Optimize Your Training *off* the Bike

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[Velo News, Vol. 34/No. 7, April 25, 2005]

Effective training has many components: proper intensity, sufficient volume, intelligent nutrition, and a balanced psychological approach. While each of these components plays an important role, the most important part of effective training actually happens off the bike: recovery. The process of physical training literally breaks us down, both physically and mentally, and it is only during the recovery from training that we build resilience, power and endurance. Without proper recovery, the damaging effects of training accumulate and can lead to burnout, overtraining or injury.

Most competitive cyclists have little difficulty training hard, devoting plenty of energy to their physical training. While it is essential to apply workloads that stress the body beyond its current state in order to improve, benefits are realized only when recovery from the training occurs, as the body rebuilds itself and adapts to a higher level of power or endurance. Recovery is as important a part of training as the physical training itself.

The rate of recovery is important for competitive cyclists, particularly as they commonly train and race on consecutive days. A proactive approach, following some basic guidelines can speed the rate of recovery, improving performance potential for subsequent workouts or on back to back race days. We can divide proactive recovery into three main categories: refueling, rebuilding and restoring.

Refueling for Recovery

The primary fuel during exercise, especially at moderate to high intensities is carbohydrate stored as glycogen. Muscle glycogen is a “fast” fuel located directly at the site of work production, and its depletion leads to fatigue, reducing peak sustainable power. Logically, replenishing muscle glycogen stores after a race training session becomes a priority for optimal recovery. Furthermore, sufficient carbohydrate intake before and during endurance exercise may help reduce stress on the immune system inherent in prolonged and intense training.

The timing of replenishing glycogen can affect the rate of recovery. The most current research has demonstrated a window of opportunity within the first 30-60 minutes immediately following exercise in which carbohydrates are more quickly stored as glycogen. This accelerated rate gradually slows over the next few hours to a normal, resting level. After a glycogen depleting exercise session, such as a long training ride or race, the highest post-exercise glycogen resynthesis occurs when ingesting at least one gram of carbohydrate per kilogram of body weight in that first hour. For a 150 lb cyclist, this translates to approximately 68 grams of carbohydrates.

The type of carbohydrates consumed during this period can also make a difference. High-glycemic carbohydrates appear to be the most effective during the 30-60 minute post-exercise window. While some research has suggested that including a small amount of protein improves the rate of glycogen storage, there is also evidence showing no

improvements when adding protein. Given that protein is an essential component for rebuilding tissue and that it does not limit glycogen storage, it makes sense to take in both. There are numerous recovery drink mixes that use a carbohydrate/protein ratio of 3:1 or 4:1, simplifying the process for you.

Hydration

Re-hydration is arguably the most important element of refueling for recovery. Intense exercise can cause a large loss in fluid, and in hotter conditions, endurance athletes can lose as much as three liters of sweat per hour. A fluid deficit of as little as 2% of body weight can impair performance, emphasizing the importance of hydration as part of optimal recovery. Try to take in at least 16-20 ounces of fluid for every pound of body weight lost during a training session or race. It is also important to recognize that the thirst mechanism is delayed compared to your body's hydration needs. Drink before you're thirsty on the bike, and consume the appropriate amount of fluid during recovery regardless of thirst.

Minerals such as sodium, potassium, chloride, calcium and magnesium are lost through sweat. A mineral imbalance can negatively affect muscular contraction and hormone function. Replacing the minerals that are lost in the highest quantity (sodium & potassium) can be easily achieved using many of the common sports drinks available today.

Vitamins and minerals play an important role in energy production. For example, the mineral iron is essential for carrying and transporting oxygen in the blood. Vitamins such as B_1 and B_2 are involved in metabolizing fuel for working muscle. The vitamin and mineral needs of most athletes are satisfied with a well balanced diet. If you suspect that you are lacking in some areas of your diet, a multivitamin antioxidant may help fill some of the nutritional gaps. Antioxidant vitamins such as C, E & beta carotene appear to help reduce some of the damage from oxidative stress in muscle. Keep in mind that vitamin supplements should not replace a balanced diet, as nutrients are best obtained from wholesome foods.

Rebuilding for Recovery

Protein is an essential element in the structure of every cell. Without it we would not be able to repair the muscular damage caused by training. Furthermore, amino acids (which form proteins) play an important role in metabolism and in regulating blood glucose levels, directly affecting the fueling of muscle.

The optimal amount of dietary protein intake has been argued over extensively, and is still not entirely agreed upon. For endurance athletes, the ideal amount appears to range somewhere between 1.0-1.6 grams of protein per kilogram of body weight per day. This suggests that a 150 lb. cyclist should consume between 68-109 grams per day. While this is clearly a wide range, the timing of protein intake should also be considered. For example, when tissue repair is critical to recovery, such as during periods of significant

increase in volume or intensity, protein needs may be closer to the higher end of the range, while less intense training phases may require a slightly lower protein intake.

Sleep

During sleep, the body goes through its most significant regenerative processes, which include the production of growth hormone (GH). GH stimulates rebuilding of muscle, improves the delivery of fuel to muscle and stimulates fat metabolism. Taking a brief nap during the day can provide additional GH release, potentially improving recovery. The duration of a nap need not exceed 20-30 minutes to be effective.

Sleep also supports proper mental functioning such as memory and other important tasks required for optimal cycling performance. Sleep deprivation, on the other hand, can affect maximal exercise performance, reducing exercise time to exhaustion by as much as 20%. Loss of sleep can also increase your perceived effort during exercise, with potentially adverse affects on your confidence and motivation.

While researchers are not certain of the optimal volume of sleep for athletes, it is clear that sleep deprivation can hinder performance and recovery. If your mental focus seems impaired after a limited number of sleep hours, or your perception of effort on the bike seems higher than it should, try gradually increasing your hours of sleep until feeling clear minded and strong on the bike again.

Restoring for Recovery

Intense physical training stimulates the stress response (sympathetic division) of the nervous system. Stress hormones are produced that increase the breakdown of glycogen for fuel and damage muscle tissue, while placing strain on the immune system as well. Conversely, the counterpart of the stress response in the nervous system (parasympathetic division) is naturally enhanced during periods of rest or while digesting a meal. When the parasympathetic “counter-stress” response takes over, restoration and recovery are enhanced.

Psychological stress produces a similar response as intense exercise even when not exercising. You can promote the restorative effects of recovery by reducing sympathetic activity and encourage parasympathetic activity whenever possible. For example, restorative Yoga poses support parasympathetic activity, enhancing recovery. We can also train this response in the brain in a similar way that we train the body on the bike. By *practicing* relaxation, the mind learns to reduce sympathetic stimulation off the bike, minimizing the stress response when it is least needed.

Musculoskeletal alignment refers to creating and maintaining the natural and full range of motion in the joints, muscles and connective tissues of the body. Flexibility and joint alignment allow optimal movement patterns. Flexibility can also describe a tissue’s ability to change in length or form without injury. Restoring muscle tissue to its natural length from a chronically contracted state can improve its ability to produce force. Good

flexibility also supports joint health through improved lubrication and prevention of injuries. Alignment-based stretching, such as in certain styles of Yoga can help improve these restorative aspects of recovery.

Massage is a commonly employed recovery tool for cyclists. It is interesting that little scientific evidence supports performance benefits from massage other than a reduction in perceived effort. Nonetheless, massage can increase circulation to a given area, nourishing heavily worked muscles with fresh blood to help repair and restore damaged tissue. Massage can also assist in realigning overworked joint movement patterns, such as the repetitive motion of pedaling for hours in a bent-forward position. Even self-massage can be a restorative practice. Lie on the floor with your legs elevated (feet against a wall or on a chair), use massage strokes that are not too deep, yet flush the muscles with fresh blood. The healing effects of massage are apparent to those who take advantage of this recovery tool.

Elements of Optimal Recovery

Refueling

- Replenish glycogen stores within 30-60 minutes following a workout or race. Take in one gram per kilogram of body weight of high-glycemic carbohydrates.
- Consume 16-20 oz of fluid per pound of weight lost during exercise.

Rebuilding

- Consume adequate protein (1.0-1.6 gm/kg/day), especially during intense period of training or racing.
- Sufficient sleep is important for optimal growth hormone production and rebuilding and repairing damage. “Power naps” of 20-30 minutes also help do the job.

Restoring

- Minimize the stress response off the bike to maximize restoration. Practice calming the mind and recovery will improve.
- Stretch or practice alignment-based forms of Yoga to restore muscle/connective tissue and joint alignment.
- Massage is a long-time recovery tool of the cyclist. Take advantage of its restorative effects.

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