



## Just the Facts...

## Laser Eye Exposures - Medical

**LASERS ARE USED TO RANGE TO TARGETS OR MARK (DESIGNATE) THEM FOR LASER GUIDED MUNITIONS. THEY ARE ALSO USED TO ILLUMINATE TARGET AREAS OR COVERTLY POINT TO TARGETS WHILE USING NIGHT VISION GOGGLES. THEY ARE MOST COMMONLY USED IN DIRECT-FIRE SIMULATORS SUCH AS MILES.**

<b>GENERAL INFORMATION</b>	Lasers are intense sources of visible or invisible light. Invisible lasers can not be seen with the naked eye but may be seen through night vision goggles. The laser was invented in 1960 and since that time many diverse uses in the military, medicine and industry have been developed.
<b>ROUTINE USES IN THE DEPLOYED SETTING</b>	Lasers are used to range to targets or mark (designate) targets for laser guided munitions. They also are used in tactical training (MILES) and to point small arms while using night vision goggles. The enemy also has similar laser devices.
<b>PERSONAL PROTECTIVE EQUIPMENT (PPE) and COUNTERMEASURES AVAILABLE FOR DEPLOYED PERSONNEL</b>	Day sights in vehicles and helicopters have built-in laser filters to protect the viewer from laser exposure. Individual soldiers have laser eye protectors (BLPS/SPECS) available that will provide protection against most laser exposures. Aviators have visors that provide the same level of protection as the individual soldier. Since the laser is a line-of-sight hazard, eliminating the line-of-sight between you and the laser source would prevent direct exposure and the potential for eye injury..
<b>LEVELS OF POSSIBLE EXPOSURE</b>	Laser rangefinders and target designators emit levels of laser light that are capable of causing blindness at close distances for a direct exposure. MILES equipment is safe for field use while tactical pointers used with NVG are above the safe limit but do not pose the acute injury risk that rangefinders and designators do. Classroom laser pointers do not present a risk of injury for accidental exposures.
<b>SIGNS &amp; SYMPTOMS OF ACUTE AND CHRONIC EXPOSURE</b>	Lasers may interfere with vision either temporarily or permanently in one or both eyes. At low energy levels, lasers may produce temporary reduction in visual performance during critical military tasks, such as aiming weapons or flying aircraft. At higher energy levels they may produce serious long-term visual loss. A "black" spot may be present in the field of view. A distinct pop or flash may be felt during the actual exposure. A flash of light hundreds of times brighter than the sun may indicate direct exposure to a laser beam. There are no known "cumulative" exposure risks from military lasers.
<b>REVERSIBILITY OF ACUTE AND CHRONIC HEALTH EFFECTS</b>	Temporary effects such as afterimages, and flash blindness are reversible. Long-term irreversible visual effects such as blindness are possible from a direct exposure to some rangefinders and most target designators at very close range.
<b>TREATMENT REQUIRED/AVAILABLE FOR EXPOSURE</b>	The immediate treatment for laser exposure is to stop the exposure when visual effects occur. Prevention of the laser exposure is even more desirable! There is no first aid for laser injury. A soldier diagnosed with a laser eye injury is evacuated to a hospital where examination by an ophthalmologist is necessary. See the Table on page 2 for more detail.
<b>LONG TERM MEDICAL SURVEILLANCE REQUIREMENTS OF HEALTH EFFECTS MONITORING</b>	There is no long-term medical monitoring for laser exposure
<b>RISK COMMUNICATION ISSUES</b>	Laser eye injury is not life threatening and chances for some if not total recovery are good.

*Table 1. Symptoms, Signs, Diagnosis, and Treatment of Laser-Induced Injuries*

Symptoms (Reported by patient)	Signs (Findings on examination)	Diagnosis (and likely laser etiology)	Treatment and management
<b>Skin and Anterior Eye Injuries</b>			
Reduction in vision. Pain in eye, eyes tender. Red or warm face or skin.	White or hazy cornea. Conjunctival inflammation. Facial or skin erythema.	Mid-moderate corneal and/ or skin burn. (Infrared laser, intermediate dose.)	If eye perforation is not suspected, apply topical antibiotics (ointment). Patch. Systemic antibiotics and pain medication.* Needs physician/PA** evaluation. Evacuate as appropriate.
Profound loss of vision. Severe pain in eyes. Burning sensation of face or skin.	Corneal ulceration or loss of corneal tissue. Perforation of globe. Skin burn.	Severe corneal and/or skin burn. (Infrared laser, high dose.)	
<b>Retinal Injuries</b>			
Temporary loss of vision. Bright light experience. No pain.	External exam: normal. Internal exam: normal.	Glare, dazzle, or flash- blindness. (Low dose laser.)	None. Return to duty.
No or slight visual impairment. Dark spot in field of vision.	External exam: normal. Internal exam: Non- foveal retinal lesion(s).	Small non-foveal, retinal burn with no or minimal hemorrhage (visible or near-infrared laser, low to medium dose).	None. Return to duty if able to function.
Vision impaired. Large dark spot at or near center of vision.	External exam: normal. Internal exam: foveal retinal lesion(s).	Peri-foveal retinal burn, and/or hemorrhage (visible or near-infrared laser, medium dose).	Evacuate. Needs physician/PA evaluation.
Severe visual impairment. Large dark spot at or near center of vision. Large floating objects in eye. May see blood.	External exam: normal. Internal exam: foveal retinal lesion(s) which may be obscured by vitreous hemorrhage.	Foveal retinal burn, with vitreous or subretinal hemorrhage (visible or near-infrared laser, high dose).	Evacuate. Needs physician/PA evaluation.*

\*Oral aspirin or intramuscular analgesics may be used as needed. Topical anesthetics such as tetracaine or proparacaine are never prescribed, but may be used on a *one-time basis only* to aid examination. Repeated use of topical anesthetics may predispose to further corneal injury.

\*\*The optometrist at the MSMC may be consulted on questionable cases.