

## Dental ozone

### What is ozone?

Ozone (O<sub>3</sub>) is a natural gas made of three atoms of oxygen. In nature, ozone is made by sunlight and lightening. It forms a protective layer in the upper atmosphere that absorbs most of the sun's UV light and is what gives the sky its blue color.

A second type of "bad ozone" exists in the lower atmosphere. Bad ozone is an air pollutant caused by chemical reactions between oxides of nitrogen (NO<sub>x</sub>) and volatile organic compounds (VOC), and it is irritating to the lungs.

When ozone is used therapeutically, it is made with pure medical grade oxygen and the concentrations are carefully controlled. Whenever gas is administered, a high-volume evacuator (suction) is used to remove any excess gas and prevent inhalation.

### How does it work?

Ozone is a powerful oxidant. What this means, is that it ruptures the cell membrane of pathogens like bacteria, fungi, viruses and even parasites. Healthy cells have antioxidant enzymes in their membranes so they are not harmed by therapeutic levels of ozone. Additionally, areas of infection and inflammation are positively charged (aka acidic) and ozone is negatively charged (aka basic). Therefore, infection and inflammation attract ozone to the areas where it is needed. Benefits of ozone therapy include infection control, improved blood flow, enhanced immune response, more rapid healing response, and no toxic side effects.

### Ozone use

Ozone has historically been used for water purification, air purification, food processing, and medical/dental treatment. There is vast literature supporting the effectiveness and safety of oxygen/ozone therapy. The International Academy of Oral Medicine and Toxicology (IAOMT) reviewed and accepted use of oxygen/ozone in dentistry as scientifically valid.

Water treatment research in Europe has demonstrated one molecule of ozone has more oxidizing power than 3000 molecules of chlorine and kills pathogenic organisms 3500 times faster without toxic side effects or byproducts. When ozone breaks down, it produces water and oxygen.

### Oral infections

The oral cavity is home to one of the most diverse microbiomes in the human body, and includes viruses, fungi, protozoa, archaea and bacteria. When the microbiome is in balance, there is a state of health. Micro-organisms in the mouth work together to form a biofilm that allows them to attach to tissues (gums or teeth). When certain pathogenic or "disease causing" micro-organisms become dominant, the biofilm they create causes an infection that results in cavities, periodontal disease, endodontic infections, etc. Oxygen/ozone helps remove and disinfect the mouth and support the surrounding tissues without toxic side effects.

### Uses in dentistry

With proper application and staying within the accepted standard of care, oxygen/ozone therapy can enhance outcomes in dentistry. Ozone is used in three different forms: ozonated water, oxygen/ozone gas, and ozonated olive oil. Ozonated water can be used as a pre-procedure rinse, for irrigation into periodontal pocket or root canal, and in water lines and ultrasonic units. Oxygen/ozone gas is used to reduce tooth sensitivity, for disinfection of the tooth under sealants, fillings and crowns, to arrest shallow cavities, and for disinfection of the periodontal pockets. Finally, ozonated olive oil is used to enhance oral hygiene and soft tissue healing.