



FACT SHEET

Strength & Conditioning



US Women's Alpine Team enjoying food and rest during their 2010 Speed camp in Portillo, Chile.

RESTING FOR PERFORMANCE

Biologists love to argue over the definition of fitness, but one interpretation might refer to fitness as the ability of an organism to survive and persist in its natural surroundings (Abrams 2009). In nature, organisms inherently conserve energy in order to survive. For example, a black bear knows it will jeopardize its survival if it doesn't hibernate in winter. If the bear attempted to hunt and forage throughout the winter, it would expend far greater energy than it would gain from the limited food supply available during the winter. Naturally, the bear conserves energy, or rests, in order for it to maintain a higher level of fitness. It utilizes rest to enhance its ability to survive.

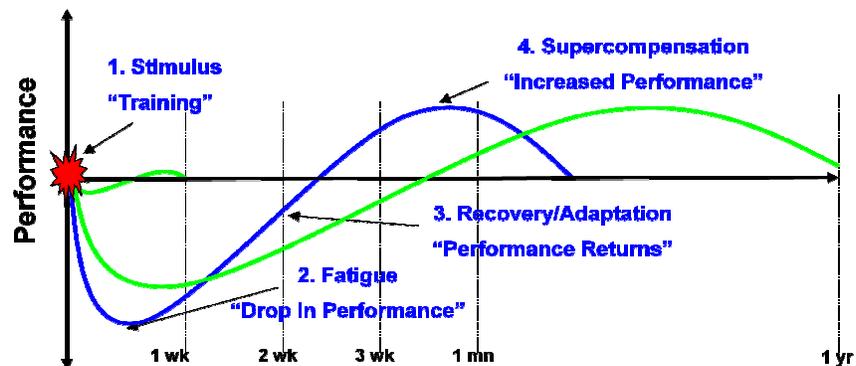
If we apply the biological definition of fitness to sport, then fitness could be defined as the ability of an athlete to survive at a high level of competition. In the same way that the aforementioned bear takes advantage of a period of rest to increase its own fitness, so should athletes.

A Recipe for Recovery:

- Next to sleep, inactivity is one of the best strategies to maintain a high level of performance over time.
- Adaptation and tissue maintenance is most effective during rest. Enhance this by maintaining optimal nutritional strategies not only during training, but during rest periods too.
- Utilize recovery modalities to maintain performance during times when the competitive or training schedule doesn't allow more rest.
- Listen to your body. Push when your body lets you, and rest when your body demands it.
- Use a journal to keep track of your daily and weekly training routines, and how those routines might affect performance on a short- and long-term basis.
- Training that is more demanding requires more rest than easier training. Training that extends over the course of several days requires more rest than shorter training blocks.
- Communicate with coaches about your need for more rest in your performance plan. They will listen.
- Talk with your Sport Science staff about how to effectively plan rest into a long term performance cycle.

How Does Rest Relate to Performance?

Chiu and Barnes (2003) summarize the Fitness-Fatigue model, one of the most common theories used in sport to describe how varying levels of fatigue and fitness caused by different training modalities (i.e., skiing/snowboarding, dry-land, etc.) add up to enhance, or inhibit performance over time. In general, the fitness-fatigue model states that after (1) a physical stimulus such as skiing or snowboarding, (2) there will be period of fatigue in which performance drops because the fatigue outweighs the fitness benefits of the different training modalities. If adequate rest is allowed, then (3) proper recovery and adaptation will allow a return to original performance in which intensity, but not so much volume, can be ramped up to (4) a time when performance actually increases beyond that which was previously capable. This process can happen at different levels over the course of days, weeks, months, and years.



Fitness-Fatigue Model

Rest is an integral component of this theory. Without rest, this process cannot take its full course. Forget about enhanced performance. Failing to plan for rest is planning for lower and lower performances because the body never has an opportunity to overcome the constant training stress generated from both on-snow and dry land training; the body reaches a state known as overtraining.

What Happened to Rest in Sport?

Athletes, coaches, and conditioning staff constantly strive to push harder and to do more both on-snow and in the gym. In theory, increasing demand will ultimately yield greater adaptations toward skill and performance. Hence, fitness, and performance, should increase over time. Unfortunately, in the pursuit of excellence, we constantly overlook the need for rest. In *Science and Skiing II* (2001), Hanin states, "The predominant emphasis in elite sport is on the volume and intensity of work loadings. Typically, the recovery is seldom systematically related to the amount of work done...athletes and coaches do not perceive recovery as an integral part of the performance process." While we consistently utilize various recovery modalities (i.e. recovery spins, ice baths, hot-cold baths, pool sessions, compression garments, physio treatments, etc.) to ensure performance maintenance on a day to day basis, long term maintenance of performance can only be accomplished with a proper nutritional strategy, as well as a proper work to rest ratio.

How Does Fatigue Take Away From Fitness?

Many additive variables contribute to success, or fitness, on competition day. Unfortunately, rest often falls at the bottom of the list. In the presence of fatigue, both acute and long-term, many fitness producing components will suffer. The following list is not conclusive, but highlights how fatigue can negatively impact some of the most important performance variables:

- **Skill Development & Execution** – Research heavily reports the notion that fine motor control, or skill, becomes jeopardized during a fatigued state. When a MLB pitcher gets tired from too many consecutive days of pitching or from too many innings in a single game, he loses accuracy. Further, skill development loses efficiency when an athlete constantly trains in a fatigued state.
- **Equipment & Tuning** – Equipment is only as good as the athlete using it. If fatigue takes away from an athlete's ability to perform, even the most finely tuned equipment can lose its effectiveness.
- **Focus, Concentration, and Decision Making** – Fatigue and stress often increase anxiety, which can diminish the focus and concentration needed during competition. Fatigue can also reduce reaction time. Anxiety can also destruct concentration in a way that makes a familiar venue suddenly unfamiliar. Together, fatigue can inhibit the ability to react to and to make fast, proper decisions during competition. As a result, confidence and performance suffer.
- **Coach/Athlete Interaction** – Fatigue can sneak in to increase irritability and decrease concentration in a way that an athlete may not be able to grasp everything his or her coach has to offer. Additionally, self-demeaning thoughts can create a pessimistic view toward a coach's encouragement.
- **Nutrition** - Many of the beneficial processes of nutrition and metabolism occur during a rested state. If rest is not adequate, nutrition cannot provide its utmost potential.
- **Strength & Conditioning** - During the summer of 2010, the USSA High Performance team monitored athletes on a daily basis to evaluate changes force and power. They observed significant daily fluctuations which ebbed and flowed over the course of weeks. When load was high, these abilities dropped. When rest was high, these abilities increased. If sport-specific qualities are affected based on training load and rest intervals, then it's easy to see how performance can be improved with proper rest strategies.

What is the Proper Recipe for Rest?

In the same way a hibernating bear or a deciduous tree requires periods of rest to enhance fitness, so do athletes. Unfortunately, rest doesn't come as naturally to competitors, and it should become a part of one's overall performance plan. Pure rest, both sleep and inactivity, is one of the best ways to aid recovery and ensure consistent performance over the course of a season and to increase longevity throughout a career. Remember, elite athletes are already good at what they do. Sometimes, too much training during the season can actually take away from competition day. The side bar above illustrates various ways in which an athlete can begin to build more rest into his or her performance strategy.

References

1. Abrams, Marshall. 2009. What determines biological fitness? The problem of the reference environment. *Synthese*. Vol 166 (1): 21-40.
2. Chiu, Loren, & Jacque L Barnes. 2003. The fitness-fatigue model revisited: implications for planning short- and long-term training. *Strength and Conditioning Journal*; 25 (6): 42-51.
3. Hanin, YL. 2001. Emotion-motivational profiling in skiing – an individualized assessment program. *Science and Skiing II*. Eds. E. Muller, H. Scwameder, C. Raschner, S. Lindinger, and E Kornexl. Universitat Salzburg: 688-705.