Therozone in practice

Christopher Dalton shares some of his experiences of ozone whitening

I have been using the KaVo Healozone unit, in conjunction with the KaVo Diagnodent and Prophyflex, for more than five years. In common with most other users, I have been very impressed with the results. Ozone therapy has revolutionised the treatment of early carious lesions in both primary and secondary dentitions, as the technique is truly a minimally invasive approach. The treatment of deeper cavities still requires the removal of some diseased tissue, but as ozone promotes remineralisation as well as sterilisation, the amputation of all carious dentine is not required. This has dramatically reduced my need for RCT, and has really helped me provide the best treatment for my patients.

What is ozone?

Ozone is a colourless gas with a pungent odour. It is formed naturally in the atmosphere where it can combine with water molecules to form hydrogen peroxide, a component of rainwater. Chemically it is the triatomic, allotropic form of oxygen and has many medical and industrial applications.

Ozone can be created by nature in three ways:

- Lightning gives the extremely clean and fresh smell after a thunderstorm
- Waterfalls and crashing waves that accounts for the feel good factor experienced near the sea and such places.
- The sun can split nitrous oxide (a pollutant formed by the combustion of hydrocarbons in the internal combustion engine).

Recently, the benefits of ozone have become apparent with numerous articles being published, giving rise to the use of ozone in water purification, technology and medicine. The ability of ozone to eradicate a wide range of bacteria, bacterial spores, and viruses in both gaseous and aqueous solutions has been conclusively shown.

The ease with which it can combine with other elements makes ozone one of the most powerful oxidising agents in existence. In certain concentrations and exposure times, when in contact with bacteria and viruses, it bonds with the unsaturated fatty acids in their cell walls, destroying the cell membrane. Healthy somatic cells withstand ozone exposure. Bacteria, viruses and fungi have no hereditary resistance to ozone.

The use of ozone in the dental surgery was described by Turk in 1985 and Phillipi in 1997, where ozone mixed with pyrogen-free water was reported to be an effective agent to promote haemostasis, enhance local oxygen supply and inhibit bacterial proliferation, for example after tooth extraction or surgery.

More recently (2001) the arrival of the KaVo Healozone unit for the delivery of gaseous ozone directly to the oral tissues has revolutionised the treatment of early coronal carious lesions, root caries and endodontic sterilisation. See the excellent book entitled *Ozone: The Revolution in Dentistry* edited by Professor Edward Lynch (Quintessence Books, ISBN 18-5097-08-82).

How ozone is produced

In the same way that ozone is formed naturally by the discharge of electricity during a thunderstorm, ozone can be produced commercially in the molecular electrical ozone generator. The passage of a high voltage, alternating electrical discharge through a gas stream of air or oxygen will result in the breakdown of the molecular oxygen to atomic oxygen. Some of the atoms of oxygen thus liberated can reform as ozone where others recombine again to form oxygen.

The problem of using gaseous ozone in dentistry is that ozone is toxic and will attack the lung tissues. Because of the inherent dangers of the gas, the design of the equipment for the delivery of ozone gas to be used for treatment in the oral cavity must be free from hazard to the operator, the surgery assistants and most important, the patient. There is currently only one device with a CE approval for the treatment of caries and that is the Healozone manufactured by KaVo.

The new Therozone unit

The Therozone was developed by Dr James Shenberg, a dental surgeon based in Santa Monica, California, who became interested in ozone after attending a conference in South Africa. The Therozone safely produces ozonated water in standard dental unit water line bottles for convenience, and is an extremely valuable asset within my practice. It is a worktop-sized machine that will quickly and safely dissolve ozone gas into chilled distilled water. To use the Therozone, the bottles are filled with chilled distilled water to the level of the Therozone logo on the bottle. The water bottle is then connected. The start button can now be pressed and the ozonating cycle is complete in five minutes with the ozonated water ready to use.

Uses for ozonated water

The uses for ozonated water are many and varied where the elimination of bacteria, viruses and fungi is desired. In this form, the complications from using gaseous ozone (i.e. toxicity to lung tissues) are eliminated. It must be stressed that the ozonated water has to be manufactured and used as soon as possible. Once dissolved in water, ozone decays to oxygen with a half life of 30 minutes at 20°c and, at higher temperatures, it decomposes more rapidly. Within my practice, I use ozonated water for the following applications:

- Periodontal therapy: The practice utilises the Durr Vector Treatment system. The Vector is an ultrasonically driven device for removing calculus and biofilm from periodontal pockets. This device incorporates its own water tank together with a polishing fluid. The ozonated water is placed in the water tank. In this way I am not only eliminating the calculus and biofilm but also the antibacterial element provided by the ozone reduces the mixed bacterial flora within the pockets. I have been extremely pleased with the results obtained. Ozonated water could be used in any ultrasonic scaler unit that is designed to operate with a dedicated water supply. Clinically active periodontal diseases are treated much more effectively than conventional treatment methods. I believe all ultrasonic units should be using water from this Therozone unit rather than just plain water.
- Endodontics: The advent of modern endodontic techniques with the use of magnification, apex locators, rotary instrumentation and various warm gutta percha techniques have given a far greater success rate for the operator. However, these have not addressed the problem of sterilising the entire root canal system. The use of ozonated water, together with the KaVo Healozone, go hand-in-hand for current endodontic therapy because of their anti-microbial effects. The most important function of the root canal irrigant is to destroy micro-organisms in the root canal system together with flushing out gross debris and lubrication. To this end one cannot imagine a better solution to use for this purpose than ozonated water especially when used in conjunction with the KaVo HealOzone in 'endo' mode. These techniques have made endodontics a far more predictable treatment option and therefore one to be enjoyed by the operator. Ozone has dramatically improved my success rates in endodontics.
- Decontamination of dental unit water lines: Dental unit water lines should be regularly maintained to deliver water of an optimal microbiologic quality according to the American Dental Association. It is well known that dental unit water lines will develop a bacterial growth on their inner surfaces. Fortunately, the reported cases of infection by bacteria from our dental units are few. It has been shown that treatment of dental unit water lines samples with ozonated water from the Therozone unit will reduce the microbial catabolite levels present (K Julian et al 2007). The recommendation is that you should continue to use your existing method to treat the water in your dental unit water lines and to use ozonater water from the Therozone instead of just regular water.

Decontamination of work surfaces

Ozonated water from the Therozone is ideal as a disinfectant for killing bacteria, viruses and spores on hard surfaces such as clinical worktops.

Other uses

Other uses for ozonated water are similar to those for gaseous ozone and must include the treatment of soft tissue conditions such as aphthous ulcers, hyperplasia, bacterial and viral infections. For example, herpes, especially where for various reasons it would be difficult to achieve an air-tight seal with the silicone cup of the Healozone unit. Of course, there are numerous other uses for the ozonated water from the Therozone as this is used for treatment of acne, dermatitis, psoriasis, eczema, ulcers, etc. I also use the Therozone to also remove all pesticides off my fruit and vegetables.

Conclusion

Having used the KaVo Healozone for some five years, it was easy to integrate the Therozone into my treatment options. The use of ozonated water from the Theroozone perfectly compliments that of gaseous ozone produced by the HealOzone by giving the clinician a source of therapeutic ozone, to be used clinically where for various reasons the use of ozone gas would be contra indicated. This unit has been long overdue. Professor Liviu Steier has described ozone as becoming the gold standard for dental disinfection and, after five years clinical use of ozone, I agree totally. ■

- Christopher Dalton has no commercial ties with Therozone or KaVo

Suggested reading

Lynch E. Evidence-based caries reversal using ozone. J Esthet Restor Dent. 2008;20(4):218-22.

Lynch E. Evidence-based efficacy of Ozone for root canal irrigation. J Esthet Restor Dent. 2008;20(4):287-293.

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