

Detraining for Endurance Athletes By Chad Butts

Many athletes look to the off-season as a time to recover and recuperate from a long season. Small injuries and muscle imbalances may have developed due to the nature of repetitive activities such as running and cycling, and athletes rightly look to the off-season as a time to focus on correcting these imbalances. However, many endurance athletes make the mistake of not doing enough targeted training in the off-season and lose most, if not all of the fitness gained. Training from scratch the following year only yields mediocre results and similar fitness gains to the previous year's levels. As an endurance athlete you want to see continual improvements from year to year and the only way to accomplish this is to maintain most adaptations from year to year. Yes, the off-season should be a time of recuperation to re-energize the body and mind, but focused effort on training is necessary to prevent your gains from slipping away.

For endurance athletes, it generally takes about 10 years of periodized training to reach peak lifetime fitness. Just look at the ages of many of the top pro cyclists or endurance athletes. Many are in their late 20's to early 30's. These are athletes who started training seriously in their early teens.

So how quickly do you lose fitness in the off season? Following complete cessation from training your VO_{2max} can decrease in as little as 3 weeks. Decreases in VO_{2max} can be as much as 14%. The primary mechanism, or the most rapidly affected component of this decrease is blood plasma volume; you simply have less blood. Blood plasma starts to decrease in as little as 2 days of no training. Most of this decrease is due to a reduction in the water content of the blood. Blood volume can decrease by 12% after 4 weeks of no training and 9 % of this is due to less water. The other 3% is due to lower red blood cell volume (Coyle). Highly trained athletes can lose as much as 25% in as little as 2-4 weeks of inactivity (Moore). As a rule it is never good to lose more than 10% of your peak fitness from the previous year if you are looking to see continual gains from year to year.

Detraining reduces your muscle's storage capacity for carbohydrate and glucose. Mitochondrial density of the muscle fibers (the cell parts responsible for breaking down carbohydrates and fat for energy) begins to decrease in as little as 4-5 days of no training. . Capillary density is one of the least affected factors with detraining. With training, the amount of capillaries in and around the muscle fibers increase, supplying more oxygen and nutrients to the muscle. This adaptation is slower to decrease following inactivity than others, but it also takes the longest to acquire.

Lactate threshold is the single best predictor of endurance exercise performance, and takes years of proper training to reach genetic potential. This is also one of the most trainable factors influencing endurance performance. As little as one week of detraining can lead to decreases in lactate threshold.

To summarize, detraining can affect different components of fitness at different rates. Muscle oxidative enzyme levels and mitochondrial density are one of the first factors affected by detraining. Blood plasma levels are the next to decrease followed by energy storage capacity of the muscles and capillary density. On average, the adaptations gained from endurance training can be lost with a half-life of about 12-14 days. That means that in about 2 weeks of no training you could lose up to 50% of the training you gained.

While the off season is the time to take a break from regular and structured training, if you wish to see continual fitness gains from year to year a stripped down and structured training plan should be designed to maintain your fitness gains while offering

time for recovery. In a well-structured plan, training volume can be decreased as much as 80% while maintaining fitness over the winter.

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