Studies

Concentrated oxygen and activated respiratory air: a comparison between the physiological effects of two inhalation applications

A study involving healthy test persons

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Summary

In this study, 19 test persons inhaled air, which had been processed according to the Airnergy technology, for 20 minutes. At the end of the inhalation there was a very significant reduction in the amount of oxygen in the exhaled air, a significant improvement in peak flow and a significant reduction in breathing and pulse frequency compared to the initial values – indications of improved oxygen utilisation, which is reflected in better metabolic quality and regulation capacity. On the other hand, the same test persons gained no such benefits from inhaling concentrated oxygen under the same conditions.

Introduction

Energy production in the human organism is directly dependent on the continuous supply and utilisation of oxygen. Humans can live for several weeks without food, several days without water, but only a few minutes without oxygen. As oxygen is a prerequisite for elementary life processes, but at the same time is increasingly "a limiting factor in our lives" (Fodor 2001), this vital gas is the focus of therapeutic efforts.

In this study, which was conducted by Dr. Ulrich Knop from the Institute for Medical Bionics in Wolfsheim, Germany, two different inhalation therapies connected with oxygen and its utilisation in the human organism are compared. The oxygen inhalation therapy, in which patients breathe in increased concentrations of oxygen, is based on the generally acknowledged hypothesis that oxygen absorption is driven from the alveoli into the lung capillary blood by diffusion processes. According to the hypothesis, the driving force behind the diffusion process is the difference in partial pressures between the alveoli and the mixed venous blood in the lung capillaries (Ullrich,

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1994). Accordingly, the objective of oxygen inhalation therapy is to increase and normalise the oxygen concentration in the blood by permanently increasing the arterial oxygen partial pressure (cf. Fodor, 2001). In addition, the aim is to increase the size of the arterio-venous oxygen difference and lower the carbon dioxide partial pressure in the blood to a normal level. All of this should lead to a situation where the body`s cells are supplied with more oxygen which should in turn improve metabolism.

The Airnergy inhalation therapy is based on a completely different assumption. This therapy sees the cause for low energy production in the body's cells in the organism's declining ability to utilise the oxygen in the air to an adequate extent. According to this assumption, the limiting factor for the metabolism is not the amount of oxygen, but rather the organism's ability to utilise it. The developers of the Airnergy therapy say that even healthy people can utilise only a fraction of the air oxygen for metabolism, and that this fraction is reduced even further as people grow older, when they are sick or stressed (cf. Grosse-Brockhoff, 1969; cf. Fodor, 2001). Because of this, the objective must be to increase the organism's ability to utilise oxygen in a physiological manner and not to increase the amount of oxygen. The principle of this new technology thus consists of making the natural oxygen proportion in the respiratory air in the alveoli and also in the parenchyma more utilisable for the body without feeding the body additional oxygen. This is achieved with the help of a patented technology, similar to photosynthesis, in which air oxygen is continuously transformed into a singlet state – the physiological active form of oxygen - in the inhalation device (cf. Schöllmann, 2004). Singlet oxygen is also continuously formed by the organism itself (cf. Elstner, 1993), i.e. when the inhaled molecular oxygen, which is actually inactive, is to be used for metabolic reactions. Airnergy imitates this natural principle in a bio-physical manner.

The decisive factor in the Airnergy principle is that users do not inhale the singlet oxygen produced in the device, but only its energy. In the inhalation device the energy that is released when the activated oxygen returns to its original state (triplet state) is immediately absorbed by water molecules in the (moist) respiratory air. These activated water molecules – not activated oxygen states – are inhaled by the user through a lightweight nasal cannula. These highly energetic water molecules are a form of energy known to the organism, which, consequently, it can utilise optimally. This has been proved, for example, in a marked improvement in heart rate variability

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(a measure for the organism's vegetative control ability) after just one Airnergy treatment (Knop, 2003).

As clinical experiences are available for both the oxygen inhalation therapy and the Airnergy inhalation therapy and since the two processes are based on completely different, mainly contradictory assumptions, it seemed obvious to make a direct comparison of the two therapies on healthy test persons. In this study the influences of the organism's overall oxygen utilisation was determined on the basis of the amount of oxygen in the exhaled air. As oxygen cannot or only marginally be stored in the organism (cf. Fodor, 1984, 2001), the amount of oxygen in the exhaled air is a direct measure for total oxygen utilisation in the organism. The lower the amount of oxygen in the exhaled air, the more oxygen was utilised by the organism. In addition, the effects of both inhalation therapies were determined on the basis of several generally acknowledged, easily gathered and interpretable performance and regulation parameters: peak flow, breathing rhythm, pulse frequency and blood pressure.

Material and methods

1. Test persons

19 healthy test persons of both genders (10 male, 9 female) with normal weight took part in the study. Their ages were between 17 and 59, the average age was 32.4. The test persons included six smokers and 13 non-smokers.

2. Inhalation therapy

- Oxygen inhalation therapy:

After the test persons had rested on a bench for five to ten minutes, various parameters were measured: breathing frequency, blood pressure and pulse frequency, followed by the amount of oxygen in the air that they exhaled (VO2) and peak flow. The respective measuring methods are described in Point 3. When the measurements had been completed, the test persons inhaled 95% oxygen through a nasal cannula for 20 minutes. A conventional oxygen concentrator with a flow of 4.5 litres/min. was used. Two minutes before the end of the inhalation, breathing frequency, blood pressure and pulse frequency were determined again, the amount of oxygen in the exhaled air (VO2) and peak flow were measured immediately after the inhalation therapy.

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- Airnergy inhalation therapy:

A few days later, the test was repeated with the same test persons, but this time with the Airnergy inhalation therapy instead of the oxygen therapy. After the test persons had rested on a bench for five to ten minutes various parameters were measured: breathing frequency, blood pressure and pulse frequency, followed by the amount of oxygen in the air that they exhaled (VO2) and peak flow. The respective measuring methods are described in Point 3. When the measurements had been taken, the test persons inhaled air through a nasal cannula, which had been prepared according to a technology similar to chemoluminescence (Airnergy) for 20 minutes. The Airnergy Professional Plus inhalation device from natural energy solutions AG, Hennef was used and the 100% setting was chosen. Two minutes before the end of the inhalation, breathing frequency, blood pressure and pulse frequency were determined again, the amount of oxygen in the exhaled air (VO2) and peak flow were measured immediately after the inhalation therapy.

3. Measuring methods

- Determination of the amount of oxygen in the exhaled air (VO2).

The oxygen flow in the exhaled air was measured in millilitres per minute (ml/min) with the help of the MedGem measuring device from microlife. The test persons breathed through the MedGem device for several minutes. The amount of oxygen in the exhaled air is a measure for oxygen utilisation in the entire organism. The lower the amount of oxygen in the exhaled air, the more oxygen was utilised by the organism.

- Determination of pulse frequency and blood pressure.

The pulse frequency was measured for one minute, blood pressure was determined using a measuring device from Scala.

- Determination of breathing frequency.

The test persons' breaths were counted for two minutes and then averaged to breaths per minute.

- Determination of peak flow.

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Peak flow in litres/minute (l/min) was measured with the Roland Pulmotest. The measurement was carried out three times in a row; the highest value was used in the evaluation.

- Statistical evaluation.

The statistical evaluation was made using a t test for combined random samples.

Results

1. Influence of Airnergy activated air and concentrated oxygen on the amount of oxygen in the exhaled air

After the test persons had inhaled Airnergy activated air, a reduction in the amount of oxygen in the exhaled air was determined in every single case. On average the amount of oxygen in the exhaled air compared to the original value was reduced by 30.2 millilitres per minute (ml/min.), which corresponds to a 9.9% reduction (see Figure 1). The difference between the amount of oxygen in the exhaled air before and after Airnergy inhalation was highly significant from a statistical aspect ($p = 1.5 \times 10\text{-}7$). On the other hand, when the test persons inhaled concentrated oxygen, there was, on average, a slight increase of 7.5 millilitres per minute (ml/min.) in the amount of oxygen in the exhaled air, which corresponds to 2.6 per cent (see Figure 1). The difference between the amount of oxygen in the exhaled air before and after inhalation with concentrated oxygen reached the 95% level of significance ($p = 0.022$).

2. Influence of Airnergy activated air and concentrated oxygen on peak flow

After the 20-minute inhalation with Airnergy activated air, the average peak flow values of the test persons had improved by 31.1 litres/minute, which corresponds to a 7.1% improvement (see Figure 2). The difference between the peak flow values before and after Airnergy inhalation was statistically significant ($p = 0.006$). On the other hand, when the test persons inhaled concentrated oxygen, the average peak flow values worsened by 15.5 litres/minute, which corresponds to 3.4 per cent (see Figure 2). The difference between the peak flow values before and after inhalation with concentrated oxygen reached the 95% level of significance ($p = 0.047$).

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3. Influence of concentrated oxygen and Airnergy activated air on breathing rhythm

After the test persons had inhaled Airnergy activated air, an average reduction in their breathing rhythm of 1.9 breaths per minute was determined, which corresponds to 12.9 per cent (see Figure 3). The difference between the breathing frequency values before and after Airnergy inhalation was statistically significant ($p = 0.005$). After a 20-minute inhalation with concentrated oxygen an average reduction in the breathing rhythm was also determined, in this case 0.6 breaths per minute, which corresponds to 4.4 per cent (see Figure 3). The difference between the breathing frequency values before and after inhalation with concentrated oxygen did not reach the 95% level of significance ($p = 0.5$).

4. Influence of Airnergy activated air and concentrated oxygen on pulse

After the 20-minute inhalation with Airnergy activated air, the average pulse frequency of the test persons had reduced by 4.5 beats/minute, which corresponds to a 6.5% reduction (see Figure 4). The difference between the pulse frequency values before and after Airnergy inhalation was statistically significant ($p = 0.002$). When the test persons inhaled concentrated oxygen an average reduction on pulse frequency was also determined, in this case 2.4 beats per minute, which corresponds to 3.6 per cent (see Figure 4). However, the difference between the pulse frequency values before and after inhalation with concentrated oxygen did not reach the 95% level of significance ($p = 0.1$).

5. Influence of Airnergy activated air and concentrated oxygen on blood pressure

After inhalation with Airnergy activated air slight changes in the systolic and diastolic blood pressure were determined, which did not reach the 95% level of significance ($p = 0.15$ and 0.13). After inhalation with concentrated oxygen slight changes in the systolic and diastolic blood pressure were also determined, which also did not reach the 95% level of significance ($p = 0.1$ and $p = 0.06$).

Discussion

A 20-minute inhalation therapy with air that was prepared according to the Airnergy technology caused a significantly high reduction in the

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amount of oxygen in the exhaled air of the test persons (see Figure 1). As the organism cannot store or store only very insignificant amounts of oxygen (differences in the quantity of transport proteins), the amount of oxygen in exhaled air is a direct measure of the organism's overall capacity to utilise oxygen. From the above data it can be concluded that when Airnergy activated air is inhaled, the body`s capacity to utilise oxygen improves significantly. It was noticeable that every single one of the test persons exhibited improved oxygen utilisation. Individually, the reduction in the amount of oxygen in the test persons' exhaled air (and thus the improvement in oxygen utilisation) fluctuated between 2.7% and 17.4%. On average, oxygen utilisation improved by 9.9%.

As the other physiological data that was gathered – peak flow, breathing rhythm, pulse frequency – show, the test persons converted the improved oxygen utilisation directly into metabolic energy and improved metabolic economy. After Airnergy inhalation the test persons exhibited a significantly improved peak flow value (see Figure 2), a significantly reduced breathing rhythm (see Figure 3) and a significantly reduced pulse frequency (see Figure 4). In addition, slight changes in blood pressure were also determined, but these did not reach the 95% level of significance.

The Airnergy inhalation did not produce improvements in all three physiological parameters of peak flow, breathing rhythm and pulse frequency. For example, five of the test persons showed no peak flow improvement after Airnergy inhalation. However, these test persons reacted to the therapy with reduced breathing frequency and/or pulse frequency – which can be regarded as an indication of metabolic economising and regulation processes having been initiated. A 49 year old male test person, smoker, who had relatively high blood pressure before the inhalation (143/98), reacted to Airnergy inhalation with a slight rise in systolic (160) and diastolic blood pressure (112). This patient also exhibited no improvement in peak flow after Airnergy inhalation. On the other hand, this test person exhibited a marked reduction in breathing frequency and pulse frequency, so that even here the inhalation therapy started regulation processes in terms of metabolic economy and relieving the cardiovascular system. On the whole, it can be said that for all 19 of the test persons the improved oxygen utilisation resulting from the Airnergy inhalation therapy (see Figure 1) was converted into at least one, but in most cases, several improved performance and regulation parameters.

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The situation was, however, different when the test persons inhaled concentrated oxygen instead of Airnergy activated air. After inhaling concentrated oxygen, an average 2.6% increase in oxygen in the exhaled air was determined – the 95% level of significance was reached. The reason for this increase in oxygen in exhaled air – whether due to "residual" highly concentrated oxygen remaining in the lungs shortly before the measurement or due to a worsening of oxygen utilisation – will not be discussed here. It was also noticeable that after the test persons had inhaled concentrated oxygen, the peak flow values dropped by an average of 3.4% - again, the 95% level of significance was reached. In some test persons there was a worsening of several physiological parameters, which indicates a reduction of the quality of metabolism and regulation capacity due to the oxygen inhalation. It thus remains to be said that in the tests that were carried out, in regard to lung function, on average the test persons could not benefit from an inhalation application with concentrated oxygen and in fact, some even experienced deterioration. On the other hand, there were also positive physiological effects from the oxygen application, for example, there was a trend towards reduced breathing and pulse frequencies. But these effects did not reach the 95% level of significance.

It should be examined whether the positive experiences with inhalation therapies using increased oxygen concentrations in the respiratory air (SMT according to Ardenne, oxygen ionisation therapy according to Engler and deviations of both of these) are possibly not the result of improved oxygen utilisation, but rather caused by the body's counter-regulation to a (toxic) stimulus (i.e. the high O2 concentration in the alveoli) and/or accompanying measures such as exercise, oral or injected catalysts, minerals, vitamins or proteins. As unrealistic and unjustified as these considerations may have seemed to date - considering the experiences with the Airnergy effect, they are certainly worthy of discussion.

To summarise, it can be said that the test persons in this study benefited very much from the Airnergy inhalation therapy in regard to their capacity to utilise oxygen, their physiological performance and regulation parameters – but not from the inhalation therapy with concentrated oxygen. After inhaling Airnergy activated air, the organism utilised considerably more oxygen in the respiratory air. The improved oxygen utilisation was also converted into metabolic performance (improved peak flow values as an indication of improved lung function) and improved metabolic economy and quality (reduced breathing rhythm and pulse frequency). Previous studies had already

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shown that the Airnergy technology application reduced the formation of reactive oxygen species in cultivated human monocytes by 60 per cent (Hulten, L. M. et al., 1999), which indicates an improvement in the antioxidative potency in human cells due to Airnergy – a counterpoint to oxygen inhalation therapies that increase the formation of free radicals (cf. Fodor, 2001).

Other studies will now have to show whether the short-term positive effects of Airnergy, which were exhibited in this study, are sustained in the longer term. It must also be clarified if not just healthy test persons benefit from the air therapy but also patients with existing illnesses. The results of a study into sleep apnoea patients (Burmann-Urbanek and Straube, 2004) and a large number of individual observations – such as patients with lung emphysema, macular degeneration or fibromyalgia syndrome speak for both assumptions. For some of these clinical pictures there are no established therapies.

Ultimately, the results of this test and previous experiences with Airnergy technology should encourage more intensive study into the molecular mechanisms of oxygen transport, oxygen activation and oxygen utilisation in the organism – ideally on the part of universities. The data presented here undoubtedly questions the generally accepted theory that diffusion is the sole motor for transporting oxygen into the blood and the main drive for transporting the gas into the body cells. If diffusion was the main driving force behind oxygen transport, Airnergy could not function. This study highlights the quality of respiratory air in preventive and therapeutic terms.

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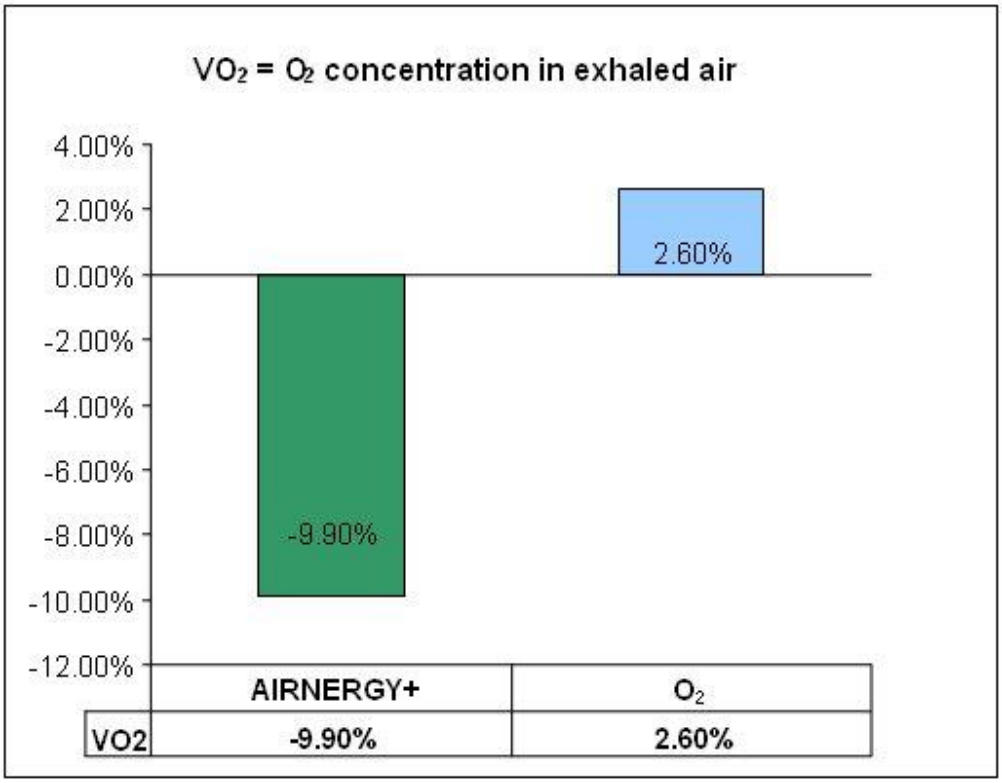

Figure 1: Influence of total oxygen utilisation in the organism after a 20-minute inhalation with Airnergy activated air (Airnergy) or concentrated oxygen (O2), exhibited on the basis of the (inverse correlated) proportional change in the amount of oxygen in exhaled air (VO2). The difference between the amount of oxygen in exhaled air before and after Airnergy inhalation was statistically highly significant ($p = 1.5 \times 10\text{-}7$), the difference between the amount of oxygen in the exhaled air before and after inhalation with concentrated oxygen reached the 95% level of significance ($p = 0.022$).

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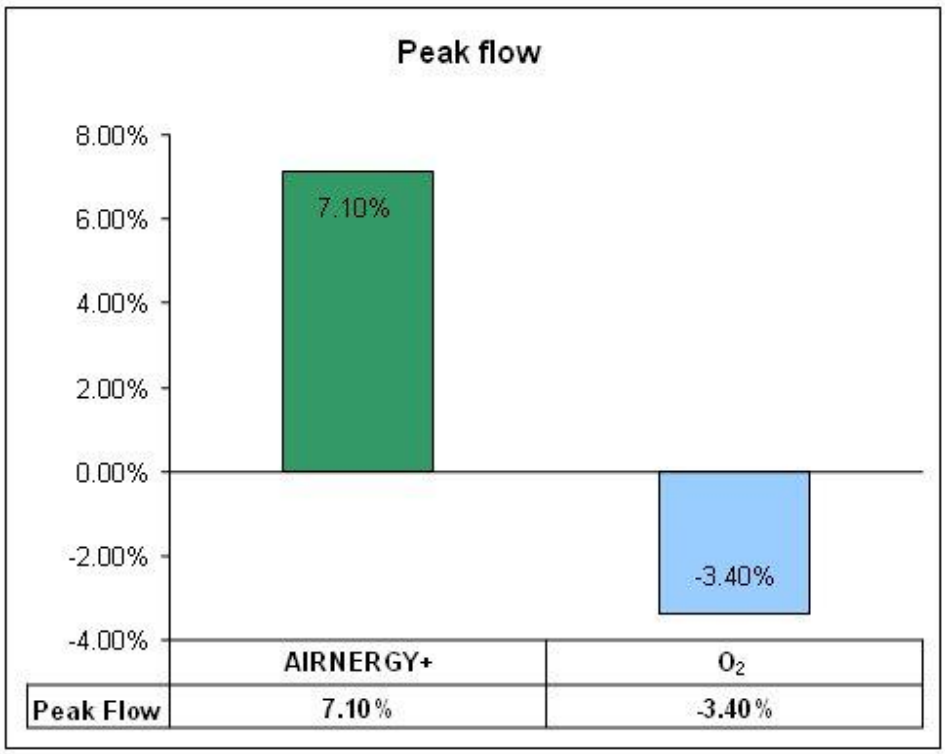

Figure 2: Proportional change in peak flow after a 20-minute inhalation with Airnergy activated air (Airnergy) or concentrated oxygen (O2). The difference between the peak flow values before and after Airnergy inhalation was statistically significant (p = 0.006). The difference between the peak flow values before and after inhalation with concentrated oxygen was significant at a level of 95% (p = 0.047).

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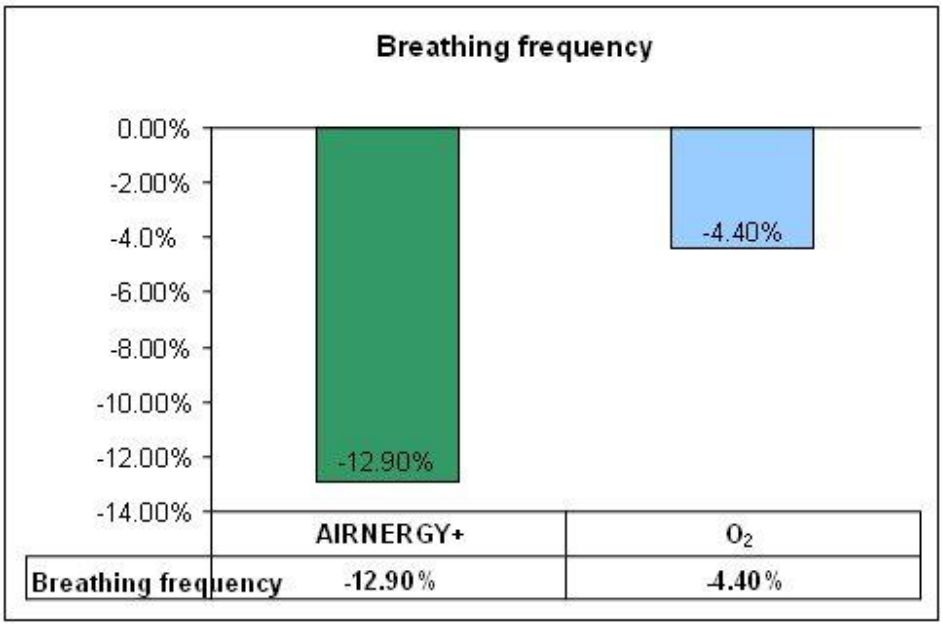

Figure 3: Proportional change in breathing rhythm after a 20-minute inhalation with Airnergy activated air (Airnergy) or concentrated oxygen (O2). The difference between the breathing frequency values before and after Airnergy inhalation was statistically significant (p = 0.005). The difference between the breathing frequency values before and after inhalation with concentrated oxygen did not reach the 95% level of significance (p = 0.5).

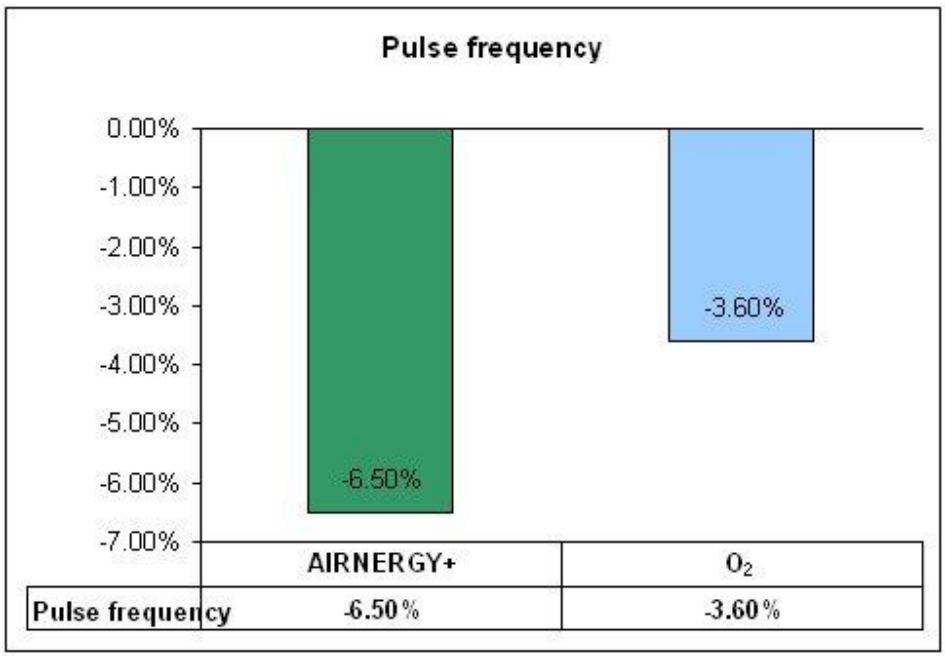

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Figure 4: Proportional change in pulse frequency after a 20-minute inhalation with Airnergy activated air (Airnergy) or concentrated oxygen (O2). The difference between the pulse frequency values before and after Airnergy inhalation was statistically significant (p = 0.002). The difference between the pulse frequency values before and after inhalation with concentrated oxygen did not reach the 95% level of significance (p = 0.1).

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