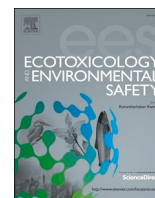




Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



Coronavirus Disease 2019 (COVID-19) and dermatologists: Potential biological hazards of laser surgery in epidemic area^{☆,☆☆,☆☆☆}



ARTICLE INFO

Keywords:

Coronavirus
COVID-19
Laser surgery

Dear Sir/Madam;

Respiratory droplets and contact transmission are most important routes of transmission of Coronavirus Disease (2019) (COVID-19), but do not fully account for the occurrence of all COVID-19 and there is other potential route of transmission include aerosol transmission, body fluid routes and oral-fecal transmission (Phan et al., 2020; Li et al., 2020; Zuo et al., 2020).

Although the role of aerosol transmission of COVID-19 is not exactly clear, recent study focused on potential transmission of COVID-19 via aerosolization of particle of virus especially in closed environment in long time or in condition with high concentration of virus particle (Zuo et al., 2020). Also viral ribonucleic acid (RNA) was found in anal swabs and in blood samples of infected patients (Zhang et al., 2020).

Aerosols are liquid and solid particles suspended in the air. An aerosol with a diameter of 5 μm or less can remain airborne for a long period of time and enter the respiratory system (Zuo et al., 2020). While most of the danger of lasers surgery in dermatology comes from the beam itself include direct eye injury, there are certain non-beam hazards include flammability, electrical hazards and airborne contaminants (Ravishankar et al., 2019).

Airborne contaminants are associated with only certain wavelengths and applications of laser. It has demonstrated thermal disruption of viable human cells results in the release of carbon particles, virus, bacteria, deoxyribonucleic acid (DNA), and toxic gases. These hazardous particulates are found in all surgical plume, regardless of the energy source and in all types of surgical procedures except using low-power lasers (Ravishankar et al., 2019). It means that aerosolized blood, blood borne pathogens and pathogen finds in the blood or other secretion can forcefully ejected when the cell disrupts, and become airborne. This organic materials released from human tissue during vaporization, including human immunodeficiency viruses (HIV), human papillomavirus (HPV), and hepatitis B virus (HBV) as well as potentially other biologic particles (Sarnoff et al., 2018; Bargman, 2010).

Regarding the outbreaks of COVID-19, in area with sustained

community transmission, special consideration on laser safety with focus on potential biological hazards of moderate and high-power laser surgery is needed to reduce potential risks of laser airborne contaminants that provide more laser safety profiles and it is preferred that elective laser procedures postponed.

Some of these special safety consideration include:

- Postpone laser therapy after outbreak of COVID-19 if it is only for cosmetic purpose.
- Serious prep and drep before and after laser (to reduce and remove the particle as much as possible).
- Sterilized laser hand pieces effectively before and after use.
- Frequent proper hand-washing, especially after direct contact with instrument.
- Wearing goggles and gloves.
- Use high-filtration media masks only while dry (filtration media stops working when the mask gets damp from breathing).
- Use plume evacuation systems with filters that remove particulates to 0.1 μm known as an ULPA (ultra low particulate air) filter.
- Place all used materials in biohazard bags.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

- Bargman, H., 2010. Laser safety guidelines. *J. Clin. Aesthetic Dermatol.* 3, 18–19.
- Li, Q., Guan, X., Wu, P., et al., 2020. Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. *N. Engl. J. Med.* 382, 1199–1207.
- Phan, L.T., Nguyen, T.V., Luong, Q.C., et al., 2020. Importation and human-to-human transmission of a novel Coronavirus in Vietnam. *N. Engl. J. Med.* 382, 872–874.
- Ravishankar, A., Turetsky, Y., Novotny, S., Allen, T., Farah, R.S., 2019. Implementing laser safety standards in the outpatient Academic dermatology clinic: a quality improvement based study. *Laser Surg. Med.* <https://doi.org/10.1002/lsm.23174>. In

[☆] Acknowledgment: Nil.

^{☆☆} Conflict of interest statement: The authors declare that there is no conflict of interests regarding the publication of this paper.

^{☆☆☆} Financial Disclosure: None of the authors has any financial disclosures.

press.

Sarnoff, D., Gotkin, H., Doerfler, B., Gustafson, J., Hanke, C.W., 2018. The safety of laser skin resurfacing with the microablative carbon dioxide laser and review of the literature. *J. Drugs Dermatol. JDD* 17, 1157–1162.

Zhang, W., Du, R.H., Li, B., et al., 2020. Molecular and serological investigation of 2019-nCoV infected patients: implication of multiple shedding routes. *Emerg. Microb. Infect.* 9, 386–389.

Zuo, M.Z., Huang, Y.G., Ma, W.H., et al., 2020. Expert recommendations for tracheal intubation in critically ill patients with novel Coronavirus Disease 2019. *Chinese Med. Sci. J. = Chung-kuo i hsueh k'o hsueh tsa chih.* <https://doi.org/10.24920/003724>. In press.

Seyed-Naser Emadi^a, Bahareh Abtahi-Naeini^{b,*}

^a *Skin Research Center, Razi Hospital, Tehran University of Medical Sciences, Tehran, Iran*

^b *Skin Diseases and Leishmaniasis Research Center, Isfahan University of Medical Sciences, Isfahan, Iran*

E-mail addresses: naseremad@yahoo.com (S.-N. Emadi), bahareh.abtahi@yahoo.com (B. Abtahi-Naeini).

* Corresponding author.