

Building an Aerobic Power Base

by Peter Cummings, MHP, NNP

In my article, *'Periodization: What Is It and Why Should I Use It?'*, I mentioned that the Aerobic Base Phase is the most important phase of training. The reason is simple: the aerobic energy system supplies the foundation for all efforts in our sport. To develop a solid Aerobic Power Base, we must first define and understand it.

Understanding the Aerobic Base or Aerobic Metabolism

"Aerobic" refers to processes that occur in the presence of oxygen. The "Base" in aerobic training refers to the power generated by the oxygen system, as opposed to anaerobic or creatine phosphate systems. This oxygen system generates energy in a highly efficient manner compared to the anaerobic or creatine phosphate systems. The Base is also about the extended use of this system over time.

When visualizing your Aerobic Base, think of it in terms of a highly efficient energy system that can be utilized for both duration and capacity. The duration represents the duration you can sustain a given 'aerobic' pace, while the capacity represents the power or wattage that can be sustained aerobically over that time. A base of significant duration implies you can ride at a steady pace for long periods, while a base with significant capacity implies you can sustain a high-power output for a long time.

The Role of Aerobic Energy Metabolism

Aerobic energy is the primary energy source in any endurance sport and is crucial in almost every cycling discipline. The bigger the aerobic system, the less anaerobic energy is needed at any given speed. In large part this is purpose of the base, to spare

anaerobic energy. Since anaerobic energy is limited and has a metabolic cost, riders with a strong aerobic system can conserve their anaerobic energy for critical moments in a race, while those with weaker aerobic outputs must tap into their anaerobic reserves earlier. This will drain glycogen reserves much quicker in these athletes.

Developing the Duration and Capacity of Your Base

To develop the duration of your aerobic base, you must stay in the aerobic zone for extended periods. The exact duration is individual and changes with fitness levels. To determine your current base, you need to measure performance and perceived exertion. Power meters are particularly useful here as they measure continuous performance in watts and perceived exertion through heart rate (HR). By comparing wattage (performance) with heart rate (exertion), you can identify when you're exceeding your aerobic base. Blood lactate measurements can help validate what is being seen in power and HR data.

When heart rate drifts above expected levels for a given wattage, you're moving beyond the edge of your base, and this is where building duration begins. This is the point at which the system is stressed beyond its current capacity, leading to fitness gains when the stress is applied in the proper dose (frequency, intensity, and duration).

Factors Affecting Aerobic Base Workouts

Dehydration, poor air circulation (especially indoors), poor electrolyte balance, and inadequate refueling can negatively impact aerobic base workouts. Controlling these variables is essential for effective training. Proper hydration, nutrition, electrolyte replacement and using fans during indoor training can help ensure that the stress response being seen in the data is physiologic and not environmental.

As for the capacity of your base, or power output at aerobic threshold, athletes using power meters have a significant advantage. Heart rate users might inadvertently limit their progress by backing off intensity to stay within prescribed HR zones, potentially preventing the necessary over-reaching that stimulates adaptation. Over-reaching, unlike overtraining, is about slightly surpassing previous limits to encourage growth. Heart rate users need to be highly attuned to intensity and exertion to achieve similar results.

Pushing the Edge

How far past the edge should you go? This varies by individual. The key is to apply just enough excess load to stimulate adaptation without overtraining. A good starting point might be to ride 20 minutes past the edge at a consistent performance level (wattage for power users, gear plus cadence for HR users). However, this level of stress should not be applied every week—one long, slow aerobic base workout per week is typically sufficient, though some studies suggest more frequent stress can be beneficial. The general rule is the more developed and fit the athlete the more training stress can be used with positive adaptation still occurring.

When to Move On

How long should you continue building your aerobic base? This depends on the law of diminishing returns. Eventually, the time and energy required to continue development may outweigh the benefits. If your base is sufficient to support your longest priority events, it may be time to transition to the Build phase. If not, more time and energy must be invested—there are no shortcuts.

Maintaining Your Aerobic Base

Once established, maintaining your aerobic base is simple. A workout of similar intensity and length to the level you've established, performed once a week, is generally sufficient.