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## **OZONE THERAPY-BOON OR BANE**

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### **ABSTRACT**

Ozone therapy is an ozone-based alternative medical therapy that involves injecting ozone into the body. Its effects are well-established, repeatable, and safe, with few and easily avoidable negative effects. However, the US Food and Drug Administration (FDA) banned all medicinal applications of ozone in 2003, noting that “ozone is a hazardous gas with no recognised effective medical application” Every therapy has benefits and drawbacks, but in order for a therapy to succeed in the market, benefits must always exceed drawbacks. In recent years, ozone has been criticised and emphasised in connection to therapeutic effectiveness and toxicity. Its usage has become more popular in recent years, it has been emphasised for its potential therapeutic advantages when taken according to well-defined and safe procedures. Ozone therapy is becoming more popular in various parts of the world. Bisleri Trust has initiated activities in India under the platform Ozone Forum of India. Ozone treatment is commonly used in Russia and Cuba, and the therapy is based on the use of low concentrations. The regularisation of ozone therapy is important because it is necessary that the authorities implement the legislative rules in accordance with their spirit and content.

***KEYWORDS : Ozone, Ozone Therapy, Ozone Forum Of India, Ozone toxicity, Bisleri Trust***

### **INTRODUCTION**

In 1840 Christian Friedrich Schonbein, coined the term Ozone from the Greek word ozein. Ozone is a three-atom based natural gaseous molecule. Ozone therapy is a diverse bio-oxidative therapy in which ozone is administered in the form of gas or dissolved in a water or oil base for medicinal purposes<sup>[1][2]</sup>.

The ozone gas is colourless, has an unpleasant odour. Despite the fact that O<sub>3</sub> has potentially dangerous side effects, researchers feel it has a wide range of medical

uses. Due to the introduction of precision medical O<sub>3</sub> generators, clinical trials have only recently been able to investigate the mechanisms, action, and toxic effect of O<sub>3</sub>. When present in smog, ozone has the ability to oxidise organic molecules, causing well-known respiratory problems. The gas produced by medical grade equipment is used in medical practise. The ozone gas produced from Medical grade oxygen is administered in therapeutic doses, but care is taken that it should not be given via inhalation, but it has excellent health benefits in the prevention of dental caries, blood cholesterol reduction, antioxidative response

stimulation, resting muscle oxygenation modification, and treatment of hypoxic and ischemic syndromes.[<sup>3</sup>][<sup>4</sup>][<sup>5</sup>]

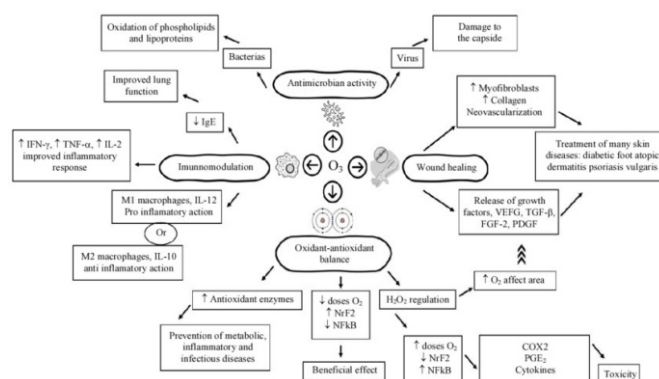
Despite the fact that ozone was first synthesised in May 1840, it took a long time for ozone therapy to acquire popularity in the medical community. However, since the 1960s, the slow, constant, and increasing use of ozone therapy, mostly in Germany and the former Soviet Union, has rekindled interest in the scientific application of ozone therapy in accordance with previously approved protocols. Ozone therapy grew popular in a number of European countries during the next few decades, most notably Italy, Spain, and lastly Cuba. China became another country where the therapy gained traction after its introduction in 2000. In today's world, therapy is gaining popularity in a number of countries. According to the data, ozone therapy is employed in over 50 countries around the world by over 40 national and international organisations, including the International Scientific Committee on Ozone Therapy (ISCO3). Germany now has over 30 000 practising ozone therapists, making it the first country with more than 11,000 practitioners. With 5000 people, China comes in second. With 3500 professionals, Russia ranks third, followed by Italy with 3000.[<sup>6</sup>]

Dr. Sergei Petrovich Peretyagin is largely credited with developing ozone therapy in Russia. Sergei uncovered the explanation while still a student at the locksmith school. Since then, he's realised the need of acquiring the necessary knowledge and skills to unlock the scientific doors of medicine as a master key. Thanks to his patient and often gruelling labour, Dr. Sergei Peretyagin was able to open many doors in the reluctant health industry to employ modern medical technologies. He has been so successful that ozone therapy is now taught at the university and post-graduate levels in Russian medical centres as normal practise.[<sup>7</sup>]

Physicians are currently treating diseases such as Skin

infections, Rheumatism, Respiratory problems, Malignant Tumours, Cerebral Sclerosis, Cirrhosis of the Liver, Diarrhoea, and Fungal Diseases. Ozone therapy is still a divisive supplementary medicine technique. Various regulatory organisations in United states and Canada have forced numerous physicians and clinics that provide this form of therapy out of business. In other parts of the world, however, this therapy has risen in popularity and validity during the previous 10 years. Ozone therapy is largely available in Mexico, the Bahamas, Cuba, and the Dominican Republic in the Caribbean, and Europe, particularly Germany and eastern Europe.[<sup>8</sup>]

It works by various mechanisms like Inactivation of cell membranes of various micro-organisms like bacteria, viruses, fungi, yeast, protozoa, activation of oxygen metabolism, immunostimulating action, action on the human lung. Through the oxidation of phospholipids and lipoproteins, ozone therapy compromises the structure of the bacterial membranes. O<sub>3</sub> limits cell development in fungi at specific stages. By interrupting virus-to-cell interaction via peroxidation, it destroys the viral capsid and damages the life cycle of viruses. It raises the rate of glycolysis in red blood cells. This causes 2,3 diphosphoglycerate to be stimulated, leading to an increase in the supply of oxygen released into the tissues. Ozone stimulates ATP generation via boosting oxidative carboxylation of pyruvate, which initiates the Krebs cycle. The release of interleukin-2 triggered a major reaction of immune reactions[<sup>3</sup>]



Medical ozone can be used locally or parentally. The various ozone application routes can be employed together or separately to provide a synergistic effect.

The following are some of the parenteral ozone application methods:

### 1. Major Autohemotherapy (AHTmajor)

The amount of blood to utilise ranges from 50 mL to 100 mL.

### 2. Minor Autohemotherapy (AHTminor)

The amount of blood that should be used is 5ml.

### 3. Intramuscular injection in the paravertebral region

The conventional paravertebral infiltration involves finding the upper portion of the spinous process and injecting 5 mL of ozone at (10-20) g/NmL into the cervical and dorsal column 1.5 cm

It can be applied locally in the following ways:

#### 1. Topical application of water, oil, or ozonized creams

Ozone in water and ozonized oil are used to treat wounds, burns, herpetic lesions, yeast infections, insect bites, dental infections, surgical cavity cleaners, and a variety of diseased lesions at different concentration: high, medium, and low, depending on the goal (to disinfect, to regenerate) and the type of tissue.

## 2. Saline Solution with Oxygen

The use of ozonized saline solution (OSS) as a systemic administration of ozone is common in Russian and Ukrainian schools, and the practise is widespread in these two nations.

The Ozone Forum of India, which is supported by the Bisleri Charitable Trust, strives to promote ozone therapy as a cost-effective alternative treatment. The Ozone Forum of India has done extensive study on tuberculosis, cancer, pain management, and Covid-19. Since 2001, it is advocating Ozone Therapy and have reached out to over 1,50,000 people around the country. Over 83 training events have been conducted by the Ozone Forum of India, and over 2000 doctors have been taught across the country. Shewri Government Tuberculosis Hospital, LG Hospital in

Ahmedabad, and Sion Hospital in Mumbai are among the Forum's partners.<sup>[9]</sup>



The Ozone Forum of India has conducted two significant trials in the treatment of COVID 19 in collaboration with Lokmanya Hospital in Pune, and the NeuroGen Brain & Spine Institute in Mumbai. Dr. Mili Shah, President, Ozone Forum of India and Trustee, Bisleri Charitable Trust says "In this crisis period of fighting the epidemic and its resurgence, we need to blend understanding of conventional medicine with natural healing techniques. We are pleased to inform that ozone therapy is helpful in COVID 19 patients, as evidenced by both study reports, and is also very cost effective. Its antibacterial properties aid patients in recovering quickly and preventing recurrence. The Ozone Forum of India has been investigating this therapy for the past 18 years, and we are only too happy to share our findings in order to aid this pandemic and the greater good of humanity. Our goal is to raise awareness of Ozone Therapy among more doctors and patients, and we've already reached out to over 2400 clinicians around the country who believe in and utilise it successfully." On the occasion of World Tuberculosis Day on March 24, it was reported that integrative medicine primarily works on tuberculosis patients who have been prescribed scientifically established medications, resulting in unpleasant drug reactions. Ozonated water and saline, aids in the recovery of patients and the elimination of pus, while also enhancing their overall health. Most importantly, within a month, patients appetites recover and they restore their weight. In Mumbai, approximately 400

patients received ozone therapy and have been helped to recover. "Tuberculosis causes severe irreversible effects to the lungs," says Dr. Lalit Kumar Anande, who specialises in drug resistance, TB complications, and anti-oxidant therapies. Empyema (Pus in the Chest) is a common complication that requires the introduction of an intercostal tube into the chest to remove the pus. Added to this was the patients' horrible drug-resistance, as well as their mental sadness and severe unpleasant consequences from taking so many antibiotics. The highly quick acting Antimicrobial, Antioxidant, and Anti-Inflammatory characteristics of Ozone therapy in such numerous circumstances helped the patients to survive.<sup>[10]</sup>

## BANE

One explanation for ozone therapy's lack of popularity in medicine is that its toxicity is equated to that of reactive oxygen species (ROS). In fact, there are significant distinctions because ozone therapy is only used once in a while and can be managed, whereas endogenous ROS production continues unabated throughout life.

The terrain of ROS formation also varies, mitochondria, which convert 95% of inhaled oxygen to harmless water, are the main source of ROS because at least 3% of oxygen is converted to superoxide. SOD disproportionates superoxide to H<sub>2</sub>O<sub>2</sub> and can generate dangerous non-specific hydroxyl radical OH in the presence of Fe<sup>2+</sup>. A 70 kg human produces 0.147 mol or more than 5 g of superoxide per day, while AHT produces less than 18 mg of ozone or less than 0.4% of the minimum daily superoxide output. A small amount of hydrogen peroxide is produced directly by the redox enzyme (NOX) NADPH oxidase. Currently, there is widespread consensus that regular production of hydrogen peroxide is required for cell survival, and the new concept is that "reactive species are not only a tool for cell distress, but also a tool for normal cell physiology." Mitochondrial DNA damage is about 10 times more oxidized than nuclear DNA and permanently damaged, but is explained by the

formation of endogenous ROS in mitochondria deeply embedded in cells. Ozone, on the other hand, acts externally on plasma, which contains large amounts of antioxidants. However, the amount of ozone supplied to the blood must reach a certain level in order to produce enough H<sub>2</sub>O<sub>2</sub>. Only 10% of H<sub>2</sub>O<sub>2</sub> migrates from plasma to the cytoplasm of blood cells and has a variety of biological effects. For ozone to work, it is necessary to create a calculated temporary acute oxidative stress that the antioxidant system can quickly correct. Therefore, the formation of peroxy radicals and hydroxylaldehydes is unmistakable, but the presence of residual OH and HOCl is rapidly neutralized by various antioxidants in plasma. It is noteworthy that all important cellular components such as enzymes, proteins, RNA and DNA are spared during extracellular ozone depletion. Ozone therapy is widely regarded as "barbaric" therapy, especially in the United States, and malicious ozone therapists and quack are doing their best to spread that awareness.

Regardless of the fact that ozone therapy is frequently used to treat a variety of disorders, doctors should be aware of potential risks. There was a case of sinus arrest, cardiac arrest, and major disc expulsions or huge fragments in the spinal canal, all of which resulted in secondary brain injury. It's possible that the issues go unnoticed. Even rarer are fatal consequences, which are rarely reported. The example of an 80-year-old woman with lower back discomfort caused by a bulging lumbar disc is described. She was given intradiscal O<sub>2</sub>-O<sub>3</sub> therapy and died after three treatments. Her death was caused by a pulmonary embolism, based on her clinical symptoms. Her lumbar spine was examined using computed tomography (CT) and magnetic resonance imaging, which revealed symptoms of disc arthrosis and a L4-L5 left disc protrusion. Her experience with nonsteroidal anti-inflammatory medications had been mixed. She also had short alleviation from physiotherapy sessions. Her overall health was excellent. She had no other illnesses, and her laboratory tests, as well as a heart examination and chest radiograph, were all normal. She chose O<sub>2</sub>-



O3 treatment to alleviate her chronic lumbar discomfort. A periradicular injection of O2-O3, corticosteroid, and local anaesthetic was used in conjunction with a L4–L5 intradiscal O2-O3 chemonucleolysis. The researchers utilised a fluoroscopy-guided intradiscal mixture of O2-O3 (40 g/ ml, 4 ml), betamethasone 4 mg, and lidocaine hydrochloride 100 mg. The patient noticed a small reduction in discomfort after the first two administrations. The patient told her family she was having problems breathing just before the third session, in the morning. She didn't mention any other symptoms, including chest pain. The emergency services were notified, and they arrived at her residence in 15 minutes. In the meantime, she had passed out. The patient was unconscious when she arrived at the hospital. The proper reanimation techniques were attempted, but the patient died.<sup>[11][12]</sup>

## Conclusion

Ozone therapy is becoming more popular in various parts of the world. More than 40 national and international ozone groups, as well as more than 30 000 ozone therapists, vouch for this. Authorities are discussing this therapy more regularly. Its practise has been picked up by the media. There have been court cases, and research is being carried out despite restricted funding resources. However, for a variety of reasons, the criteria do not reflect the breadth of ozone therapy's utilisation. When it was outlawed in several regions for several years in outpatient private clinics, such popularity became a hurdle. Ozone is inexpensive, and unlike traditional treatments, it cannot be patented or packaged and marketed easily. The primary goal of ozone therapy is to improve the therapeutic outcomes that pharmacotherapies can provide in a variety of disorders. Would ozone therapy gain support from the pharmaceutical business, at least in terms of building up clinical trial teams, if it is positioned as a potential partner rather than a threat. Perhaps not; as a result, new avenues for ozone study must be investigated.

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