

7 Tips to improve running performance

(Before you go out for your next run, you may want to read this!)

by

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Endurance athletes generally agree on the benefits of running. Unknowingly, this practice can also be detrimental to one's health as workload becomes excessive and overloads the body's ability to recover. From joint pains and nagging cold symptoms, to bodyfat accumulation and feeling run down, runners should always be aware of the returns on their time invested. If negative symptoms are impacting your endurance workouts, perhaps learning what may be causing these problems and taking the time to address the issues may be of priority. Let's look at some of the possible culprits.

Lack of Structural balance between opposing muscle groups

Too many runners are, well... only runners and with that title comes the structural imbalances of excessive repetitive movement which we call running. With long distance endurance running, weaknesses in the VMO musculature (the tear drop muscle to the inside of the kneecap) and hamstrings^(12,22,29,50), particularly the part of the hamstring musculature that is responsible for flexion of the knee, may appear. A weak VMO can lead to unstable tracking of the knee joint ^(12,16), whereas weakness in the hamstring musculature responsible for flexion of the knee can lead to lateral instability^(33, 50, 54) about the knee as well as potential for hyperextension of the knee capsule itself.



Ouch, Ouch, Ouch, Ouch!

What can a runner do to avoid these structural imbalances and the risks that come along with them? The answer: unilateral leg training. Through unilateral leg training a balanced leg structure can be achieved through corrections of compensatory movements. If bilateral (2 legged) exercises are always done, the movement patterns leading to the chronic pain will never be addressed. Due to the excessive workload taken up by the stronger leg, the weaker leg never has a chance to achieve the same strength levels. With unilateral training, the target leg has to do the work, allowing for recruitment of the weakened musculature.

3 exercises that may help

1. **Single leg hamstring curls:** these can be performed on a Swiss ball while lying on your back, standing utilizing a cable system, prone, seated, or kneeling on a hamstring curl machine. By adjusting your toe position you can target saggittal, medial, or lateral hamstring musculature.
2. **Box Step Ups:** When performed correctly they teach proper hip and knee extension with minimal strain on the low back musculature.
3. **Split squats:** when done correctly, this exercise packs a one-two punch. The working leg recruits the quads, glutes and hamstrings to get the work done, while the non-working leg gets one of the best hip flexor stretches with each repetition.

Oxidative Stress and Lack of Antioxidants

Have you ever noticed that the more mileage you seem to accumulate over periods of time, the more susceptible you become to stuffy noses and cold symptoms. Endurance training can lead to an increased accumulation of free radicals (4,15,42,47), which are the damaging oxygen molecules. In order to keep these under control and to keep them from damaging the body, antioxidants are needed to counteract their effects (4,20,32,51). World renowned antioxidant expert, Dr. Lester Packer recommends what he refers to as the Network Antioxidants: vitamin E, Vitamin C, CoQ10 and Alpha Lipoic Acid. These highly important antioxidants work in combination with each other, magnifying the body's antioxidant effects in combating oxidative stress (13,27,37,47,49).

Alpha Lipoic acid has been shown to play a major role in the metabolism and generation of the body's most potent naturally occurring antioxidant, glutathione (7,47, 49). Along with its ability to decrease oxidative stress (37), Alpha Lipoic Acid has also been shown to have a positive effect on mitochondrial health (37, 41), liver/kidney health, and inflammation (41). One of the most interesting characteristics about Alpha Lipoic Acid, which is the reason why researchers refer to it as a "superantioxidant", is its ability to regenerate both fat soluble Vitamin E (7, 27) and water soluble Vitamin C (7,35), after they have been used in free radical scavenging. So powerful are Alpha Lipoic Acid's antioxidant properties, that it is used in the treatment of the potentially fatal Amanita mushroom poisoning.

Studies on vitamin E have shown this antioxidant to be one of the most abundant and efficient scavengers of free radicals (51), thus playing a major role in decreasing risk of degenerative diseases and cancer (26), while preserving cellular membrane health and cardiovascular health (13). One of this fat

soluble vitamin/antioxidant's major benefits is the fact that after it has scavenged a free radical, it can basically be recycled to be used again in the battle against free radical and oxidative stress⁽²⁷⁾. Alpha Lipoic Acid and vitamin C play a crucial role in this antioxidant recycling ⁽²⁷⁾. The key to vitamin E is to find one that includes all members of the vitamin E family, 4 tocopherols and 4 tocotrienols ⁽⁴⁸⁾, as many of the store bought brands contain only Alpha-dl-tocopherol, which by itself, has not shown to promote the health benefits of the entire Vitamin E family.

Vitamin C has been shown to be a very versatile vitamin with regards to its antioxidant abilities. Deficiencies in vitamin C have been shown to be a risk factor in cardiovascular disease ⁽²¹⁾ and oxidative stress ⁽⁵¹⁾, while vitamin C supplementation has been shown to reduce the inflammatory biomarker C-reactive protein after only 2 months of treatment⁽⁹⁾. Of major benefit is the fact that ***vitamin C has been shown to regenerate Vitamin E*** ⁽²⁷⁾, as well as the ability to improve antioxidant capacity of the blood through its positive effects on red blood cell glutathione⁽²⁵⁾.

Coenzyme Q10 has long been studied and known for its positive effects on mitochondrial health and energy production ^(31,38,53). More recently though, CoQ10 has also been found to play a role in neurodegenerative diseases, cancer and diabetes complications ^(17,39). This antioxidant has a similar characteristic to that of Alpha Lipoic Acid, in that it also has the ability to recycle Vitamin E.^(17,39).

Outside the Antioxidant Network are many valuable antioxidants including Selenium, Beta-carotene, N-acetyl Cysteine, and EGCG. In the more recent years, a potent antioxidant with superior anti-aging effects from red wine has made it into the media headlines: Resveratrol. Resveratrol has been shown to have anti-carcinogenic properties ^(3, 18), anti-inflammatory properties ⁽¹⁸⁾, as well as positive effects on neurodegenerative diseases associated with oxidative stress ⁽⁴⁵⁾. This tremendous compound has also been shown to have anti-estrogenic properties, thought to promote cardiovascular health ⁽¹⁹⁾.

Vertical Core Training

We run in an upright position, but yet we do most of our core work from horizontally lying positions. Understanding that the "core" is not just a single muscle segment of the abdominal musculature, but also includes the muscles of the hips and lower back, is critical. Consideration of this fact must be taken into account when training the "core" musculature. Studies have shown there is

much greater total core activation in standing/lifting exercises including dead lifts, squats, and tire flipping, when compared to horizontally positioned core exercises (24). Even more significant is the greater activation of the core one achieves while carrying a weight at waist height (1).



For more efficient as well as effective core training, try upright posture exercises including hanging knee raises, standing band crunches, deadlifts, standing overhead pressing, or odd object carrying such as modifications of those events found in strongman contests.

Eating more Protein:

The mantra of many endurance athletes is more carbohydrates equals more energy, but let's think about this a moment. If carbohydrates provide energy, then what provides the building blocks needed to repair the body after a long training session. Far too often protein is overlooked and the body falls into a catabolic state, in which it is constantly breaking down tissue due to lack of these rebuilding blocks.

Simple ways to ensure you are getting enough protein are to include protein at breakfast, lunch, dinner, and post-workout. A protein shake can be the most effective method of post-workout nutrition. The body can switch from a catabolic post-workout environment to an anabolic state in a matter of 30 minutes with the liquid meal, as opposed to four hours with a solid meal.

The Benefits of Cross Training

Strength training increases lean muscle tissue, growth hormone, and testosterone, leading to increase in resting metabolism as well as decreases in cortisol and insulin resistance. When runner's start marathon training, they usually find that even with the increased caloric expenditures of long runs they may actually start to increase body fat. And no, running more and eating less is not the answer! Bringing your body back to a hormonal balance is the key here.



Cortisol signals the body to go into storage mode when too much chronic stress is present (2,8, 56). Similar to cavemen when the cold days of winter approached, increasing cortisol becomes a protective mechanism to ensure one's survival. Until cortisol levels are allowed to drop and androgenic (building) hormones are allowed to return to normal, fat gain, inflammation, and oxidative stress may leave the body just a shadow of your competitive self.

Controlling your cortisol should be of priority. Excessive cardiovascular training may lead to increases in cortisol (43, 56). There is an inverse relationship between cortisol and the anabolic (re-building hormone) testosterone. When cortisol levels go up, testosterone levels go down. Studies have shown rather large decreases in testosterone immediately following endurance training (23, 34,56,57). The combination of lack of protein, decreased testosterone, and increased cortisol can lead to a breakdown of muscle and accumulation of body fat (2, 8).

That nagging lateral hip pain

Many studies have shown rather large amounts of chronic injuries in endurance trained athletes (15,22,28,29,30,55). For example, is it truly sciatica as many runner seem to assume or is it a structural imbalance leading to excessive stress on the lateral hip musculature (15,22), particularly the piriformis and glute medius muscles (22,28,50).



Competitive runners have successfully treated this through the use of biofoam rolling of the lateral glute/hip musculature, structural balance strength training, hip flexor stretching, and muscular activation techniques of the glute max and musculature. Another successful method of treating this used by chiropractors is Active Release Technique, or ART.

Lack of Omega 3's

Inflammation. The bane of an endurance athlete's existence. After a couple thousand foot-strikes on a hard surface, with a mere ½ of rubber padding separating the soles of your feet from the concrete, inflammation can rear its ugly head, particularly in the knees, hips, and low back (15,22,55). Combine this with some of the previously mentioned catabolic issues, and there you have a recipe for

chronic pain and injury. Omega 3 fatty acids, particularly in the form of fish oil, has been shown to be beneficial in the treatment of chronic inflammation (36,44,46,52) and arthritis (46). Fish oils are also known for their positive role in defending the body from various forms of autoimmune disease (52).

Wrap-up

As can be seen, the sport of running can be stressful to one's immune, skeletal, and muscular systems. Taking the correct precautionary steps, some of which have been presented to you in this article can have a dramatic effect on performance and overall health. From decreased oxidative stress damage and inflammatory processes, to increases in hormonal and structural balance, runners can achieve positive outcomes if they put their energies toward other peripheral aspects of the sport, besides running.

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