

Potentially Negative Effects of Ozone-producing Air Purifiers in Human ART Laboratories

by Don Rieger, PhD
Scientific Director, LifeGlobal

Scientific studies have shown that the use of specifically-designed air purification systems in human ART laboratories results in increased pregnancy rates and decreased spontaneous abortion rates. Conversely, air purifiers that are marketed for home use and produce ozone may endanger the health of laboratory personnel and could have deleterious effects on gametes and embryos in culture.

Ozone, sometimes called “activated oxygen” or “trivalent oxygen” is a highly reactive oxidizing agent. It is considered to be one of the six major air pollutants, and is known to have significant functional and structural effects on the human respiratory system, even at very low concentrations.

Contrary to the anecdotal and unsubstantiated claims made for ozone-producing air purifiers, the results of many scientific investigations have shown that:

- Low levels of ozone will not remove most indoor air contaminants
- Ozone acts only to mask odors
- Ozone can convert some air contaminants to less odorous, but potentially more toxic compounds
- Introducing ozone into indoor air may present a risk to human health

Consequently, the U.S. Environmental Protection Agency, Health Canada, the State of California Department of Health Services, the State of Alaska Department of Health and Social Services, the American Lung Association and many other organizations have all issued warnings about ozone-producing air purifiers.

Most significantly, U.S. Food and Drug Administration regulations state that: “Ozone is a toxic gas with no known useful medical application in specific, adjunctive, or preventive therapy. In order for ozone to be effective as a germicide, it must be present in a concentration far greater than that which can be safely tolerated by man and animals.” The regulations further state that any device that generates ozone will be considered adulterated and/or misbranded if it used or intended for use: “to generate ozone and release it into the atmosphere in hospitals or other establishments occupied by the ill or infirm,” (or) “to generate ozone at a level less than 0.05 parts per million by volume of air circulating through the device and it is labeled for use as a germicide or deodorizer.”



DON RIEGER, PHD

Because of the ineffectiveness of ozone for air treatment, the well-known effects of ozone on human health, and the possible deleterious effects of ozone on gametes and embryos in culture, ozone-producing air purifiers have no place in human ART laboratories.

You can contact Don Rieger, PhD, Scientific Director, LifeGlobal at: DonRieger@LifeGlobal.com

Suggested Reading

- Boeniger M.F. (1995). Use of ozone generating devices to improve indoor air quality. *Am Ind Hyg Assoc J* 56, 590–8.
- Canadian Centre for Occupational Health and Safety (2004) Ozone - CHEMINFO Record Number 774.
- Cohen J., Gilligan A., Esposito W., Schimmel T., Dale B. (1997). Ambient air and its potential effects on conception in vitro. *Hum Reprod* 12, 1742–9.
- Cohen J., Gilligan A., Willadsen S. (1998.) Culture and quality control of embryos. *Hum Reprod* 13 Suppl 3, 137–44; discussion 145–7.
- Gornicki A., Gutsze A. (2000). In vitro effects of ozone on human erythrocyte membranes: an EPR study. *Acta Biochim Pol* 47, 963–71.
- Guerin P., El Mouatassim S., Menezo Y. (2001). Oxidative stress and protection against reactive oxygen species in the pre-implantation embryo and its surroundings. *Hum Reprod Update* 7, 175–89.
- Hall J., Gilligan A., Schimmel T., Cecchi M., Cohen J. (1998). The origin, effects and control of air pollution in laboratories used for human embryo culture. *Hum Reprod* 13 Suppl 4, 146–55.
- Hoxey E.V., Thomas N. (1999). Chapter 21: Gaseous Sterilization. In ‘Principles and Practice of Disinfection, Preservation and Sterilization’. (Eds AD Russel, WB Hugo and GAJ Ayliffe) pp. 703–32. (Blackwell Science: Oxford)
- Mayer J.F., Nehchiri F., Weedon V.M., Jones E.L., Kalin H.L., Oehninger S.C., Toner J.P., Gibbons W.E., Muasher S.J. (1999). Prospective randomized crossover analysis of the impact of an incubator air filtration system. *Proc. Am. Soc. Reprod. Med. Annual Meeting, Abstr.*
- United States Environmental Protection Agency (1995) ‘National Air Quality and Emissions Trends Report.’
- United States Environmental Protection Agency (1996) ‘Air Quality Criteria for Ozone and Related Photochemical Oxidants.’ EPA/600/P-93/004a-cF.
- Victorin K (1992) Review of the genotoxicity of ozone. *Mutat Res* 277, 221–38.
- Wickramanayake G.B. (1991). Disinfection and sterilization by ozone. In ‘Disinfection, Sterilization, and Preservation.’ (Ed. SS Block) pp. 182–190. (Lea & Febiger: Philadelphia)