


If this is the first time you are using these training modules in laboratory safety, you should read the instructions for moving from location to location within the training modules. Bring the pointer to the following rectangle (dashed blue) where it turns into a pointing hand (if adobe is set with the “hand icon” in the tool bar) and click the left mouse button (typical).

Go to [Instructions](#). If you have not read "[Expectations](#)," do so now.

Do you wish to go to [Lesson 1](#), page after next one?

Note: Remember that this module exclusive of sections with green titles is part of your required training if there are no hazardous materials present in your lab. If hazardous materials are present you need the training of an Authorized Occupant included in sections with green titles.





The portion of [Lesson 2 of TM 50/51](#) on lasers is to be considered part of this module. Review!



Part V, Laser Safety, Lesson 1 (EHS 55)

Introduction and Biological Effects

[Go to Objectives for Lesson 1](#)

Requirements for Becoming an Authorized User of Lasers at Level I and II

- Documented training in the applicable portions of the “University Safety and Health Manual”.
- Documented training in the applicable portions of [Part I](#) of the “Laboratory Safety Manual”. (See also [EHS TM 50](#))
 - Note: It is recommended that the prospective user includes all of Part I in his/her training although only the portions marked with an asterisk or superscript “L” are mandatory.
- Documented training in this training module on [Part V](#) of the LSM.
- Documented training in the laboratory- and laser-specific Standard Operating Procedures (SOP’s).
- Lasers with classifications of 3b or 4 may not be used in Level I or II laboratories. Additional training is required

Nature of Hazards from Laser Beams

- Lasers emit very intense coherent electromagnetic radiations
 - Beams may have a narrow cross section but may deliver enormous amounts of energy per unit time per unit area at long distances from the source. The beams do not diverge very much.
 - Laser beams are readily redirected by reflective surfaces, however small.
 - Depending upon the power level, these beams may cause damage to eyes or even possibly the skin--for intense beams, before the eye can blink.

Summary of Biological Effects

Appendix 8.8 of LSM Part V should be studied

- Damage to the eye is the primary concern.
- No evidence of damage to the eye at or below MPE's.
 - MPE = Maximum Permissible Exposure
- Eye can concentrate parallel rays by a factor of 100,000.
- Infrared and UV lasers can cause corneal damage.
- Extremely low densities of pulsed laser beams can cause retinal damage.

Biological Effects (Con't)

- Corneal damage
 - Minimal corneal lesion = small white area involving the epithelium
 - Appears within 10 minutes of exposure
 - Minimal lesion heals within 48 hrs without scarring
- Minimal damage from infrared lasers
 - Excessive exposure causes loss of transparency
 - Produces surface irregularities in cornea
 - Damage from absorption of energy in tears and tissue water in cornea

Biological Effects (Con't)

- Minimal damage from UV lasers
 - Excessive exposure produces
 - Photophobia with surface redness, tearing, conjunctival discharge, corneal exfoliation, stromal haze.
 - Photophobia = intolerance of light.
 - Conjunctiva = mucous membrane lining
 - Exfoliation = peeling off in thin fragments
 - Stroma = supporting framework, usually of connective tissue.
 - Action is photochemical rather than thermal.

Biological Effects (Con't)

- Minimal damage from visible light lasers
 - Retinal lesions are produced -- smallest opthalmoscopically visible white patch in retina.
 - Occurs within 24 hours of exposure.
 - Most serious if damage is in the macula -- central region of retina
- For wavelengths that are transitional, both types of damage may occur.
- Damage to the skin is not likely with lasers that may be used in Level I and II laboratories.
- Maximal damage--permanent loss of sight.
 - Produced at exposures well above MPE's.

[Go to Questions on Lesson 1?](#) [Go to Lesson 2?](#)