

LASER IN OPHTHALMOLOGY

Sawa private university

**College of health and medical
technology**

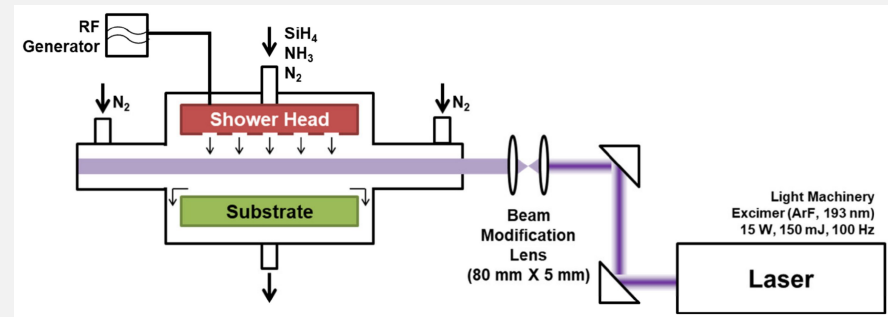
third class

Eximer laser



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Introduction



• Excimer =
excited dimer

• Discovered in
1970s;
ophthalmic use in
1980s

• Used in PRK and
LASIK for precise
corneal reshaping

Historical Background

- First human excimer laser procedure (1985)

- FDA approval for PRK (1995)

- Basis for modern refractive surgery

- Ref: AAO & Ophthalmic Professional Journal

Physical Principles

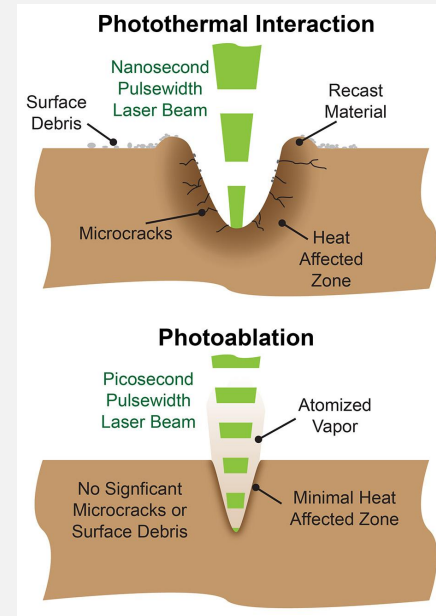
- Lasing medium:
Argon–Fluorine (ArF)

- Wavelength: 193 nm (UV)

- Mechanism:
photoablation (cold laser)

- Minimal thermal damage

Mechanism of Action



- UV photons break corneal molecular bonds



- Removes $\sim 0.25 \mu\text{m}$ per pulse



- Layer-by-layer precision



- Maintains transparency

Beam Delivery Systems

- Types: Broad beam, Flying-spot, Scanning-spot

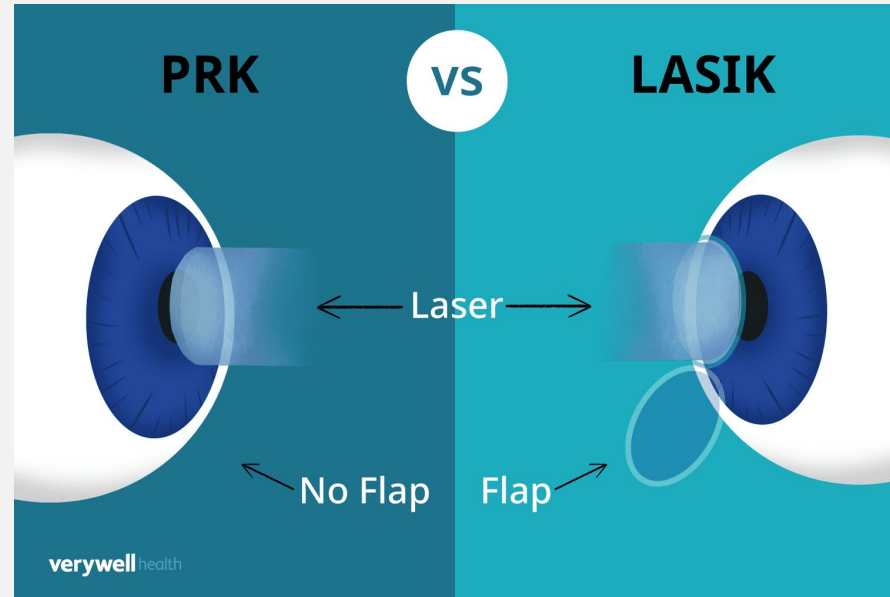
- Eye-tracking ensures accuracy

- Pulse rate and fluence influence results

Corneal Ablation Principles

- Myopia: central flattening
- Hyperopia: peripheral ablation
- Munnerlyn Formula: $(D^2 \times \text{Diopters}) / 3$
- Smooth transition zone reduces glare

PRK (Photorefractive Keratectomy)



• Surface
ablation
technique

1. Remove
epithelium

2. Excimer
ablation on
stroma

3. Bandage
contact lens

• Pros: No flap,
good for thin
corneas

• Cons: Slower
recovery

LASIK

- Flap created by microkeratome/femtosecond laser

- Ablation beneath flap

- Pros: Quick recovery, less pain

- Cons: Flap complications

Patient Selection

- Stable refraction ≥ 1 year
- Corneal thickness >500 μm
- Normal topography
- No ocular/systemic disease

Contraindications

- Keratoconus, ectatic corneas
- Thin cornea ($<480\text{ }\mu\text{m}$)
- Severe dry eye
- Pregnancy, autoimmune disease
- Unrealistic expectations

Postoperative Care & Complications

- Medications: antibiotic + steroid taper + lubricants

- Follow-up: 1 day, 1 week, 1 month, 3 months

- Complications:

- Dry eye

- Haze (PRK)

- Flap issues (LASIK)

- Ectasia (rare)

Summary & Future Trends

- Excimer laser = precise UV ablation

- Key in PRK & LASIK

- Future: customized, topography-guided ablation

- Optometrist's role: screening & co-management