Attention Endurance Athletes: Do Not Resist Resistance Training

By Joe Giandonato, MS

A long standing debate within the fitness industry has been the appropriateness of strength training for endurance athletes, both recreational and competitive. Many people, including fitness professionals assume that endurance athletes share nothing in common with their strength athlete counterparts. Some examples of strength athletes include, but are not necessarily limited to: Olympic weightlifters, power lifters, and strongman competitors. Additionally, bodybuilders and athletes whose sport involves power, strength, and strength-endurance as well as some degree of hypertrophy, use strength and resistance training in preparation for their competitions and events.

So why isn't strength training appropriate for endurance athletes? People, including naïve endurance athletes, may exclaim that it will add too much bulk, citing some blatantly erroneous mal-effects of lifting weights such as losing flexibility, elevating blood pressure, and perhaps dropping the age old term "muscle bound". Until recent research pioneered by Dr. Hickson, among others, it was once perceived that endurance and strength athletes might only share the same gym locker room, zip code, or air outside. Research has revealed more commonalities among endurance athletes and strength athletes, additionally; it has provided considerable amounts of evidence supporting the need for endurance athletes to engage in strength training. This article will identify some common muscular imbalances and their resultant dysfunctions affecting endurance athletes, specifically, cyclists and distance runners. This article will also provide a wealth of empirical data gathered from studies, which support strength training in endurance athletes, thus necessitating a need for strength training to stave off injury and improve performance. Additionally, the article will provide some guidelines necessary in implementing and adhering to a strength training program for endurance athletes.

Cardiovascular exercise, throughout history has been deemed as acceptable in multiple populations. It has long been regarded as a staple for weight loss. Whether it be a "New Year's Resolutionist" looking to shed those stubborn 10, 20, maybe 100 pounds, in time for the summer season, a bodybuilder who is huffing and puffing during a fasted cardio session on the recumbent bike, or as we have all heard or seen: a wrestler or boxer donning a trash bag or rain poncho and running in the hot sun, hoping to cut weight in time for an upcoming match. Cardiovascular exercise has been shown to improve health, with regular cardiovascular exercise offering up a cadre of benefits, including, but not limited to: improving HDL to LDL cholesterol ratio, reducing blood pressure, lowering body weight, through increasing fat loss, improving metabolic and digestive functioning, and increasing insulin sensitivity (1).

So if cardiovascular exercise is appropriate for just about everyone, including strength athletes, why isn't strength training appropriate for endurance athletes? Endurance athletes may not be laying bone crunching hits on other endurance athletes, such as football and rugby. Imagine if distance running events involved deliberate contact which caused bodily harm? The media outlets would be clamoring to broadcast such events. So much for MMA and Monday Night Football! However, distance running, as well as the

other events or sports that endurance athletes engage in can still be injurious. Injuries, as we are well aware, impede performance and over time, can worsen.

A recent case study conducted by faculty from the University of Pacific's Department of Physical Therapy, blamed prolonged poor posture among cyclists for causing lower back pain (2). The cyclist featured in the study was a middle aged male, who by all accounts would be considered an endurance athlete, as his weekly training volume exceeded 300 km per week. Not only did he experience lower back pain, he also suffered from internal snapping hip syndrome, which is a chronic condition characterized by audible or inaudible popping caused by the tendon of the iliopsoas muscle as it moves across the iliopectineal eminence of the hip, or femoral head, as the hip quickly moves from flexion to extension (3). This condition presents itself in cyclists, as they are exposed to prolonged periods of lumbar flexion in training and competition. The study's subject underwent physical therapy, which concentrated on joint mobilization and stabilizing the core by strengthening the deep and superficial musculature of the abdominals and obliques (2). The physical therapy, following a period of rest, preceded a strength training program, which enabled the subject to resume training pain free. It should be noted that the subject had only been engaging in strength training for a period of two weeks.

A study conducted by Stanford's Physical Therapy department (4) and a subsequent study (5), again carried out by the department, in conjunction with Stanford University School of Medicine, identified muscular weaknesses and chronic pain associated with distance running. Each study featured members of the Stanford University Cross-Country and Track Teams.

The first study included an injured group of athletes suffering from iliotibial band syndrome, who at the time, were being treated at the Stanford University Sports Medicine Clinic. The injured group consisting of 24 distance runners (14 female, 10 male) were randomly selected. A control group (14 females, 16 males), also randomly selected, was chosen from a pool of non-injured athletes. The injured runners participated in a standardized rehabilitation program for six weeks, which prioritized activation and strengthening of the gluteus medius. Following the rehabilitation program, 22 of the 24 athletes were pain free. None of the athletes in the injured group experienced recurrent issues per a six month follow up assessment. The study concluded that long distance runners with iliotibial band syndrome suffer from weaker hip abduction in the affected leg compared with their unaffected leg and the participants in the control group (4). The follow up study highlighted treatment options for runners with iliotibial band syndrome. Along with medical treatment, myofascial release, and stretching, strengthening exercises may help injured runners fully recover within six weeks (5). The study noted that the strengthening exercises should consist of multi-planar, integrated movements, with emphasis on the eccentric portion of the movement (5).

Countless studies have shown that strength training has directly improved performance. A study involving elite cyclists showed that the cyclists, who engaged in resistance training, in addition to their endurance training, improved their time trials (6). Maximal strength training in cyclists elicited improvements in VO2 Max (oxygen uptake), rate of

force development (RFD), and work efficiency (7), thus resulting in an improved cycling economy, ultimately leading to improved performance.

Runners have also reaped the many benefits strength training has to offer. Running economy, much like cycling economy, was markedly improved in multiple studies participants (8,9,10,11). Running economy is hypothesized by researchers to be a better predictor of performance in elite runners compared to VO2 max (12), citing that runners with good running economy, use far less energy and oxygen than runners with an inefficient running economy even if they are running at the same velocity (13).

A study conducted by the Department of Kinesiology at the University of Connecticut analyzed the effects of resistance training on elite runners (8). Five study groups partook in resistance training (four groups employed plyometric exercises, one group engaged in heavy strength training). Following their respective resistance training programs, two groups improved their performance in 3K and 5K events, by 2.9%, whereas all five groups netting improvements in running economy which ranged from 3-8.1% (8). Another study, performed by Norwegian researchers also revealed that strength training improves running economy (9). In the study, improvements were noted following an 8 week strength training program. Improvements included: one repetition maximum, rate of force development, time to exhaustion via maximal aerobic speed, and running economy (9).

Strength training, in addition to endurance training, has benefited the middle aged and elderly. A study conducted by Finnish researchers, along with the Department of Kinesiology at the University of Connecticut noted improvements in maximal isometric force of the lower extremities and VO2 max following a 21 week training period, which was divided macro cyclically (first developing strength-endurance, second to produce functional hypertrophy, lastly emphasizing strength, by using heavier loads) (10).

We can conclude from the aforementioned studies that: a) resistance training will help endurance athletes prevent and rehabilitate from injuries, b) resistance training will improve performance in endurance athletes, c) concurrent resistance and endurance training is beneficial for both performance and health purposes.

We know it's good and we know it begets a myriad of benefits, but how do we as strength coaches, athletic trainers, and personal trainers, etc., implement an effective resistance exercise training program? According to a 2007 article featured in NSCA's Strength and Conditioning Journal (12), a program employing linear periodization shall be used to: recover from the previous competitive season, which is achieved by active rest and by maintaining a baseline of cardiovascular conditioning, sufficient strength, and a favorable body composition; next, develop strength, specifically strength endurance. Training preceding competition should develop factors necessary to endurance performance, such as: running economy, lactate threshold, oxygen uptake, and power. During the season, the results achieved in previous training phases should be maintained through a reduced volume of both strength and endurance training.

Note: RC Hickson is a physiologist with many decades of research, ranging in topics from neuroendocrinology to resistance / strength training in endurance athletes. Though his research was not directly cited in this article, Hickson's work has influenced many of the research conducted within the past couple of decades, including some of the studies and articles cited below. Abstracts of Dr. Hickson's research work can be found here: http://lib.bioinfo.pl/auid:784053

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About the author

Joe Giandonato is a Philadelphia-area healthcare professional and personal trainer, he holds an M.S. in Exercise Science and has nearly a decade of personal training experience. He has experience training and consulting endurance athletes and strength athletes alike, recently helping over a dozen participants prepare for the 2010 Broad

Street Run. Presently, he trains clients at Broad Street Fitness in Philadelphia, PA. More of his articles can be found at frequency555.com