

# Reviewing Serious Ocular Complications Caused by Laser and Light-based Procedures

---

Margit Juhasz, MD, MSc,<sup>1</sup>

Christopher Zachary, MBBS, FRCP,<sup>1</sup> Joel L Cohen, MD, FAAD <sup>1,2</sup>

<sup>1</sup> University of California, Irvine, Department of Dermatology, Irvine, CA

<sup>2</sup> AboutSkin Dermatology and DermSurgery, Greenwood Village, CO

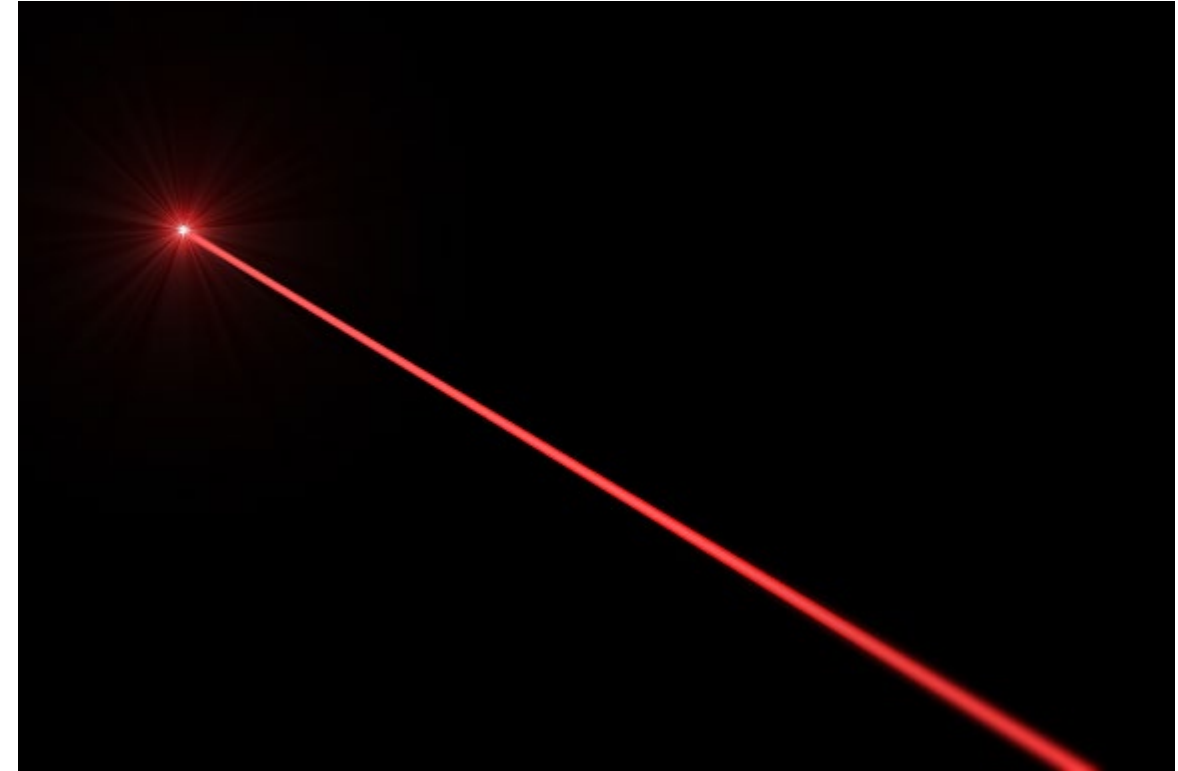
# Disclosures

Margit Juhasz, MD, MSc  
Christopher Zachary, MBBS, FRCP  
Joel L Cohen, MD, FAAD

- None related to this presentation

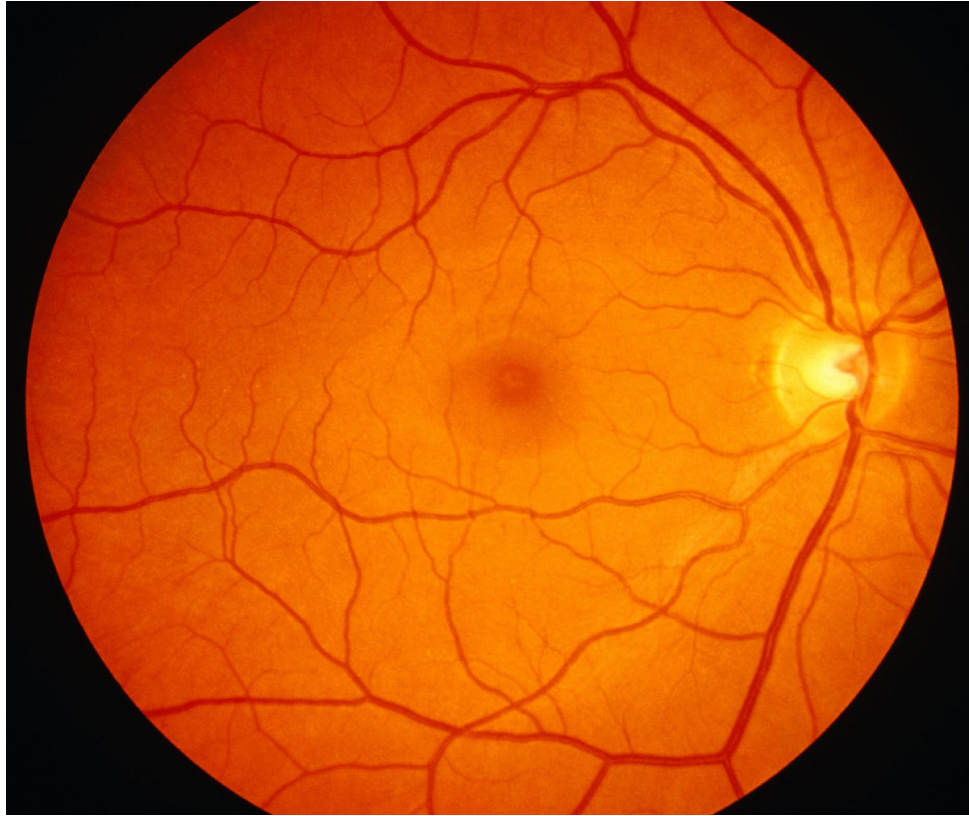
# Laser and light-based devices

- Used in medicine for over 50 years
- Diagnostic and therapeutic
- Injuries in industry or military “accidental exposure”
- Cutaneous adverse events (AEs) well known
  - e.g. burn, scar, post-inflammatory pigmentary alternation
- Serious ocular injuries may also occur



[How do you focus regular light to make it a laser beam? | Science Questions with Surprising Answers \(wtamu.edu\)](#) (Accessed Jan 25, 2021)

# “Retinal Hazard Region”



[The Anatomy of the Retina \(verywellhealth.com\)](https://www.verywellhealth.com) (Accessed Jan 25, 2021)

- “Retinal Hazard Region” (400-1400 nm)
  - > 700 nm are invisible to naked eye
  - Thin eyelid skin
  - Procedures within the orbital rim
  - Retinal pigment absorbs more energy
  - Palpebral oculoerythric reflex (Bell phenomenon)

# Objective



To complete a systematic review of the current literature regarding ocular complications in the dermatologic field after laser and/or light-based therapies.

[Question Mark Photograph by PhotoStock-Israel  
\(fineartamerica.com\)](https://www.fineartamerica.com) (Accessed Jan 25, 2021)

# Literature Search

PubMed/Medline Database August 2020  
Search term: "laser or light and ocular and complication"

## Inclusion Criteria

Written in or translated to English  
Injuries after laser or light-based therapy for dermatologic or cosmetic indications

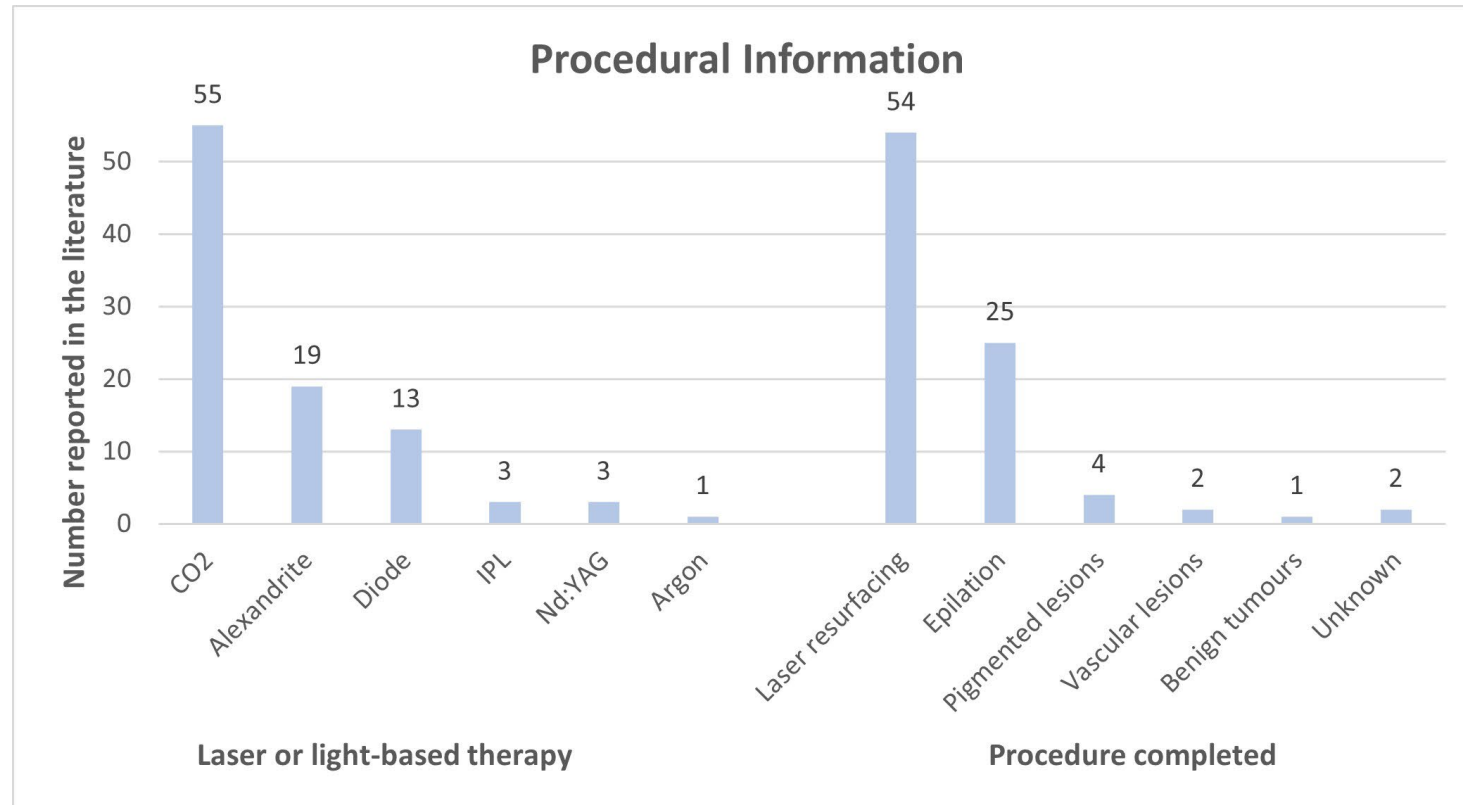
## Exclusion Criteria

Written in a language other than English with no translation  
Injuries in the military, laboratory or industrial fields  
Injuries occurring in other fields of medicine

References of included articles screened

36 manuscripts  
94 patients

# Procedures performed



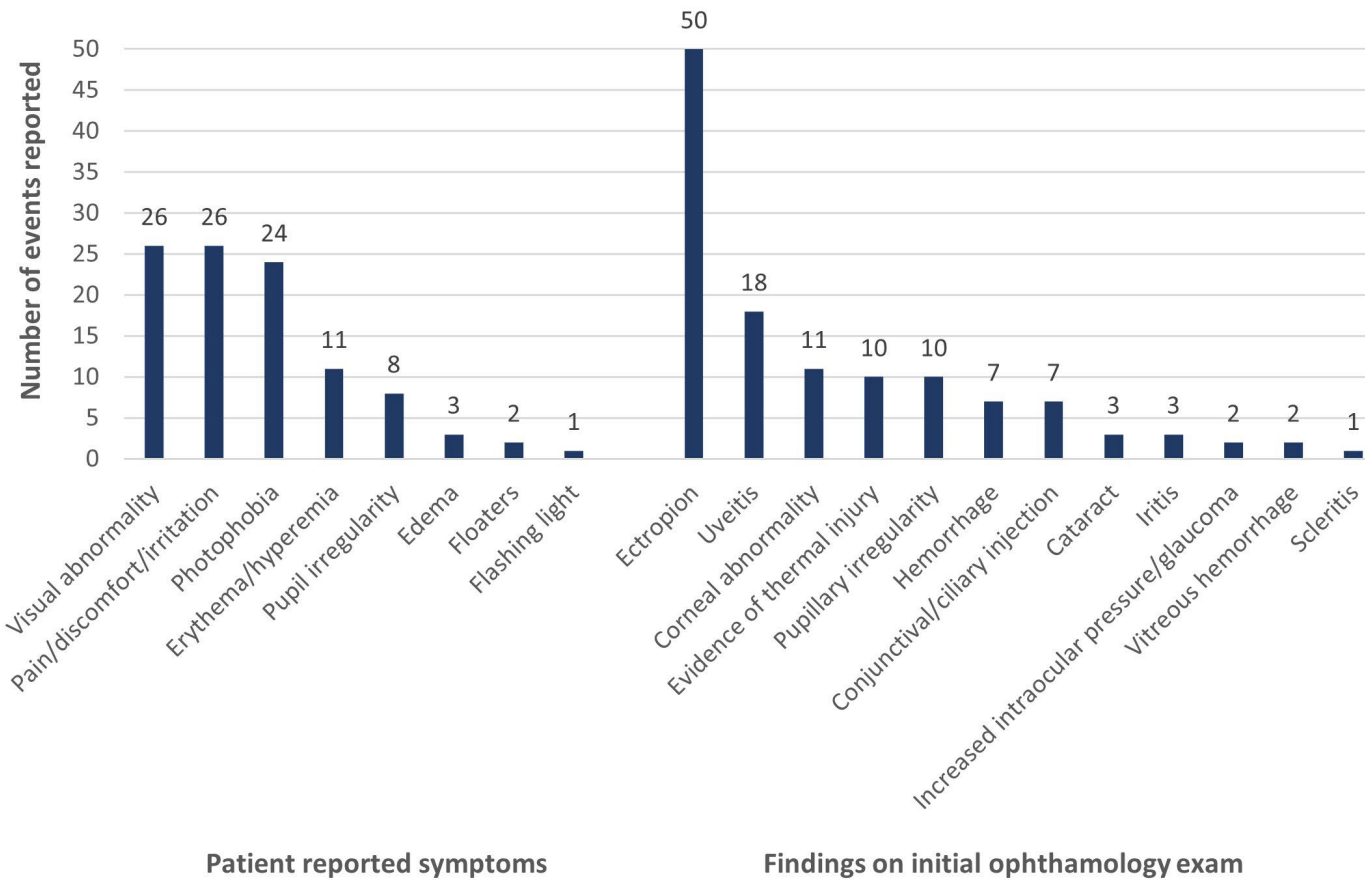
Most common laser: CO<sub>2</sub>

Most common procedure: resurfacing (periocular, full facial)



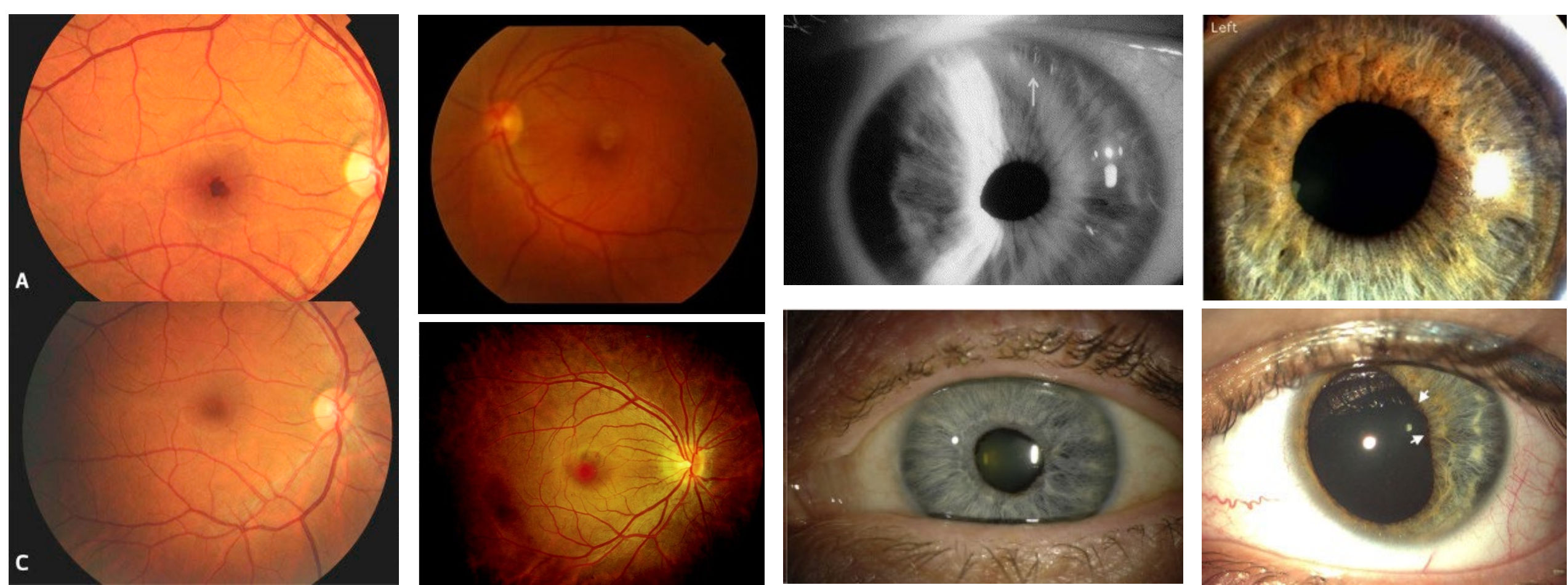
# Reported ocular complications

Ocular injuries after laser and light-based therapies



- Most common symptom:
  - Visual abnormality, pain, photophobia, erythema
- Most common exam finding:
  - Ectropion
- **L eye (48.8%)** > R eye (29.3%) > both (21.9%)





[Ocular injuries secondary to alexandrite laser-assisted hair removal – ScienceDirect](#) (Accessed Jan 26, 2021)  
[Inadvertent macular burns and consecutive psychological depression secondary to Alexandrite laser epilation: A case report – ScienceDirect](#) (Accessed Jan 26, 2021)  
[Diode-laser–induced cataract and iris atrophy as a complication of eyelid hair removal – ScienceDirect](#) (Accessed Jan 26, 2021)  
[Iris damage and acute pigment dispersion following photo-epilation | Eye \(nature.com\)](#) (Accessed Jan 26, 2021)  
[Alexandrite laser induced uveitis & pigment dispersion: A case report and review of the literature – ScienceDirect](#) (Accessed Jan 26, 2021)  
[Iris atrophy and posterior synechiae as a complication of eyebrow laser epilation – ScienceDirect](#) (Accessed Jan 26, 2021)  
[TRAUMATIC MACULAR HOLE SECONDARY TO A Q-SWITCH ALEXANDRITE L... : RETINA \(lww.com\)](#) (Accessed Jan 26, 2021)

## “Keyhole deformity”

- Injury of pigmented iris
- Inability to contract the pupil

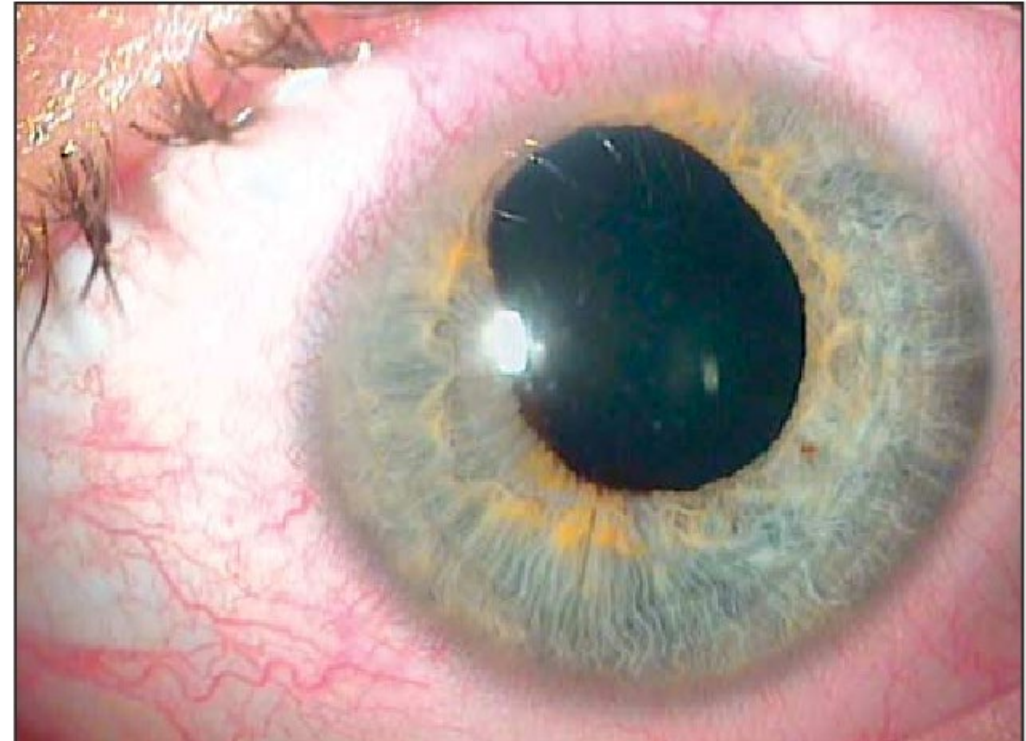
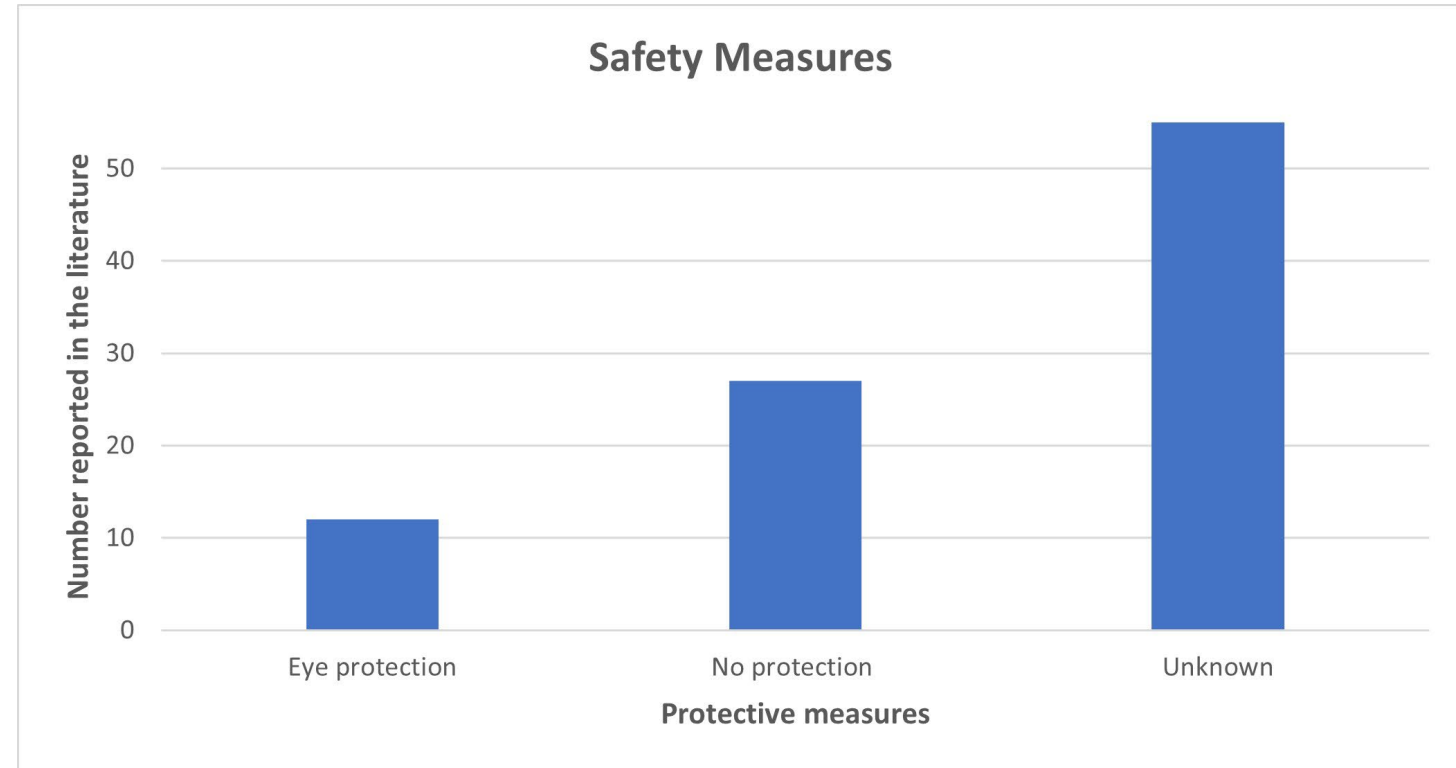


Figure 1 from [Pupil damage after periorbital laser treatment of a port-wine stain.](#) | [Semantic Scholar](#) (Accessed Jan 26, 2021)

# Eye protection use and ocular complications

- **ONLY 12.8% of cases reported appropriate eye protection at the time of injury!**
  - 28.7% no protection, eyes closed or fingers covering eyes
- 5 cases removed eye protection at time of injury
- 1 case refused eye protection





# Ocular injuries

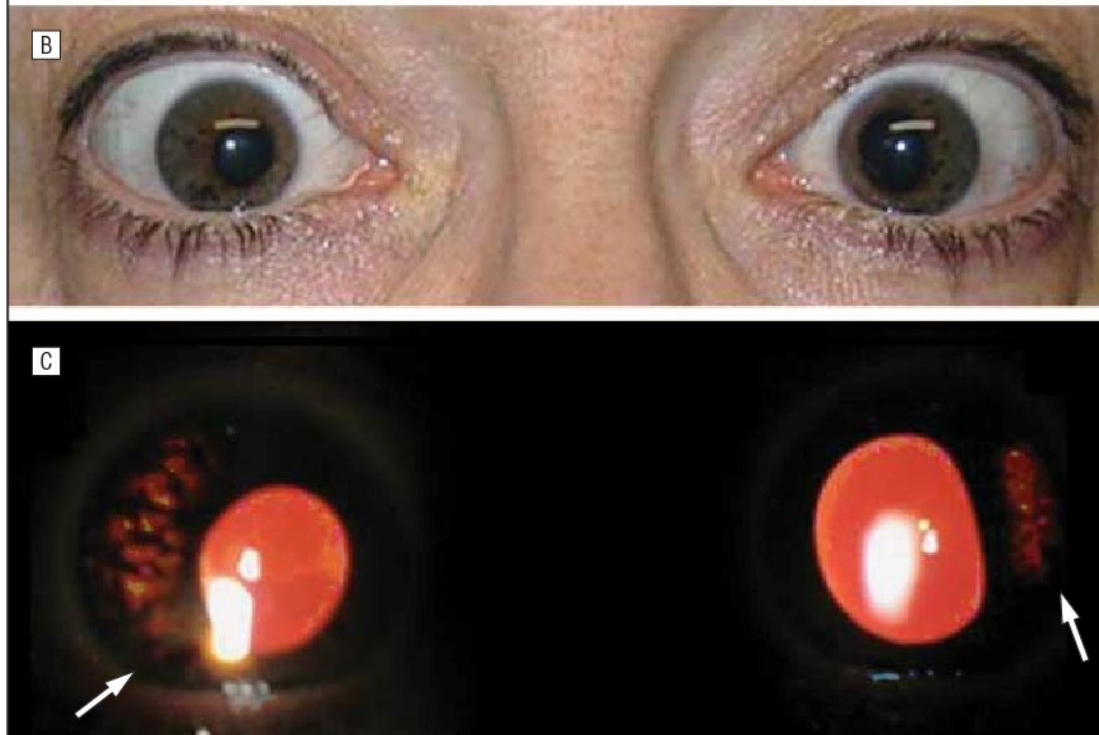
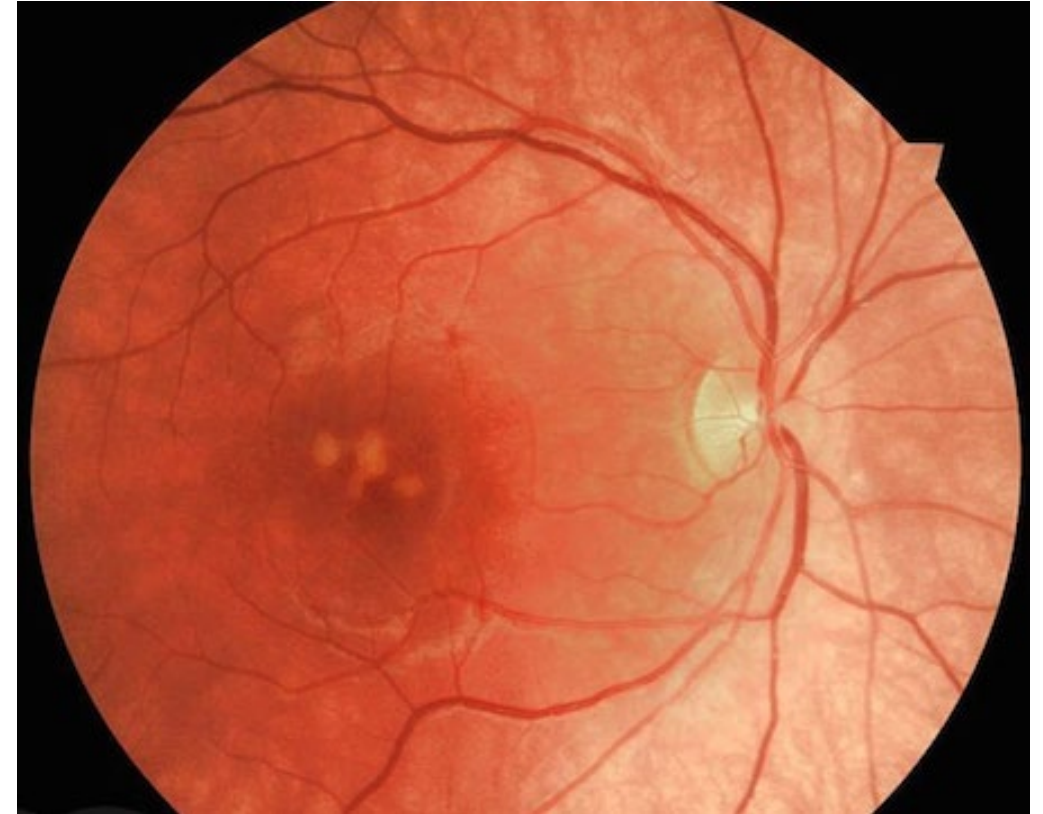


Figure 3 from [Ocular injury after laser hair reduction treatment to the eyebrow.](#) | Semantic Scholar (Accessed Jan 25, 2021)

- Long-term, devastating
  - e.g. decreased visual acuity, photosensitivity, inflammation, physical appearance of pupil
- 2.2% of lawsuits after laser or light for epilation or resurfacing
  - Lack of informed consent most common
  - 57.5% name physician as the operator
  - 66.6% due to operator error
    - Lacking protective eyewear
    - Deviating from safety protocol

# Factors affecting ocular injuries

- Duration of exposure
- Distance from exposure
- Energy delivered
  - Wavelength, intended chromophore, total Joules
- Eye colour
  - Light → retinal injury
  - Dark → pupillary abnormality
- Pupil size 2-3 mm
- High visual acuity
- History prior ocular aberrations



[Eye injury - self-inflicted | Laser Pointer Safety - News of non-aviation incidents, arrests, etc.](#) (Accessed Jan 26, 2021)

# Avoiding ocular injuries

- Physical exam, remove exogenous material
- Eye protection
  - “Gold standard” corneal shields
- Safety protocols
  - Signage
  - Opening/closing doors during procedures
- Early recognition signs/symptoms of ocular injury



[Oculo-Plastik 21-262HR - McKesson Medical-Surgical](#) (Accessed Jan 26, 2021)

[Laser In Use Sign – SafetyKore](#) (Accessed Jan 26, 2021)

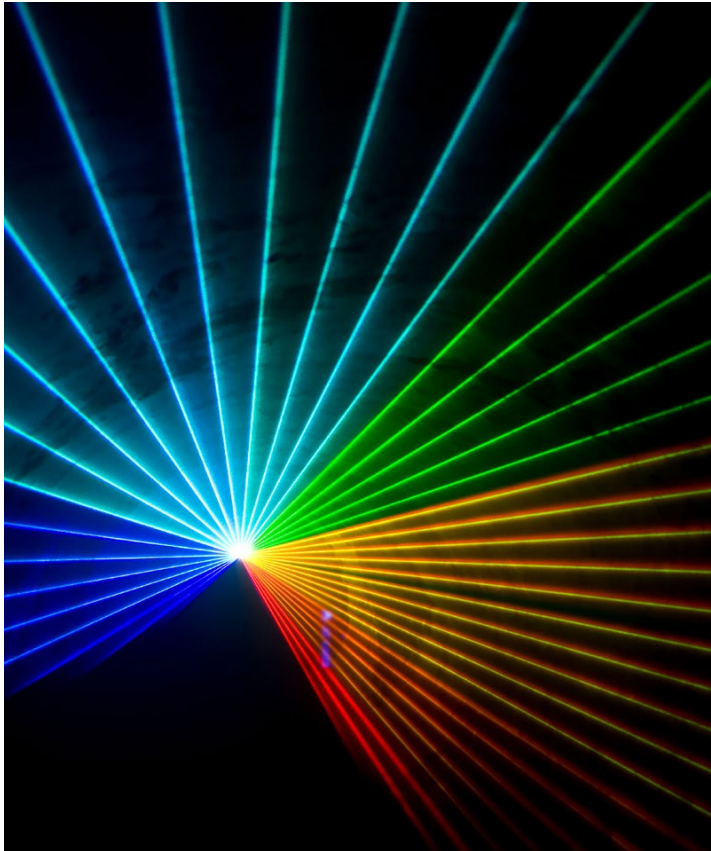


DO NOT treat inside the orbital rim without corneal shields!





# Conclusions



[LASER shines on Munich – Physics World](#) (Accessed Jan 26, 2021)

- Lasers and light-based devices are safe if used appropriately
- Ocular injuries are serious and can have long-term effects
- Ocular injuries avoided by providing clinicians with appropriate training and safety protocols
- Recognize signs and symptoms of ocular injury early to avoid patient morbidity

**STAY TUNED FOR OUR ASLMS WEBINAR  
COMING SOON!**

ASLMS Mentorship Program Project

# Questions

Thank you so much for your time! We are happy to answer any questions.



Margit Juhasz, MD, MSc  
University of California, Irvine  
[mjuhasz@hs.uci.edu](mailto:mjuhasz@hs.uci.edu)



Christopher Zachary, MBBS,  
FRCP  
University of California, Irvine  
[czachary@hs.uci.edu](mailto:czachary@hs.uci.edu)



Joel L Cohen, MD, FAAD  
AboutSkin Dermatology and  
DermSurgery  
[jcohenderm@yahoo.com](mailto:jcohenderm@yahoo.com)