

Safety and Health Topics Laser/Electrosurgery Plume

During surgical procedures that use a laser or electrosurgical unit, the thermal destruction of tissue creates a smoke byproduct. An estimated 500,000 workers are exposed to laser or electrosurgical smoke each year, including surgeons, nurses, anesthesiologists, and surgical technologists. Surgical plumes have contents similar to other smoke plumes, including carbon monoxide, polyaromatic hydrocarbons, and a variety of trace toxic gases. As such, they can produce upper respiratory irritation, and have in-vitro mutagenic potential. Although there has been no documented transmission of infectious disease through surgical smoke, the potential for generating infectious viral fragments, particularly following treatment of venereal warts, may exist. Local smoke evacuation systems have been recommended by consensus organizations, and may improve the quality of the operating field. Employers should be aware of this emerging problem and advise employees of the hazards of laser smoke.

Recognition

- Hazard of Laser Surgery Smoke. OSHA Hazard Information Bulletin (1988, April 11), 2 pages. Links potential airborne biological hazards with the use of lasers during surgery.
- Occupational Health Hazard: Surgical Smoke. American Nurses Association, Nursing World (1996), 2 pages. Reviews hazards of laser smoke.
- Laser Generated Air Contaminants (LGAC). Laser Institute of America (1993). LGACs as defined by the American National Standard Institute (ANSI) in ANSI Z-136.1, section 7.3.
- Surgical smoke; what we know today. Mastel Precision. 151 KB PDF, 21 pages. A multitude of information about the potential dangers of surgical smoke.
- Surgical smoke; clinical notes. British Journal of Surgery (1996), 40 KB PDF, 4 pages. An article on the hazards associated with Electro-surgery smoke.

Control

- Control of Smoke from Laser/Electrical Surgical Procedures. NIOSH Hazard/Controls, DHHS (NIOSH) Publication 96-128 (1998, March 2), 2 pages. Describes the hazards and methods to control smoke plumes when using lasers or electrosurgical units during surgery. Also available in a 166 KB PDF file.
- Laser Plume in Surgical Procedures. Info Alert No. 24 (1992, August 19), 2 pages. Ontario Ministry of Labour, Canadian Centre for Occupational Health and Safety. Describes hazards and control recommendations for laser plume.
- The American National Standards Institute (ANSI) has developed several standards relating to laser hazards and non-beam hazards. They are recognized as a minimum standard for laser safety. These are available for purchase.

ANSI Z136.1-1993: American National Standard for the Safe Use of Lasers.

ANSI Z136.3-1996: American National Standard for the Safe Use of Lasers in the Health Care Environment.

Compliance

There are no standards specific to laser plume; however, safety from such hazards can be addressed from the following standards, and the OSH Act of 1970, General Duty Clause 5(a)(1).

- OSHA Standards

1910.134, Respiratory Protection. Paragraph (a)(1), states the primary objective is to control occupational diseases caused by breathing air contaminated with harmful substances. This is to be accomplished through accepted engineering controls if feasible, or through the use of appropriate respirators. *Note: Surgical masks used to prevent contamination of the patient are not certified for respiratory protection of medical employees.

1910.1030, Bloodborne Pathogens. Paragraph (d)(3)(i), states the employer must supply appropriate personal protective equipment such as gloves, gowns, masks and eye protection. This standard would apply if such items become contaminated with viable bloodborne pathogens from laser smoke or plume.

- Review Commission and Administrative Law Judge Decisions The Occupational Safety and Health Review Commission (OSHRC) is an independent Federal agency created to decide contests of citations or penalties resulting from OSHA inspections of American work places. To locate decisions related to this topic, search for keywords at the OSHRC site.
- Standard Interpretations and Compliance Letters
 - Hazards of Smoke Generated from Surgical Procedures (1996, April 18), 2 pages. Addresses questions about laser smoke hazards and OSHA requirements.

Other

Various companies provide safety products for protection against the hazards of laser plume, to find these companies search the internet using the terms "laser and plume" or "electrosurgery and smoke or evacuation."