The Benefits of Strength Training for Endurance Athletes

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Introduction

Many athletes abhor the idea of running laps for football or being on the stationary bike to cut weight for wrestling, but if the desire to compete remains strong enough for an athlete even after their athletic career is completed, they may actually find themselves entertaining the idea of competing in an endurance race of some sort. Of course this is only one example of why an athlete may get into endurance sports; other examples such as a desire to lose weight, remain healthy, or picking an activity that does not hurt (e.g. a basketball player who begins swimming because chronic knee pain does not allow them to run up and down the court anymore). The point is—not all endurance athletes were born endurance athletes.

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An endurance "newbie" often has no idea how to train for the sport. He or she may simply buy a pair of running shoes and begin running. This is not a bad way to start, but at some point if this person is going to get serious about actual competition, he or she is going to need to learn how to train for the sport.

The endurance athlete who was "born" to run, cycle, or swim, likely has this information down already, but there may be one area lacking in their training: effectively using the weight room to best enhance performance. This is an area where the cross-over athlete may have an advantage. It is no secret that one is more likely to see the football team in the weight room than the cross country team. Although a football-specific workout is not designed to enhance cardiovascular fitness, it stands to reason that athletes who were previously engaged in sports that required use of the weight room are more likely to return to the weight room again due to the enjoyment that they may have had there and experience in doing such activities.

From this standpoint, the 35-year-old former basketball player who wants to seriously compete in 10k's could have an advantage over the 35-year-old non-athlete who just decided to begin running. Intelligent use of the weight room, just like intelligent implementation of a running program, can have a dramatic influence on the success of the competitor. This success can be defined as faster running times, but can also be extended to include reduced injury risk, and an overall heightened enjoyment of the sport, a goal that many athletes surely have.

Training

In very general terms, sports have an in-season and an off-season. The goals of these different periods vary drastically, as should the training. During the off-season, an endurance athlete is often looking to incorporate a variety of different training methods (commonly referred to as cross-training) as they look to expand their

endurance base. The exercise intensities are often fairly low, but the duration of activity is fairly long. During the in-season period, the athlete has scheduled some races of varying importance. The training becomes more intense (workouts at race-pace for example), which may be slightly shorter in total duration. Obviously this is a simplification of the process, as each athlete will utilize his or her own strategy, but in general terms, it is how most endurance athletes train throughout the year.

The resistance training program should, in essence, parallel this pattern of training. The common fault for endurance athletes is that the lifting workout never really changes. The athlete continues to do circuit training or high repetitions and sets throughout the year at very low intensities. Tables 1 and 2 demonstrate how strength programs should be designed for endurance athletes.

Table 1. Endurance Off-Season

Program variables			Repetitions per Set					Notes
Day	Order	Exercise	1	2	3	4	Rest	
1	1a	Back squats (figure 1)	20	20	20	20	60s	Stay light and go deep
1	2a	Walking lunges	15	15	15	–	60s	15 repetitions on each leg
1	3a	Romanian deadlifts (figure 2)	20	20	20	–	45s	Keep weight on heels—slight bend in knee
1	4a	Leg extensions	20	20	20	–	45s	May be contraindicted for some people
1	5a	Calf raises	20	20	20	–	45s	Seated or standing
1	6a	Anterior tibialis exercise	20	20	20	–	45s	Anti-shin splints exercise
1	7a	Leg raises	20	20	20	–	45s	For lower abdominals
2	1a	Bench Press	20	20	20	20	60s	
2	2a	Bent over barbell row (figure 3)	20	20	20	20	60s	Keep back bent over—don't jerk
2	3a	Flat DB chest flyes	20	20	20	–	60s	May use machine instead
2	4a	Front lat pulldown	20	20	20	–	60s	May do pull-ups instead (or pull-up assist)
2	5a	DB shoulder press	15	15	15	–	60s	May use machine instead
2	6a	DB bicep hammer curls	20	20	20	–	45s	Seated or standing
2	7a	Cable tricep pushdowns	20	20	20	–	45s	Rope or bat attachment
2	8a	Weighted crunches	20	20	20	–	45s	Or crunch machine
2	9a	Oblique crunches	20	20	20	–	45s	Twisting crunches or machine
3	1a	DB step-ups	15	15	15	15	0s	Alternate legs—15 each
3	1b	Push-ups	15	15	15	15	0s	
3	1c	Step-back (reverse) lunges	15	15	15	15	0s	Hold dumbbells or use body weight only
3	1d	Seated row	15	15	15	15	0s	
3	2a	Leg press	15	15	15	15	0s	
3	2b	DB lateral raise	15	15	15	15	0s	
3	2c	Stability ball leg curls (figure 4)	15	15	15	15	0s	Or machine leg curl
3	2d	DB pullovers	15	15	15	15	0s	Get a good stretch
3	3a	EZ bar bicep curls	15	15	15	15	0s	
3	3b	Back extensions	15	15	15	15	0s	
3	3c	EZ bar lying tricep extensions	15	15	15	15	0s	

*** The third day is a circuit day: go through circuit 1 twice and then go to circuit 2 and then three. After you have gone through each circuit twice, go through all three circuits again. There should be little to no rest between exercises.**

Table 2. Endurance In-Season

Program variables			Repetitions per Set					Notes
Day	Order	Exercise	1	2	3	4	Rest	
1	1a	Split jerk (figure 5)	5	5	5	–	2 min	Barbell or dumbbell—land in split position
1	2a	Back squat	8	6	4	–	2 min	Go pretty heavy
1	3a	Forward stepping lunge (figure 6)	6	6	6	–	2 min	Do all one leg first, then the other
1	4a	Bench Press	8	6	4	–	2 min	
1	5a	DB shoulder press	8	8	8	–	90s	
1	6a	Tricep exercise (choice)	8	8	8	–	90s	
1	7a	Weighted crunch	15	15	15	–	90s	
1	8a	Oblique crunches	15	15	15	–	90s	
2	1a	Standing tuck jumps (figure 7)	5	5	5	5	3 min	Be quick off the ground and jump high
2	2a	Alternating leg bounding (figure 8)	4	4	4	4	3 min	4 bounds each leg
2	3a	Underhand medicine ball throw (figure 9 & 10)	5	5	5	5	3 min	Throw backwards—use 6 – 12 lbs ball
2	4a	Bent over barbell row	8	6	4	–	2 min	
2	5a	Bicep exercise (choice)	8	8	8	–	90s	
2	6a	Back Hyperextensions	12	12	12	–	90s	

*** Find a soft surface to do your jumps—grass works well, just make sure there are no holes.**

Note that the workouts are very different from one another. As stated earlier, many athletes choose to train in the same manner the whole year, but this method does not take advantage of the body's ability to specifically adapt to the workout variables that are presented during each phase of training. An endurance athlete should not have the goal of achieving their fastest times during the off-season because there are no races then. Likewise, this athlete should not do heavy, intense lifting during this time either. When in the meat of the competition schedule, the athlete needs to remain healthy and fast. The more intense, but lower volume lifting workout is meant to accomplish these goals. Table 3 explains the rationale between the key differences between the two workouts.

Most endurance athletes who have little experience in resistance training will not appreciate what intense resistance training will do for them in their sport. Some fear that they will add unnecessary bulk to their frame, or that heavy lifting will reduce their VO_2 maximum and thereby make them slower. These fears are not unfounded, as heavy lifting will add lean muscle tissue, and high intensity, long rest period workouts can have the effect of reducing aerobic efficiency. However, these adaptations will only happen if this workout is maintained over a long period of time (several months). But, when properly inserted into a workout over a short period (two different four week periods), the adaptation is mainly neural in nature, meaning there is only a small physiological change that would have any chance of negatively influencing the endurance athlete[1].

Even for those who buy in to an aggressive in-season program for endurance activities, may do so for the wrong reasons. They believe that the only time in which being fast and powerful would be of real benefit to the endurance athlete would be during the final kick, or perhaps climbing a difficult hill.

Suppose, for example, that you could reduce the number of strides you took in a distance race by 10%. Do you think that this would allow for faster running performance? Tall, lanky runners with long, loping strides are often the envy of their shorter counterparts. You cannot change how tall you are, but you can influence your running stride by learning better running mechanics, and also increasing the amount of force with which you push-off the ground on each step. A small increase in force will allow for a slightly longer stride

For example, let us assume that a given runner has a stride length of five feet. During the course of a 5K race they would take 3280 strides. An increase in stride length of just 6 inches would allow for the individual to take just 2981 strides, a reduction of over 9%. Heavy resistance training, and specifically some form of plyometric training, is the best way to increase stride length, and therefore running economy.

Conclusion

In endurance competition, individuals who come from a strong resistance training background but have never participated in endurance sports may have a leg-up on those who have never lifted weights before, because they are accustomed to a variety of lifting protocols including power type exercises and plyometrics. These athletes may, therefore, be able to successfully enter the fun and personally challenging realm of competitive athletics again even though their football or track and field days are long gone. Although resistance training is not a panacea for all athletes, if one is serious about taking his or her training to the highest level, even the endurance athlete has to seriously consider how resistance training can positively influence performance. ▲

Table 3. Differences between in-season and off-season programs

Acute Program Variable	Off-season	In-season
Volume	The high volume in the off-season is meant to increase local muscular endurance. This is meant to parallel the longer duration running, cycling, etc. that is also going on at this time to help build a stronger endurance base	Lower volume in-season allows for higher intensities. In addition, high stress demands of intense endurance workouts and races require lower lifting volume to reduce the risk of overtraining
Intensity	Very low intensity during this time period ensures that some degree of aerobic benefit is seen, but it is also required to be low when the volume is so high	A higher intensity during this period is utilized to elicit a neurological response that makes the muscles stronger and more powerful, which will enhance stride length, thus increasing running efficiency/economy
Rest Periods	Short rest periods keep the heart rate up and blood pumping, which adds to the endurance qualities of the athlete during this period	Longer rest periods are required in order to "re-load" the muscles with the fuel necessary to exert high levels of force and power. High complexity activities, such as plyometrics, require a longer rest period for the nervous system to adapt
Choice	Exercise are basic in nature that hit all major muscle groups. There are a combination of multi- and single-joint activities, and some are in place to aid in injury prevention	Exercises are sports-specific in nature or purposely chosen to be explosive. Single-joint exercises are included, but not required as part of the workout, as they do not typically aid the athlete at this time

Figures

Figure 1. Back Squat

Figure 2. Romanian Deadlift

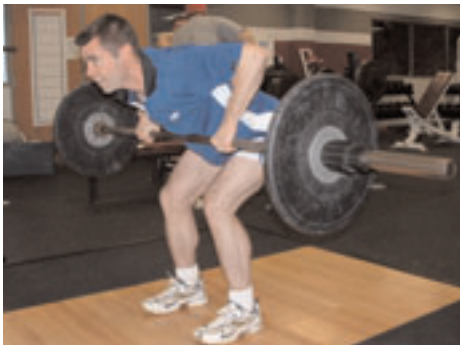

Figure 3. Bent Over Barbell Row

Figure 4. Stability Ball Leg Curl

Figure 5. Split Jerk

Figure 6. Forward Stepping Lunge

Figure 7. Standing Tuck Jump

Figure 8. Alternate Leg Bounding

Figure 9. Underhand Medicine Ball Throw 1

Figure 10. Underhand Medicine Ball Throw 2

References

1. Enoka R. (2002). *Neuromechanics of Human Movement, 3rd Edition*. Champaign, IL: Human Kinetics.

About the Author

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