# FUNCTIONAL TRAINING METHODS FOR THE RUNNER'S MYOFASCIAL SYSTEMS

FASCIA I S-C I RUNNING
22-01-COKINETIC
FORMATS ▶ WEB ▶ MOBILE ▶ PRINT

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The importance of fascia and the fascial system in both movement and impaired movement has grown in recent decades along with the knowledge base about it to the point now that we understand that fascia, along with muscles, is involved in force transmission, which leads us to the role of the myofascial system. The book *Fascia in Sport and Movement* second edition (edited by Robert Schleip and Jan Wilke) is a compendium of the most up-to-date information about the structure and function of fascia and its impact on improving strength, mobility and performance and reducing pain and injury, with contributions from 51 leading teachers and practitioners. This article has been extracted from Chapter 31 'Functional training methods for the runner's myofascial systems' by Dr Wilbour Kelsick and will allow you to treat your runners' injuries and to deliver performance improvements by developing training programmes for the body as a whole and not just strengthening one isolated segment. Read this article online https://bit.ly/3pCZFFp

## Introduction

Running is big business and preparation is paramount to success in the sport. Participation has increased exponentially in the last 3 decades at both the amateur and the professional level. On average, runners cover ~110–130km a week but, at times, can be thwarted by a variety of injuries. First, it should be mentioned that running is a complex elastic/spring-like movement involving the whole body's gait mechanism. An improved efficiency or energy-saving motion can be achieved when close to ideal elastic bounce in the running or walking gait is attained (discussed further in Chapter 8 of *Fascia in Sport and Movement*). The beauty of functional myofascial training is that it can not only prevent injuries but can also increase running efficiency and myofascial tissue fatigue resistance.

This article (extracted from Chapter 31 of the book) focuses on how functional myofascial training can address the elastic strength and coordination components of the running and walking mechanism (Chapter 30). Reference will also be made to the principles of biotensegrity (Chapters 11 and 36) as a means of explaining the mechanism of running and the behaviour of the body tissues, which allow it to happen. Briefly, biotensegrity explains how the principles of tensegrity manifest in biological systems (Chapter 11): from viruses to cells and tissues of living systems (ie. plants and animals). Biotensegrity integrates complex anatomy and biomechanics to make sense of living systems as a functional unit. From a biotensegrity perspective, any body movement (including walking, running and sprinting) is a continuous balancing dance of tension and compression forces within the body systems.

Running injuries are related to poor running technique and coordination, minimal or poor elastic bounce, muscle (myofascial complexes) weakness (eg. hip abductors, quadricep/knee mechanism), imbalances of myofascial complexes in running structure (eg. pelvic trunk myofascial complexes), biomechanical faults (over-pronation of feet, valgus of the knee), micro-trauma from overuse, an inadequately trained elastic myofascial net, low resistance to tissue fatigue and overall diminished body global strength relative to impact cyclic loading. All of the above can influence each other, creating a collage of epidemiological causes for running injuries. Studies show that the majority of running injuries can be summed up as micro-trauma to collagenous tissues.

It has been well documented that over 70% of recreational runners will sustain an injury during a 1-year period. For instance, more than eight out of 10 running injuries are below the knee, suggesting some common mechanism might be the culprit. Based on the biotensegrity model, evidence does not support any one segmental region but more a global involvement of myofascial–skeletal running structures. Excessive pronation as a causative factor in overuse injuries is well documented. Also, hip and pelvic complex mechanism weakness and imbalance, or poor stabilisation, are now believed to be one of the major links to lower body running injuries: for example, iliotibial band compression syndrome and patella femoral syndrome. The aforementioned studies indicate that the causes of the majority of running injuries are related, or have some link to, inefficiency in the structural integrity of the running mechanism (the myofascial–skeletal system). It is, therefore, clear that the prevention, prehabilitation and rehabilitation of such injuries must address these causes in a practical manner. This leads to the proposed functional approach to train the runner's fascia from a global prospective.

However, at this point, the following questions must be addressed:

- What are the principles of running and how do they relate to global functional training?
- What do we mean by functional training?
- What is the purpose of strength training for runners?
- What do we mean by myofascial training?
- What global functional myofascial training is specific to runners?

## What Are the Principles of Running and How Do They Relate to Global Functional Training?

Walking, running and sprinting are complex elastic movements involving the entire body. They involve a cyclic exchange between potential and kinetic energy (a storage and release mechanism). The bones, tendons and ligaments are some of the stiffest springs in the body. The movement in such activities is not incremental or segmental but involves the entire body in simultaneous global action. Hence, training runners and sprinters cannot merely include exercises, which target segmental body parts, such as muscle groups (hamstrings, calves, etc.) or core (meaning abdominal muscle strength; ie. the six-pack look). Evidence has shown that such exercises do not target the true bio-movements of running and sprinting in an effective and functional manner. In fact, this type of segmental training creates more myofacial and biotensegral imbalances setting up a platform/environment in the body's structure/architecture making it more prone to injury and substandard performance. The concept of global functional training is geared to address biotensegrity in the body's myofascia architecture. Since the myofascial net infiltrates the entire body, and its elastic and sensorimotor properties are crucial to running, it makes sense that the global functional training method of training is an effective and efficient approach.

## What Do We Mean by 'Functional Training'?

Functional training is exercise that is specific to the body movement you are attempting to execute.

In more detail, functional training describes the concept of using multi-joint exercise (ie. sport-specific exercises) which more closely reproduces the movement pattern of a sport (in our case running) and can be modulated to improve the sum of parts, all of the biomechanical movement pattern or physiological profile of the sport. For example, in running, the biomechanical pattern would be stride distance or frequency and the physiological profile would be aerobic power for a distance runner. In functional training, exercise must be global (ie. using the whole body as much as possible) and not addressing isolated body regions.

In summary, functional training could be any sport-specific activity that moves an injured, deconditioned athlete or physically dysfunctioning individual towards safe return to sport or activities as soon as feasible.

## What Is the Purpose of Strength Training for Runners?

Running performance is dependent not only on a combination of aerobic and anaerobic capabilities, which vary based on the distance of the event, but also on other factors related to lower and upper body power and strength, speed and coordination.

It has been documented that force and power are strongly correlated with running performance for short distances (ie. sprints, hurdles). For example, plyometric resistance and explosive strength training have shown significant improvements in sprint training performance (sprinting is not just about speed but strength, endurance, balance, etc.).

From observation, I firmly believe that strength training can help improve the trunk–pelvic complex, and hip and lower extremity strength both concentrically and eccentrically, so enhancing the structural integrity of the body's biotensegral architecture and thus improving running efficiency and performance.

The mechanism for this improved

●● RUNNING IS A COMPLEX ELASTIC/SPRING-LIKE MOVEMENT INVOLVING THE WHOLE BODY'S GAIT MECHANISM ●●

performance in distance runners is thought to be related to improved muscle and tendon stiffness and the elastic properties of the fascial net (Chapter 7). Therefore, the evidence for adapting exercises that train the fascial tissue net, as well as muscles and tendons, is paramount in decreasing and preventing running injuries and improving running economy. It should be noted that speed of running is a function of strength and coordination.

Sport-specific strength training for running must take into consideration sensorimotor factor and movement pattern behaviours (ie. using global approach to exercise design) to guarantee the most transferrable effect of the training.

By contrast, middle and long distance running have received (have undergone or conducted) few studies that suggest force and power improve performance. However, a few well-designed studies have recently revealed that explosive strength training can improve the running economy of middle and long distance runners to a significant degree and also strengthen elastic elements such as fascia, tendons and ligaments thus making them more robust to withstand repetitive loading and injury.

## What Do We Mean by Myofascial Training?

In the past, training for athletes focused mainly on conventional cardiovascular fitness, muscular strength, power and neuromuscular coordination. The classical biomechanical tradition of considering the body as functioning in separate segments, with attached levers, and concepts of linear mechanics is no longer feasible in the light of new research on myofascial function in the whole body. Humans, like other species, are complex biological and biotensegral systems. You cannot train body parts in isolation and expect to have efficient global functioning.

Running, in its true form, is mostly an elastic event. The mechanism of running involves the storing of energy during the deceleration or breaking phase (during foot ground contact) and the instantaneous release of energy during the lift-off phase initiated by ground reaction force (GRF) (Fig. 1). Using an elastic recoil technique (Chapter 7) will allow the runner to be more efficient, placing less stress on the musculoskeletal system and eventually decreasing injury risk. Training for runners must be elastically functional and global in its approach, inclusive of the entire body, and not just the lower extremities or individual muscle groups. It should be considered as complex training targeting neural adaptation, coordination, strength and proprioception modes.

There is evidence to support that different myofascial elements are affected by different loading styles and that fascia has an important role in maintaining muscle function. Typical weight training loads the muscle in its normal range of motion, therefore strengthening fascial tissues arranged in series with active muscle fibres. This type of loading has minimal effect on the intramuscular fibres that are arranged in parallel to active muscle fibres and also extra-muscular fascia. This evidence reinforces that, during functional training of the runner's fascial net, exercises must have a dynamic varied loading pattern with rhythm to have an effect on the elastic components and resilience of the body's myofascial net.

The concepts of global functional training for the runner arise from these insights. The global functional training programme, designed in this context, will address the running mechanism from a global perspective with exercises geared to train the runner's elastic myofascial component as well as the muscle, ligaments, bone and tendons. The functional myofascial exercise protocol for the runner is carried out with a certain amount of rhythm and an explosive component. Special attention is paid to the sport-specific movement pattern for running.

In maintaining form, or activated structural integrity, the body is able to set up its own internal and external anchor to create the dynamic stability needed as one segment generates power and the other provides stability. This creates the alternate-movement-pattern biology designed for running. This patterning is classified as the concentric/eccentric (dynamic/structural, stability/power-generating) switching mechanism (between concentric and eccentric myofascial contraction) required for alternate body segmental movement in walking and running (Chapter 30). As previously described, running and walking are a simultaneous balancing dance between tension and compression in harmony with concentric and eccentric movement patterns of the entire body myofascial net and other supporting tissues. This tension and compression mechanism is always engaged during static or dynamic activity based on the principles of biotensegrity (Fig. 1). In addition, the body's tissues (which are soft matter) exhibit auxetic properties (ie. they expand when tensioned (stretched) as opposed to shrinking-narrowing).

In terms of biotensegrity, a body in motion (walking, running, climbing, swimming, etc.) is a continuous well balanced harmonic dance between tension and compression of its global myofascial net and other supporting tissues.

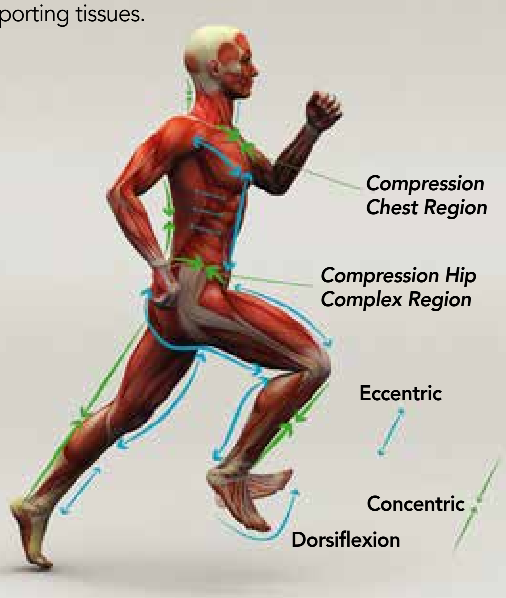


***Figure 1: Some key global and compression omni-directional external forces in a moving body*** Schleip and Wilke (eds). Fascia in Sport and Movement. Handspring 2021

## What Global Functional Myofascial Training Is Specific to Runners?

It has been documented that the manner, slow or fast, in which connective tissue is loaded will determine whether the tissue will become more elastic or react with hypertrophy (ie. volume) (Chapter 14).

In nature, kangaroos and gazelles are excellent examples of elastic storage and the release of energy during their movement patterns (Chapter 8). The human myofascial net seems to have similar elastic behaviour (ie. kinetic energy storage and release) in our daily activities of walking, running or jumping. This justifies the approach of global functional training for the runner's myofascial net using explosive, rhythmic-type exercise movement patterns.

## The Functional Fascia Training Concept

The elastic behaviour of human fascia is now documented. It stores energy and returns it quickly, as seen in cyclic movements such as walking and running (Chapter 29).

Running elastically uses less muscle power, that is, less metabolic energy (glucose) and more of the elastic fascia feature of the tissue, thus storing and returning energy back during propulsion. Global functional training for runners' fascia is designed to train the elastic myofascia net of the entire body (ie. muscle, tendons, ligaments and bones). The modes of exercise include bouncing or plyometric movements, preparatory counter-movement, unilateral movement patterns, coordination drills, and other exercises which mimic the mechanism of running (eg. single-leg hops, single-leg squats, etc.). The exercise protocol avoids slow, jerky-type movement patterns, repetitive constant-angled movements, movement with mono tempo/rhythm, muscular dominant movement, segmental isolation-type movement pattern and minimises constant loading thus encouraging variable loading of the runner's body. This is in line with research suggesting that the fascial system is better trained by use of a variety of vectors/angles, loads and rhythm (Chapter 24).

We cannot delve into this topic without mentioning the importance that coordination, posture and technique play in enhancing running efficiency and performance. In a correct sprinter's posture, for example, the athlete is at a considerable height off the ground in the flight phase, with a well-positioned body preparing for the landing phase (a very important body position to maximise horizontal distance travel through the air). Although it is not possible to discuss the concept of running technique in this context in this article, it should be noted that it is a crucial piece of the puzzle in preventing running injuries and improving performance.

## Exercise Protocol for Training the Runner's Myofascial Net

Sports conditioning programmes need to be optimally individualised and specific because the limits of peak performance are highly variable even within the same discipline of sport. As described above, the purpose of appropriate exercises is geared to enhance sensorimotor coordination and to strengthen the elastic components of the runner's myofascial net. Energy is stored in the eccentric phase of motion and immediately released on the concentric phase. The exercises are preceded by an eccentric pre-stretch (counter-movement) (Chapter 24) that loads the muscle, tendon and fascia, preparing it for the ensuing concentric contraction. This coupling of the eccentric–concentric muscle contraction is known as the stretch-shortening cycle, which physiologically involves the elastic properties of the connective tissues (fascia, tendon) and proprioceptive reflexes. The fact that connective tissue has a high capacity of adaptability and resilience makes it ideal for this type of training where loading forces, shearing and strain are highly variable. Connective tissue has the ability to continuously remodel its fibrous network when specific functional strain or load is applied to it (Chapter 4).

In designing any exercise strengthening programme, there are some basic exercise prescription guidelines which must be taken into consideration and a few important questions that need to be asked: Why are you doing the activity? What is the goal of the activity? Is it for fitness maintenance or for competition? Note that the basic principles of training will also apply here [ie. principles of adaptation (acute and chronic), specificity, overload, and progressive overload, stress-rest, contraction, control, coordination, ceiling, maintenance, symmetry and overtraining]. In this context we cannot address all these principles but they are found in detail in physiological texts on training.

First, exercise prescription must consider the total demands of the programme and ensure that the volume of exercise is not excessive, which can negatively interfere with the optimal physiological adaptation and performance. It should also consider the activity movement pattern, since complex systems like our bodies do not move in a linear manner or pattern.

To ensure an effective prescription, the following should be taken into consideration:

- the concept of periodisation of the training programme and goals of training;
- developing a well-planned exercise recovery and rest protocol by using the principles of periodisation; and
- understanding the balance between strength/power (intensity), coordination and aerobic and anaerobic (volume) training.

In addition, the key resistance training programme components should be considered when designing functional fascia-type exercises. These components are:

1. **Needs analysis:** this addresses questions about the myofascial net, whole-body segments to be trained, the energy/metabolic systems involved (aerobic, anaerobic), the type of muscle action (eccentric or isometric). Also the principle that the body is a complex biological system and is non–linear.
2. **Acute programme variables:** this deals with choice, order, number of sets, rest period between sets and amount of load (intensity).
3. **Chronic programme manipulation:** this addresses the principles of periodisation as a means of designing long-term programmes.
4. **Administrative concerns**: this deals with equipment needs in the gym (free weights, machine-assisted resistance isokinetics, jump platforms, etc.).

**THE BEAUTY OF FUNCTIONAL MYOFASCIAL TRAINING IS THAT IT CAN PREVENT INJURIES AND INCREASE RUNNING EFFICIENCY**

## Exercise Posture

These exercises are geared more towards middle distance and recreational runners, taking into consideration the concepts of transfer training and exercise specificity. The concept of practising one movement pattern to improve the efficiency of another movement pattern is known as 'transfer of training'. For example, a runner will get little benefit from doing high-intensity seated rowing. Split squats or walking lunges, which are more similar to the movement pattern of running, would be more beneficial. When exercise movement patterns are similar, this principle is known as 'exercise specificity'. Specificity in athletic or any type of training is paramount and a main guarantee that one can achieve transfer of training. Owing to space constrains in this chapter, only eight exercises have been documented.

All exercises are performed in a 'closed kinetic chain' posture to increase joint compressive forces, and to improve joint congruency and myofascial co-contraction/activation, which will overall enhance the dynamic stability of the body segments targeted although the entire body is involved (the global approach). The concept of transfer of training and exercise specificity is taken into consideration. Proper foot placement is paramount. The ankle should be in a 'locked' position attained by dorsiflexion. This allows a stiff but dorsiflexed forefoot to contact the ground, instantaneously transmitting the GRF up the kinetic chain. This well-timed, coordinated action of the foot creates the stiffness in the lower extremity chain required to create reactive strength to receive the GRF. Such action ensures a pre-stretch and engages the elastic components of calf. Engagement/activation of the neuromuscular components of the trunk, pelvis, pelvic floor and lower extremities is also necessary. The exercises are not segmental but address the entire body movement pattern of running.

## Exercise Mode

All exercises are performed explosively with quick repeated rhythm/tempo to enhance the elastic effect on the muscular and fascial tissues.

*Figure 2: Extended arm overhead pull: eccentric resistance for anterior abdominals/trunk*
Schleip and Wilke (eds). Fascia in Sport and Movement. Handspring 2021

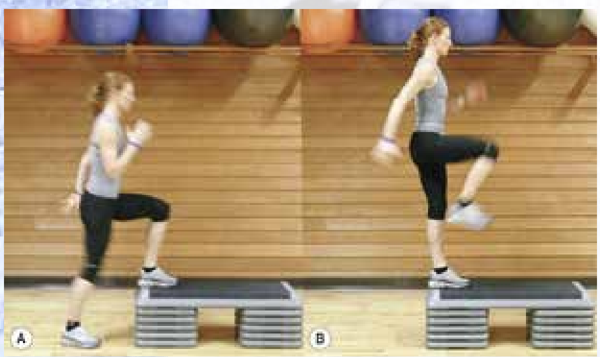


*Figure 3: (A) Quick step-ups and (B) walking step-ups*
Schleip and Wilke (eds). Fascia in Sport and Movement. Handspring 2021

## Pre-Exercise Preparation

This preparation should be about 15min and consists of the following to enhance general body mobility, ankle and foot ground reactiveness:

- 3–5min jogging;
- upper body alternating arm action (simulating arms during running) with rhythmic breathing;
- low-amplitude ankle/foot bouncing with initial active dorsiflexion and plantar flexion when landing on ground;
- standing lower extremity swings from hips;
- walking lunges with quick tempo;
- sideway scissors runs – lower extremity crossovers;
- double- and single-ankle hops with dorsiflexion of foot landing on balls of the feet; and
- hip mobility drills – flexion and extension hip swings.

## Functional Training Exercises

Some of these exercises were developed in collaboration with the coach Gary Winckler (internationally renowned athletics coach and former Illinois and Florida State women's track & field head coach). These exercises are designed to target and exploit the elastic components in the fascia net, muscle and tendon tissues. Execution must be explosive, rhythmic and reactive. Attention to global body posture and technique execution is crucial to achieve the full benefits.

### 1. Extended Arm Overhead Pull with Resistance: Rectus Abdominis and Anterior Compartment Eccentric Strengthening (Fig. 2)

**Purpose**

This exercise builds anterior trunk anchoring eccentric strength for abdominal and lateral wall muscles (transversus, internal and external obliques), which transmit forces from the back structures (mainly the thoraco-lumbar fascia). The rectus abdominis, pelvis and hip complex all work eccentrically to improve balance, coordination and force transmission during the single-leg stance in the walking movement of this exercise.

**Position/Posture**

Stand upright, engage trunk anterior and posterior musculature, pelvic floor and hip structures. Hands are overhead with extended elbows.

**Start Position**

Stand facing away from the anchor of the elastic tubing or pulley weight cables, which is anchored at the height of extended forearm overhead. Alternatively, you can use an individual assistant (as an anchor) to hold the tubing.

**Movement Technique**

- Flex one hip with flexed knees (eg. like running stance) with your thigh in midline and your pelvis level.
- Check your alignment then begin to march or walk against the overhead resistance.
- Lift the chest and chin up and look slightly upward so you feel the tension in the anterior abdominal wall complex.
- Increase pace from a walk to a slow jog maintaining tension on the elastic strap at all times.

The key is to be as upright as possible and to try not to over-extend the spine/trunk but maintain good tension of the elastic strap as you move forward. You can also use cable pulley weights for this exercise.

**Dosage**

- Sets: 3–6
- Reps: 10–20 steps
- Rest: 1–2min.

### 2. Quick Step-Ups (Fig. 3)

**Purpose**

This is a closed-kinetic-chain movement to strengthen trunk, pelvis, hip, knee, ankle and foot, and to improve coordination and balance in single-leg stance.

**Position/Posture**

Stand upright and engage anterior and posterior trunk musculature, pelvic floor, hip structures.

**Start Position**

Stand facing a step or box.

**Movement Technique**

- Place the foot of your front leg on the step/box (30–35cm) with your


***Figure 4: Double-leg hops over mini-hurdles*** Schleip and Wilke (eds). Fascia in Sport and Movement. Handspring 2021

thigh in midline and your pelvis level, back leg on ground.
- Check your alignment then quickly push with the back leg, lifting it off the ground and pushing your body straight upward.
- Step off with the leg that was first on the box.
- Repeat alternating your legs.
- The key is to push off with the back leg/leg on the ground and not the front leg/leg on the box.

**Dosage**
- Sets: 3–6
- Reps: 10–20
- Rest: 1–2min.

## 3. Low-Amplitude Double-Leg Hop Over Mini-Hurdles (Fig. 4)

**Purpose**

This is a plyometric drill, which initiates the stretch-shortening cycle of the lower extremity complex. This drill assists in developing elastic strength, speed and explosive power of the lower leg and the pelvis, especially the gluteals, hamstrings, quadriceps and gastrocnemius–ankle complex. It enhances the elastic fascial components in the trunk, pelvis, hip, knee, ankle and foot.

**Position/Posture**

Stand upright and engage the trunk's anterior and posterior musculature, pelvic floor and hip structures. Set up mini-hurdles 15–30cm high about one stride length apart.

**Start Position**

Stand upright about half a stride length in front of the hurdles with shoulders slightly forward, head up. Elbows should be at 90° and hands at your sides with thumbs up.

**Movement Technique**
- Begin by performing a counter-movement downward and jump as high as possible, flexing legs so the feet arrive under the buttocks. Bring the knees up medium high and forward for each jump to ensure maximum lift.
- To land, ensure the ankle is dorsiflexed. Jump forward again with the same cycle of leg and foot pattern.
- Execute as rapidly as possible, always moving forward.
- The key is to gain moderate height and maximum distance without affecting repetition rate.

**Dosage**
- Sets: 3–6
- Reps: 10–20
- Rest: 1–2min.

## 4. Double-Leg Ankle Hops (Fig. 5)

**Purpose**

This is a plyometric drill that initiates the stretch-shortening cycle of the lower extremity complex. It helps to develop elastic strength, speed and explosive power of the lower leg and gastrocnemius–ankle complex. It enhances the elastic myofascial

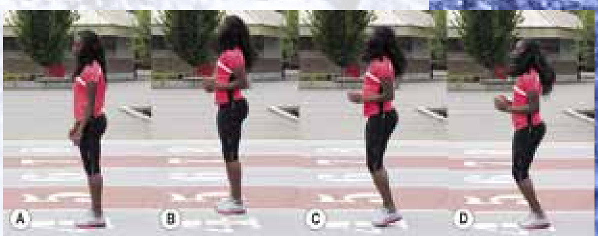


***Figure 5: Double-leg ankle hops*** Schleip and Wilke (eds). Fascia in Sport and Movement. Handspring 2021

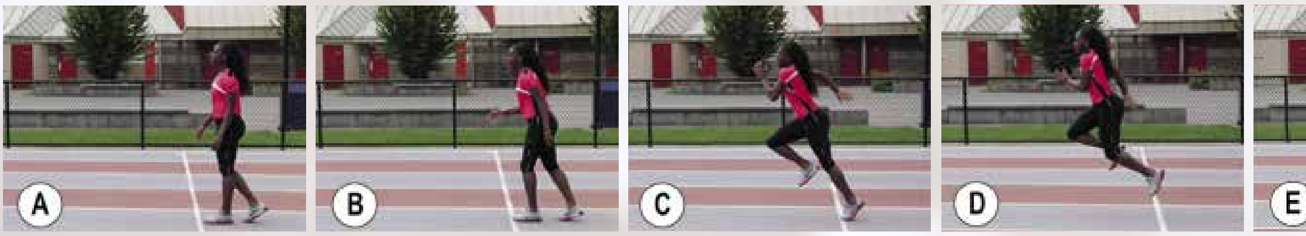


***Figure 6: Single-leg ankle hops*** Schleip and Wilke (eds). Fascia in Sport and Movement. Handspring 2021

components of the lower knee, ankle and foot.

**Position/Posture**
Stand upright and engage the trunk anterior and posterior musculature, pelvic floor and hip structures.

**Start position**
Stand upright with both feet on the ground and hands by your side.

**Movement technique**
Push off the ground and immediately dorsiflex the ankle joint. The knee should be in extension. On landing, ensure your foot is dorsiflexed and land on the balls of your feet. Repeat the sequence rapidly, maintaining an extended knee. Remain basically in the same spot.

**Dosage**
- Sets: 4
- Reps: 15–30
- Rest: 2min.

## 5. Single-Leg Ankle Hops (Fig. 6)

**Purpose**
This is a plyometric drill that initiates the stretch-shortening cycle of the lower extremity complex. It helps to develop elastic strength, speed and power of the lower leg and gastrocnemius–ankle complex. It enhances the elastic fascial components of the lower knee, ankle and foot.

**Position/Posture**
Stand upright and engage the trunk's anterior and posterior musculature, pelvic floor and hip structures.

**Start Position**
Stand upright with both feet on the ground and hands by your side.

**Movement Technique**
Push off the ground on one leg, only leaping forward and immediately dorsiflexing the ankle joint. Try to land one stride length ahead on the ball of your foot. The knee should be in extension. On landing, ensure your foot is dorsiflexed and land on the push-off leg on the ball of your feet. Repeat the sequence rapidly, maintaining an extended knee and alternating legs.

**Dosage**
- Sets: 4
- Reps: 15–30
- Rest: 2min.

**Video 1: Jumping split lunges**
(Courtesy of YouTube user CasallTraining)
https://www.youtube.com/watch?v=kVx92DcS7f0

## 6. Jumping Split Lunges on the Spot (Video 1)

**Purpose**
This is a plyometric drill, which initiates the stretch-shortening cycle of the hip and lower extremity complexes. This drill helps to develop elastic strength, speed and power of the lower leg and pelvis, especially the hip flexors, gluteals, hamstrings, quadriceps and gastrocnemius–ankle complex. It enhances the elastic strength of fascial components in trunk, pelvis, hip, knee, ankle and foot complexes. The goal is to attain maximum height.

**Position/Posture**
Stand upright and engage the trunk anterior and posterior musculature, pelvic floor and hip structures, as in the previous exercises.

**Start Position**
From a standing parallel foot position with feet shoulder width apart get into lunge posture. Step forward with the **left** leg with the knee flexed at 45–90°, and the hip flexed at about the same degree, and so your **right** back hip is now extended (to a comfortable near maximum range of motion) and the knee of the back **right** leg is also flexed at 45–90°. In this position you are maintaining an upright/erect and engaged trunk and pelvis. Your arm positioning is important. The **right** arm (on the opposite side of the leg that you stepped forward on) should be forward, flexed 40–60° at the shoulder and 90° at the elbow. The **left** arm (on the same side of the leg that's in front) should be extended back at about 50–60° at the shoulder and with 90° flexion of the elbow (basically your posture should be the running stance).

**Movement Technique**
The goal is to jump into the next lunge position landing on the same area/spot by pushing off the back leg explosively lifting your body into the air and again landing in a lunge position. Using counter-movement technique, drop down into a lunge position and stop that movement subsequently exploding upward as far as you can with a scissor-like motion. Note while in the air you need to execute a scissor action. Quickly move the **left** hip which was in flexion into


extension and the extended **right** hip into flexion before landing again in a lunge posture but this time your **right** hip and leg is now in front (flexed right hip) and your **left** hip and leg are now in the back (extended **left** hip). This scissors movement (alternating leg position front and back) is repeated continuously for the desired number of reps. It is important during landing (which should be on the balls of the feet) and pushing off that the ankle complex is held in dorsiflexion posture as much as possible. This exercise can be performed by moving the forward covering distance but is much more demanding (as for quick walking lunge) for desired number of repetitions.

**Dosage**

- Sets: 4
- Reps: 1–5
- Rest: 2min.

## 7. Quick Walking Lunge (Fig. 7)

**Purpose**

This is a closed-kinetic-chain movement in the lower extremity complex. It helps to develop the elastic strength, speed and power of the lower leg and pelvis, especially the hip flexors, gluteals, hamstrings, quadriceps and gastrocnemius–ankle complex. It enhances the elastic strength of myofascial components in trunk, pelvis, hip, knee, ankle and foot. The goal is to attain a good rhythm.

**Position/Posture**

Stand upright and engage the trunk's anterior and posterior musculature, pelvic floor and hip structures as in the previous exercises.

**Start Position**

Place feet shoulder width apart, bend one leg to 90° at the hip and 90° at the knee, attaining more or less a running stance.

**Movement Technique**

Lunge forward quickly with the non-weight-bearing leg. As soon as contact is made with the ground, recover the hind leg and use it to repeat the lunge. Land with feet/ankle in dorsiflexion so you land on the balls of the feet in a split lunge position and immediately repeat the sequence, initiating the pushing phase on the front leg to propel the body forward. Cover about 30–40m.

**Dosage**

- Sets: 4
- Reps: 15–30 (30–40m)
- Rest: 2min.

## 8. Alternate Leg Box Jumps (Fig. 8)

**Purpose**

This is a plyometric drill that initiates the stretch-shortening cycle of the lower extremity complex. This drill helps to develop the elastic strength, speed and explosive power of the lower leg and pelvis, especially the hip flexors, gluteals, hamstrings, quadriceps and gastrocnemius–ankle complex. It enhances the elastic fascial components in the trunk, pelvis, hip, knee, ankle and foot.

**Position/Posture**

Stand upright and engage the trunk anterior and posture musculature, pelvic floor and hip structures.

**Start Position**

Stand upright on one leg, with one leg in front of the other, as if taking a step. Shoulders are oriented slightly forward and head faces upwards. Arms are at the sides.

**Movement Technique**

Begin the exercise by pushing off with

> ●● EXECUTION OF FUNCTIONAL TRAINING EXERCISES MUST BE EXPLOSIVE, RHYTHMIC AND REACTIVE ●●

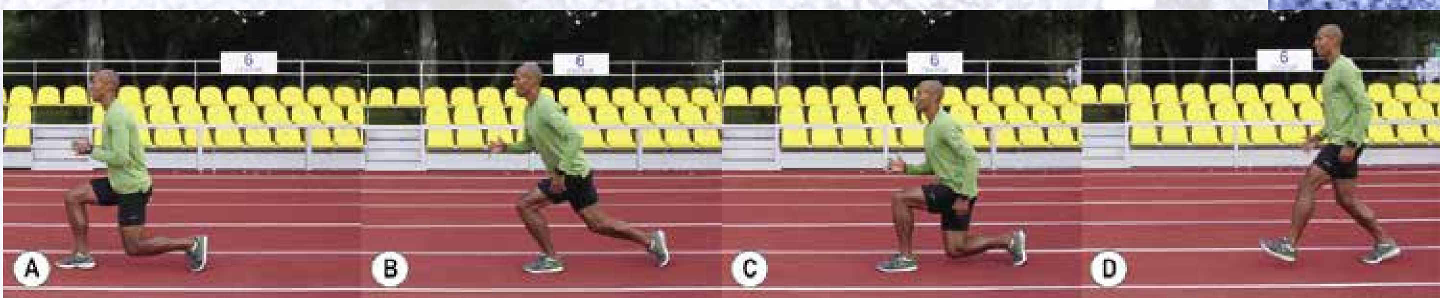


***Figure 7: Quick walking lunge*** Schleip and Wilke (eds). Fascia in Sport and Movement. Handspring 2021

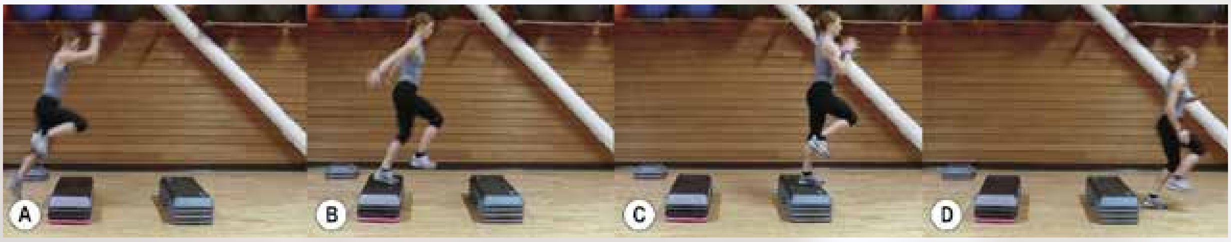


***Figure 8: Alternate leg jumps*** Schleip and Wilke (eds). Fascia in Sport and Movement. Handspring 2021

## ●● OVER 70% OF RECREATIONAL RUNNERS WILL SUSTAIN AN INJURY DURING A 1-YEAR PERIOD ●●

the back leg. Drive the knee up to the chest to achieve maximum height and distance before landing. Quickly extend the driving foot outward. Cycle the arms in contra-lateral motion in the air for balance. Repeat the sequence using alternate legs on landing.

### Dosage

- Sets: 2–4
- Reps: 8–12 (40m)
- Rest: 2min.

## Summary

Speed is a composite of strength and coordination. Walking, running and sprinting are movements in complex biological systems where the principles of biotensegrity (internal omni-directional forces, tension and continuous compression) function in a harmonic dance of balance, to maintain the integrity of the body's architectural systems during motion. In addition these internal forces prepare the body's closed-kinetic-chain system to absorb, transmit and create movement from the external GRF. Effective training for runners must address complex global movement pattern similar to running and not individual muscle groups. Training the myofascia net re-enforces strength and enhances elasticity of the biotensegral architecture of the running body systems. This, in turn, results in improved running economy and efficiency and decreases running injuries.

## Acknowledgement

All figures have been published with permission from Handspring Publications. Video 1 (courtesy of YouTube user CasallTraining) was not part of the author's chapter in the book *Fascia in Sport and Movement.*

## Bibliography

Owing to space limitations, we have provided a bibliography of the more recent references used in the book chapter from which this article was created. Please see Chapter 31 'Functional training methods for the runner's myofascial systems' of the book *Fascia in Sport and Movement*, second edition, for the full reference list.

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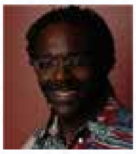
- Connectivity: Fascia-Related Therapies [Article] https://spxj.nl/3ojTnep

## DISCUSSIONS

- With the knowledge of fascia and connectivity, assess the injuries or niggles of some of your patients in relation to their running. Could their problems be caused by issues elsewhere along the kinetic chain?
- If you have a patient who is a runner, what programme of exercises would you develop to protect them from injury and also to boost their performance?
- Many runners will know of the benefit of strength and conditioning, but are they aware of the need to develop elastic bounce and how would you explain this to them?

## KEY POINTS

- Running is a complex elastic/spring-like movement involving the whole body's gait mechanism.
- Attaining the ideal elastic bounce in the running gait delivers improved energy efficiency.
- Although the majority of running injuries appear to occur below the knee, these injuries can be influenced by hip and pelvic complex weakness or imbalance.
- Runners should not only do exercises that target different body segments, as this kind of segmental training can create further myofascial and biotensegral imbalances.
- Functional training is exercise that is specific to the body movement you are attempting to execute, and more closely reproduces the sport-specific movement pattern.
- Functional training should use the whole body as much as possible.
- Strength training for the trunk–pelvic complex improves running efficiency and performance by enhancing the structural integrity of the body's biotensegral architecture.
- The best way to prevent/treat runners' injuries and deliver performance improvements is through global functional myofascial training.
- Good posture is important when performing functional training exercises.



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## *Fascia in Sport and Movement*, second edition

**Robert Schleip and Jan Wilke (editors)**

Handspring Publishing 2021; ISBN 978-1-912085-77-4

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Edited by Robert Schleip and Jan Wilke, *Fascia in Sport and Movement*, second edition, is a unique publication, whose strength lies in the breadth of its coverage, the expertise of its authorship and the currency of its research and practice base.

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