OZONE GAS AS A "POWERFUL WEAPON" FOR DISINFECTION AND STERILIZATION (ZHOU 2020)

Ozone gas is an inexpensively generated sanitizer and disinfectant. People and pets must not be present where the gas is released from a remotely or timer-controlled generator, due to toxicity. But unlike other products that leave residues and/or remain toxic in the air, ozone gas quickly breaks down into oxygen *(Sharma & Hudson 2008)*.

Ozone gas has successfully decontaminated against MRSA *(de Boer, van Elzelingen-Dekker, van Rheenen-Ver-berg, & Spanjaard 2006), E. coli, P. aeruginosa, C. difficile, and antibiotic-resistant Enterococcus, to over 99.9999% (Zoutman, Shannon, & Brown 2011)*.

Hudson et al. ran several controlled tests to determine how effective ozone gas is for sanitizing various surfaces and for airborne disinfection. Prototype ozone generators with circulating fans were used against 12 stock viruses–mostly human pathogen–and against aerosol-borne viruses. Due to similar structures, the viruses tested were considered suitable substitutes for other, untested viruses. In all cases, none of the viruses were resistant to the ozone gas, and efficacy results were not affected by surface type or presence of contaminants. Findings were 99% or greater inactivation rate in all their field trials *(Hudson, Sharma, & Vimalanathan 2009)*.

Foodborne illnesses are also a concern, as the CDC estimate puts related illnesses at "48 million people" per year, of which they estimate "128,000 are hospitalized and 3,000 die" *(CDC, 2019)*. Masotti et al. addressed this concern by examining a well-maintained, but heavily trafficked dairy factory on an unpaved road close to farmyards. They found biological airborne contaminants, bacteria, viruses, and fungi were not being eliminated effectively enough by chlorine-based sanitizers that were being used according to proper protocols. Their results after the use of ozone gas determined bacteria, molds, and yeasts were all reduced to next to nothing or eliminated completely. Therefore, they recommended adoption of air disinfection protocols to maintain good air quality over simple chlorinated surface cleaning *(Masotti, et al. 2019)*. Likewise, Toriak et al. outlined how various foods were decontaminated against Salmonella effectively, with ozone gas with little-to-no loss of flavor or appearance *(Torlak, Sert, & Ulca 2013)*.

The exceptional decontamination effects of ozone gas are coupled with the superior advantage of the gas penetration in hard-to-clean and difficult access areas *(Sharma & Hudson 2008)*. This is extremely important because many common pathogens can survive for long periods of time on surfaces, leading to infections and reinfections with contact (Zoutman, Shannon, & Brown 2011).

With the Covid-19 ("coronavirus") pandemic, Zhou Muzhi, professor of Tokyo Keizai University and president of Cloud River Urban Research Institute recommends ozone gas as a "powerful weapon" for disinfection and sterilization (Zhou 2020).

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