

Ozone Therapy in Dentistry

A Brief Review for Physicians

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Summary

The 21st century dental practice is quite dynamic. New treatment protocols and new materials are being developed at a rapid pace. Ozone dental therapy falls into the category of new treatment protocols in dentistry, yet ozone is not new at all. Ozone therapy is already a major treatment modality in Europe, South America and a number of other countries. What is provided here will not be an exhaustive scientific treatise so much as a brief general introduction into what dentists are now doing with ozone therapies and the numerous oral/systemic links that make this subject so important for physicians so that, ultimately, they may serve their patients more effectively and productively.

First Step: treating caries

Naturally, the first interest of dentists was treating caries. And ozone in a number of forms is a very powerful tool to stop caries. Even extremely deep lesions can quite predictably be arrested. We also have found over the last decades that we can reverse early lesions and heal teeth. However, once there's a hole, there's a hole, and sometimes our full restorative technologies need to be brought to bear in order to repair the damage.

We also recognize now that we can prevent caries in the first place using ozonotherapy. The mechanism is interesting and parallels what physicians are seeing with management of bio-film infections elsewhere in the body (Figure 1).

Not only does ozone kill all the bad bacteria, fungi, viruses and protozoans, it also removes

their breakdown products as well as other necrotic debris. In the case of caries, much of the waste is highly acidic. That's what contributes to the initial attack on enamel. But, beyond that, it's the various biomolecules left behind by the acidogenic infecting organisms that enables others to colonize and take over the bio-film and perpetuate the carious attack. If one not only removes the germs but also the residual biomolecules, the niche collapses and a much less damaging biofilm can be encouraged to predominate. We create a window of approximately 3-4 months in which teeth can remineralize from the supersaturated calcium and phosphate ions common in a healthy saliva. After using ozone, dentists can encourage this remineralization with a variety of other adjuncts such as fluorides, xylitol, probiotics, etc.

It is also not uncommon to make full-arch trays covering all the teeth and gums and then insufflating the area for several minutes every few months as a preventive measure.

The vast majority of carious lesions can be eliminated by adequate uses of ozone in gaseous, aqueous or oil forms.

Why should physicians be concerned about caries? The germs notoriously responsible for tooth decay also show up in the plaques in the intima of arteries and contribute to atherogenesis. They attack joints and prostheses. They can cause fatal brain infection.

Managing Periodontal Infection

Periodontal (gum) disease is most commonly associated with halitosis. It ultimately results in the loosening and loss of teeth. *This goes FAR*

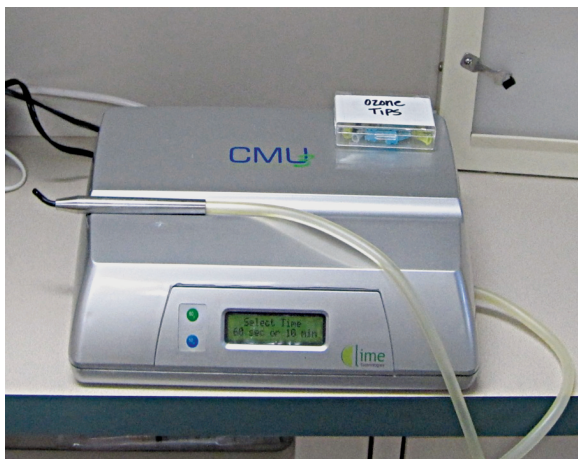


Figure 1 A clinical ozone generator for dental applications.



Figure 2 Treating a highly contaminated periodontal pocket.



Figure 3 In a very short time there is resolution of inflammation.

beyond being just a dental problem. The infective process can easily lead to a lesion wrapping around the roots of the teeth in a highly contaminated area. Upon adding up all the pustulent, raw tissue it can quickly sum up to the surface area of the palm of the hand or even the entire forearm. The only saving grace is the lesion is generally hidden. If a patient walked into your office with a fungating lesion over half the face, it would probably demand immediate attention. But with periodontal attack, there's rarely no pain until the very end stages, so it's frequently out-of-sight, out-of-mind.

Nevertheless, a large percentage of your patients present with periodontal lesions that leads to constant germ cascade directly into the entire circulation. *Beyond direct infection, this incursion is highly inflammogenic* and, among other consequences, attacks the endothelium of all vessels. Once damaged, the endothelium then admits pathogenic organisms into the intima and the stage is now set for atherosclerosis.

Knowing there are 700 oral bacterial species and as many as 19,000 different phenotypes suspected as causative agents in periodontal attack, and with the current knowledge of the formation of biofilm and its layering and protective elements, *new nonspecific treatments must be found*. Ozone fulfills these criteria. Ozone gas, ozonated oils and water can be applied into the sulci, or directly into abscesses or even directly into areas of chronic infection to curb and eliminate the bacterial populations (Figures 2-3-4).

Once atherosclerotic plaques have formed, further stimulation, often from oral microflora, triggers the formation of matrix metalloproteinase enzymes within the atherosclerotic plaques. These collagenases cleave the plaques, releasing their contents and making for clots or turning them into valves thereby shutting off blood-flow downstream. Cardiac and brain infarcts are immediate consequences.

Triggering insulin resistance and diabetic attacks is another common result of periodontal pathogens and their waste products. Worse, this is a vicious cycle, with diabetes exacerbating the periodontal attack.

Many of the periodontal pathogens are serious treponemes, close relatives to *T. pallidum*. They go systemic and can end up in the brain, often associated with *Alzheimer's attacks*.

These raw gingival lesions are also clearly associated with *preterm births, low birthweight and even "spontaneous" abortions*.



Figure 4 Tray insufflation to flood the entire arch with ozone.



Figure 7 Insufflation of herpetic lesions. Note that suction must be employed in order to manage ozone inhalation.



Figure 5 Endodontic infection can easily go systemic.

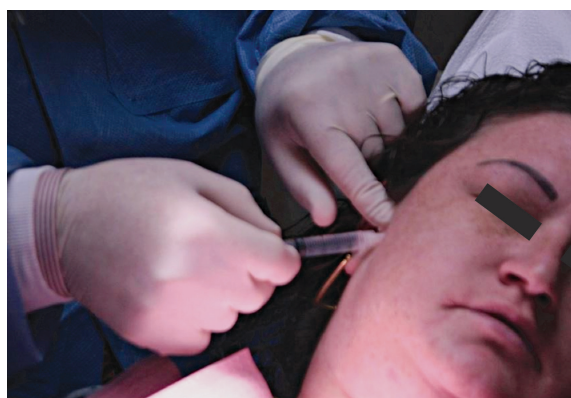


Figure 6 Infection can spread submandibularly and block respiration with rapidly fatal consequences.



Figure 8 Ear insufflation of ozone to manage sinusitis and temporomandibular joint dysfunction. Temporomandibular joint dysfunction has multifactorial origins and may sometimes be managed by joint injections. Muscle trigger points may also be areas where ozone placement can help with headache pain.

Figure 9 Dentists place low concentration ozone gas into the area of the TMJ.



The good news is that dentists are having increasingly better abilities to control and prevent these gingival incursions. We can irrigate out the deep pockets around the roots using ozonated water during debridement processes, then insufflate the deep, infected crevices with ozone gas using fine cannulae, followed by placement of ozonated oils for longer term disinfection.

Patients may also be given their own supply of ozonated oils to place into hard-to-reach areas on a daily basis. And, again, tray insufflation is often recommended as a periodic preventive regimen.

How do physicians know their patients have periodontal attack? Bleeding or receding gums and halitosis are often a give-away, but frequently there are no readily observable signs. Physicians and dentists can now avail themselves of DNA testing to reveal the presence of unrecognized periodontal pathogens before inflammatory attack becomes readily evident.

Ozone in Endodontics

Germs, often from carious processes, enter the tooth and progress deeper into the pulp or 'nerve'. There are multiple lateral canals and a periapical space that can all be inhabited by pathogenic bacteria. Conventional endodontic therapy does not reach into all the microtubules and interstices which may harbor bacteria and their toxins. Ozone offers some of the best results seen to date in the treatment of internal tooth infections.

Enterococcus faecalis has been implicated as a major causative factor in endodontic disease and is particularly resistant to sodium hypochlorite, the antimicrobial most commonly employed in endodontic (root canal) therapy. Ozone has

been shown to be effective in eliminating this organism as well as all others including viruses and fungi found inside roots. Using ozone gas and ozonated oils and water, the depth of penetration of this therapy can reach its intended targets. Additionally, the bone at the end of the roots is often shown to harbor pathogenic bacteria for many years after traditional root canal therapy has been completed. Ozone can eliminate those bacteria that infest this region and remove toxic waste products that effectively prevent complete healing of the osseous structures. Endodontic infections need to be taken as seriously as those of periodontal or caries origin. They readily become systemic with potentially fatal consequences (Figures 5-6).

Viral and Fungal Infections

Ozone is particularly well suited to the management of viral and fungal lesions. The pain and disfigurement of perioral herpetic infections is a good example. In short order, the practitioner can render the areas comfortable and significantly accelerate the healing process. Interestingly, around 25% of lesions treated with ozone do not appear to recur. Both gas and ozonated oils are well suited to managing viral infections. (Figure 7).

Sinusitis and Temporomandibular Joint Dysfunction

Frequently, pain felt in the maxillary posterior teeth comes from infection and inflammation of the sinus directly above the dental roots. Dentists can help your patients using ear insufflation as well as injections of low concentra-

tion ozone gas into the loose areolar tissues on the buccal surfaces along the sinus wall. Since easily 25% of sinus infections are fungal in origin, the indiscriminate disinfecting power of ozone seems to outshine the uses of antibiotics. (Figure 8-9).

Bisphosphonate Lesion Treatment

Increasingly, dentists are encountering very hard to treat osteonecrotic lesions, mostly of the mandible. Many of these are secondary to infections or tooth extractions on patients who have received significant doses of bisphosphonate medications.

Ozone seems well suited to resolution of these problem lesions that otherwise require multiple surgical interventions and treatment with exotic and very costly antibiotics.

Further Resources

Physicians would do well to consider joining the International Association of Ozone in Healthcare and Dentistry. www.IAOHD.org to learn more about the optimum uses of ozone and work hand in hand with their dental colleagues.

Another organization to consider: The American Academy of Ozonotherapy. See www.AAOT.US

Visit www.ZT4BG.com for a rich resource on the oral/systemic link. This tool is designed as an overview for your patients as well as a compilation of much of the relevant research for serious professionals.

Finally, to learn a great deal more about the oral/systemic connection, we'd recommend investigating the American Academy for Oral Systemic Health. www.AAOSH.org.

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