OPINION ARTICLE

Ozonated Saline and Its Uses in Medicine

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ABSTRACT

INTRODUCTION

Following the Opinion Article of Prof. Travagli, towards which I express the widest endorsement and sharing, I would also like to outline my opinion on a topic that is still the subject of debate within the various Ozone Organizations around the world.

After years of discussions on the usefulness of the Ozonated Saline (OS) technique compared to the more common Indirect Systemic Intravenous Ozone Treatment (formerly MAHT), I would like to highlight the knowledge and the scientific data on the topic in the aim to allow all our colleagues to evaluate independently and seriously the merit of the topic.

The position of the WFOT was clearly expressed in a document years ago (1).

Given that my vision as a researcher does not allow me to deny a priori the supposed efficacy or usefulness of emerging techniques based on the use of complementary resource other than purely pharmacological ones, I still want to clarify that the acceptance of new methods or therapies must always be accompanied from serious and proven hypotheses on the probable molecular mechanisms according to the principles linked to the key disciplines of medical activity including bio / chemistry, physics / medicine and human physiology.

BODY

The proposal to use a physiological saline solution (NaCl 0.9%) as a vehicle for the administration of medical ozone was proposed a few decades ago by some scientific groups belonging to the Russian School and then widely spread also for the greater technical simplicity compared to use and management of human blood, both from a practical and ethical point of view in relation to the methods of blood collection and its handling.

The systemic ozone treatment technique through ozonation of an adequate quantity of blood has already been in use for many decades and with excellent results that have allowed the best scientific characterization both in terms of results and protocols (2). Despite the above, the OS technique has been proposed as an alternative to the classic blood systemic ozone treatment without or with little scientific endorsement and with the opposition of most of the operators in the sector and especially of the WFOT.

The reason for this endorsement of the well-established technique of the indirect blood ozonation is not only linked to the fact of a scarce scientific literature in support of the OS technique, but also to the fact that this technique does not have a consistent scientific literature and above all it is not accompanied by toxicological studies that can guarantee its absolute safety from the point of view of potential side effects.

In confirmation of the above, it seems useful to cite the work recently published by Ma et al (3) where it is reported literally:

"Due to a lack of toxicology studies of chlorate in blood, it remains elusive whether ozonated saline and chlorate at the range of 0.90±0.14-7.69±0.48 μg/l has any toxic effects.

The potential toxicity of chlorate should be considered when ozonated saline is used for clinical infusions."

Given the above, and to go into more scientific detail, the greatest impediment to including OS among the protocols of ozone treatments derives from the simple fact that the ozone molecule is not the first nor the unique that interact with biological tissues.

Thus, to my opinion, this method cannot be included among the well consolidated ozone techniques simply because the ozone molecule, in its primitive chemical form O3, is replaced by a series of by-products deriving from the interaction between ozone and components of the saline solution (3). Conversely, the fact that the interaction of the ozone molecule with biological fluids leads to the activation of multiple biochemical and pharmacological events, well described by a vast international literature, is more than consolidated. In fact, to date on PubMed database (https://pubmed.ncbi.nlm.nih.gov/) we can find only 88 citations on OS and its uses in medicine compared to over 3 thousand that concern treatments with ozone mixed with oxygen:

Ozonized Saline and Medicine - 88 citations.
Ozone and Medicine - 3943 citations.

Going even more into technical and scientific detail, it is interesting what reported in the work of Qing et al (4) on the use of OS in rabbit tumours in relation to the methods of preparation and administration.

"Chilled normal saline (stored at 4°C) was used for the preparation of ozonated saline. An ozone generator from Humares GmbH (Bruchsal, Germany) was used to freshly prepare the ozonated normal saline one hour before use. Ozonated normal saline was made by constantly injecting the oxygen/ozone mixture into 30 mL of cold normal saline at ozone concentrations of 20 μg/mL or 40 μg/mL, at a speed of 3 L/min, at room temperature for 20 min. The ozonated saline was then stored at 4°C and utilized in later experiments at low temperatures."

From what reported by the Authors, the OS is obtained by bubbling a mixture of O3O2 at the concentration of O3 of 20 or 40 micrograms for 20 minutes, then the same OS is stored and used in "subsequent experiments".

Keeping faith with the utmost scientific rigor, we would like to remember that the strong instability of the O3 molecule does not allow its conservation, even when it is dissolved in bi-distilled water, therefore in the absence of other possible reactive species, for more than 12-24 hours. In saline solution, the O3 molecule quickly disappears, leaving the products of its reaction with sodium chloride and water unaltered.

Probably other authors have described different methods for the preparation of OS but, considering the extreme reactivity of the O3 molecule and the presence of NaCl in the saline solution, a rapid depletion of the ozone molecule with the formation of different chemicals is expected. as reported in the international literature (3).

Despite the above, which confirm the complete lack of standardized and verified protocols at least for a common method of preparation of any active ingredient, and the fact that the specific literature has tried to explain the behaviour from a purely chemical point of view physical chemical of ozone in saline solution (5), we are really worried about the spread of this technique which, in our opinion, is not accompanied by scientific and uniform criteria that guarantee its safety and efficacy, as it happens instead for other techniques that use calibrated and standardized oxygen-ozone mixtures.

Finally, we would like to recall what Razumovskii et al reported in their article on the kinetics of ozone in isotonic saline solution (5). With great surprise, the authors conclude by stating that:

"... the decomposition of ozone in aqueous NaCl solutions is not accompanied by the formation of products other than oxygen."

This sentence confirms that even the authors themselves agree that ozone is no longer present in the solution (OS) that will be administered to patients.

In conclusion, in my opinion, OS cannot be part of the well-established techniques of ozone treatment. I only suggest users of this new method to coordinate with each other and to initiate clinical and in-depth studies to better characterize its alleged mechanisms and the absence of toxicity or side effects.

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