Strength Training for Endurance Athletes

A year-round strength routine for developing cycling specific strength, endurance and power.

Introduction

Strength training is an essential component to the endurance athlete’s annual training plan. Muscular strength is the basis of all movement. As endurance athletes we rely on our aerobic system to be able to produce virtually endless muscular contractions required to swim, bike, and/or run over our specific distances. However, we are limited at just how much force can be applied to those contractions based on the maximum strength our muscles have to work from. Put simply, the more weight you can move in one repetition directly relates to how forcefully you can pull during your swim stroke, pedal your bike and push off on your running stride.

In addition to increasing the amount of force you can apply to forward motion, strength training has several other benefits including improving your body composition. Strength training develops lean muscle mass. Lean muscle mass utilizes more calories than fat. The more muscle mass you have, the more energy you are using even at rest. This shift in caloric usage leads to leaner total body mass. Basically, increased muscle mass burns more fat and makes you leaner and faster.

Other benefits of strength training include strengthening of tendons and ligaments that help stabilize joints and reduce the likelihood of injury. An increase in bone density occurs with weight training as does overall health and longevity which is important for older athletes and as we age. Finally, the changes we see in our physique from strength training are positive ones. Looking in the mirror and seeing a strong, fit body in the reflection does wonders for our self-esteem and psyche. These components of mental strength are every bit as critical on race day as the extra force you are able to produce repeatedly as you swim, bike and run your way to faster finishes.

Many endurance athletes fear that strength training will cause them to bulk up too much and make them slower. I promise this will not happen. It takes years of strength training and very different routines and exercises to add significant bulk. Strength training for the endurance athlete is geared towards improving your force producing strength and core strength which leads to a stronger, fitter, faster and healthier athlete.

Exercises

The specific exercises chosen for endurance athletes are specific to the movements of cycling, running and/or swimming; ie. “Functional Movements” for forward motion. Exercises are identified as developing propulsive force, recovery strength, and stabilization for the particular movement. The propulsive and recovery movements are performed together as a “super-set”. The stabilization exercises are performed following the propulsive/recovery sets. For example, you want to perform the propulsive exercise and recovery exercise together as a “super-set”; for example performing a set of step-ups followed by a set of standing leg-pulls, rest, and then repeat for remaining sets. Once all sets are completed, then move on to the next propulsive and recovery exercise super-set and finish with the hip stabilization exercise set to complete your lower-body exercise routine. Upper-body exercises are then performed in a similar fashion, followed by core strength exercises.
The specific exercises will remain the same throughout your strength training regimen. What will change, based on the goal of the session and phase of training, are the number of sets and repetitions you will perform, the manner in which you perform each repetition and the load of resistance you are using.

Determining Load

Strength training for endurance athletes requires a different load structure than typical strength training for increased mass. A common method for determining the amount of weight you should be lifting for a particular exercise is using a percentage of your 1-rep maximum (1RM), the maximum amount of weight you could lift for a single repetition. Determining your 1RM is a stressful endeavor since it requires you to “max-out” to find this level of resistance. This method is not recommended as it requires assistance and can leave you sore (or possibly injured) for several days. Estimating your 1RM is often a safer method.

Endurance athletes should never lift to exhaustion. This means as you complete a set, regardless of the specific type of session you’re doing, you should always be able to perform another two or three reps with the load you are using. This means if your set requires you to perform 8 repetitions, you should use a load that you could perform 10 repetitions where you would fail (or be unable to perform without assistance) on the tenth or eleventh repetition. Likewise if your set required 20 repetitions, you would select a load that you could perform 22 repetitions and unable to complete a 23rd rep. The key here is that you never perform a set to failure since you are always completing your set using a weight that you could perform 2 more lifts without assistance.

When performing an 8-rep set at a load that you could perform 10 reps and failing at 11 would be equivalent to using a load of approximately 85% of your 1RM. When performing a 20-rep set at a load that you could perform 22 reps and failing at 23 would be equivalent to a load of approximately 50% of your 1RM. By performing your exercises at these prescribed loads and number of reps you are prevented from ever lifting to failure. This leads to a safer and more productive level of stress and adaptation than often experienced with typical weight training. Less soreness is experienced so you can continue to train on a daily basis without interruptions.

The load and number of sets and repetitions you perform for a particular session varies based on the type of the session you are performing.

5 Types of Strength Training Sessions:

1. Adaptation
2. Strength
3. Endurance
4. Power
5. Maintenance

1. Adaptation

The first phase of any strength training program is Adaptation. You must begin strength training very conservatively to avoid injury and unnecessary soreness and discomfort. This can be achieved by spending your first several sessions using very light weight and performing only two sets of each exercise with 12 repetitions per set at approximately 50% of your 1RM. These minimal stress sessions allow you to get familiar with your routine, where your weights and machines are located in your gym and allow your muscles, tendons and ligaments to adapt to the training load gradually. Your first few sessions should be extremely easy, so opt for the lighter weights and gradually increase the weight loads with each session. An Adaptation set is also used as a warm-up performed as the first set of every type of individual session.

2. Strength

The second type of training is Strength. As a specific focus phase, this phase can last as long as several weeks in addi-
tion to being utilized throughout most endurance athletes annual training plan to maintain strength gains throughout the year. This type of training requires the highest levels of resistance, most amount of sets and lowest number of reps per set. The goal with these sessions are to develop maximum force production. A typical session includes an Adaptation set as a warm-up (1x12 @ 50% 1RM) followed by two to three sets of eight repetitions at 85% of your 1RM. The movements of the individual reps should be slow and controlled to minimize stress and chance of injury.

3. Endurance

Once your force production has increased with Strength sessions, you can begin to increase your ability to produce more force repetitively with Endurance sessions. Endurance sessions are typically performed on a weekly basis along with weekly Strength sessions. A typical Endurance session includes an Adaptation set as a warm-up (1x12 @ 50% 1RM) followed by two sets of twenty repetitions at 50% of your 1RM. The movement of the individual reps is the key in the Power phase. You want to perform the contraction part of the movement in a quick, explosive manner. The recovery part of the movement should be very slow and controlled. For many athletes a Power session will be combined with an Endurance session to save time and energy. These combined sessions are done as one Endurance set of twenty reps at 50% 1RM (trains Endurance while providing warm-up for Power sets), followed by two Power sets of six reps at 50-60% of your 1RM.

4. Power

Power sessions bring the maximum force production developed with Endurance sessions together to develop the explosive power needed when swimming, cycling and/or running at higher velocities. In Power sessions you concentrate on moving moderate amounts of resistance very quickly. Despite the lower levels of resistance, reps are kept very low because the amount of work you are performing is still quite high due to the explosive nature of the movements. Power sessions are done on a weekly basis once Strength and Endurance have been adequately developed. An individual Power session consists of an Adaptation set as a warm-up (1x12 @ 50% 1RM) followed by three sets of six reps at 50-60% of your 1RM. The movement of the individual reps is the key in the Power phase. You want to perform the contraction part of the movement in a quick, explosive manner. The recovery part of the movement should be very slow and controlled. For many athletes a Power session will be combined with an Endurance session to save time and energy. These combined sessions are done as one Endurance set of twenty reps at 50% 1RM (trains Endurance while providing warm-up for Power sets), followed by two Power sets of six reps at 50-60% of your 1RM.

5. Maintenance

Most endurance athletes should maintain strength training throughout their season. The heaviest strength training volume should be performed during the off-season while spending more time indoors training and not competing. Once the race season begins strength training should taper some to allow for more recovery and fresher muscles for key swim, bike and run sessions. Strength training should be maintained at least once a week, often twice per week, for the majority of endurance athletes. The reason being is so you can continue to increase your strength over the course of many seasons as opposed to training only in the off-season, not at all in-season, then starting again from scratch when your next off-season rolls around. By maintaining strength year-round you start your next off-season ahead of the previous and can continue to make gains. Reducing training volume and maintaining resistance loads (as opposed to gradually increasing them over the off-season) will minimize stress while maintaining strength throughout your season.

Maintenance Sessions will typically utilize multiple phases of your strength training routine, often combining all three phases into each set of exercises. A once-per-week Maintenance session might look like this: Endurance set (1x20 @ 50% 1RM) followed by Strength set (1x8 @ 85% 1RM) followed by
a Power set (1x6 @ 60% 1RM).

**Core Strength**

Every strength training session should include a focused core strength segment. Your “core” includes all of your abdominal muscles and low-back muscles that allow for all twisting and bending movements as well as forward propulsion on land. Core strength is critical for all human movement as it gives you a base of strength to push, pull and rotate from allowing for greater force production in all forms of locomotion. A strong core also keeps your form and technique in shape as you fatigue which allows for better efficiency as well as reducing chances for injury.

The typical rule-of-thumb is to perform your Core Strength exercises at the end of your Strength Training sessions. Since they play an important role in all strength movements, fatiguing these muscles by performing them at the beginning of your strength session would compromise the quality of work you could perform the other exercises at. Allowing the final 15-minutes of your strength sessions to be focused on Core Strength you can hit the three primary targets of core: front abdominals, obliques (side abdominals), and lower back. Performing super-sets of abdominal, obliques and low-back works well allowing you to hit all three target areas keeping your core balanced and strong. Mixing up exercises between sessions also helps keep things balanced and interesting.

**Summary**

Strength training is an important piece of the triathlon puzzle. Many triathletes engage in some form of strength training during the their off-season to only let it go once their race season begins. By maintaining strength throughout the entire season you can be stronger, get leaner, stay healthier and make more gains year-to-year translating to faster racing.

By following the guidelines below for each type of training session you will continue to make progress in strength development that leads to improved swimming, cycling and/or running. As always, feel free to modify the number of exercises you perform per session to best fit your time and training goals for the session.

### The 5 Strength Training Phases:

**Adaptation:**
- 2 x 12 @ 50% 1RM
- 2-3 x 6-8 @ 85% 1RM (main set).
- Perform the contraction and recovery phases in a comfortably smooth manner.

**Strength:**
- 1 x 12 @ 50% 1RM (warm-up).
- 2-3 x 6-8 @ 85% 1RM (main set).
- Perform the contraction and recovery phases in a consistent, controlled manner.

**Endurance:**
- 1 x 12 @ 50% 1RM (warm-up).
- 2x20 @ 50% 1RM (main set).
- Perform the contraction and recovery phases in a comfortably smooth manner.

**Power:**
- 1 x 12 @ 50% 1RM (warm-up).
- 2-3 x 6 @ 50-60% 1RM (main set).
- Perform the contraction phase in a quick, explosive manner, recovery phase in slow, controlled manner.

**Maintenance:**
- 1 x 20 @ 50% 1RM (warm-up/endurance).
- 1x8 @ 85% 1RM (strength).
- 1x6 @ 50-60% 1RM (power).