

## **Optimize Your Training When Not Training**

By Dario Fredrick

Effective training has many components: proper intensity, sufficient volume, intelligent nutrition and a balanced psychological approach. While each of these components plays a key role, the most important part of effective training actually happens when not physically training - during recovery.

Most competitive athletes have little difficulty pushing themselves, devoting plenty of energy to physical output. 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 training occurs. The body must rebuild itself to adapt to a higher level of power or endurance. Without proper recovery, the subtly damaging effects of training accumulate and can lead to burnout, overtraining or injury. Recovery is as important a part of training as the physical training itself.

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

### **Refueling for Recovery**

The primary fuel during exercise is carbohydrate stored as glycogen. Muscle glycogen is a “fast” fuel located around muscle and in the liver, and its depletion leads to fatigue, reducing peak sustainable power. Logically, replenishing muscle glycogen stores after a race or training session is a priority to optimize recovery. Also, sufficient carbohydrate intake before and during endurance exercise can help reduce stress on the immune system inherent in prolonged and intense training.

The timing of replenishing glycogen affects how quickly you recover. A window of opportunity exists within the first 30-60 minutes immediately following exercise in which ingested 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 athlete, this translates to approximately 68 grams of carbohydrates (divide weight in pounds by 2.2). High glycemic carbohydrates (simple sugar) appear to be most effective during the post-exercise window. Some research has suggested that including a small amount of protein improves the rate of glycogen storage as well. 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. If real foods are not available, there are numerous sports recovery foods and 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. 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, and consume the appropriate amount of fluid during recovery regardless of thirst. Minerals such as sodium, potassium, chloride, calcium and magnesium are also lost through sweat and 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 and mineral supplements 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 B1 and B2 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 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 1.0-1.8 grams of protein per kilogram of body weight per day. This suggests that a 150 lb. (68 kg) athlete should consume between 68-120 grams daily. 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 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

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 effects 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 seems higher than it should, try gradually increasing your hours of sleep until feeling clear minded and strong again.

### **Restoring for Recovery**

Intense physical training stimulates the stress response of the nervous system. Stress hormones are produced that increase the breakdown of glycogen and muscle tissue, while challenging the immune system as well. Conversely, the counterpart of the stress response in the nervous system is naturally enhanced during periods of rest or while digesting a calm meal. When the “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 and meditation support parasympathetic activity, enhancing recovery. We can train this response in the brain in a similar way that we train the body during exercise. By practicing relaxation, the mind learns to reduce the magnitude of the stress response, minimizing the detrimental effects.

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 injury. 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 athletes. 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. Even self-massage can be a restorative practice. 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 (1.0-1.8 gm per kg per 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 when not training to maximize restoration. Practice calming the mind and recovery will improve as well.
- Stretch or practice alignment-based forms of Yoga to restore muscle/connective tissue and joint alignment.
- Massage is a long-time recovery tool of successful athletes. Take advantage of its restorative effects.

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