

# Airborne Particulate Concentration during Laser Hair Removal: A Comparison between Cold Sapphire Contact Cooling and Cryogen Skin Cooling.

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## Background

Potentially harmful sub-micron nanoparticles are released during laser hair removal (LHR) procedures when non-contact cryogen cooling is utilized.<sup>1</sup> These emissions pose a potential biohazard to health care workers who have prolonged exposure to LHR plume. Chuang- et al<sup>1</sup> quantified the risk by performing nanoparticle (<1um) counts during LHR using a laser with Cryogen Skin Cooling (GentleMax, Candela, Wayland, MA). These measurements showed an increase of particulates of 8 fold as compared to baseline when a smoke evacuator was used continuously and nearly 30 fold when used intermittently.



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laser dermatology procedures including LHR.<sup>2, 3, 4</sup> However, plume suppression has been a potentially overlooked benefit with sapphire skin cooling during LHR.

## Objective

Demonstrate that cold sapphire skin cooling done in contact mode with a layer of aqueous gel between the skin and sapphire window effectively suppresses plume during LHR.



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## Methods

Concentration of ultrafine particles <1um were measured using a TSI 8525 (TSI, Shoreview, NM) portable particle counter during LHR with two laser systems, the GentleMax (GM) with cryogen cooling and the excel



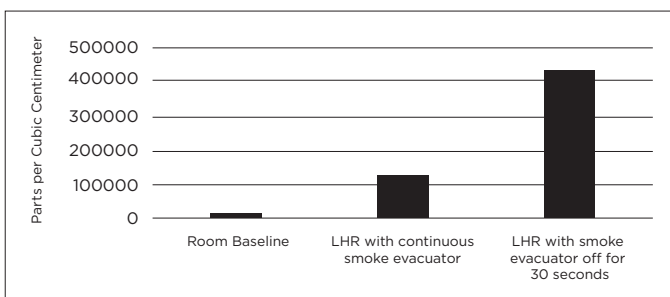
TSI 8525 Particle Counter

HR (HR) with cold sapphire contact cooling. These measurements were performed in a 10'X10' treatment room with base line levels recorded before and during LHR treatment in the plane of the laser practitioner.

Bi-Lateral treatments were performed on each patient with the GM on one side and the HR on the other. Treatment sites were shaved prior to laser treatment.

For the HR treatment, a thin layer of clear aloe vera gel was applied to the area pretreatment with a tongue depressor. The Sapphire window temperature was 4 degrees C. The Cryogen was set for 40 ms of application and then a 20 ms delay before onset on the laser pulse.

Figure 1. Airborn Particulate Concentration during Cryogen Cooled LHR



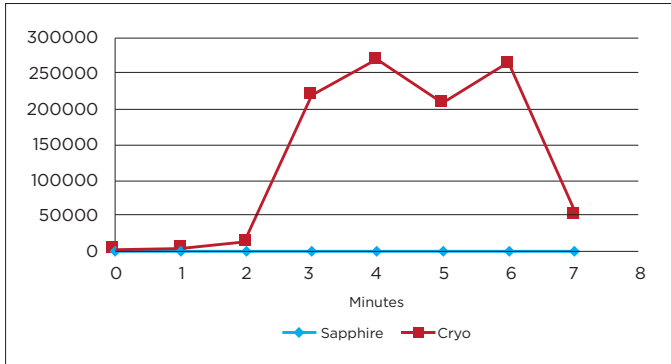
Analysis of chemical compounds using gas chromatography-mass spectrometry (GC-MS) identified 377 chemical compounds. Sixty-two of these compounds, of which 13 are known or suspected carcinogens and more than 20 are known environmental toxins, exhibited strong absorption peaks. A key point noted by Chuang et al is the burning hair plume should be considered a biohazard, warranting the need for smoke evacuators, good ventilation and respiratory protection especially with practitioners and health care workers. Contact cooling (CC) is an efficient skin cooling method for

## Results & Discussion

Post treatment perifollicular edema was observed with both systems. During treatment no detectable plume compared to baseline escaped using the HR system, provided contact was maintained and aloe vera gel was used.

**Figure 2. Airborn Particulate Concentration during LHR Cryogen vs Cold Sapphire**

1064 nm, 20 J/cm<sup>2</sup>, 18 mm spot for treatments. Left back treated with HR, right back treated with GM



In contrast, the GM system produced levels of plume 72 fold higher than baseline. The odor of the treatment was not pleasant for practitioner nor patient.

## Conclusion

Cold Sapphire Skin cooling with Gel effectively suppresses plume during laser hair removal, obviating the need for smoke evacuators, ventilation systems and respirators during LHR. Thus, Cold Sapphire Skin cooling with gel may be a safer treatment for laser operators provided proper contact is maintained and gel used.

## References

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