

## Indoor Training – Is the Indoor Air Quality (IAQ) in your training center ruining your workout?

By: Coach Peter Cummings

I have always been a stickler about my indoor training environment, or at least so I thought. Long ago I learned from reading studies that air movement is critical to cooling the body during exercise. The reason why we usually aren't dripping all over our bikes when outside, is air movement promotes the evaporation of sweat. In fact, it is air movement, and the evaporative cooling it promotes far above temperature and for the most part humidity that is responsible for us not over heat while exercising. This is why using a fan while indoor training is so important. If you don't use a fan try it and see. Your perceived exertion during similar workloads will be dramatically lower.

I have known this for a few decades and have always instructed my athletes to go out and get a big fan before the stores put them away in late summer. Recently, I found out that there is much more to the story of improving environmental conditions for indoor training than I realized and that if you really want to optimize your indoor training there are other things you must address.

A few months back I called my friend Joel Solly of Indoor Air Professionals. You see, my wife had pleaded with me for years to have the air ducts cleaned in the house. While attending a Bike team meeting which Joel was hosting at his office, both my wife and I immediately realized the quality of the air was pristine in Joel's place. Before leaving I asked Joel to send over a salesperson to speak with me about his services.

A week later in walks Gwen. She looked at the house and gave me a quote to get the air ducts cleaned. At the end of her presentation I asked why the air quality in their office at Indoor Air Professionals was so good. She explained that not only would duct cleaning help but an air purification system would decrease pollutants and particulates in the air of the home. She also mentioned that Joel would be very interested in using me and my training center as an example, which is why I am writing this article today. The findings were surprising if not alarming to me.

Joel stopped by a few days later with an Aircuity monitor. I guess you can think of it as the Black Box for air quality. It samples just about everything you can imagine from the air (temp., RH, CO, CO<sub>2</sub>, radon, ozone, small particles, large particles, and TVOC's) and stores the data in its memory for later retrieval and examination. After calibrating this Box with outdoor air samples we set it up in my office and training center. I was instructed to just do what I do here. Work, train and do an occasional load of laundry. My washer and dryer are both in an enclosed space within my office. While all this was going on the box was recording any changes in the air of this room.

I ignored the box. It sat up on the shelf in front of my desk with the display facing away from me. Joel didn't want the numbers to affect me. Then on the third day I finally got time for a workout. As I mounted the bike and set up my Computrainer I finally got a look at the numbers. I could see the humidity levels were at 55% and the Co<sub>2</sub> levels at 600 parts per million (PPM) and the temperature was

73 degrees and off I went to do a 1 hour steady state workout at about 65% of Vo2max. It was nothing too difficult or long but steady.

As I rode I started to see the numbers change. Remember, I have a 20 inch high volume fan on me helping to cool me and it is evaporation that is cooling ultimately. This means that the movement of air is essential and so are humidity levels ultimately. I have a dehumidifier in the room to keep humidity low and it is air conditioned. Within minutes I could see the humidity rising. 60%, then 65% and ultimately by the end of the hour it was at 75%. We are talking about a room with 8 foot ceilings, and is 12 feet wide and 15 feet long. In one hour my sweat evaporating and the water vapor in my breath increased 1440 cubic feet of air 20%! Temperature also rose 4 degrees Fahrenheit but the alarming part was the carbon dioxide (CO2) levels. CO2 is also measured in parts per million and will increase during exercise, you exhale CO2, thus will increase the levels as you breath harder. If levels get too high you begin to feel sleepy like in church or in an office space with many people in a closed space due to increasing the CO2 and decreasing the oxygen levels available in the room. Levels were at 600 ppm when I started which is a little above outside levels (typically between 350-450ppm) but I had already been sitting in the office and working at my desk since 8am. It was almost 2pm when I started my workout. Spoke with Joel and the normal readings he told me to look for are levels ranging under 800-1000ppm. Anything under 800-1000ppm are considered good levels indoors, but when they increase over 1000, they are considered on the higher side and over 1200-1500 start to get a little on the dangerous side if your exposed to that level for longer periods of time. Well in this one hour steady state ride I raised the CO2 levels to a little over 1500 ppm. I more than doubled the CO2 levels.

One other thing jumped out when we looked at the reports. I could see that something called TVOC's spiked very high then dropped shortly after they rose. Joel explained that TVOC's were Total Volatile Organic Compounds, which are compounds that off gas indoors. Common sources are housecleaning and maintenance products, like detergents and other chemical laden products that off gas like carpets, drapes, etc. High exposure to these TVOC's can cause many disorders and illnesses. So, when did these TVOC levels spike? Seemed like when I was doing laundry and when did I do Laundry? I did laundry while I rode. I thought it was a great way to multi-task. So, here I was exposing myself to high CO2 and high levels of TVOC and breathing as deep as possible. Not so goo huh?

Well, Joel sat down with me and I learned a few more things about indoor training environments. Here are some recommendations. On top of the big ass fan I have always recommended, crack a window in the room and if you have a ventilation fan in the house turn it on. This will pull fresh air into the room and help to keep CO2 from going to high. Use a dehumidifier. Keeping humidity low will insure there is room in the air for evaporation. 100% humidity means there is no room for water in the air. It is full. Lower humidity means more room for evaporation. Clear your area if all paints, gas cans, detergents and the like. You are planning on processing dozens of liters of air per minute. For example at moderate intensity I process about 80 l/min. 1440 cubic feet converts to 4077 cubic liters. So, I can process the entire volume of air in the room in just 50 minutes of one workout and that is a moderate intensity. If I were to add a few intervals and I can drop that time down to 30 minutes. Now consider this, my wife and I in the winter will often train in this room together!

For those of you that think, “Oh I like to sweat and be hot”, know this, these types of adverse environmental conditions do not create the type of stress that creates a positive training adaptation. They just ruin workouts and possibly damage your health.

I now use a mechanical air purification system in the room. It drops the parts of pollutants to crazy low levels. You can actually smell how clean the air is when you enter the room. I use an all-natural air purifier called Kanberra Gel which uses tea tree oil to eliminate the odors in the room. I also crack the windows and turn on the bathroom exhaust. The dehumidifier is on, the fan is on and now all I have to do is get on the darn trainer. Clean up your training environment and increase your health benefits.



Peter Cummings is a full time professional coach that specializes with training with Power meters and the use of the TrainingPeaks platform and WKO+. He was certified by the American College of Sports Medicine in 1993. He is a Certified and Licensed USA Cycling Level II Coach with Distinction, and Certified USA Cycling Skills Instructor. As a health club owner and coach he has directed and overseen the programming of over 10,000 individual and has been racing bicycles since 1991. His athletes have won 8 Nationals Championships, qualified for World Championships, won over 15 State championships and many other Local championships and races. He is available for consultations, presentations, testing, programming or coaching. Those interested can contact him at [Peter@Plan2Peak.com](mailto:Peter@Plan2Peak.com). For more articles on training and racing by Coach Cummings visit the Resource Page of [www.Plan2Peak.com](http://www.Plan2Peak.com).

