

PREVENTING INJURY FROM LASER SKIN TREATMENT

LASER USE

The greatest increase in laser use in health care facilities this decade has been in dermatology and plastic surgery. Possible ocular injuries are more likely to occur to physicians while using multiple laser wavelengths to perform skin treatments. The information provided in this document is intended to provide information on the potential injury from lasers used for dermatological purposes such as tattoo removal, vascular lesions, and other dermatological surgery.

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 requirements for certain wavelengths or pulse duration.

LASER TYPE	TYPICAL DERMATOLOGICAL USE	WAVELENGTH (nm)
Pulsed Dye	Blood vessel reduction (treatment of scars (Keloids), vascular lesions, and telangiectasia)	400-900 typically 504, 577, 585, 590, 720 or 750
Argon	Blood vessel reduction (treatment of vascular lesions)	488, 514
Copper Vapor	Treatment of vascular lesions (treatment of telangiectasia)	510, 578
Nd: YAG and Nd: YAG-KTP	Tattoo pigmentation breakup and blood vessel reduction (treatment of vascular lesions such as telangiectasia blemishes)	532, 1064
Ruby	Tattoo pigmentation breakup and blood vessel reduction (treatment of vascular lesions)	694
Alexandrite	Tattoo pigmentation breakup and blood vessel reduction (treatment of vascular lesions)	720-800
Diode	Blood vessel photocoagulation (treatment of vascular lesions)	800-820
CO ₂	Skin Resurfacing	10,600

FACT SHEET



Pulsed Dye Laser

IDENTIFYING HAZARDS-WATCH FOR DIFFERENT WAVELENGTHS

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 insuring the laser eye protection offers multi-wavelength protection, may not always be rigorously followed. As a result, retinal injuries have been claimed.

PREVENTING INJURY FROM LASER SKIN TREATMENT

USE THE RIGHT LASER EYE PROTECTORS

Safety guidelines for the use of lasers for dermatological purposes should be reviewed. The guidelines should insure 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) for the protection (Note: OD is wavelength dependent). Current laser eye protective technologies offer several 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.

OTHER HAZARDS FOR DERMATOLOGICAL LASERS

The use of membranes to reduce or prevent aerosolized biohazards 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 in fact 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.

REFERENCES

American National Standards Institute. American National Standard for the Safe Use of Lasers, ANSI Z136.1-2007

American National Standards Institute. American National Standard for the Safe Use of Lasers in Health Care Facilities, ANSI Z136.3-2005

Sloney D.H., "Laser Safety for Plastic Surgery and Dermatology", Lasers in Plastic Surgery and Dermatology, Thieme Medical Publishers, pgs. 176-184, 1992.

USACHPPM, Nonionizing Radiation Protection Study No. 25-42-0337-86, Standard-Item and Commercially Available Laser Eye Protection, U.S. Army, 1986.

Sloney D.H., and Trokel S.L., Medical Lasers and their Safe Use, New York, Springer-Verlag, 1992.

Laser Institute of America, LIA Guide to Medical Laser Safety, First Edition, LIA, 1997.

McCoy S. E., Copper Bromide Laser Treatment of Facial Telangiectasia, Lasers in Surgery and Medicine, 21:329-340, 1997.

Perez B., Nunez M., et al, Progressive Ascending Telangiectasia Treated with the 585nm Flashlamp-Pumped Pulsed Dye Laser, Lasers in Surgery and Medicine, 21:413-416, 1997.

Pay A.D., Kenealy J. M., Laser Transmission Through Membranes Using the Q-Switched Nd: YAG Laser, Lasers in Surgery and Medicine, 24: 48-54, 1999.

FACT SHEET



Protective Eyewear

Danger Sign



REMEMBER

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 insure that appropriate safety protocols are in place and are being rigorously followed.