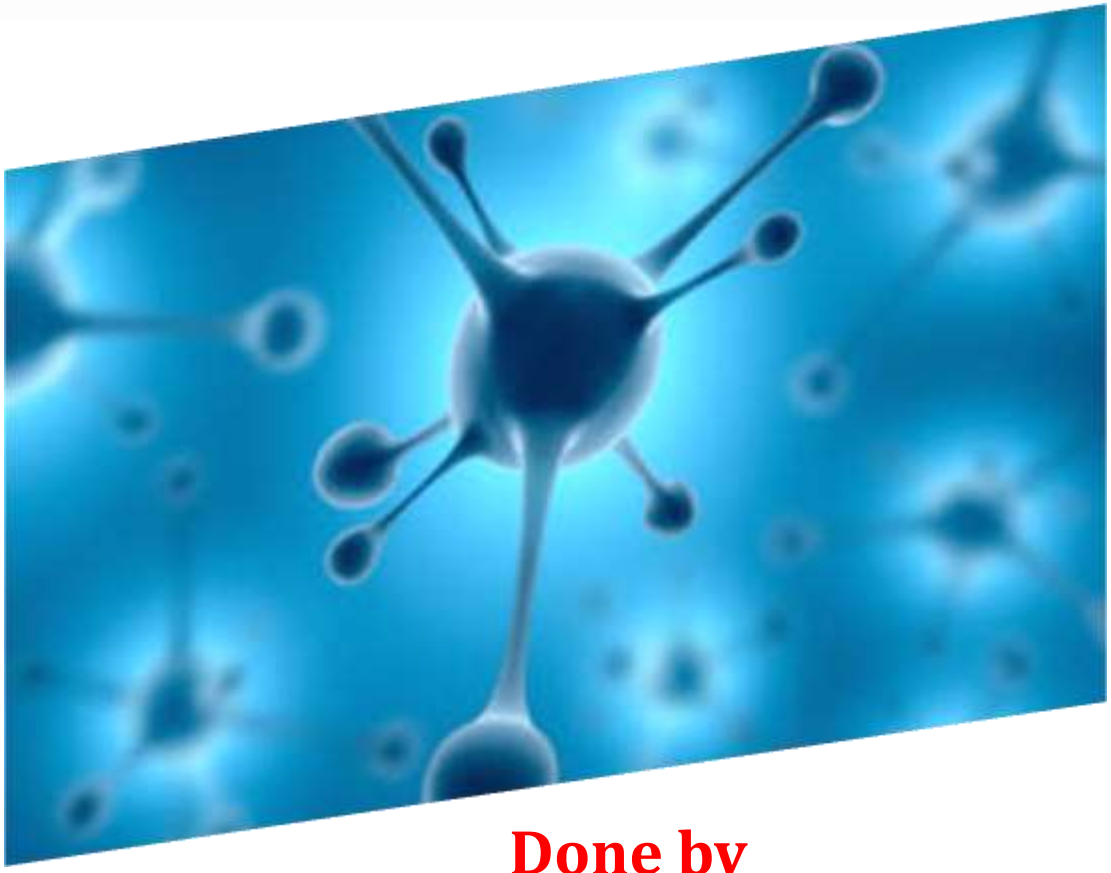
OZONE IN DENTISTRY



Done by

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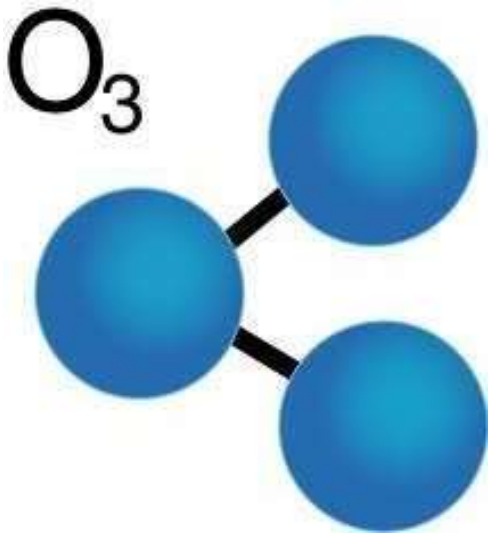
OZONE is a blue gas, with strong odour, made up of three oxygen atoms and it is the most important gas in the stratosphere due to its ability to filter UV rays.



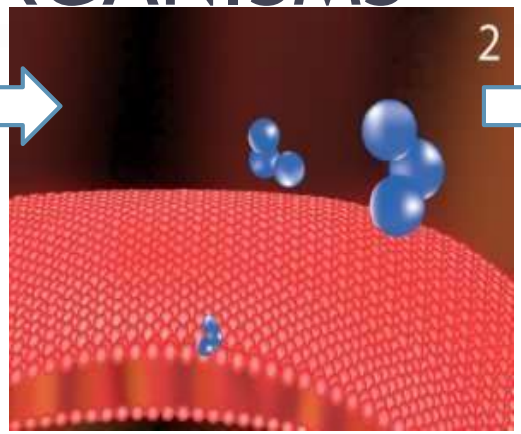
MECHANISM OF ACTION:

There are several actions of ozone such as

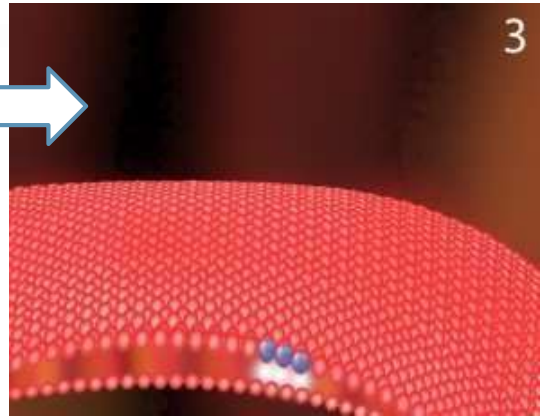
- anti-microbial
- immune stimulating
- anti - hypoxication
- bio-energetic and biosynthetic (activation of the metabolism of carbohydrates, proteins & lipids) actions.
- The effect of ozone on the organic material of calcified tooth tissues

HOW IT REALLY WORKS ON MICRO ORGANISMS

Healthy bacterial cell

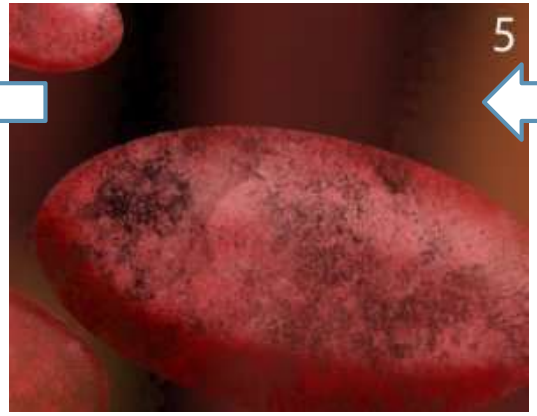


Exposed to ozone

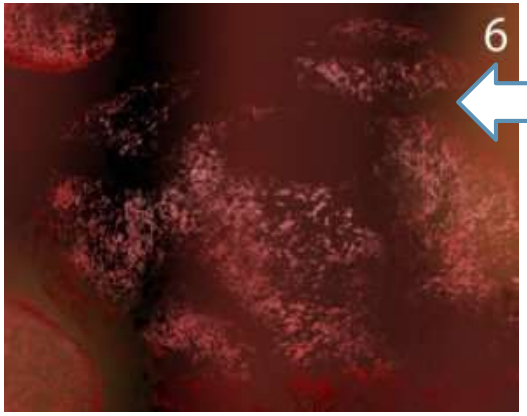


Oxidation

Puncturing of the wall



lose its shape in seconds



Death of the cell.

DENTAL OZONE GENERATORS

- **HEAL OZONE:**

- **The OzoTop :**

ROUTES of ADMINISTRATION in DENTISTRY:

1)Gaseous Ozone

2)Ozonated Water

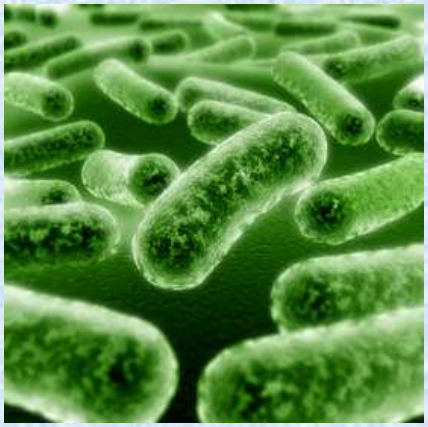
3)Ozonized Oil

Ozone is applied at 6, 12, 18, 24 seconds, depending on which treatment is required.

APPLICATION of OZONE in DENTISTRY

*Ozone and oral pathogens

- Various bacteria have been studied in relation to ozone treatment. It has been reported that an exposure of about 60s exhibited 99.9% killing efficiency against cariogenic bacteria such as *Actinomyces* naeslundii, *Streptococcus mutans* and Lactobacillus casei.



*OZONE AND ORAL TISSUES

Ozone application has various beneficial effects on the oral tissues including

- **remission of various mucosal alterations,**
- **enhanced wound healing**
- **increased turnover rate of oral cells.**
- **In patients suffering from carcinomatous lesions, chemotherapy and radiotherapy are routinely administered and it invariably causes mucositis. Ozone therapy enabling the patient to eat normally, and improves the quality of life during therapeutic interventions.**

*OZONE AND DENTAL CARIES

- **In addition to the marked anti microbial properties of ozone, it also oxidizes the pyruvic acid produced by the cariogenic bacteria to acetate and carbon dioxide.**

Management of pit and fissure caries

***After the ozone treatment, application of remineralizing agent and sealing of the clean fissures is encouraged.**

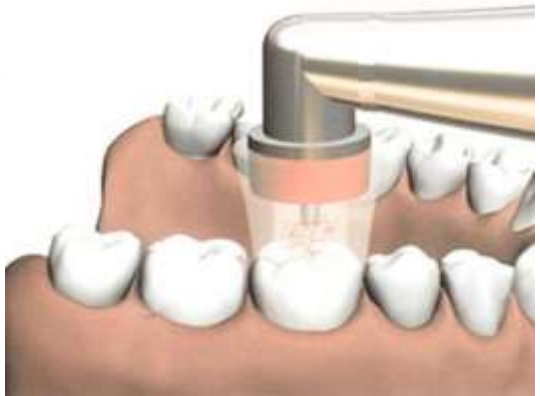
Ozone removes the smear layer leaving behind the exposed dentin that is occluded by the remineralizing agent applied.

Management of root caries

- **Marked reversal and arrest of shallow non-cavitated root caries lesions have been reported following the use of ozone as part of a full preventive care regimen.**
- **Arrest in the progression of non-cavitated root caries, without the need for its removal has been reported following regular application of ozone for 40 s, and the use of remineralizing products.**

*Restorative dentistry

- Evidence gathered from studies testing the efficacy of ozone on dental materials justifies the use of ozone prior to the placement of etchant and sealant.
- ozone gas has a strong bactericidal effect on microorganisms within the dentinal tubules of deep cavities, consequently improving the clinical success of restorations.
- Crown discoloration of non-vital teeth is treated after placing bleaching paste in the pulp chamber followed by ozone exposure for 3–4 min by the virtue of its oxidation property.



*Endodontics

- **When used as an irrigant, ozone encourages tissue regeneration and bone healing. Also when a root canal was disinfected by ozone water , the antimicrobial efficacy was comparable to 2.5% NaOCl. Hence in periapical infections, ozone therapy can increase the scope of non-surgical management of these lesions.**

*Hypersensitive teeth

Ozone application has been found to effectively reduce sensitivity of exposed dentin, also in cases of root sensitivity. 40–60 s application of ozone is found to instantly reduce pain in these sensitive teeth. Ozone initiates removal of the smear layer, opens the dentinal tubules and widens them. On applying remineralizing agent; calcium & fluoride ions enters the dentinal tubules easily, readily and completely, preventing the fluid exchange from these tubules.

*PEDODONTICS

- very quick
- effective
- easy
- a painless procedure to perform.
- improves the patient compliance and tolerance to the treatment procedure.
- a study stated that treating open carious lesions with ozone in anxious children, there was near total reduction (93%) of dental anxiety.

- **frequently encountered cases in a pediatric practice are those of trauma to the teeth. A high level of biocompatibility of aqueous ozone on human oral epithelial cells, gingival fibroblast cells, and periodontal cells has been observed.**
- **Ozonated water is indicated in replantation of avulsed tooth without any harmful effect on periodontal cells.**

*OZONE IN PERIODONTICS

ozonized water was used to irrigate the periodontal pockets in patients suffering from aggressive periodontitis, with a highly significant improvement regarding pocket depth, plaque index, gingival index and bacterial count.

*PROSTHODONTICS

- **Dentures are commonly inhabited by several micro-organisms especially *C. albicans*. Denture stomatitis is routinely encountered in clinical practice which is a manifestation of plaque accumulation on the surface of the denture and hence effective denture plaque control should be initiated to prevent such outcomes. One successful method to do so is the use of ozone as denture cleaner.**

*ORAL SURGERY

- **It can be successfully used in cases of wound healing impairments following surgical interventions like tooth extractions or implant dentistry.**
- **When surgical removal of bone sequestra is carried out, ozone can be used as an alternative to hyperbaric oxygen therapy owing to its extensive oxidation property and on the fact that ozone contacted bacteria can be more easily recognized and destroyed by granulocytes and the complement system.**
- **Ozone has also been recommended as a therapeutic treatment in cases of bisphosphonate related osteonecrosis of jaw.**
- **Ozone was found to be an effective topical agent that considerably decrease postoperative pain, swelling, and trismus also improving patient comfort postoperatively and can be considered a substitute of postoperative systemic antibiotics.**

ORTHODONTICS

- **Studies stated that enamel pretreatment with ozone did not affect the shear bond strength of adhesive systems used for bracket bonding. Moreover, shear bond strength values of the ozone pretreated specimens were somewhat higher.**
- **The use of ozonized olive oil gel in addition to the standard oral hygiene regimen was found to show significantly less decalcification of teeth among orthodontic patients.**

OZONE TOXICITY

- **Ozone inhalation can be toxic to the pulmonary system and other organs.**
- **Complications caused by ozone therapy are infrequent**
- **Known side-effects are upper respiratory irritation, rhinitis, cough, headache, occasional nausea, vomiting, shortness of breath, blood vessel swelling, poor circulation, heart problems and at a times stroke.**
- **Because of ozone's high oxidative power, all materials that come in contact with the gas must be ozone resistant, such as glass, silicon, and Teflon.**
- **However, in the event of ozone intoxication the patient must be placed in the supine position, and treated with vitamin E and n-acetylcysteine**

Conclusiones

- **Ozone therapy has a wide range of applications in almost every field of dentistry. Its unique properties include immunostimulant, analgesic , antimicrobial , bioenergetic and biosynthetic actions.**
- **Its atraumatic, painless, non invasive nature and relative absence of discomfort increase patient's acceptability and compliance thus making it an ideal treatment choice specially for pediatric patients.**


THANK
YOU