



# Hazard Alert: Potential for Eye Injury from Medical Lasers Used in Dermatological Surgery

FACT SHEET 25-014-0116

## Purpose

The greatest increase in medical laser use during recent years has been in dermatology and plastic surgery. Possible ocular injuries are more likely to occur to physicians while using multiple laser wavelengths to perform dermatological surgery. This fact sheet provides information on the potential injury from lasers used for dermatological purposes such as tattoo removal, vascular lesions, and other procedures.



Dermatological Laser that offers 4 independent wavelengths for treatment purposes

## Background

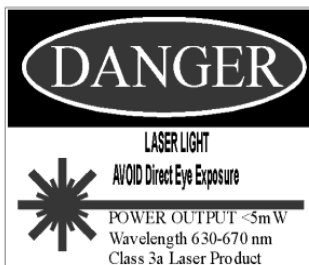
Lasers used in dermatology and cosmetic surgery are now common. The following table lists several lasers used in dermatology and their typical uses (this list is not all-inclusive). The choice of the laser depends on the treatment required. Several lasers may be used for one specific treatment based upon need for certain wavelength or pulse duration.



Typical laser eye protection. New rare earth doped laser lenses offer multi-wavelength protection while maintaining high visible light transmission.

Laser Type	Typical Dermatological Use	Wavelength (nm)
Pulsed Dye	Treatment of scars (keloids) and vascular lesions such as telangiectasia	400 - 900 typically 504, 577, 585, 590, 720, or 750
Argon and Krypton	Treatment of vascular lesions	488, 514, 568
Copper Vapor	Treatment of vascular lesions	510, 578
Nd:YAG and Nd:YAG - KTP	Tattoo pigmentation breakup, treatment of vascular and pigmented lesions, hair removal	532, 1064
Ruby	Tattoo pigmentation breakup, treatment of vascular lesions, hair removal	694
Alexandrite	Tattoo pigmentation breakup, treatment of vascular lesions, hair removal	720 - 800
Diode	Treatment of vascular lesions, hair removal	805
CO <sub>2</sub>	Skin resurfacing, keloid and hypertrophic scar reduction	10,600

AVOID EXPOSURE  
LASER LIGHT  
IS EMITTED FROM THIS APERTURE



Typical Laser Warning Sign

Army Public Health Center  
Nonionizing Radiation Division  
5158 Blackhawk Road, Aberdeen Proving Ground, Maryland 21010-5403  
410-436-3932 or DSN 584-3932  
Approved for Public Release; Distribution Unlimited

## Hazard Identification

The potential for injury while using these laser devices for dermatological purposes greatly increases when the specific treatment requires the use of more than one wavelength of laser light, such as in tattoo removal. Typical laser eye protection is wavelength specific. An individual laser eye protector does not protect against all types of lasers. For the case of a dermatological treatment, several laser lines may be used during one session. The hazard arises when the laser eye protection does not protect against the wavelength being used for treatment. Due to fatigue and lack of situational awareness, the simple task of switching to the appropriate laser eye protector for the laser being used, or ensuring the laser eye protection offers multi-wavelength protection, may not always be rigorously followed. As a result, retinal injuries have been alleged.

## Discussion

Safety guidelines for the use of lasers for dermatological purposes should be reviewed. The guidelines should ensure that protocols and procedures address the problem of assuming that appropriate laser eye protection is always chosen for the selected wavelength of the laser. Lasers should be clearly labeled as to their emitted wavelengths and type of laser. Further labeling should clearly indicate which wavelength is selected and in use. Laser eye protection should be clearly marked and indicate the wavelength and type of laser protection that is afforded, as well as the Optical Density (OD) provided (Note: OD is wavelength dependent). Current laser eye protective technologies can offer multi-wavelength protection. Generally, however, all wavelengths will not be covered by a single laser eye protective goggle or shield. The Standing Operating Procedure (SOP) should address this issue where applicable.

## Additional Hazards for Dermatological Lasers

The use of membranes to reduce or prevent aerosolized biohazard during treatment may pose reflection hazards. The membranes may act as specular or semi-specular reflectors. Additionally, for the high power lasers that are used, the diffuse reflections may be dangerous (thus posing hazards for all personnel within the Nominal Hazard Zone (NHZ)). Assessment of the procedures used and operating conditions present (including surgical instruments, apparatuses, and biohazard membranes) must be addressed.

## Conclusions

Current SOPs and policy may not sufficiently address or stress the importance of choosing and wearing only the correct wavelength laser eye protection, especially during multi-wavelength laser procedures. Health care administrators and health care providers must ensure that appropriate safety protocols are in place and are being rigorously followed.

## References

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