

*"Looking for that Edge  
in Performance?"*



## WARRIOR WISDOM | TO BREATHE OR REBREATHE THAT IS THE QUESTION?

By Dr. Frank B. Wyatt

That "one thing", or perhaps a combination of things that gives you the slight advantage over your competitors? You are not alone. Since time began (actually, I cannot verify this) man/woman has been looking for that device or "ergogenic" aide that will enhance their performance and move them up a notch on that proverbial podium. Myself included. So it was when I was contacted by Bas Rutten, former heavy-weight champion of Mixed Martial Arts (MMA) with a breathing device he developed and calls the "O<sub>2</sub>-trainer™".

The purpose of this breathing device is to restrict the intake of air (i.e., inspired ventilation) and thus lead to reduced oxygen intake. With reduced oxygen intake one works harder for any given workload. This is the same premise one faces when exposed to high altitudes. The pressure of oxygen at higher altitudes is reduced, leading to a reduced intake of oxygen.

The corresponding adaptations are why athletes sojourn to altitude in their training. These adaptations include the following: increased red blood cells, increased capillary density, increased mitochondrial density. If you were to analyze the physiological consequences of the aforementioned adaptations, you would realize that endurance performance is greatly enhanced through altitude acclimatization. However, there is an inherent problem with training at altitude: the ability to go and live at altitude. For most of us, the cost and time do not allow for any length of time to train in a place other than home. Unless...

You have been approached by a known athletic, celebrity figure to try out a device that could enhance your performance when used on a limited basis. And so it was when Bas contacted me to try out his O<sub>2</sub>-trainer™. Plus, even though I am a 4<sup>th</sup> Degree Black Belt in Taekwondo, I thought it would be in my best interest to comply with Mr. Rutten's request.

The user of the device places it into the mouth and breathes through two openings that can be altered in their inflow amount. By placing in the two openings different "holes" of varying circumference you can change the amount of restriction of air flow. Consequently, periodic use would theoretically provide adaptations similar to training at altitude.

Anecdotally, Bas reported to me that when he used the device his conditioning improved dramatically and as a reported asthmatic, his breathing was markedly better. As a researcher, I find it very important to gather anecdotal reports from individuals as this may lead to further investigations and/or interpretations of findings.

And so began my training with Bas Rutten's O<sub>2</sub>-trainer™. The surprise at what I experienced and subsequent search for answers has led me to further research. Upon first use of the apparatus there was noticeable difficulty in breathing in (inhalation) during ventilation (bulk flow of air). I struggled to get air in and in that struggle, I worked my ventilation muscles (i.e., diaphragm, intercostals) considerably. This is a real positive in training as research has shown that ventilation muscle fatigue during endurance events leads to decreased performance.

I was thrilled to find something that was definitely enhancing the amount of work my ventilation muscles had to do. But it was not just during inhalation that I struggled: I also discovered that I had to force my exhalation phase of ventilation to blow off the carbon dioxide (CO<sub>2</sub>) my body was producing during exercise.

This second realization lead me to investigate the subsequent physiological reactions and adaptations that could be associated with forced exhalation and re-breathing of CO<sub>2</sub>. Re-breathing CO<sub>2</sub> is termed hypercapnea. This occurs a little bit with each breath we take and blow out as our lungs fill with a mixture of gases.

Predominant in that mixture of gases and most utilized by the human body are oxygen and carbon dioxide. So with each breath we take we take in both oxygen and carbon dioxide. However, in some circumstances we may alter that normal mixture either by the environment we are currently in, by our own ability to ventilate (both inhalation and exhalation) or by utilizing a device that facilitates that alteration. So what may occur during this period of hypercapnea?

One obvious consequence of CO<sub>2</sub> re-breathing is that the aforementioned mixture of gases increases the pressure of carbon dioxide and reduces the pressure of oxygen. The later affect is similar to altitude. With reduced oxygen pressure during ventilation, muscle tissue becomes hypoxic (lack of oxygen) and early fatigue ensues.

One consequence to the device is a simulated altitude adjustment to work. Second, with reduced oxygen pressures and increased CO<sub>2</sub>, work at any given workload becomes harder. For example: if I am doing twenty squats with 50 kilos then by using the device I become fatigued at a lower repetition number with the same weight. This is a way to enhance the intensity of work. Third, another outcome of hypercapnea is increased opening of breathing passages. This is referred to as broncho-dilation. By enhancing this broncho-dilation, one can increase the bulk flow of air into and out of the lungs. This is perhaps the effect that Bas referred to with his asthma. Lastly, through the re-breathing of CO<sub>2</sub> one may actually stimulate the ventilation response to allow for enhanced movement of air into and out of the lungs. Carbon dioxide has been reported as a stimulant to ventilation so when increases are noted in the blood, ventilation is increased.

So the bottom line for any device and specifically the O<sub>2</sub>-trainer™, is the following: does it work to improve your performance? Based on the reactions of the body to forced inhalation (increased inspiration muscles) and exhalation and to the reactions I described above to re-breathing carbon dioxide I would have to say, "Yes". I am furthering my investigation with female cross-country runners to also see if use of this device increases red blood cell production. For this breathing enhancement device, I believe Mr. Bas Rutten is on to something.

You can find more information on this device through Google of Bas Rutten. However, I may suggest to Bas that he change the name to CO<sub>2</sub>-Re-Breather. Or perhaps not!