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Ozone Therapy: An Excellent Treatment for Various Diseases



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Hattur Shanta Shrisel*, Solanke Amruta Suryakant

*Government College of Pharmacy, Karad, Maharashtra,
India*

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ABSTRACT

We all are familiar with the importance of ozone layer in order to protect us from harmful UV radiations. Apart from that, Ozone gas is used as medicine via different techniques. Ozone Therapy is originated in Germany. Ozone is generated in the laboratory by using different Generators. In Ozone Therapy Ozone is administered through different routes such as Autohemotherapy, Rectal, ear or nose insufflations, Parenteral and topical routes. Many of clinical conditions treated by Ozone Therapy, they are Cancer, Aging, Lumbar disc herniation, Infected wounds, Geriatric conditions, Muscular degeneration, Atherosclerosis and IAD, Periodontitis, Diabetes mellitus, Parkinson's disease, Energy enhancement, Lung Diseases, EBOLA etc. It is also used in Cosmetics. Ozone Therapy has some disadvantages such as the burning of eyes, nausea, vomiting, Herxheimer reaction, discomfort and flu-like symptoms etc.



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INTRODUCTION ⁽¹⁻¹⁸⁾

Ozone is discovered in 1840 by Christian Friedrich Schonbein while working with the voltaic pile in oxygen. Ozone which is symbolically denoted as O₃ is a triatomic molecule. The word “Ozone” itself means ‘adorent’. It is naturally formed at an altitude of 50000 to 100000 feet in the stratospheric layer and its formation is continuous. It possesses molecular weight of 47.98 g/mol and it is a pale blue gas that condenses to the liquid of deep blue. This is 1.6 times denser and 10 times more soluble in water than oxygen. Production of ozone naturally by Photo-dissociation of molecular oxygen (O₂) into activated oxygen atom [O]. Activated oxygen atom further reacts with molecular oxygen. Medical grade ozone is a mixture of pure O₂ and O₃ in the ratio of 0.1% to 5% of O₃ and 95% to 99.5% of O₂. The half-life of O₃ is 40 min at 20⁰C. As ozone is unstable gas it quickly gives up nascent oxygen molecule so this is used in medicine. Although O₃ has many dangerous effects, it has many therapeutic effects. Ozone therapy originated in Germany about 100 years ago. It is now routinely used in Europe, Germany, Russia, Italy, France, and India. Ozone therapy is the non-surgical alternative form of the medical treatment in which amount of oxygen in the body is increased by administrating O₃ via different routes. This therapy may help to reduce clogging of blood cells, detoxify the liver, decrease uric acid in the body, improves circulation and oxygen supply, kill viruses, fungi, and bacteria, also increase the activity of WBCs. IN 1980s study done by German medical society for ozone therapy, examined results from over 5579238 ozone therapy treatments spanning 644 therapists and 384775 patients of these, there were only 0.00007% (40 cases) of side effects noted. Ozone statistically is proven one of the safest medical therapies available.

Generation of Ozone ⁽⁹⁾

Since ozone is very unstable, it has to be generated only when needed and used at once. The ozone therapist must have an ozone generator that is safe, non-toxic and reproducible. The material of instrument must be ozone resistant. A variety of ozone generators is available but three main types of ozone generator are

- **Corona Discharge Type** ⁽³⁾

High voltage electric field also called corona discharge tube is used in this type of generators. They are cost effective and use ambient as the source of oxygen. These types of generators produce ozone of concentration 3-6%. Nitrous oxide is a byproduct produced in this process.

- **UV Lamp Type**⁽³⁾

A Light source that generates the narrow band UV light with a wavelength approximately 185nm is utilized in the generators concentration of ozone produced is 0.5% or less but these generators are cost effective than corona discharge type and use less electricity. There is no production of nitrous oxide as a byproduct.

Oxygen gas is exposed to the plasma created by dielectric barrier discharge in this type of generators. The ozone generators break O₂ molecule in molecules of oxygen which are very reactive and combines the available oxygen molecules to form a molecule of ozone maximum concentration of 5% ozone produced in such generators.

Calculation of Ozone Dose:⁽³⁾

Ozone dose is calculated on the basis of following –

- a) The total volume of the gas mixture composed of oxygen and ozone.
- b) Ozone concentration expressed in µg/ml.
- c) Barometric pressure (mmHg), if different from normal. (Hyperbaric pressure must be avoided for safety).

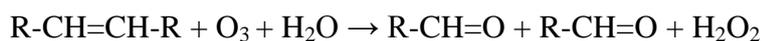
The total ozone dose = Gas volume x Ozone concentration.

European generators give the ozone concentration in terms of µg/ml and the range 1-100 is sufficient for medical use.

Mechanism of Action of Ozone^(3, 19)

When ozone meets blood it acts on different targets and initiates a number of reactions in the body producing several beneficial effects.

Ozone reacts with bio-molecules producing one molecule of reactive oxygen species (ROS) mainly hydrogen peroxide and two molecules of lipid oxidation product (LOP). ROS react with Erythrocytes in the blood and disappears. This is called early phase reaction and it is short lived. LOPs distributed to tissues and act on receptors at the different location on the body. They undergo marked dilution under circulation system. This is called late phase reaction and it lasts longer.⁽¹²⁾



Mechanism of beneficial effects of ozone therapy summarized as:

- 1) Ozone increase availability and delivery of Oxygen, Glucose, and ATP within the Ischemic tissue.
- 2) Ozone enhances implantation of bone marrow stem cells at the site of lesion, which can provide Angiogenesis, Neovascularization and tissue regeneration.
- 3) It activates neurohormonal reaction responsible for improving quality of life.
- 4) It induces up-regulation of expression of antioxidant enzymes and hence Oxygenase-I and extends preconditioning benefits.

Routes of administration of Ozone ^(3, 33)

1. **Auto Hemotherapy:** Around 250ml of blood collected in anticoagulant solution, it is ozonized outside the body then slowly infused back into the animal's body in over 15 min by the intravenous route. This maintains homeostasis of the body.
2. **Insufflations:** Insufflation of ozone gas is practiced through body spaces like Rectal, Vaginal and Ear canal. Rectal Insufflations are most commonly practiced.
3. **Ozone Bagging:** In this method, O₂-O₃ mixture is pumped into an ozone resistant bag, which is then placed around the area to be treated. Ozone is absorbed through the skin and superficial lesions are treated.
4. **Ozonated Oil:** Ozone is used with oil as ozone carrier. In oils like olive oil, sesame or sunflower oil. Ozone is bubbled until it forms the gel like consistency.
5. **Ozone Blanket:** It is used to treat several local and systemic conditions. In this method, Ozonated Silicon blanket is placed around the whole body of the animal.
6. **External Administration of ozone** ⁽⁷⁾: Use of Ozonated antiseptics, saline, Ozonated ointments, Ozonated vegetable oil etc.
7. **Parenteral methods** ⁽¹⁰⁾: Subcutaneous Ozone injections, Paravertebral Intramuscular Injections, Intravenous Infusions are taken.

8. **Enteral Method:** This route includes Intake of ozonated distilled water, Intestinal irrigation with Ozonated distilled water.

9. **Steam Sauna** ⁽¹⁶⁾: Bathing with Ozone or steam mixture is called as Steam Sauna. It cleanses the skin, pores and Lymphatic system.

10. **Body Suit:** The patient first opens off the pores of the skin by taking a warm or hot shower, after which they immediately enter the body suit. Bodysuit must be sealed at the ankles and wrists to reduce leaking of ozone.

Ozone in Medical and Surgical Management of Patient:

Ozone has been proposed to treat various diseases. Ozone therapy can be used in the following medical specialties ^(21,27).

Gerontology	Infectiology	Orthopedics
Gastroenterology	Hepatology	Rheumatology
Dermatology	Gynecology	Stomatology
Dentistry	Intensive therapy	Pneumology
Cosmetology	Neurology	Urology
Cardiology	Oncology	Angiology

Some clinical conditions treated by ozone therapy are as follows ^(26, 30, and 34)

1. **Cancer**⁽²¹⁾: Ozone is antineoplastic. This means that Ozone inhibits the growth of new tissue because rapidly dividing cells shift their priorities away from producing the enzymes needed to protect themselves from the ozone. Cancer cells are rapidly dividing cells and are inhibited by Ozone.

2. **Aging:** Early and premature aging is treated by Ozone therapy.

3. **Lumbar Disc Herniation**⁽²³⁻²⁴⁾: Combined Intradiscal and preganglionic injection of medical ozone and preganglionic injection of steroids have a cumulative effect that enhances the overall outcome of treatment for pain caused by disc Herniation. Oxygen-Ozone therapy is a useful treatment for lumbar disc Herniation that has failed to respond to conservative management.

4. **Infected wounds**⁽¹⁸⁾: Open leg ulcers, Bedsores, and Burns are treated by ozone. Clinical studies have shown that even very severe cases improve with ozone.
5. **Circulatory Disorders**⁽¹⁸⁾: Ozone Therapy gives very good results in arterial circulatory disorders, which are characterized by a sensation of heaviness and coldness and pain in legs while walking.
6. **Geriatric Conditions**⁽¹⁸⁾: Ozone has the general revitalizing capacity. Therefore, it can be successfully used for poor concentration, Forgetfulness, General Reduction in mental and physical performances, Insecurity in walking and clinical Dizziness and Vertigo.
7. **Macular Degeneration**⁽¹⁸⁾: Ozone is used to improve weak eyesight due to age-related Retinal detachment.
8. **Intestinal Conditions**⁽¹⁸⁾: Inflammatory conditions of the large intestine and small intestine, fistulas are treated by rectal insufflation of Ozone.
9. **Periodontitis**⁽⁴⁻⁶⁾: periodontitis is the destructive inflammatory disease of supporting tissue of the teeth and caused by microorganisms. Ozone therapy is one of the modern non-medication methods of periodontal treatment.
10. **Atherosclerosis and Ischemic heart disease**⁽⁷⁻⁹⁾: Ozone has been found to be the hypolipidemic effect. It activates antioxidant defense system, the eliminating lipoprotein toxicity, decreasing their capacity to penetrate the vessel wall. Hence, ozone can treat Atherosclerosis and IHDS.
11. **Diabetes mellitus**⁽⁷⁻⁹⁾: Ozone improves the penetration of cellular membranes for glucose. This is achieved by stimulating pentose phosphate pathway and aerobic glycolysis is that in case of Diabetes mellitus.
12. **Parkinson's disease**⁽⁷⁻⁹⁾: Ozone therapy useful in Parkinson's disease for tremor, bradykinesia, postural disturbance and gait disturbance.
13. **Energy enhancement**^(26-27, 29): Ozone increases the glycolysis and hence production of ATPs in the body increases which enhance energy.
14. **Lung diseases**⁽³¹⁻³⁷⁾: Ozone is used in the treatment of lung diseases such as bronchial asthma and chronic obstructive pulmonary disease.

15. **Hemorrhagic fever (Ebola)** ⁽³²⁾: Ebola virus may have a very narrow window of redox infectivity capacity, which can be easily exploited with ozone therapy, Ozone therapy may be the useful modality in EVD and other viral diseases.

16. **Cosmetology**: Ozone therapy used in cosmetology to treat skin, hair related problems, Acne, pimple etc.

Disadvantages: Accidental inhalation of ozone may cause burning of eyes, sometimes vomiting, coughing or nausea and is very sensitive person cause a mild headache. In the rectal administration of ozone may give discomfort and gurgling or mild cramps. In some cases may cause Herxheimer reaction in these cases patients feel flu-like symptoms.

Future directions to ozone therapy ⁽²⁸⁾:

The recent discovery that ozone is produced in vivo as a fundamental immunological defense against pathogenic organisms opens exciting conceptual and research directions for the clinical use of ozone in medicine.

SUMMARY:

Various case studies, research papers, and reviews have been published till today on ozone therapy. Ozone now a day widely used to cure various diseases. This article provides a brief review on nature of ozone its administration, dose, mechanism of action on body and usefulness in many diseases to treat them. This article also focuses on disadvantages of ozone therapy for safety purpose.

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