

Indoor Training – Is the Indoor Air Quality (IAQ) in Your Training Center Ruining Your Workout?

By: Peter Cummings, MHP, NNP

I've always been particular about my indoor training environment—or at least I thought I was. I've long known that air movement is critical to cooling the body during exercise. The reason we usually don't drip sweat all over our bikes when training outdoors is that air movement promotes the evaporation of sweat. In fact, it's air movement and the evaporative cooling it promotes—far more than temperature or humidity—that keeps us from overheating while exercising. This is why using a fan during 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've known this for decades and have always instructed my athletes to buy a big fan before the stores put them away in late summer. However, I recently learned that there's much more to optimizing your indoor training environment than I realized. If you truly want to get the most out of your indoor workouts, there are other factors you need to address.

The Importance of Air Quality

A few months ago, I contacted my friend Joel Solly of Indoor Air Professionals. My wife had been urging me for years to have the air ducts in our house cleaned, and while attending a bike team meeting at Joel's office, both my wife and I immediately noticed the pristine air quality. Before leaving, I asked Joel to send over a salesperson to talk about his services.

A week later, Gwen visited our home, assessed the situation, and gave us a quote for cleaning the air ducts. During her presentation, I asked why the air quality in their office was so good. She explained that, in addition to duct cleaning, an air purification system would reduce pollutants and particulates in the air. She also mentioned that Joel was interested in using me and my training center as an example, which is why I'm writing this article today—the findings were surprising, if not alarming.

Monitoring Indoor Air Quality

A few days later, Joel came by with an Aircuity monitor—a device that measures various aspects of air quality, including temperature, relative humidity (RH), carbon monoxide (CO), carbon dioxide (CO₂), radon, ozone, small and large particles, and total volatile organic compounds (TVOCs). After calibrating the monitor with outdoor air samples, we set it up in my office and training center. Joel instructed me to go about my usual activities—working, training, and even doing laundry—while the monitor recorded changes in the air quality.

I ignored the monitor, as it sat on the shelf in front of my desk with the display facing away from me. Joel didn't want the numbers to influence my behavior. On the third day, I finally had time for a workout. As I mounted the bike and set up my Computrainer, I noticed the initial readings: humidity at 55%, CO₂ levels at 600 parts per million (ppm), and temperature at 73°F. I began a steady-state workout at about 65% of VO₂ max, nothing too difficult or long, just steady.

The Surprising Results

As I rode, I watched the numbers change. Even with a 20-inch high-volume fan blowing on me, the humidity started to rise—first to 60%, then 65%, and by the end of the hour,

it was at 75%. This was in a room with an 8-foot ceiling, 12 feet wide and 15 feet long. In just one hour, my sweat evaporation and breath increased the humidity of 1440 cubic feet of air by 20%! The temperature also rose by 4°F, but the most alarming change was in the CO2 levels. CO2 levels, measured in ppm, naturally increase during exercise as you exhale more CO2. If the levels get too high, you can start feeling sleepy, like what happens in a stuffy room or office with poor ventilation.

When I started, CO2 levels were at 600 ppm, which is slightly above outdoor levels (typically 350-450 ppm), but I had already been sitting in the office working since 8 a.m. I began my workout around 2 p.m. Joel told me that CO2 levels under 800-1000 ppm are considered good indoors, but when they exceed 1000 ppm, they're on the higher side, and over 1200-1500 ppm can be dangerous if you're exposed for long periods. During my one-hour workout, CO2 levels climbed to over 1500 ppm—more than double the starting level.

Another surprising finding was the spike in TVOCs, or Total Volatile Organic Compounds, which are emitted by products like detergents, cleaning supplies, carpets, and more. High exposure to TVOCs can cause various health issues. The TVOC levels spiked while I was doing laundry during my ride—what I thought was a great way to multitask turned out to be exposing myself to high CO2 and TVOCs while breathing deeply. Not so good, huh?

Improving Your Indoor Training Environment

Joel and I sat down to discuss these findings, and I learned a few important things about indoor training environments. Here are some recommendations:

- Use a fan: I've always recommended this, but in addition, crack a window in the room and turn on any ventilation fans in the house. This will help bring in fresh air and keep CO2 levels from rising too high.
- Use a dehumidifier: Keeping humidity low ensures there's room in the air for sweat to evaporate. At 100% humidity, the air is saturated, leaving no room for evaporation.
- Clear your area of chemical-laden products: You're planning on processing dozens of liters of air per minute during your workout. For example, at moderate intensity, I process about 80 liters per minute. In a 1440 cubic foot room, I can process all the air in just 50 minutes—and that's at moderate intensity. Add intervals, and I can do it in 30 minutes. My wife and I often train together in this room during winter!

For those who think, "Oh, I like to sweat and be hot," know that these types of adverse environmental conditions don't create the kind of stress that leads to positive training adaptations—they just ruin workouts and potentially harm your health.

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