

DENTAL OZONE

BASIC SCIENTIFIC FACTS

- Ozone (O₃) is an allotrope of Oxygen (O₂). An allotrope is a variant of a substance consisting of only one type of atom. It has a NEW molecular configuration and NEW PHYSICAL PROPERTIES. Example: carbon can exist in multiple forms such as: a soft graphite and/or a hard diamond.
- Ozone is created by an energetic reaction that results in an oxygen molecule (O₂) being split into singlet oxygen (O₁). A singlet oxygen then combines with a diatomic oxygen (O₂) forming ozone (O₃). This energetic process is a result of energy produced by: sunlight, lightning, ultraviolet light and corona discharge tubes.
- Ozone is an oxidant and is also referred to as an oxidizer. An oxidizer is a substance that accepts an electron from another substance and is then reduced. It acts as an electron acceptor. It also adds an oxygen atom to the compound being oxidized. In vivo it produces hydroperoxides, lipoperoxides, etc.
- Healthy cells have antioxidant enzymes in their cell membranes, such as: superoxide dismutase, catalase, glutathione peroxidase, etc. There are also antioxidants such as: vitamin C, vitamin E, etc. present in the extracellular matrix fluids, plasma, etc. These antioxidants protect the healthy cells from being oxidized (burned up) by ozone.
- Pathogens such as: Bacteria, Viruses, Fungi, and Parasites have little or no antioxidant enzymes in their cell membranes. This makes them vulnerable to oxidants. An oxidant (ozone, chlorine, etc.) will destroy the cell membrane of the pathogen resulting in a disinfecting or sterilizing effect. Ozone leaves NO TOXIC BYPRODUCTS like chlorine compounds (trihalomethanes, etc.) leave in vivo or ex vivo. The final breakdown products of O₃ are water and oxygen.
- Biofilms are a complex aggregation of structurally and genetically diverse microorganisms growing on a solid surface. Biofilms are found in dental plaque, carious lesions, periodontitis, dental waterlines, etc. The cover story in **"THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION," Vol 140, No 8 978-986 is "Periodontitis: An Archetypical Biofilm Disease"** It states that "Periodontitis is a classic example of biofilm-mediated diseases." The article concluded that, "Periodontitis, like other biofilm infections, is refractory to antibiotic agents and host defenses because the causative microbes live in complex communities that persist despite challenges that range from targeted antibiotic agents to phagocytosis." The clinical implications concluded that, "The regular delivery of non-targeted anti-biofilm agents may be an effective strategy for treating biofilms, especially **if these agents include oxidative agents that dissolve the biofilm matrix.**"

Frequently Asked Questions About Dental Ozone

How does ozone produce therapeutic effects in the Dental Office?

Ozone is a powerful oxidant. Bacteria, Viruses, Fungi and parasites have little or no antioxidant enzymes in their cell membranes. Without this protection ozone oxidizes (burns a hole through) the cell membrane causing it to rupture, resulting in cell death. Healthy cells have antioxidant enzymes in their cell membranes and are not harmed by therapeutic levels of ozone. Water treatment research in Europe has demonstrated that **ONE MOLECULE OF OZONE** has the oxidizing power of more than 3000 molecules of chlorine. This same research also showed that the ozone killed pathogenic organisms 3500 times faster with no toxic side effects and no toxic byproducts. Medical ozone studies have demonstrated benefits such as: improved wound healing, improving the immune system response, increased oxygen delivery to hypoxic tissues, etc. Velio Bocci, MD, in his book, ***"OZONE: A NEW MEDICAL DRUG"***, states, ".....it is clear that, among complementary approaches, ozone therapy has emerged as the one that is well explainable with classical biochemical, physiological, and pharmacological knowledge."

Are Dentists using ozone in their practices now?

Yes, as reported in the April 2010 edition of ***"Dental Product Shopper"***, ozone has revolutionized the dental practices of thousands of Dentists. When ozone is used in Dental procedures it treats the cause of the problem NOT JUST the symptom. This produces a proactive approach to treatment rather than solely engaging in the routine procedure of damage control.

How are other Dentists using ozone for dental treatment?

- **Prevention and Protection:** Routine use of ozonated water as a pretreatment patient rinse to disinfect their oral cavity. Fill the unit water supply bottles and the Ultrasonic/Piezo reservoirs with ozonated water. This protects you and your staff from aerosol contaminants produced by high-speed instruments and water spray from the three way syringe. The unit water lines will also be free of all biofilms when the ozonated water is used in the reservoirs. Ozone performs this disinfection and sterilization and leaves only oxygen and water as byproducts.
- **Patient Treatment:** In patient care, ozone is utilized in two forms: (1) ozonated water and (2) pure oxygen/ozone gas. Using these two agents in combination allows the Dentist to treat all oral infections using only oxygen and water! Regardless of the location or the type of infection ozone is able to treat almost any situation. The ozonated water is the perfect irrigation solution for periodontics and endodontics. For operative dentistry, periodontics and endodontics, ozone gas is used to reach and penetrate areas such as: carious dentin, dentinal tubules, accessory canals and periodontal pockets where no other antibiotic or disinfectant can reach.

This is possible because in very simple terminology, the area of infection/inflammation is positively charged (acidic) and ozone is negatively charged. (basic) In technical terminology, the positive chemical charge of the infection and/or inflammation attracts the negative end of the dipolar ozone molecule to the area. The negative end of the dipolar ozone molecule releases the weakly bound oxygen to react in the area as singlet oxygen. This results in oxidation (O₁) and oxygenation (O₂) of the positively charged contents of the area.

Is ozone toxic?

To reiterate, OZONE IS A STRONG OXIDANT! Because of this extreme oxidant capacity, good ozone hygiene is required. Correctly scavenging the excess ozone gas and preventing it from escaping into the office environment is essential. This aspect is critical because the membranes of the eyes and lungs are very weakly protected by antioxidant enzymes. These are the only tissues that require protection from the dosage levels that are used in dental ozone protocols.

Are there any published studies on Dental ozone?

Yes, there are hundreds of published research studies that use ozone in dental procedures. In the book, ***OZONE, The Revolution in Dentistry***, edited by Dr. Edward Lynch and published by Quintessence Publishing Company Limited, there are 132 studies that apply ozone as treatment for different dental problems (page 78, Table 1). Also, as of May 2014, there are 224 published articles available on PubMed, the U.S. National Library of Medicine, NIH. (www.pubmed.com) Go to the site and search "ozone dentistry". Additionally, a research article from Scripps Institute, in LaJolla, CA, published in November, 2002, in the journal, ***Science***, reported that ozone was produced in the plasma cells to kill invading pathogens. This ozone production is a naturally occurring process of the immune system to identify and kill invading pathogens.

When was ozone first used in dental procedures?

In the 1930's, ozone was used in Germany for dental procedures by Dr. E.A. Fisch.

How do I learn to use ozone in my dental practice?

The American College of Integrative Medicine and Dentistry (ACIMD) offers "Ozone in Dentistry" courses that are AGD approved for Dental Continuing Education. **The AGD subject code for Ozone Therapy is #162.**

The ACIMD website is www.ozonefordentistry.com
Phone: 201- 820-3829 or 201-587-0222

The schedule for upcoming dental ozone courses can be found at:
www.oxygenhealingtherapies.com.

A Brief Description of **Specific Dental Applications**

- I. Hygiene Appointments----Protect Patients, Doctor and Staff
 - a. Patient uses ozonated water as a pre-treatment rinse
 - b. Ozonated water is used in the unit water supply bottles
 - c. Ozonated water is used in the Ultrasonic unit water reservoirs
 - d. Ozone gas is used before placing sealants

- II. Operative Dentistry Appointments----Protect Patient, Doctor and Staff
 - a. Patient uses ozonated water as a pre-treatment rinse
 - b. Ozonated water is used in the unit water supply bottles
 - c. Ozone **GAS** is applied to cavity preparations and crown preparations to sterilize the prepared tooth by oxidizing the remaining pathogens and organic materials in the enamel, remaining caries, and dentinal tubules. This produces a pathogen free oxidized surface that enhances bonding strength and decreases or eliminates post-operative sensitivity.

- III. Periodontal Appointments----Protect Patient, Doctor and Staff
 - a. Patient uses ozonated water as a pretreatment rinse
 - b. Ozonated water is used in the unit water supply bottles
 - c. Ozonated water is used in the Ultrasonic water reservoir
 - d. Ozonated water is used to irrigate periodontal pockets
 - e. Ozone **GAS** is used to insufflate (blow gas into) the periodontal pockets
 - f. Ozone Custom Trays are used for total saturation (microbaric therapy) of all periodontal tissues AND carious lesions, precarious areas, occlusal grooves, interproximal areas and margins of existing restorations. This can prevent caries and aid in re-calcification of areas that have minimally invasive caries

- IV. Endodontic Appointments----Protect Patient, Doctor and Staff
 - a. Patient uses ozonated water as a pre-treatment rinse
 - b. Ozonated water is used in the unit water supply bottles
 - c. Irrigate canals with ozonated water to debride the canals and remove biofilm
 - d. Insufflate canals with ozone **GAS** to eliminate pathogens and oxidize organic materials in the dentinal tubules, accessory canals and lateral canals

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