UNIVERSITY OF HAVANA, CUBA

PHARMACY AND FOOD INSTITUTE

PHARMACOLOGICAL MECHANISMS OF MEDICAL OZONE AND ITS BENEFICIAL EFFECTS ON ELDERLY PATIENTS WITH OXIDATIVE ETIOLOGY DISEASES

INTERNATIONAL OZONE ASSOCIATION

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IN THE 20TH CENTURY THE AVERAGE LIFESPAN WAS 48 YEARS FOR MEN AND 51 YEARS FOR WOMEN. MORE THAN 100 YEARS OF PROGRESS HAS LED TO A LIFE EXPECTANCY OF 76 YEARS FOR MEN AND 81 YEARS FOR WOMEN AS OF 2017.

AT PRESENT AGING IS A GLOBAL PROBLEM; IT SEEMS TO BE UNAVOIDABLE AND IRREVERSIBLE. NEVERTHELESS, RECENT STUDIES ARE EXPANDING OUR HORIZON OF AGING AND THE MOLECULAR MECHANISMS IT INVOLVES, WHICH IS LEADING TO THE BELIEF THAT IN THE SAME WAY AS WITH ALL OTHER DISEASES, AGING MAY BE CONSIDERED AS A DISEASE THAT CAN BE EITHER PREVENTABLE OR POTENTIALLY TREATABLE.

SINCE DENHAM HARMAN FIRST PROPOSED THE FREE RADICAL THEORY OF AGING IN THE 1950 A LARGE AMOUNT OF DATA HAS BEEN PUBLISHED IMPLICATING OXIDATIVE STRESS IN AGING. AS MEDICAL OZONE REESTABLISHES THE ANTIOXIDANT/PROOXIDANT BALANCE, IT MAY BECOME A STANDARD THERAPEUTIC APPROACH IN THE PREVENTION AND MANAGEMENT OF AGE-RELATED OXIDATIVE DISEASES IN SUCH PATIENTS.

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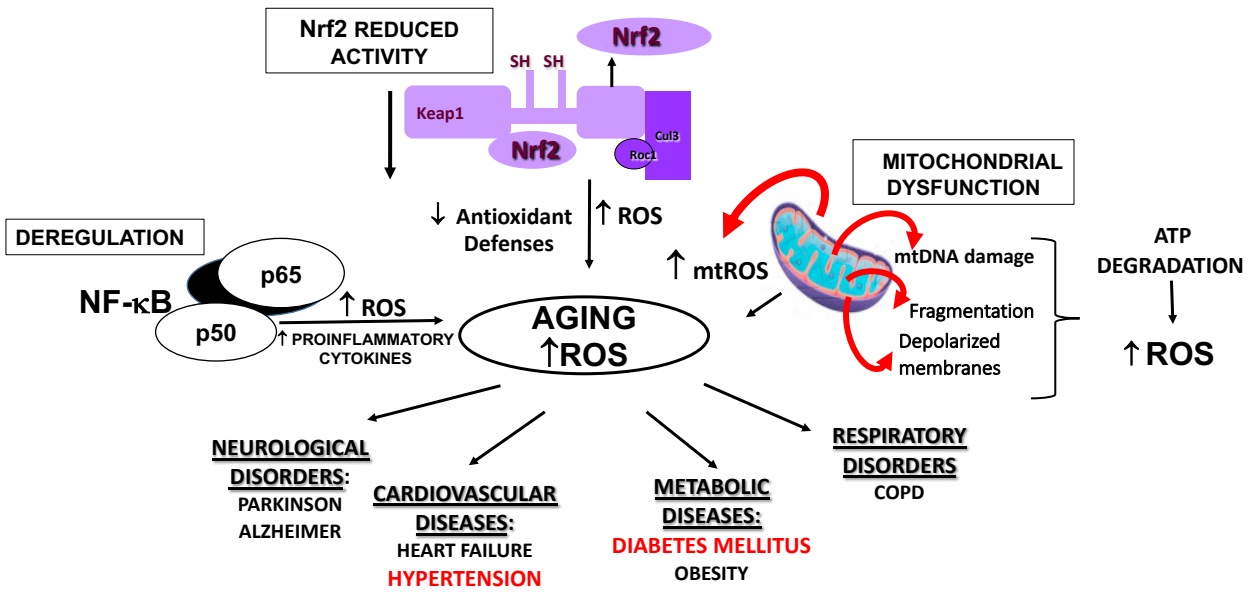
SOURCES OF OXIDATIVE STRESS DURING AGING



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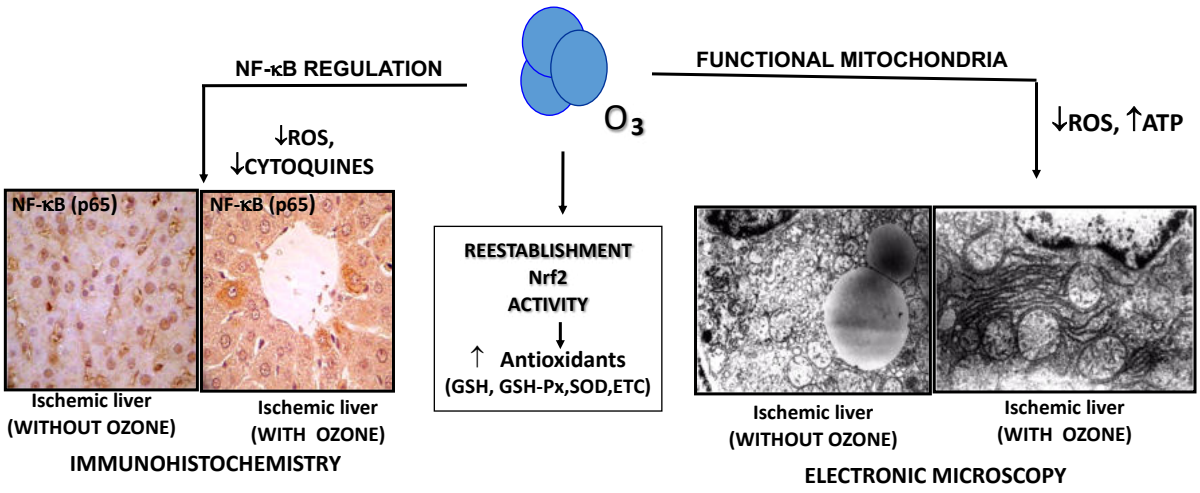
PROTECTIVE MECHANISMS OF MEDICAL OZONE DURING THE AGING



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THE AIM OF THIS WORK WAS TO EVALUATE THE OXIDATIVE STRESS AND SOME VASOACTIVE SUBSTANCE CONCENTRATIONS IN ELDERLY (60-70 YEARS) PATIENTS WITH RHEUMATOID ARTHRITIS AND COMORBIDITIES AS WELL AS ANOTHER OLDER GROUP OF PATIENTS WITH BRONCHIAL ASTHMA IN ORDER TO INVESTIGATE IF MEDICAL OZONE COULD BE EFFECTIVE IN THE PREVENTION AND THERAPY OF THIS AGE GROUP.

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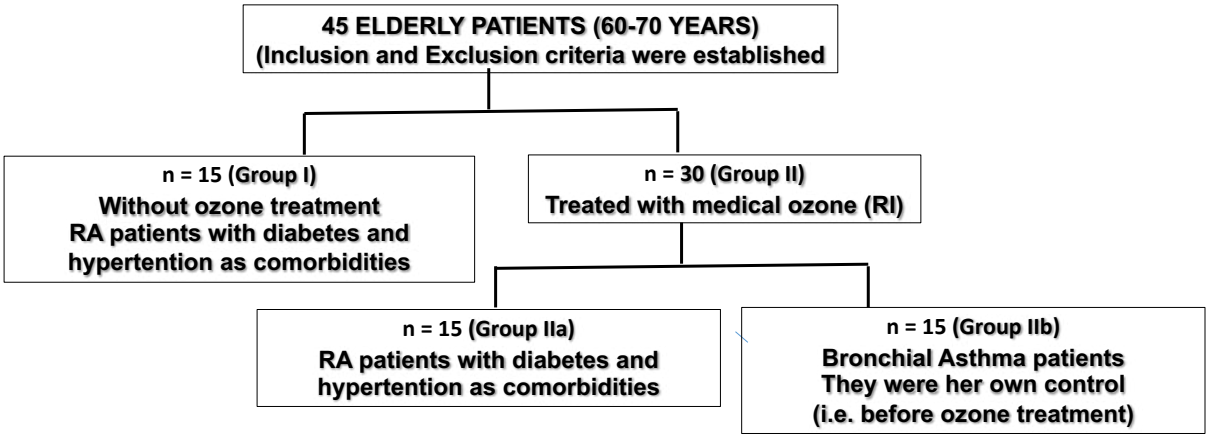
CLINICAL STUDY DESIGN

A **randomized, prospective and intervention controlled clinical study was performed (n = 45 patients)**



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Demographic data/patient histories	Group I (60-70 years) RA + Comorbidities Without Ozone (n = 15)	Group II (60-70 years) With Ozone (n= 30)	
		Group IIa (n =15)	Group IIb (n =15)
Group IIa: Rheumatoid arthritis (RA) + Comorbidities			-
Women (n/%)	12/80	10/67	-
Men (n/%)	3/20	5/33	-
Age (years)	63 ± 1[(a)]	62 ± 1[(a)]	-
Comorbidities			
Diabetes Mellitus	13/86	14/93	-
Hypertension	14/93	15/100	-
Group IIb: Bronchial asthma	-	-	
Women (n/%)	-	-	8/53
Men (n/%)	-	-	7/47
Age (years)	-	-	65 ± 3[(a)]
Race			
Caucasian	13/87	10/66	9/60
Non-Caucasian	2/13	5/34	6/40

Group I MTX + Ibuprophen + folic acid + hypoglicemic/anti-hypetensive drugs

Group IIa: Rheumatoid Arthritis + Comorbidities, (the same basic treatment as Group I + medical ozone,.

Group IIb: Bronchial asthma: Bronchodilators + medical ozone (each patient was his/her own control (i.e. before medical ozone treatment).

The data reflecting age are: mean ±S.E.M. in each group. Mean values with different letters indicate significant differences ($p < 0.05$) between bot groups

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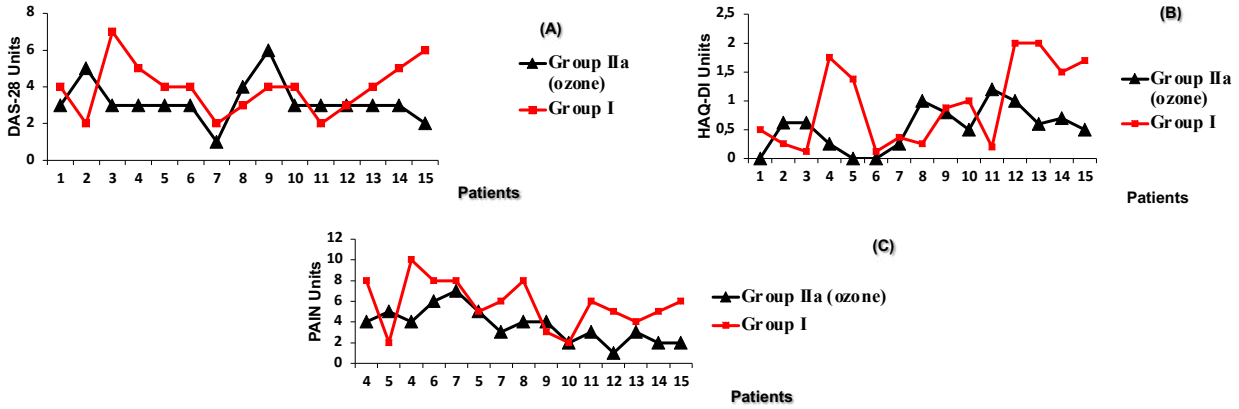

Clinimetric evaluation in I and IIa groups with RA. After medical ozone treatment, an improvement in DAS_{28}, HAQ-DI and Pain Index was observed. (A) In group IIa 80% of patients showed low-activity disease versus 4% in patients who received no ozone (group I). (B) There was a correspondence with HAQ-DI (disability index) as in group IIa 94% were negative in comparison with 60% in group I (+ >1.25 points) and with regard to pain (C) 80% of patients who were treated with medical ozone reduced more than 50% pain perception in the VAS versus 47% of patients without ozone therapy.

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QUANTITATIVE RESULTS OF DAS-28, HAQ-DI AND PAIN IN I AND IIa GROUPS

(AGE GROUP 60-70 YEARS)

	END EXPERIMENT (WITH OZONE)	END EXPERIMENT (WITHOUT OZONE)
DAS-28	3 ± 0.2 (a)	5 ± 0.4 (b)
HAQ-DI (+ > 1.25)	0.64 ± 0.1 (a)	1.3 ± 0.2 (b)
PAIN	3 ± 0.4 (a)	6 ± 0.1 (b)

Mean values with different letters indicate significant differences ($p < 0.05$) between both groups

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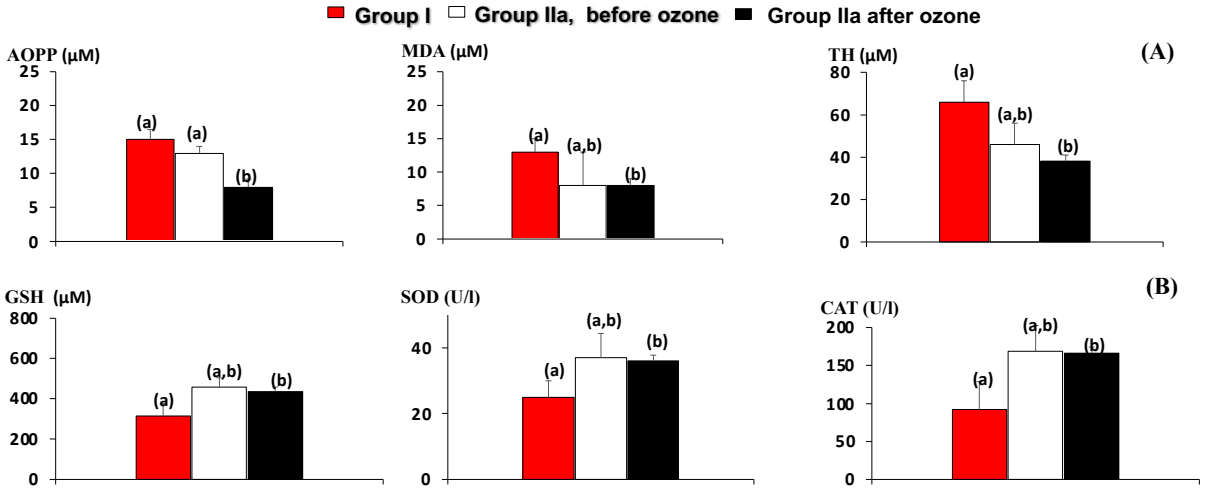

After ozone treatment, no change in injury (A) and antioxidant defenses (B) biomarkers could be observed except protein damage (AOPP), which decreased significantly after medical ozone. Nevertheless, when the redox biomarkers after ozone treatment were compared with those of group I (without ozone therapy), then statistical differences were found. Antioxidant defenses (GSH, SOD and CAT) increased, whereas injury biomarkers (MDA and TH) decreased compared with group I.

It is important to emphasize that there were no differences between both groups before ozone therefore these results suggest that, in elderly patients (60-70 years) with RA + comorbidities, medical ozone arrests the oxidative damage progression along with a disease improvement (DAS.28, HAQ.DI and PAIN). Mean values with different letters indicate significant differences ($p < 0.05$) between both groups

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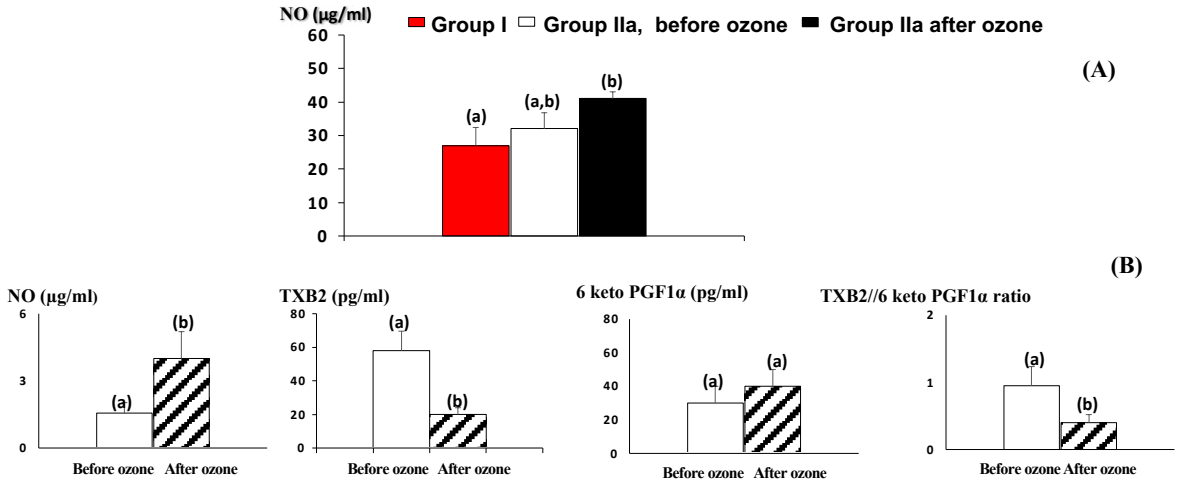

Mean values with different letters indicate significant differences ($p < 0.05$) between both groups

León Fernández OS, Oru GT, Viebahn-Hänsler et al, Medical ozone arrests oxidative damage progression and regulates vasoactive mediator levels in elderly patients (60–70 years) with oxidative etiology diseases. Front. Physiol 13: 2022.

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THE QUESTION IS HOW TO MAINTAIN THE MEDICAL OZONE IMPROVEMENT OR EVEN BETTER INCREASE THE CLINICAL RESPONSE IN THESE ELDERLY PATIENTS?

THE ANSWER IS TO TREAT THE PATIENTS WITH A SECOND OZONE CYCLE

Gabriel Takon Oru, Renate Viebahn-Haensler, Olga Sonia León et al. (2019) Medical Ozone Effects and Innate Immune Memory in Rheumatoid Arthritis Patients Treated with Methotrexate+Ozone After a Second Cycle of Ozone Exposure.Chron Pain Manag 2: 114. DOI: 10.29011/2576-957X/100014

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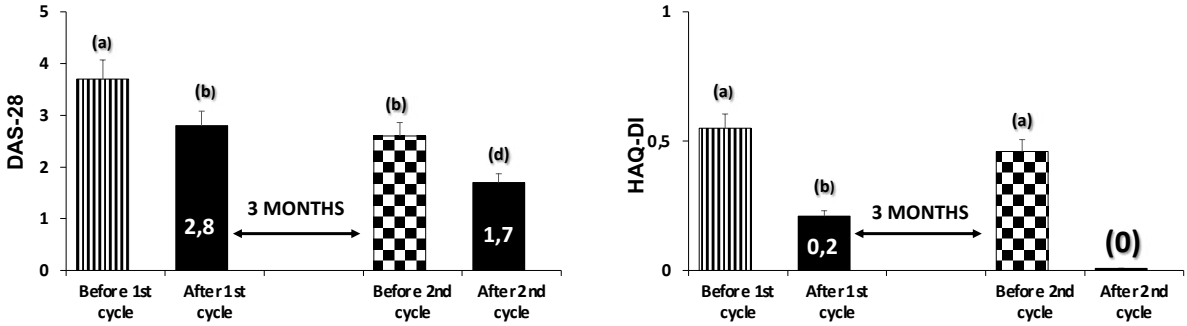
RHEUMATOID ARTHRITIS PATIENTS WITH DIABETES AND HYPERTENSION
(AGE GROUP 60-70 YEARS)



Clinical markers in elderly rheumatoid arthritis patients (60-70 years) with comorbidities after receiving two cycles of ozone treatments at intervals of three months between each cycle. **Patients received 20 ozone treatments by RI and the clinical variables were determined before and after the first cycle. After 3 months they received another cycle (20 treatments) and the same variable were assessed.** Different letters mean statistical differences ($p < 0.05$). Mean values with different letters indicate significant differences ($p < 0.05$) between both groups

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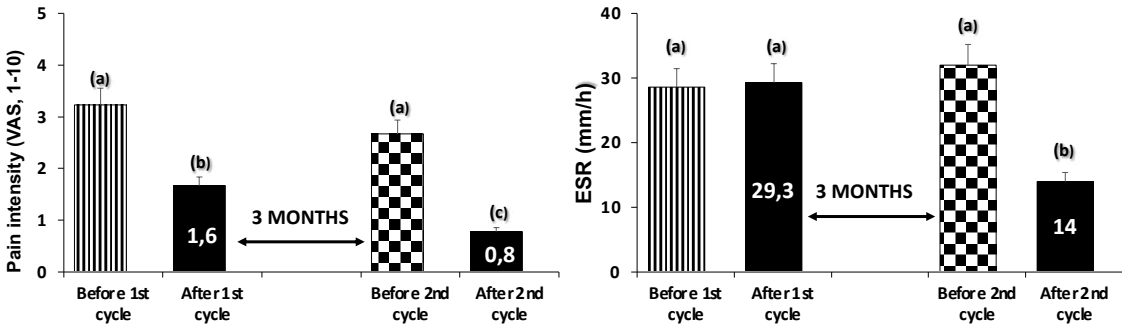
RHEUMATOID ARTHRITIS PATIENTS WITH DIABETES AND HYPERTENSION
(AGE GROUP 60-70 YEARS)



Pain intensity was reduced 50% after 2nd ozone exposure with regard to the end of the first cycle Similar picture of Eritrosedimentation rate was observed. Different letters mean statistical differences ($p < 0.05$). Although there was an improvement after the first ozone cycle the clinical response was stronger after the 2nd cycle suggesting an ozone memory response which is displayed after a 2nd ozone exposure. Mean values with different letters indicate significant differences ($p < 0.05$) between both groups

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Taken together these results indicate medical ozone may become a standard approach in the prevention and management of age-related oxidative diseases which have, up to now, not only been frequent, but have constituted many risks for elderly people.

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MEDICAL OZONE IN ELDERLY PATIENTS

PAIN RELIEVE
INFLAMMATION DECREASE

ARREST OXIDATIVE DAMAGE PROGRESSION
↑ ANTIOXIDANT DEFENSES
↓ PROTEINS/LIPIDS INJURY

DECREASE THROMBOSIS RISK
↑ NO (VASODILATOR/ANTI-PLATELET
↓ THROMBOXANE (PROTHROMBOTIC)
↑ PROSTACICLYN (VASODILATOR/ANTI-PLATELET)

QUALITY OF LIFE IMPROVEMENT AND HEALTHFUL LONGEVITY

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