

# EXHALED NITRIC OXIDE MEASUREMENT IN HEALTHY INDIVIDUALS DURING EXERCISE ASSOCIATED WITH THE USE OF ZONAIR 3D SYSTEM

## BACKGROUND

Nitric oxide within the respiratory system, regulates vascular tone and bronchial dilation promoting dilation both blood vessels and the bronchi, helps facilitate the coordination of ciliated epithelial cells of the respiratory system and is a major neurotransmitter of non-adrenergic neurons not cholinergic that end in the bronchial wall. This molecule can be detected in exhaled gas in concentrations that vary in health and disease. The American Thoracic Society Clinical Practice Guidelines suggest that higher levels of 50 ppb in adults of eNO (exhaled Oxid nitric) increases greater than 40% over the last one is the result of inflammation in the airway eosinophilic. Its use has been studied mainly in bronchial asthma, but also in other diseases such as bronchiectasis, COPD (Chronic Obstructive Pulmonary Disease), asthma and eosinophilic bronchitis upper respiratory infections. Now, the usefulness of the determination of exhaled nitric oxide (eNO) is in the diagnosis and monitoring of the inflammatory state of airways with some limitations for the costs.

Elevated levels of particulate air pollution has been associated with increased mortality and respiratory and cardiovascular morbidity and worsening of asthma. Ultrafine particles (UFP); less than 0.1 microns in aerodynamic diameter) can contribute to health effects for a few reasons: 1) UFP have a higher predicted pulmonary deposition, 2) have greater potential to induce lung inflammation, 3 ) greater surface area, and 4) increased oxidative capacity. UFP also have the potential to cross the epithelium and enter the systemic circulation. This has been studied mainly in patients with asthma. No studies on the effect of reducing UFP exercise.

Zonair 3 D system is the first mobile space where you can breathe fresh air in a 99.995% continuous regeneration of particulate pollution-free, viral agents, bacterial and allergens. The effects of Zonair is 1. Improved physical performance by reducing CO2 pollution. 2. Streamlines the process of recovery after exercise. 3. Promotes the body's antioxidant mechanisms when combined with physical activity. 4. Breathing difficulties decreased significantly to isolate potentially allergenic substances. 5. Decreasing the rate of lactic acid (22%) and glucose (10%), among others.

## **MATERIAL AND METHODS**

Patients:

We include two athletic healthy individuals with no history of sensitivity to inhaled agents. Subject over 18 who performed aerobic exercise daily for more than 1 hour. No history of hyperactivity in childhood.

Were randomly assigned as patient A and patient B. Patient A was submitted to daily aerobic exercise consisting of running a distance of 42 195 for 7 days. The patient B would not perform exercise for 7 days. Both performed an initial assessment and a final consisting of the realization of complete pulmonary function tests, measurement of exhaled nitric oxide, and electrocardiogram. During the 6 days of evolution both slept in the 3D Zonair system. Were performed spirometry, measurement of exhaled nitric oxide at morning and evening daily.

## **RESULTS**

The mean baseline FENO in the athlete A was 16.30 parts per billion (ppb) and 24.30 ppb in the athlete B. (Table 1) There were a progressive decrease in the levels of eNO in the athlete A and an inverse effect on the athlete B during the week, but the difference was not statistically significant. [p

0.074] (Figure 1 and 2) There were no differences in the values of forced expiratory volume in 1 second (FEV1) and forced vital capacity (FVC) in either of the 2 athletes during all the trial. (Figure 3 and 4).

## **DISCUSSION**

In 1952 in the UK, thousands of people were killed by the inversion that lasted several days, this event provided the first evidence of the effects of environmental pollution on health. Initially focused the attention of the adverse effects on the respiratory system, as it is the main entrance of pollutants to the body, but as has been investigated also can affect the cardiovascular system. In fact epidemiological studies have shown that daily mortality for cardiovascular and respiratory diseases, follows the daily fluctuation of air pollution.

Probably the pollution effects on health are caused by the overall gamma of various pollutants, rather than individual components of the mixture.

Therefore, the interest in recent years is to know the air we breathe to the development of technology to identify environmental contaminants (Radiello ®, Carbotrap, etc), and the development of techniques in ambient air purification (Zonair 3D ®).

The depth of penetration of the particulate material depends on its size. Particles larger than 10  $\mu$ m remain in the wetlands of the mouth and nose, smaller particles penetrate the airways, and particles of 2-3  $\mu$ m enter the alveolar region. Alveolar macrophages as well not eliminate very small particles, called ultrafine (<0.1  $\mu$ m), as larger particles, and stay longer in the alveolar region.

In last year, there has been an increase in studies that highlight the importance of indoor ultrafine particles. Frampton et al studied if UFP deposition would be increased and underlying airway inflammation enhanced. They found no increases in soluble markers of systemic inflammation or coagulation. They observed subtle changes in leukocyte subsets and adhesion molecule expression are consistent with effects on vascular endothelial function. Our result are limited because the number of patients is small. We observed decrease of the level eNO in the patient A, we hypothesized that it is because of reduction in airway inflammation. However, the patient A did

exercise and decrease of level eNO could be secondary to exercise. It is necessary further double-blind randomized clinical trial that confirm this findings.

### CONCLUSIONS AND CLINICAL RELEVANCE

Our results suggest that exercise associate to use Zonair 3D system decrease level eNO, it may be to the decrease inflammation airways. Further studies are required to confirm these findings.

	N	Min	Max	Media	Desv
Pacient A	10	4.00	28.00	16.30	7.70353
Pacient B	10	8.00	39.00	24.30	8.78193
N valid	10				

Table 1 FENO measurements.

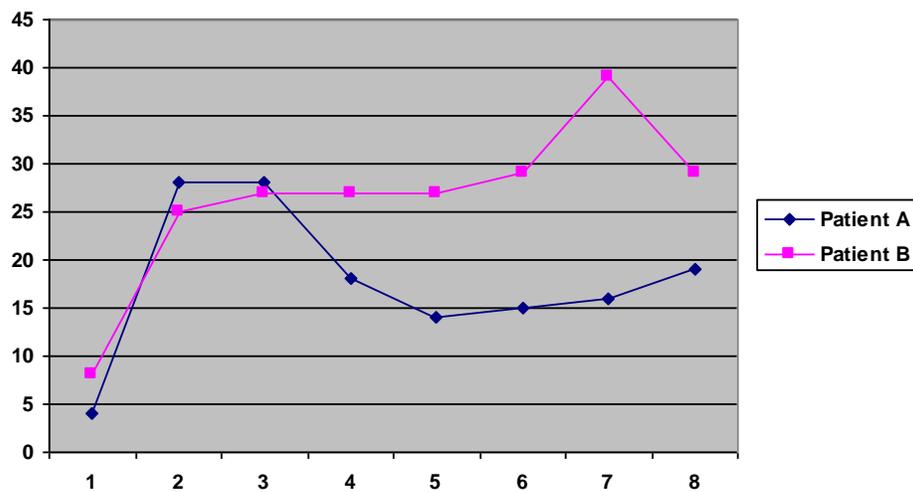


Fig 1

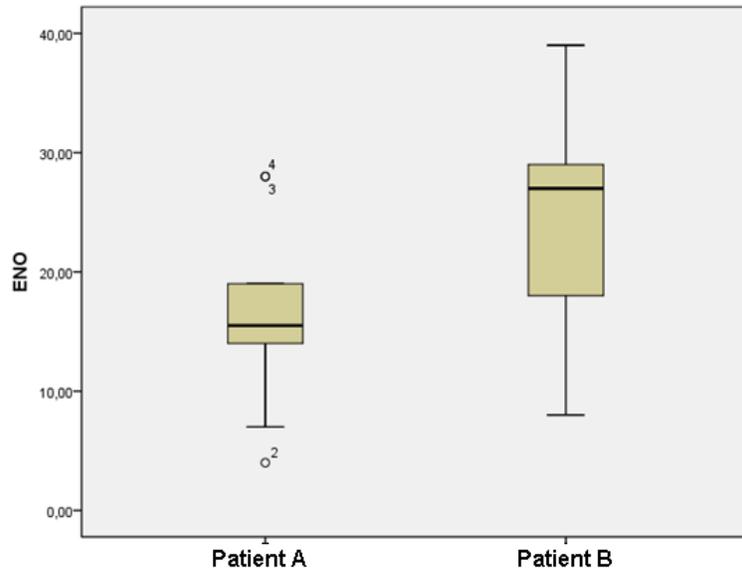


Fig 2

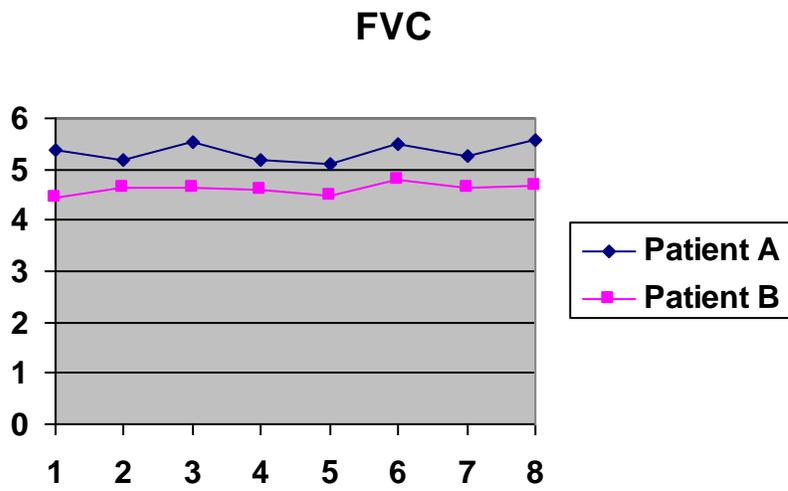


Fig 3

## FEV1

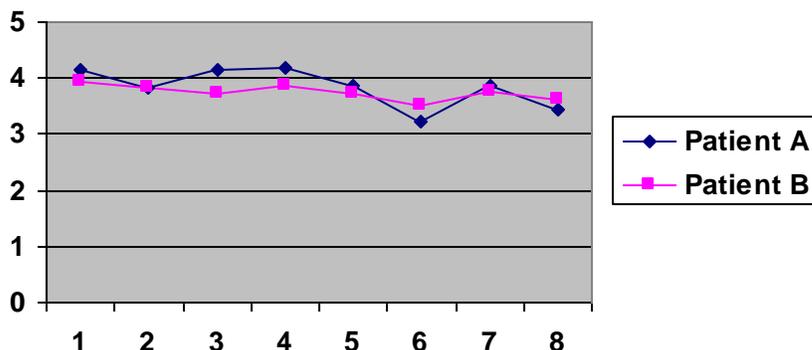


Fig 4

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