties of Laser

- A laser beam highly intense in nature.
- Laser beam is strictly monochromatic.
- Laser light is highly capable of going to long distance not easily absorbed by water.
- Laser beam is highly directional.
- This beam is coherent with wave train in phase with each other



Classification of Laser

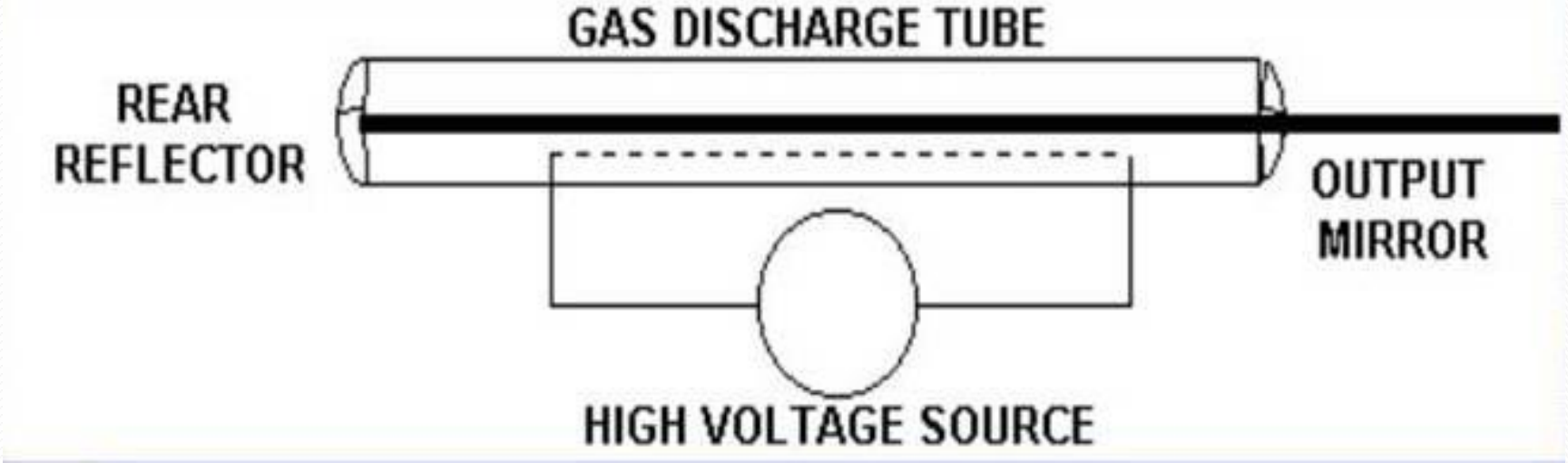
Gas laser	Solid laser
Argon laser Carbon dioxide laser	Nd: Yag laser Ho :Yag laser Er: Yag laser

Components of laser

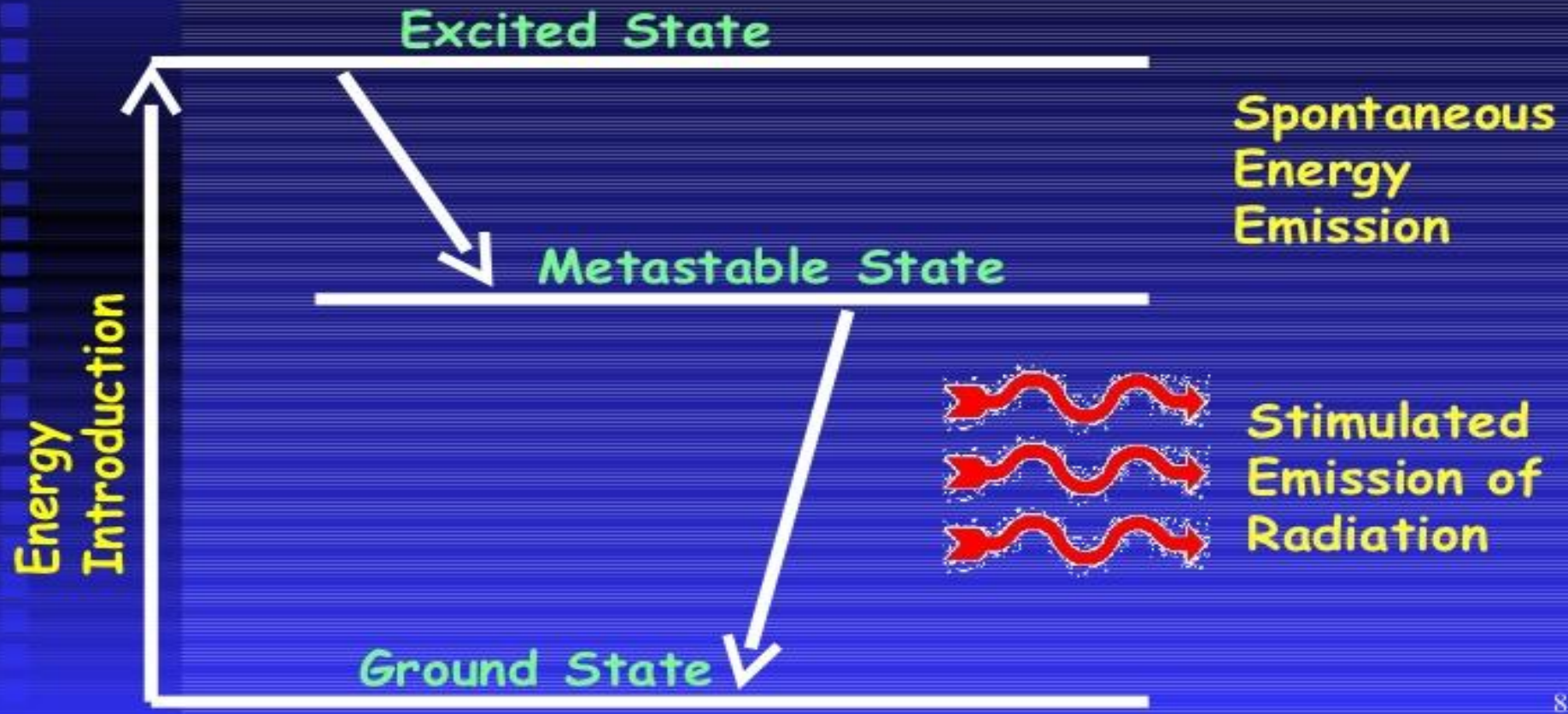
- **Active Medium** The active medium may be solid crystals like ruby or Nd yag laser liquid dyes, gases like CO_2 and helium/Neon or semiconductors such as Ga As. Active medium contains atom so electrons get excited to a metastable energy level by an energy source.
- **Excitation Mechanism** This pumps energy into active media by one of the methods - electrical , optical and chemical.
- **High reflectance mirror** Reflects 100% of laser light

Gas laser

Consists of gas filled tube in the laser cavity an external voltage is applied to the tube to excite the atoms in the gas to achieve population inversion followed by light emission



Lasing Action Diagram



Lasing action

- **Energy is applied to a medium raising electrons to an unstable energy level.**
- **These atom spontaneously decay to a long lived lower energy meta stable level.**
- **A population inversion is achieved when the majority of atom is reached to this metastable level.**
- **Lasing action occurs when electron is spontaneously reach to its ground level and produce a photon If the energy from this photon is of precise wave length it will stimulate production of another photon of the same wave length resulting in a cascading effect.**
- .

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- **Highly reflective mirror and partially reflecting mirror will continue the reaction by directing photon back through the medium along the axis of laser.**
- **Partially reflecting mirror allows the transmission of small amount of coherent radiation that we observe as beam.**
- **Laser radiation will continue as long as energy is applied to the lasing medium.**

Commercially available lasers and their

Laser	Year of discovery	Commercialise since	Application
Ruby	1960	1963	Metrology, Medical application, Inorganic material processing
N d Glass	1961	1968	Length and Velocity measurement
Diode	1962	1965	Semiconductor processing ,Biomedical application , welding
He Ne	1962		Light pointers , Length and Velocity measurement
Carbon dioxide	1964	1966	Material processing –cutting and joining
Nd Yag	1964	1966	Material processing – joining analytical technique
Argon ion	1964	1966	Powerful light, Medical application
Dye	1966	1969	Pollution detection, isotope separation
Excimer	1975	1976	Medical application, material processing ,colouring

Laser hazard

- **EYES- A/c exposure of eye of certain wave length can cause corneal or retinal burns.**
- **C/c exposure can lead corneal or lenticular opacity.**
- **SKIN- A/c exposure to high levels of optical radiation can cause skin burns, while carcinogenesis may occur for ultraviolet wave length(290-320).**
- **Chemical hazard –Some lasers require toxic chemical or hazardous substance to operate-chemical and excimer laser**

contd

- **Electrical- Most laser ultra high level can be lethal.**
- **Fire- Solvents used in dye lasers are flammable. high voltage pulse or flash may cause ignition. Flammable material may be inflated by direct beam of specular reflection from high power continuous wave infrared laser.**

What is Lasik Surgery?


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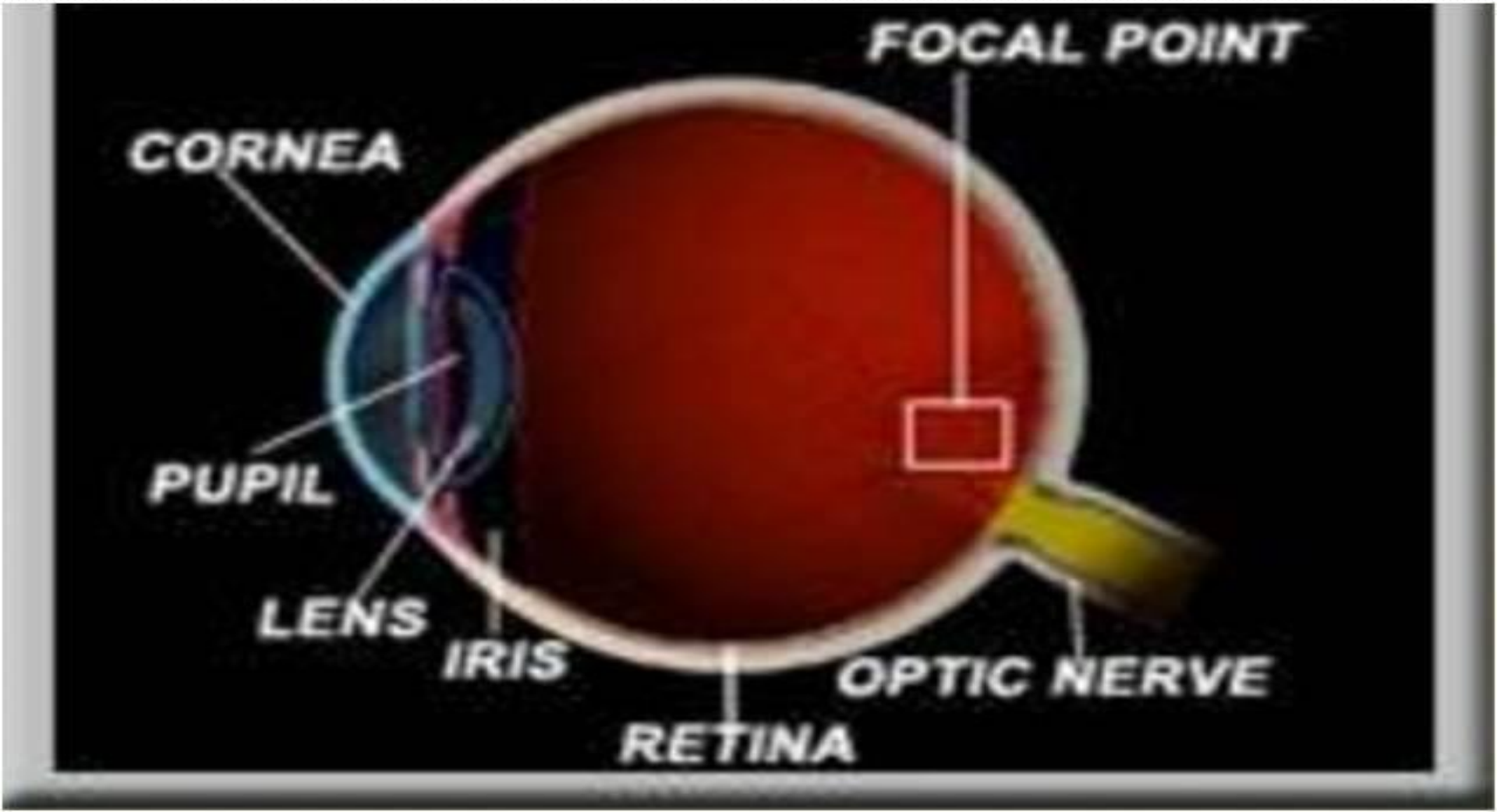
- **Lasik is an acronym laser assisted in situ keratomileusis or subsequent use of laser to reshape or flatten the cornea after an incision has been made in the cornea by using a microkeratome (thin knife) or laser keratome.**
  - **The epithelium is incised and folded back revealing stroma.**
- **Stroma is laser vaporized to reshape the cornea and epithelium is then replaced.**
- **Epithelium**
- **Stroma**
- **Endothelium**

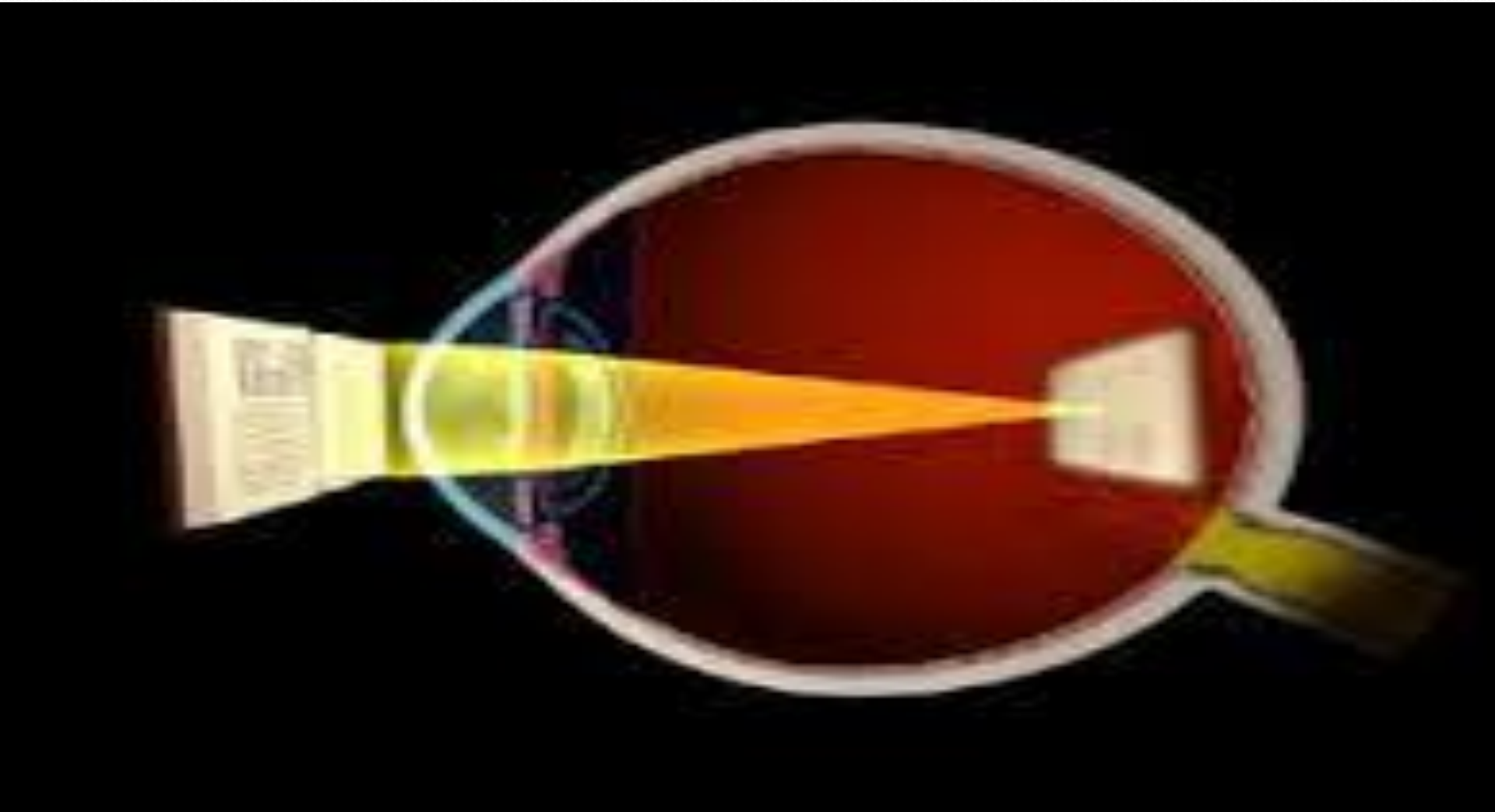
Indications of Lasik

- **Myopia-1 to- 15 D**
- **Hypermetropia+1to +8D**
- **Astigmatism range from 0.5D mixed astigmatism may not be corrected in single ablation**

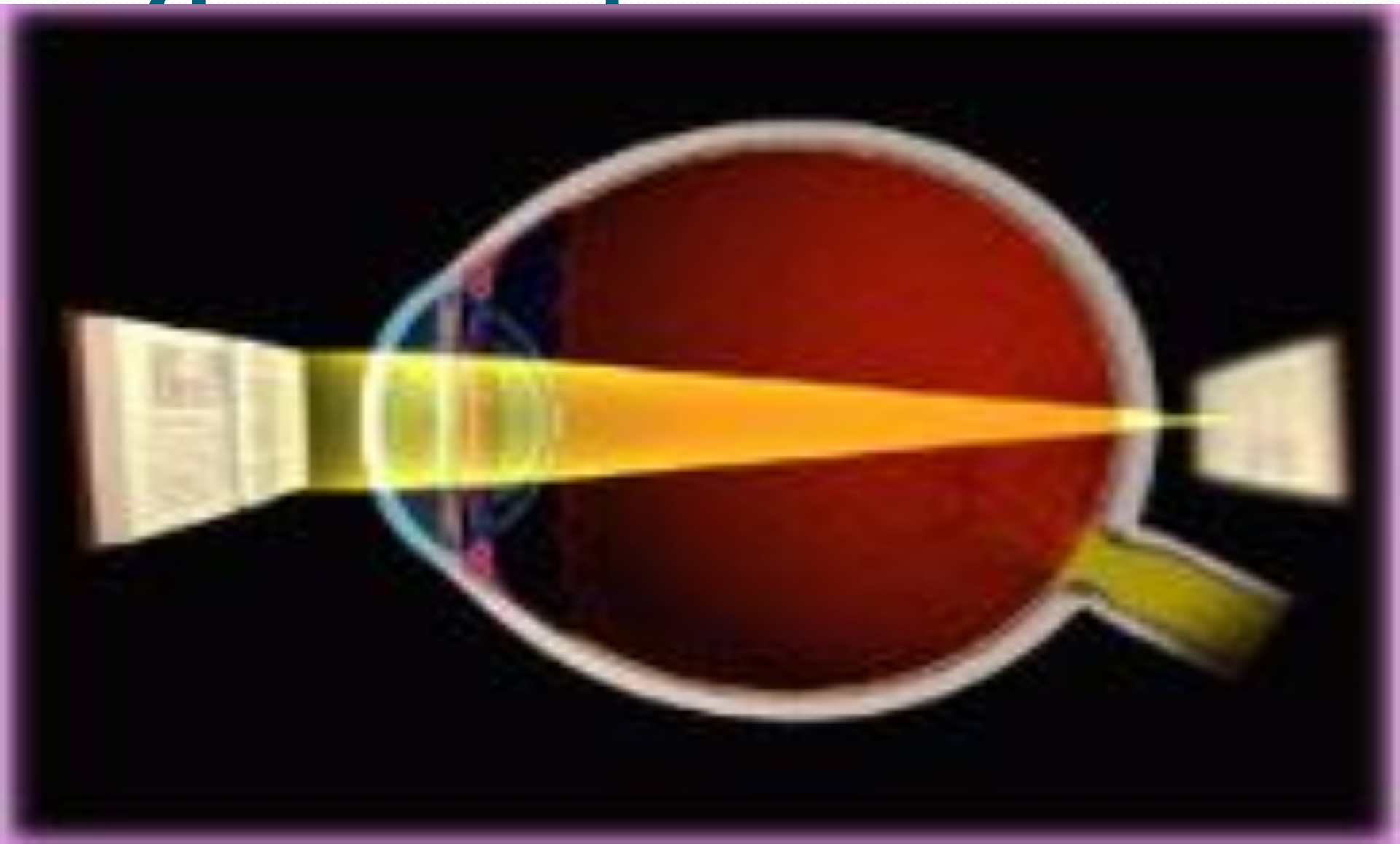
Normal anatomy of Eye



Myopia



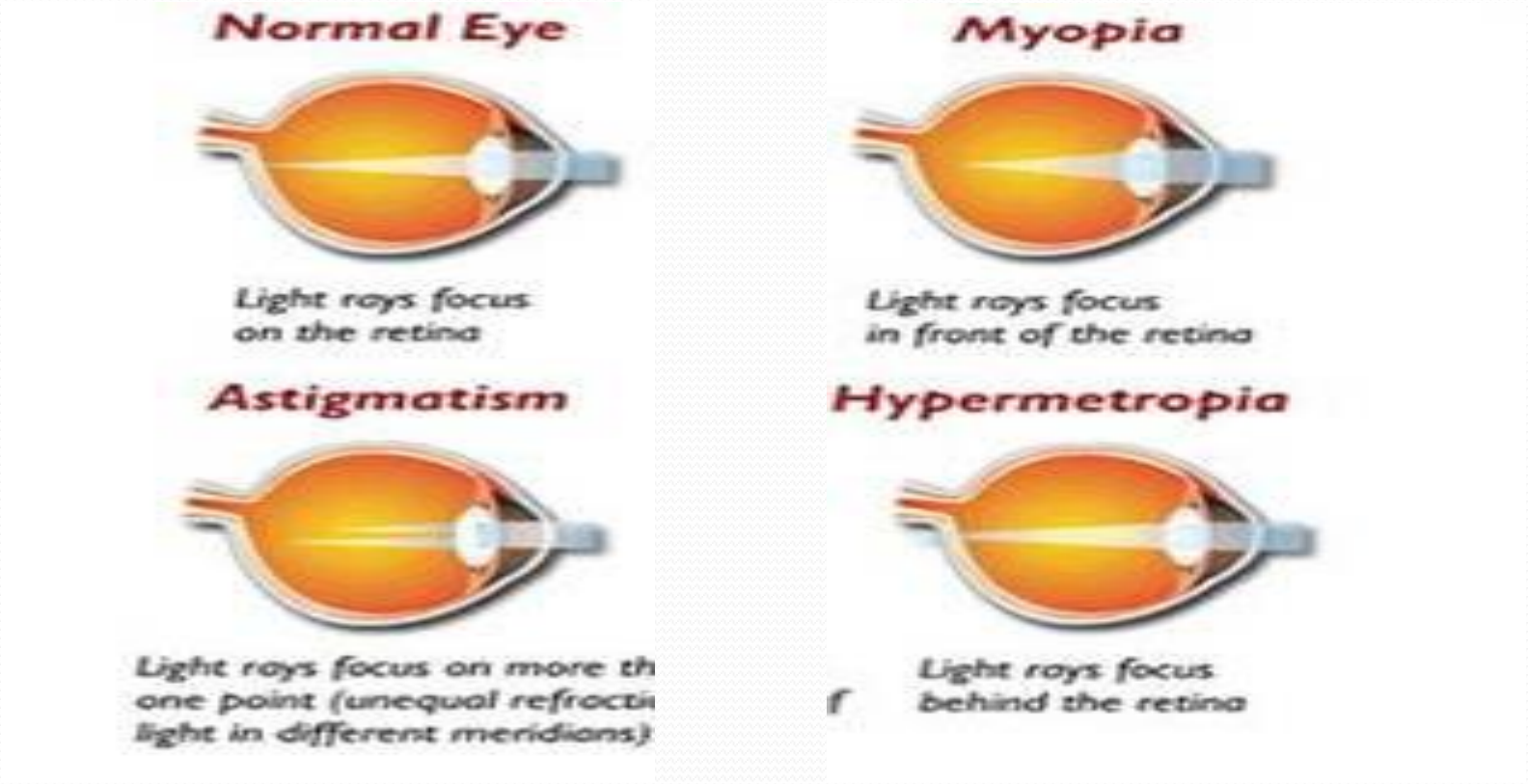
Hypermetropia



Astigmatism

- People who suffer from myopia and hyperopic may suffer from Astigmatism.
- Object may appear far and near blurry.
- Light entering fous on multiple sites rather than retina

Differences in the curvatures of Eye



Patient selection criteria

- Above 18 years of age.
- Stable refraction for at least one year.
- Refusal to use glass and contact lens.
- Contact lens intolerance.
- Absence of corneal pathology.
- Realistic expectation from the procedu
- Change in spherical equivalent should than 0.5 D over 12 months.

Pre requisite for the surgery

- Reversible changes in refractive status of eye.
- Discontinue soft contact lens for at least 2 weeks and hard contact lens for 4 weeks.

Pre operative assessment

- Patient selection is of vital importance.
- Patient education .
- Practical knowledge of the procedure.

Clinical examination before surgery

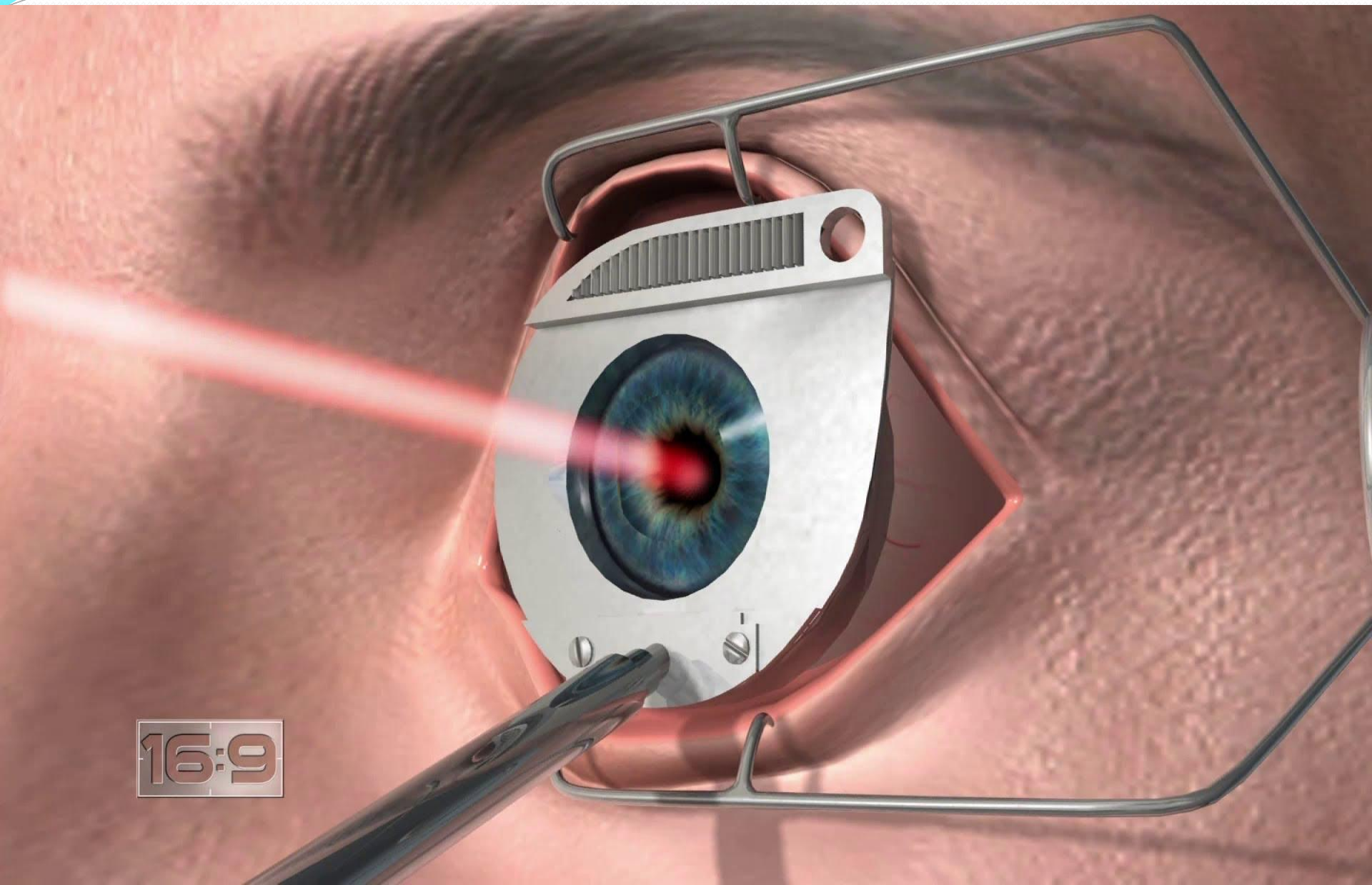
- Uncorrected & best corrected visual acquity.
- Manifest and cycloplegic refraction.
- Fundus examination.
- Slit lamp examination.
- Keratometry and axial length
- Corneal topography.
- Pachymetry
- Pupil size
- IOP
- Specular microscopy
- Glare and sensitivity test

Patient preparation

- Some surgeons sedate .
- Eye is cleaned with 5% povidone iodine solution.
- Broad spectrum antibiotic.
- Patient head must be parallel to the floor chin and forehead should be at same level.
- Patient cornea is perpendicular to the laser beam.
- Topical anaesthesia applied 10minutes prior to the surgery.
- Eye drape

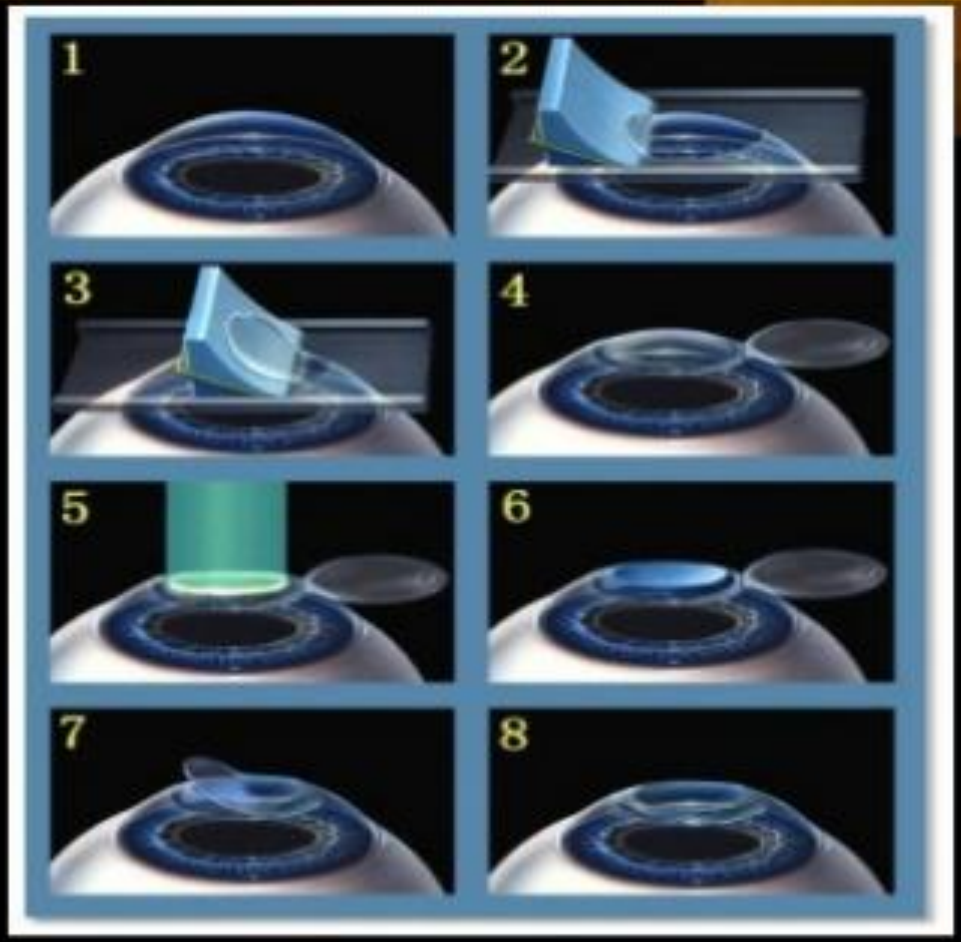
Laser surgery

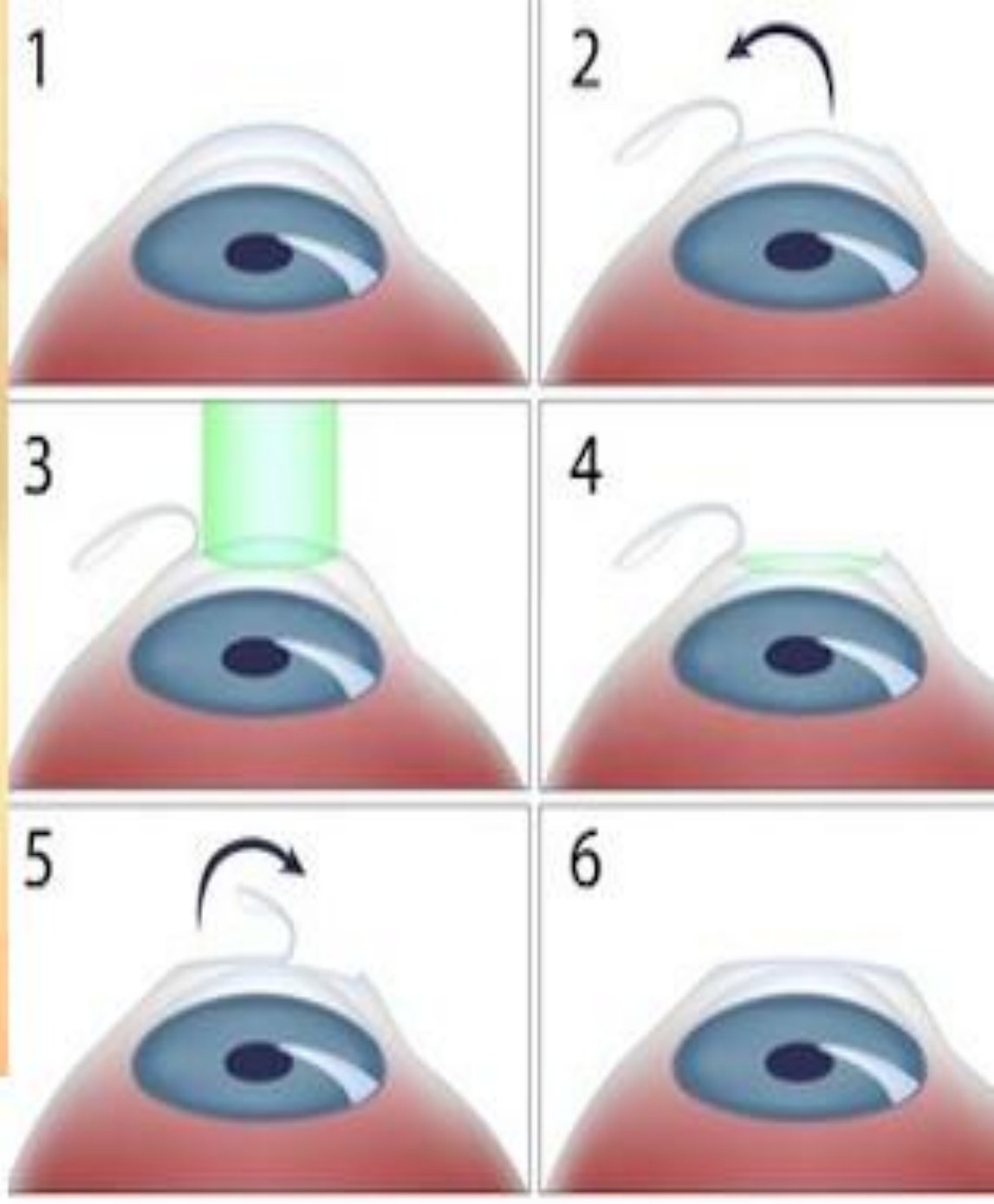
Laser surgery



Laser surgery

Lasik

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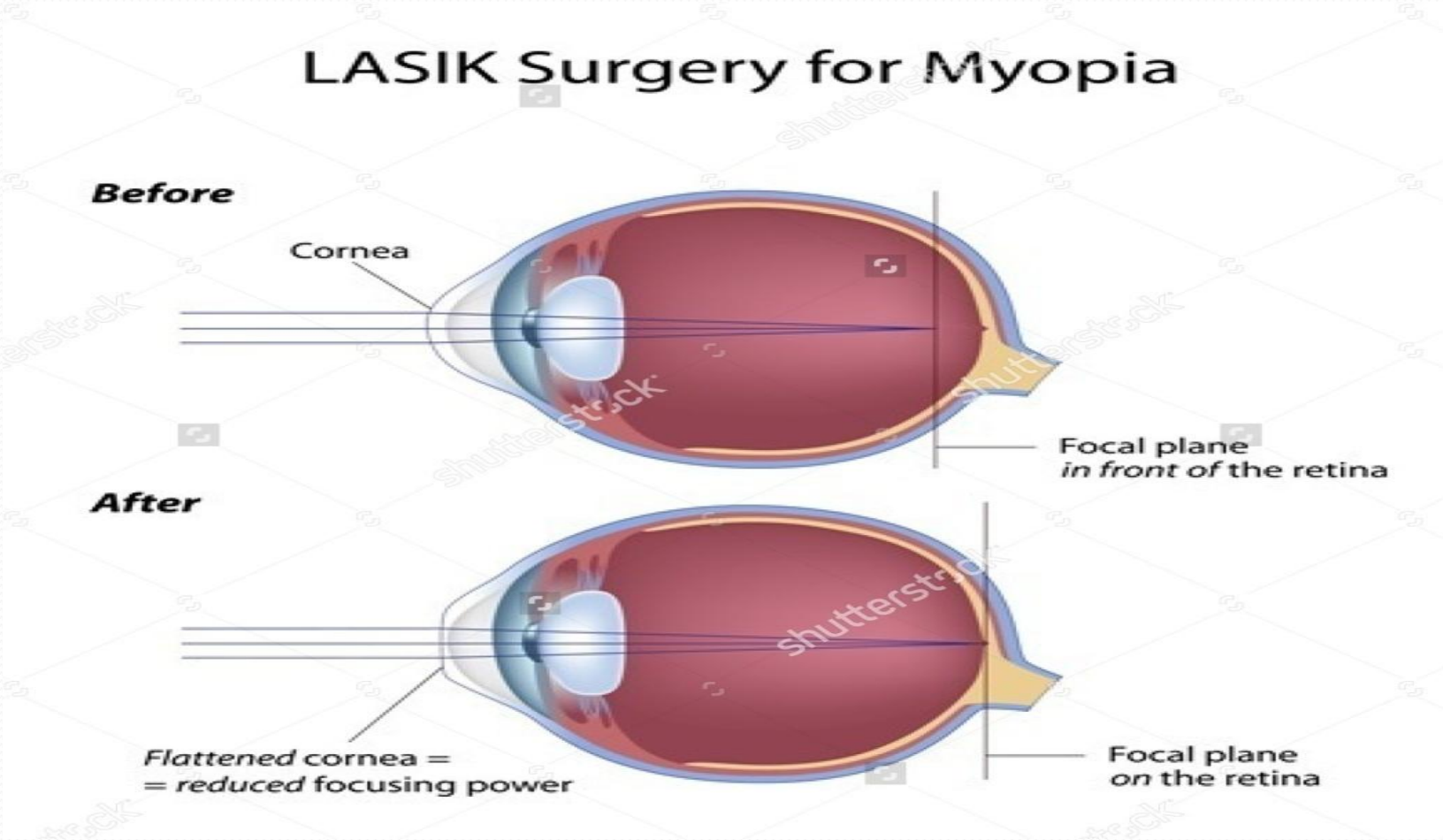
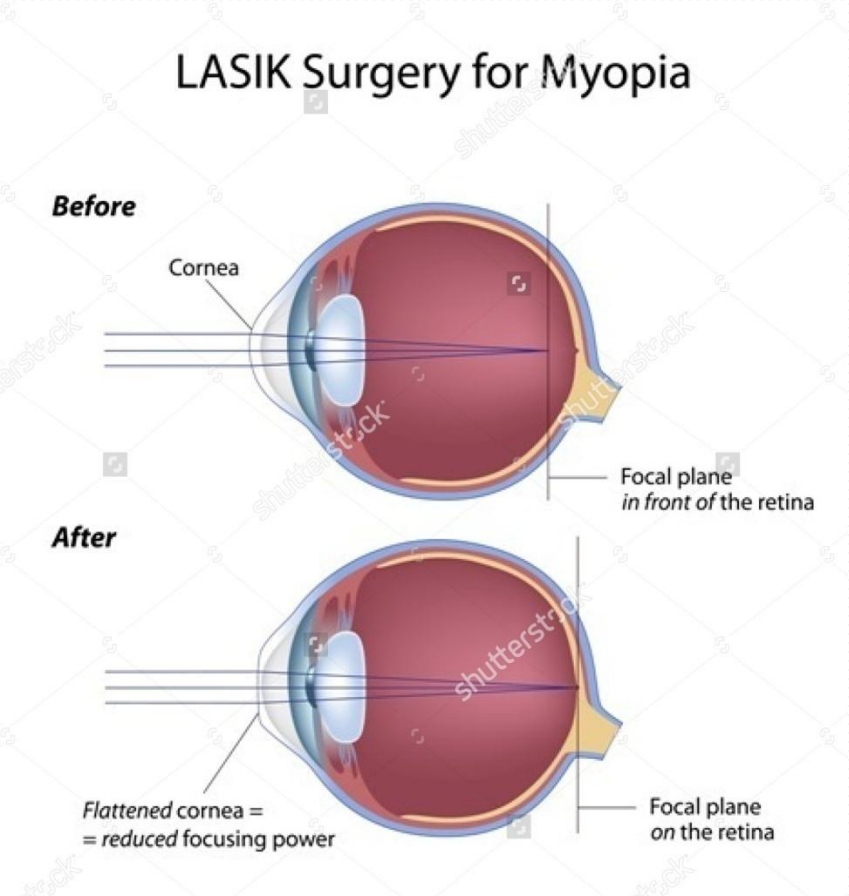
Post operative management

- **Steroids & Antibiotics for 1 week an hour.**
- **Tear supplement**

Before and after surgery

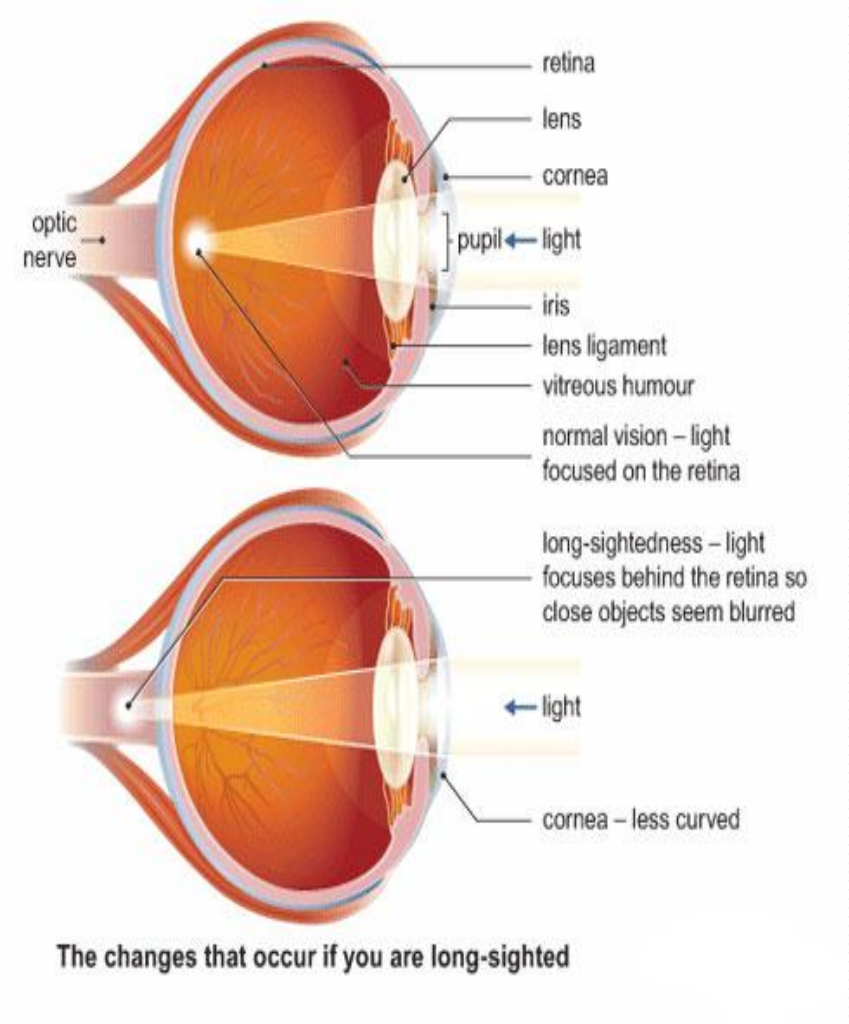


Before and after surgery



- Micro thin layer for cornea is eliminated to flatten its curvature

Before and after surgery



The changes that occur if you are long-sighted

- **In Hyperopic dough nut shaped hole is made to make it more conical in shape**

Contraindication -

- Patient should not suffer from autoimmune diseases like rheumatoid arthritis ,uveitis ,sjogrens syndrome.
- Uncontrolled vascular disease.
- Immunosuppressed patients HIV

Possible side effect

- Eye discomfort first during 24 hours.
- Dry eyes during the healing process.
- Over or under corrected vision.
- Blurring or vision loss.
- Irregular astigmatism which can decrease the corrected vision.
- Corneal haze ,glare or sensitivity to light.
- Corneal scarring.
- Inflammation or infection.
- Inability to wear contact lens in future.
- Loss of corneal flap requiring a corneal graft.

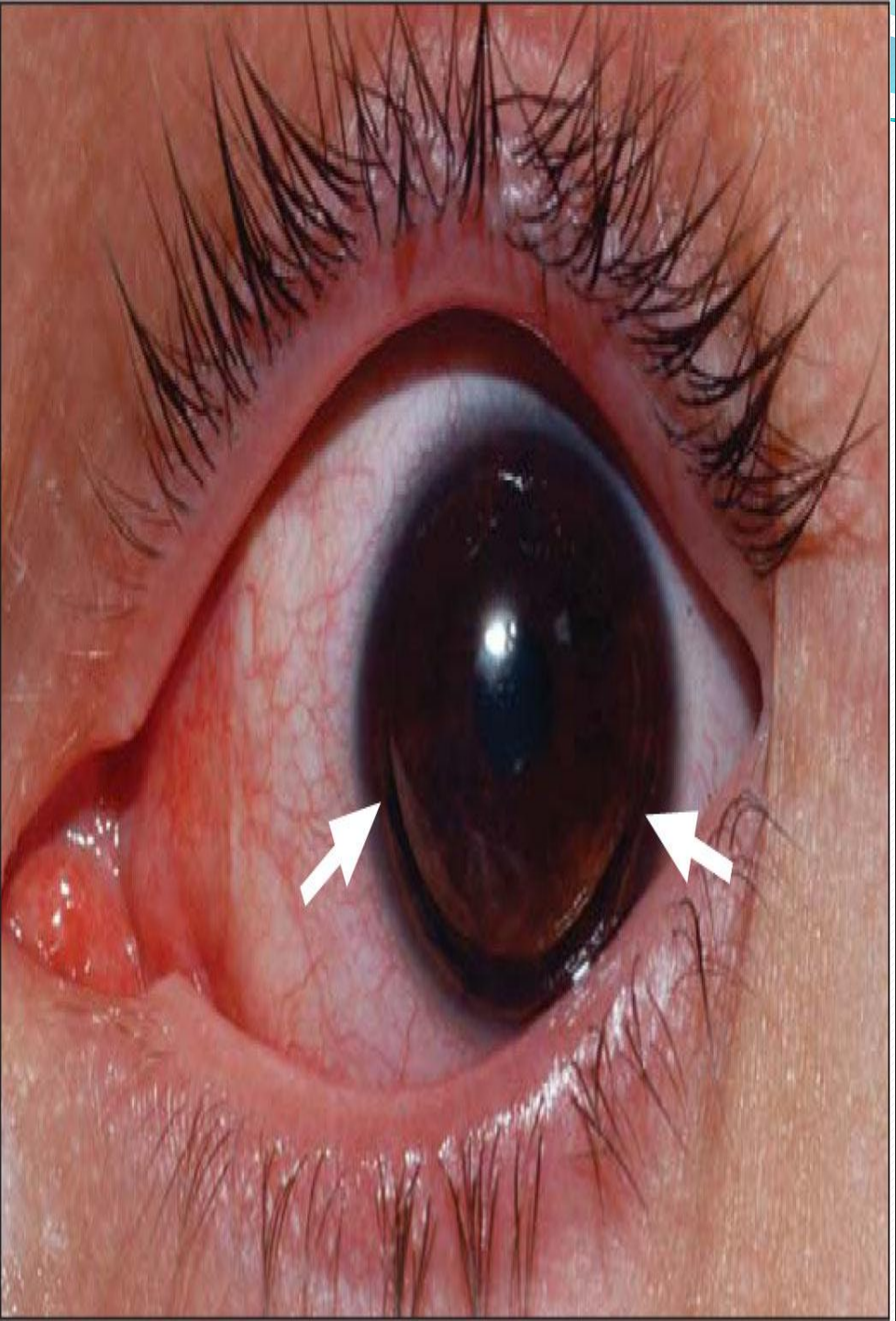
Contd

- Decentred ablation.
- Over size pupil.
- Diffuse lamellar keratitis.
- Epithelial in growth

and others around it, so th
images fall on the retina o

Double vision is usually
strabismus (deviation or m
the two eyes), although no
produces double vision. In
movement of the eye in a
direction is impaired due t
or more muscles. Tilting o

Majid Moshirfar, MD, says IntraLase flaps can sometimes take some extra effort to lift. This extra effort, combined with a very thin flap, caused this SBK flap to tear.



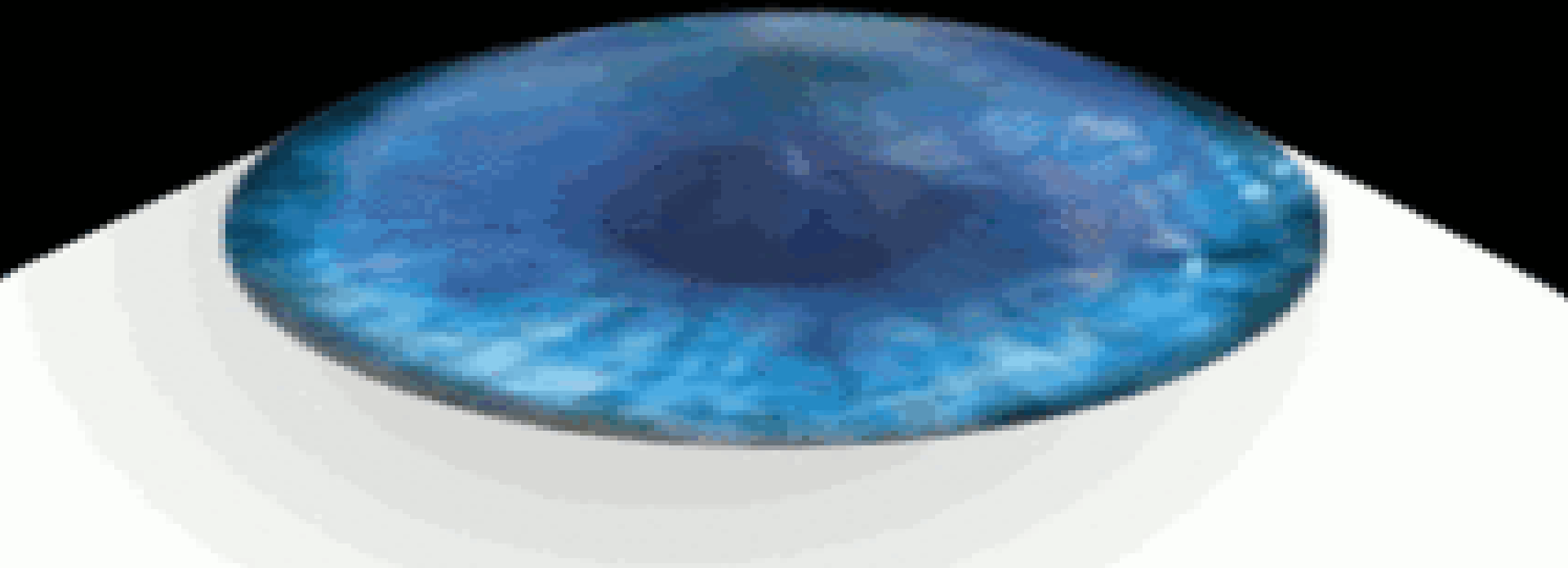
Advantages and disadvandages

- High precision .
- Reduce amount of bacterial in surgical site
- Haemostasis ,no suture.
- Reduced swelling and post operative pain.
- Less trauma for the patient.
- Promotes cellular healing.leading to faster recovery.
- Relatively costly .
- Extensive training.
- Laser are only end cutting side cutting and shaping cannot be performed in this.

Conclusion

- Complication of lasik can be sight threatening.
- Demands for safety.
- Knowledge and experience and careful use of and maintenance of microkeratome can reduce the incidence of these complication.

LASIK EYE




Thank
you!