



## 1. Introduction

Individuals may be at risk of exposure to laser hazard while at work. Medical surveillance and post exposure treatment should be considered for those who are known to be at risk from particular kinds of laser radiation. This procedure will establish the requirements and practices for managing medical surveillance and post exposure treatment associated with laser exposure to the skin and eyes. The requirements in the procedure reflect those stated in ANSI Z136.1-2022.

## 2. Scope

This Procedure is a component of the Occupational Health Management System, Health hazard monitoring and surveillance and Post exposure management as outlined in the Occupational Health Policy. This protocol applies to personnel, post-doctoral researchers, university students, visiting students, visiting researchers, consultants, service providers, and tenants who perform work as defined by KAUST while on or off campus directly involved with the use of lasers (Class 3b and 4) in KAUST facilities.

## 3. Procedure

Personnel working with Class 3b (3B) and/or Class 4 lasers or laser systems are not required to obtain either a pre- employment or post-employment medical examination specific to laser use.

### 3.1. Eye Exposure

In the event of any accidental or suspected eye exposure to laser radiation, the individual must report to KAUST health emergency room as soon as possible (within 48 hours). If immediate medical assistance is required, dial 911.

A thorough eye examination shall be conducted by a qualified ophthalmologist, as specified in ANSI Z136.1-2022. In addition to the acute symptoms, consideration shall be given to the exposure wavelength, emission characteristics and exposure situation to ensure appropriate medical referral (see [Laser Eye Injury Description Sheet](#)).

The injured individual must report to their PI or Lab Safety Representative if they believe that they have been exposed or injured should report the incident using the online reporting system.

### 3.2. Skin Exposure

In the event of an accidental or suspected skin exposure to laser radiation, the individual must report to KAUST health emergency room, if immediate medical assistance is required, dial 911.

A referral to a qualified dermatologist, as specified in ANSI Z136.1-2022 may be indicated based on the findings of the KAUST health assessment. In addition to the acute symptoms, consideration shall be given to the exposure wavelength, emission characteristics and exposure situation to ensure appropriate medical referral.

The injured individual must report to their PI or Lab Safety Representative if they believe that they have been exposed or injured should report the incident using the online reporting system.

#### 4. Examination Protocol Following Suspected or Known Laser Eye Injury

Post exposure examinations should include the following elements:

**Ocular History:** The past eye history and family history are reviewed. Any current complaints concerned with the eyes are noted. General health status assessment with a special emphasis upon systemic diseases that might produce ocular problems. The current refraction prescription and date of the most recent examination should be recorded. Certain medical conditions may cause the laser worker to be at an increased risk for chronic exposure. Use of photosensitizing medications, such as phenothiazines and psoralens, lower the threshold for biological effects in the skin, cornea, lens and retina of experimental animals exposed to ultraviolet and near ultraviolet radiation. Aphakic individuals would be subject to additional retinal exposure from blue light, near ultraviolet and ultraviolet radiation.

**Visual Acuity:** Visual acuity for far and near vision should be measured with some standardized and reproducible method. Refraction corrections should be made if required for both distant and near test targets. If refractive corrections are not sufficient to change acuity to 20/20 (6/6) for distance and near vision, a more extensive examination is indicated.

**Macular Function:** An Amsler grid or similar pattern is used to test macular function for distortions and scotomas. The test should be administered in a fashion to minimize malingering and false negatives. If any distortions or missing portions of the grid pattern are present, the test is not normal.

**Examination of the Ocular Fundus with an Ophthalmoscope or Appropriate Fundus Lens at a Slit Lamp:** This portion of the examination is to be administered to individuals whose ocular function in any of subsections is not normal. The points to be covered are:

- a) the presence or absence of opacities in the media;
- b) the sharpness of outline of the optic disc;
- c) the color of the optic disc;
- d) the depth of the physiological cup, if present;
- e) the ratio of the size of the retinal veins to that of the retinal arteries, the presence or absence of a well defined macula and the presence or absence of a fovea reflex; and any retinal pathology that can be seen with an ophthalmoscope (hyper-pigmentation, depigmentation, retinal degeneration, exudate, as well as any induced pathology associated with changes in

macular function). Even small deviations from normal should be described and carefully localized. Dilation of the pupil is required.

**Color Vision:** Color vision discrimination can be documented by Ishihara or similar color vision tests.

## **5. Related Regulations and Procedures**

### **5.1. KAUST Laser safety manual**

### **5.2. ANSI Z136.1-2022**

## **6. Examination Protocol Following Laser Skin Injury**

While not required for pre-placement of laser workers, skin examinations are recommended for employees with a history of photosensitivity or working with lasers emitting accessible ultraviolet radiation.

Post exposure examinations should include the following elements:

- Any previous dermatological abnormalities and family history.
- Any current complaints concerned with the skin.
- History of medication usage, dosage and concentration; particularly those drugs that are potentially photosensitizing.
- History of photosensitivity.
- Consider the type of laser radiation, exposure wavelength, emission characteristics and exposure situation.
- Treatment based on the severity and presentation of the injury.

## 7. Record Retention

Complete and accurate records of all medical examinations (including specific test results) should be maintained for all personnel included in the medical surveillance program. Records should be retained for at least 30 years.

## 8. References

- Department of the Army Field Manual 8-50, Prevention and Medical Management of Laser Injuries, Headquarters, Department of the Army, Washington, D.C. August 1990.  
<http://www.adtdl.army.mil/cgi-bin/atdl.dll/fm/8-50/toc.htm>
- Friedman, A. L., "The ophthalmic screening of laser workers," Ann. Occup. Hyg., vol. 21, pp. 277-279, 1978.
- Hathaway, J. A., "The need for medical surveillance of laser and microwave workers," Current Concepts in Ergophthalmology, Societas Ergophthalmologica Internationalis, Sweden, pp. 139-160, 1978.
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- Wolbarsht, M. L., and Landers, M. B., "Testing visual capabilities for medical surveillance or to ensure job fitness," J. Occup Med., vol. 27, pp. 897-901, 1985.
- ANSI Z136.1-2022

Questions about this procedure? Contact [occupational.health@kaust.edu.sa](mailto:occupational.health@kaust.edu.sa)