Cancer Association of South Africa (CANSA)

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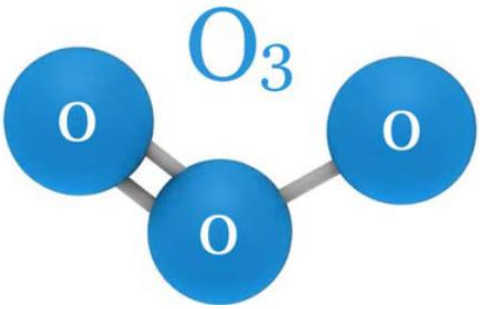
Fact Sheet
And Position Statement
on
Ozone Therapy

Introduction

Ozone (O_3) is a highly reactive gas composed of three oxygen atoms. It is both a natural as well as a man-made product that occurs in the earth's upper atmosphere (the stratosphere) and lower atmosphere (the troposphere). Depending on where it is in the atmosphere, ozone affects life on earth.



[Picture Credit: Ozone]

Ozone forms an energetic molecule that readily donates its third oxygen atom to free radicals that are usually causing damage to one's body through oxidation. If there is Ozone present in one's body, then the oxidation damage caused by these free radicals is halted because the free radicals are made stable and, therefore, non-destructive by the extra oxygen atom given off by the Ozone.

Zanardi, I., Borrelli, E., Valacchi, G., Travagil, V. & Bocci, V. 2016.
"A comprehensive outline for understanding and recommending the therapeutic use of ozone in combination with established therapy in diseases characterized by a chronic oxidative stress is currently available. The view of the absolute ozone toxicity is incorrect, because it has been based either on lung or on studies performed in artificial environments that do not correspond to the real antioxidant capacity of body compartments. In fact, ozone exerts either a potent toxic activity or it can stimulate biological responses of vital importance, analogously to gases with prospective therapeutic value such as NO, CO, H2S, H2, as well as O2 itself. Such a crucial difference has increasingly become evident during the last decade. The purpose of this review is to explain the aspects still poorly understood, highlighting the divergent activity of ozone on the various biological districts. It will be clarified that such a dual effect does not depend only upon the final gas concentration, but also on the particular biological system where ozone acts. The real significance of ozone as adjuvant therapeutic treatment concerns severe chronic pathologies among which are cardiovascular diseases, chronic obstructive pulmonary diseases, multiple sclerosis, and the dry form of age-related macular degeneration. It is time for a full insertion of ozone therapy within pharmaceutical sciences, responding to all the requirements of quality, efficacy and safety, rather than as either an alternative or an esoteric approach."

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Braidy, N., Izadi, M., Sureda, A., Jonaidi-Jafari, N., Banki, A., Nabavi, S.F. & Nabayi, S.M. 2018.
"Ozone, one of the most important air pollutants, is a triatomic molecule containing three atoms of oxygen that results in an unstable form due to its mesomeric structure. It has been well-known that ozone has potent ability to oxidize organic compounds and can induce respiratory irritation. Although ozone has deleterious effects, many therapeutic effects have also been suggested. Since last few decades, the therapeutic potential of ozone has gained much attention through its strong capacity to induce controlled and moderated oxidative stress when administered in precise therapeutic doses. A plethora of scientific evidence showed that the activation of hypoxia inducible factor-1α (HIF-1a), nuclear factor of activated T-cells (NFAT), nuclear factor-erythroid 2-related factor 2-antioxidant response element (Nrf2-ARE), and activated protein-1 (AP-1) pathways are the main molecular mechanisms underlying the therapeutic effects of ozone therapy. Activation of these molecular pathways leads to up-regulation of endogenous antioxidant systems, activation of immune functions as well as suppression of inflammatory processes, which is important for correcting oxidative stress in diabetes and spinal pain. The present study intended to review critically the available scientific evidence concerning the beneficial properties of ozone therapy for treatment of diabetic complications and spinal pain. It finds benefit for integrating the therapy with ozone into pharmacological procedures, instead of a substitutive or additional option to therapy."

Non-Medical Uses of Ozone
Ozone is used for non-medical purposes, for example:

- In the food industry as a decontaminating agent
- Pest control in the grain industry
- Water purification where it kills bacteria and viruses much more potent than chlorine and with no side effects
- Disinfection of air and removal of odours
- Disinfection in the field of plants and vegetables
- Disinfection in poultry farming
- Disinfecting swimming pools

Brodowska, A.J., Nowak, A. & Smigielski, K. 2018.
"The food contamination issue requires continuous control of food at each step of the production process. High quality and safety of products are equally important factors in the food industry. They may be achieved with several, more or less technologically advanced methodologies. In this work, we review the role, contribution, importance, and impact of ozoneas a decontaminating agent used to control and eliminate the presence of microorganisms in food products as well as to extend their shelf-life and remove undesirable odors. Several researchers have been focusing on the ozone's properties and applications, proving that ozone treatment technology can be applied to all types of foods, from fruits, vegetables, spices, meat, and seafood products to beverages. A compilation of those works, presented in this review, can be a useful tool for establishing appropriate ozone treatment conditions, and factors affecting the improved quality and safety of food products. A critical evaluation of the advantages and disadvantages of ozone in the context of its application in the food industry is presented as well."

Amoah, B.A. & Mahroof, R.M. 2019.
"Gaseous ozone, an oxidizing agent used as a disinfectant in food processing and preservation, has potential for the control of stored product insects. In this study, we investigated ozone for the management of the rice weevil, Sitophilus oryzae (L.) (Coleoptera: Curculionidae), a serious stored product insect pest. We exposed eggs, immature stages within wheat kernels, and adults of the rice weevil to 200-ppm ozone for 12, 24, 36,

48, and 60 h. Insects were placed at 5, 15, or 25 cm depth within a wheat mass in PVC pipes (10 cm in diameter, 30 cm in height) and exposed to ozone. Egg eclosion was recorded 10 d after treatment (DAT), and immature stages were observed for adult emergence 28 DAT. Adults were observed for survival immediately after ozone exposure and again at 1 and 2 DAT. Egg eclosion was significantly lower at 5 cm compared with 25 cm at all exposure times, but not the 12-h exposure time. For each exposure time tested, significantly lesser adults developed from kernels and none of the adults survived at the 5 cm depth compared with the 15 and 25 cm depths. Survival rate of adults was significantly higher at 25 cm depth than at 15 cm depth at the 24-60 h. The deeper the insect in the grain mass, the higher the survival rate. The work reported suggests that ozone is effective in killing all life stages of S. oryzae; however, the efficacy of the gas is dependent on the concentration, exposure time, depth, and gas loss."

Ozone Therapy

Ozone therapy can be described as a form of therapy to improve the body's intake and use of oxygen and to activate the immune system. In medicine, ozone is used to disinfect and treat diseases by limiting the effects of bacteria, viruses, fungi, yeast, and protozoa.

Historically Ozone was found to be a useful treatment for people with HIV before pharmaceutical medication was available.

Today it is used for treating the following:

- infected wounds
- activation of the immune response
- disinfection and the treatment of diseases by limiting the effects of bacteria, viruses, fungi, yeast, and protozoa.
- circulatory disorders
- geriatric disorders
- macular degeneration
- viral diseases
- rheumatism and arthritis
- cancer
- severe acute respiratory syndrome (SARS)
- Aids

Although ozone is a gas, developments in technology mean it can be used in several forms and different ways, including:

- ozonated olive oil applied directly to the body
- insufflation, a risky therapy where ozone is blown into the rectum
- ozonated water, which is drunk
- injections, which are often used in dentistry
- autohemotherapy, where blood is withdrawn, mixed with ozone, and put back into the bloodstream
- gas bath or sauna

Aydogdu, I., Ilbey, Y.O., Coban, G., Ekin, R.G., Mirapoglu, S.L., Cay, A., Kiziltan, H.S., Ekin, Z.Y., Silay, M.S. & Semerci, M.B. 2019.

OBJECTIVE: We investigate the protective and therapeutic effects of ozone therapy (OT) in radiotherapy (RT)-induced testicular damage.

METHODS: Thirty healthy adult male Wistar rats divided into five groups consisting of six animals each as follows: (1) Control (C), (2) RT, (3) OT, (4) OT + RT, and (5) RT + OT group. Histopathological findings, Johnsen scores, thiobarbituric acid-reactive substances (TBARS), glutathione (GSH), superoxide dismutase (SOD), catalase, and glutathione peroxidase (GPx) levels were evaluated.

RESULTS: RT caused a significant decrease in testicular weight and Johnsen score compared to the control group. In addition, TBARS level was significantly higher, whereas GSH, SOD, catalase, and GPx levels were significantly lower in the RT group when compared to the control group. Pre and postRT OT significantly increased GSH, SOD, catalase, and GPx levels and decreased TBARS level. Furthermore, testicular weight and Johnsen score were increased with OT.

CONCLUSIONS: The present study showed that OT is protective and therapeutic in radiation-induced testicular damage. OT may be beneficial to the patients who underwent RT.

Tirelli, U., Cirrito, C., Pavanello, M., Plasentin, C., Lieshi, A. & Taibi, R. 2019.

OBJECTIVE: Fibromyalgia is a chronic disorder with a very complex symptomatology. Although generalized severe pain is considered to be the cardinal symptom of the disease, many other associated symptoms, especially non-restorative sleep, chronic fatigue, anxiety, and depressive symptoms also play a relevant role in the degree of disability characteristic of the disease. Ozone therapy, which is used to treat a wide range of diseases and seems to be particularly useful in the treatment of many chronic diseases, is thought to act by exerting a mild, transient, and controlled oxidative stress that promotes an up-regulation of the antioxidant system and a modulation of the immune system. According to these mechanisms of action, it was hypothesized that ozone therapy could be useful in fibromyalgia management, where the employed therapies are very often ineffective.

PATIENTS AND METHODS: Sixty-five patients with fibromyalgia, according to the definition of the American College of Rheumatology (Arthritis Rheum 1990; 33: 160-172), were treated at the MEDE Clinic (Sacile, Pordenone, Italy) from February 2016 to October 2018. Females were 55 and males were 10; age ranged from 30 to 72 years, and the time from fibromyalgia diagnosis ranged from 0.5 to 33 years. Treatment was made by autohemotransfusion in 55 patients and by ozone rectal insufflations in 10 patients, according to SIOOT (Scientific Society of Oxygen Ozone Therapy) protocols, twice a week for one month and then twice a month as maintenance therapy.

RESULTS: We found a significative improvement (>50% of symptoms) in 45 patients (70%). No patient reported important side effects. In conclusion, at our knowledge, this is the largest study of patients with fibromyalgia treated with ozone therapy reported in the literature and it demonstrates that the ozone therapy is an effective treatment for fibromyalgia patients without significant side effects.

CONCLUSIONS: At the moment, ozone therapy seems a treatment that, also because without any side effect, is possible to be proposed to patients with fibromyalgia that are not obtaining adequate results from other available treatments and it can be considered as complementary/integrative medicine.

Luongo, M., Brigida, A.L., Mascolo, L. & Gaudino, G. 2017.

"Recent literature highlights that ozone therapy could be considered a viable adjuvant therapy in oncological patients receiving radio-chemotherapy. The use of ozone therapy in these patients enhances the action of chemotherapy and at the same time reduces side-effects, such as nausea, vomiting, opportunistic infections, buccal ulcers, hair loss and fatigue. Such positive therapeutic effects of ozone therapy can cause a larger physical and mental wellbeing resulting in improved quality of life. This work reviews the recent acquisition of

scientific knowledge regarding the ozone therapy and highlights the molecular and cellular pathways involved."

Clavo, B., Santana-Rodríguez, N., Llontop, P., Gutiérrez, D., Suárez, G., López, L., Rovira, G., Martínez-Sánchez, G., González, E., Jorge, I.J., Perera, C., Blanco, J. & Rodríguez-Esparragón, F. 2018.
INTRODUCTION: This article provides an overview of the potential use of ozone as an adjuvant during cancer treatment.
METHODS: We summarize the findings of the most relevant publications focused on this goal, and we include our related clinical experience.
RESULTS: Over several decades, prestigious journals have published *in vitro* studies on the capacity of ozone to induce direct damage on tumor cells and, as well, to enhance the effects of radiotherapy and chemotherapy. Indirect effects have been demonstrated in animal models: immune modulation by ozone alone and sensitizing effect of radiotherapy by concurrent ozone administration. The effects of ozonein modifying hemoglobin dissociation curve, 2,3-diphosphoglycerate levels, locoregional blood flow, and tumor hypoxia provide additional support for potential beneficial effects during cancer treatment. Unfortunately, only a few clinical studies are available. Finally, we describe some works and our experience supporting the potential role of local ozone therapy in treating delayed healing after tumor resection, to avoid delays in commencing radiotherapy and chemotherapy.
CONCLUSIONS: *In vitro* and animal studies, as well as isolated clinical reports, suggest the potential role of ozone as an adjuvant during radiotherapy and/or chemotherapy. However, further research, such as randomized clinical trials, is required to demonstrate its potential usefulness as an adjuvant therapeutic tool.
Tirelli, U., Cirrito, C., Pavanello, M., Del Pup, L., Lleshi, A. & Berretta, M. 2018.
OBJECTIVE: Fatigue may be cause by all cancer treatments, maybe because the tissue damage or the build-up of dead cells derived products.
PATIENTS AND METHODS: At the Mede Clinic in Sacile, Pordenone, Italy, from February 2016 to May 2018 we studied 50 patients with cancer and fatigue (15 with breast cancer, 12 with lung cancer, 11 with colon cancer, 5 with renal cancer, 3 with prostate cancer, 2 with melanoma and 2 hepatocellular carcinoma). Patients were treated with Auto Hemotransfusion (GAE) according to the SIOOT (Scientific Society of Oxygen Ozone Therapy) protocols, two times a week for one month and then twice monthly as maintenance therapy.
RESULTS: Nineteen of them were undergoing neoplastic treatment, 10 had already ended the cancer therapy and 21 were in a palliative setting. The Fatigue Severity Scale was used to assess the extent of fatigue in patients, in order to estimate the severity of the symptom with a score from 1 to 7. No side effects were found, and 35 patients (70%) achieved a significant improvement (> 50%) of the symptoms.
CONCLUSIONS: Our preliminary data demonstrate that ozone therapy is a valid supportive therapy for fatigue in cancer patients, both during cancer therapy and in a palliative setting with no significant side effects.

CANSA's Position on Ozone Therapy
Following an extensive search of the scientific literature, the Cancer Association of South Africa (CANSA) has concluded that:

> It cannot yet support ozone therapy as a stand-alone treatment for any form of cancer.

From the international scientific literature it would appear that there may be a variety of medicinal uses of ozone therapy. However, CANSA strongly advises that:

> Cancer patients should refrain from using any form of ozone therapy without having discussed it with their respective treating physician and/or oncologist.
>
> If adjuvant ozone therapy has been approved or advised by an oncologist, CANSA advises that such adjuvant ozone therapy should be used under supervision of the treating oncologist.

Medical Disclaimer

This Fact Sheet is intended to provide general information only and, as such, should not be considered as a substitute for advice, medically or otherwise, covering any specific situation. Users should seek appropriate advice before taking or refraining from taking any action in reliance on any information contained in this Fact Sheet. So far as permissible by law, the Cancer Association of South Africa (CANSA) does not accept any liability to any person (or his/her dependants/estate/heirs) relating to the use of any information contained in this Fact Sheet.

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Ozone
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Ozone Therapy
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