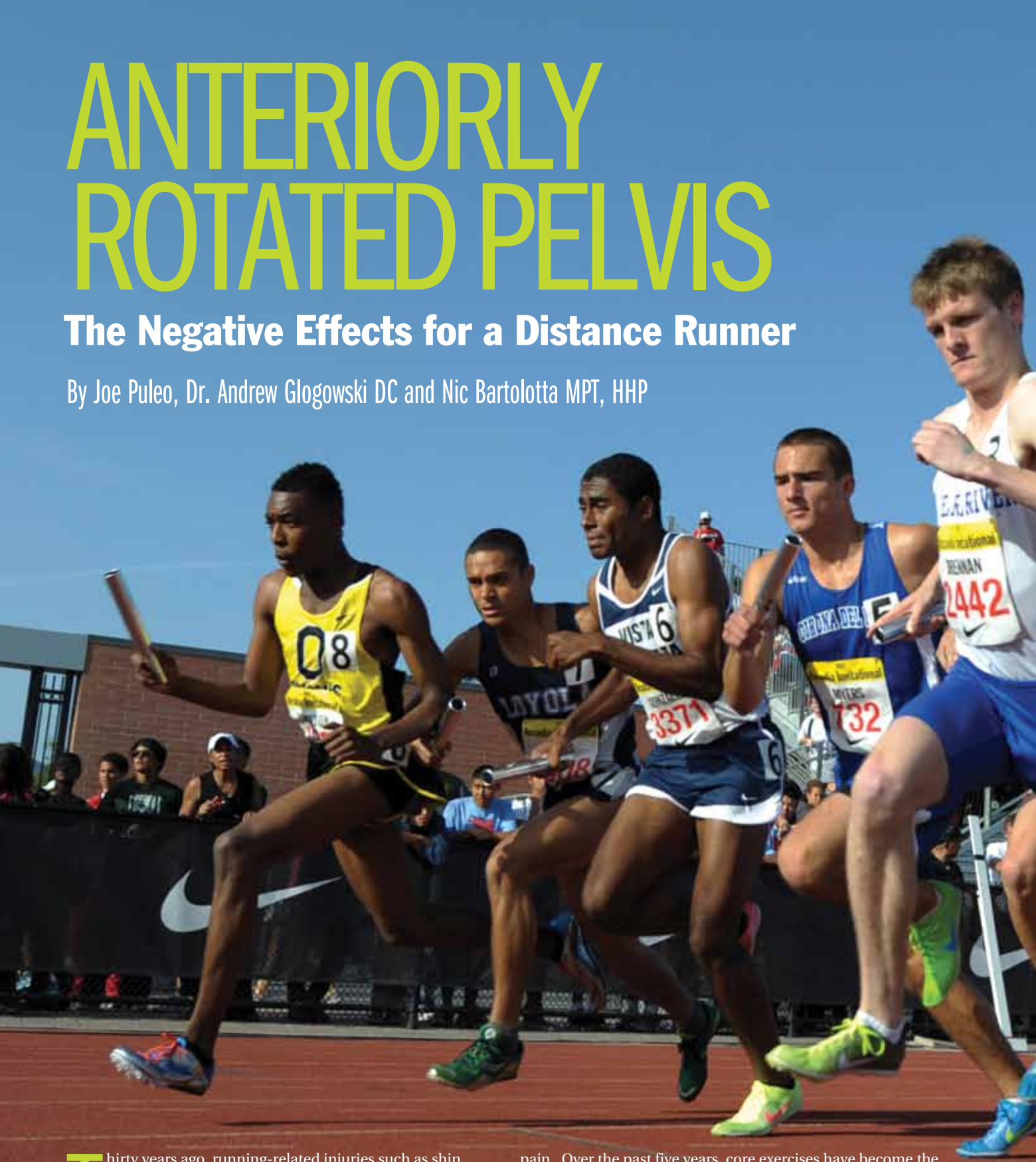
# ANTERIORLY ROTATED PELVIS

## The Negative Effects for a Distance Runner

By Joe Puleo, Dr. Andrew Glogowski DC and Nic Bartolotta MPT, HHP




Thirty years ago, running-related injuries such as shin splints and tibial stress fractures, chondromalacia, and Achilles tendonitis were evaluated by analyzing the biomechanics of the foot. After this analysis, and this analysis only, an injury treatment plan was developed. Approximately 10 years ago, discussions of common running injuries began to include the possibility of anterior pelvic rotation as a major culprit in patella-femoral syndrome, ITB syndrome and piriformis pain. Over the past five years, core exercises have become the backbone of many runners' strength training programs, specifically those exercises targeting the gluteus muscles as well as the psoas and the other hip flexor muscles. This shift in focus represents a significant paradigm shift, moving away from the traditional "bottom-up" podiatric model of injury causation, towards a more "top-down" pelvic tilt-related understanding of running injuries, specifically those from the knee to the hip.

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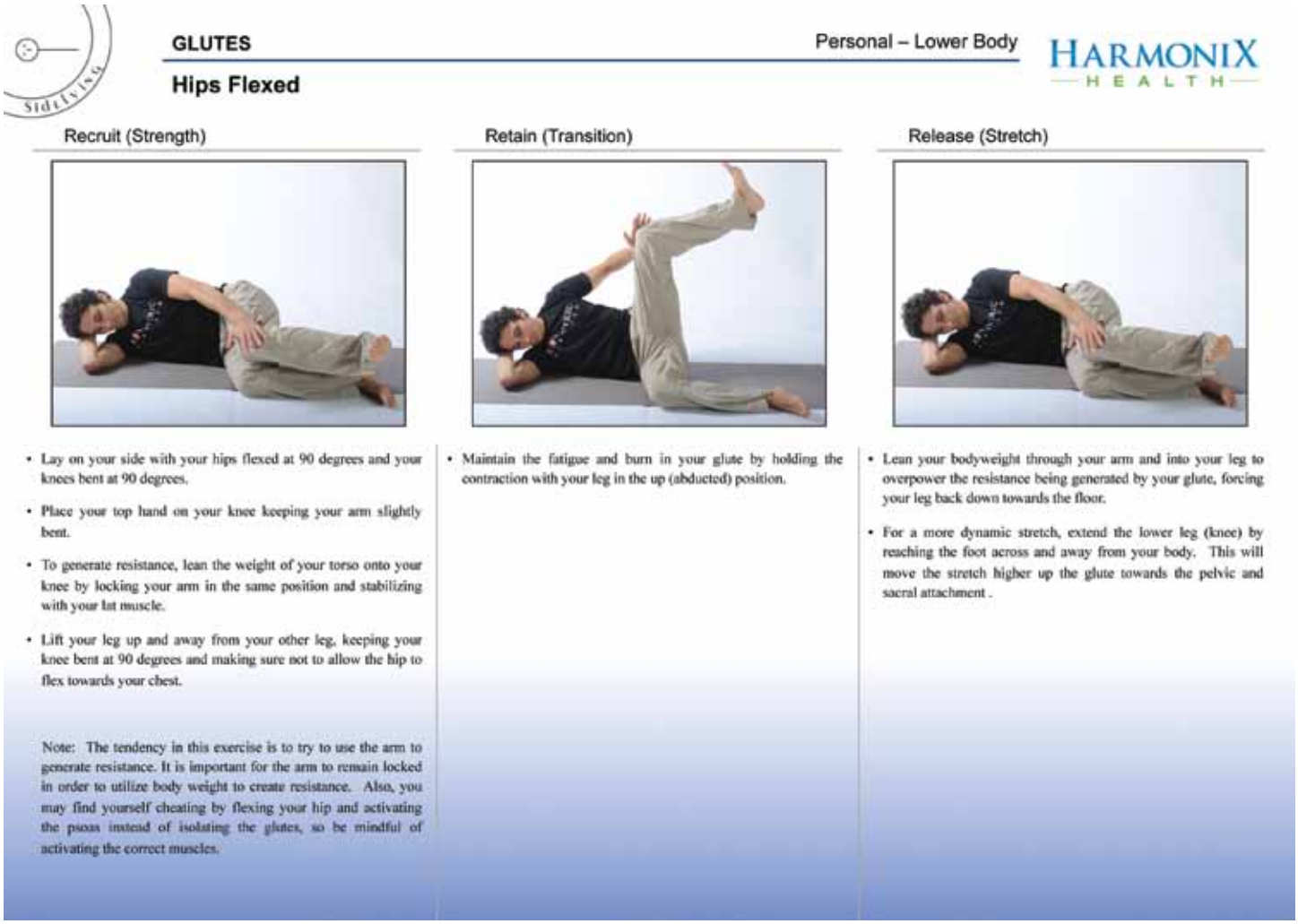


The goal of this article is to examine the shift in the methodology involved in examining running injuries from a traditional foot-based, podiatric model to a pelvic tilt (specifically an anterior tilt) model. Also, this article proposes to thoroughly explain this new model of injury causation and offer a treatment strategy which combines ART® (Active Release Techniques) and DCT (Dynamic Contraction Technique) specific strength/stretching exercises which can function as both prehab and rehab for runners.

## ORIGIN OF THE "BOTTOM-UP" MODEL

The basis of the podiatric model for treating running injuries was established in the mid 1960s by Dr. Merton Root, a California podiatrist who coined the term "podiatric biomechanics." Simply put (and this is no easy task because the foot and ankle are a very complex network of soft-tissue, bones, and nerves), the foot, upon landing, pronates via movement of the subtalar joint. This pronation is significant (over-pronation), normal, or minimal/under-pronation). Although pronation happens in three planes, the emphasis, in this model, is on the sagittal plane. Once the foot achieves mid-stance the foot accelerates through a supination phase, ensuring push-off. The pronation or lack thereof and the subsequent position and movement of the foot determines what happens "up" the kinetic chain all the away to the hip. Hence, faulty biomechanics of the feet cause all chronic running-related injuries.

This is a straightforward concept (given the publication of Dr. Root's *Biomechanical Examination of the Foot* Vol. I and *Abnormal Function of the Foot: Clinical biomechanics* Vol. II), and makes a lot of common sense. The foot is the initial point of contact for the runner's body and the surface he/she is running on. Given the amount of impact force (on average, three to five times the runner's body weight) on a relatively small structure (although ingeniously designed as a cantilever), any breakdown (over- or significant under-pronation) of the foot/ankle complex's movements will need to be compensated for by the muscles and soft tissue above the foot/ankle in order to ensure proper motion for the runner. Once these compensatory structures become overloaded, they, in turn, break down, and an injury occurs. The injury is treated as a symptom of the foot pathology (normally over-pronation) and a course of treatment (usually custom orthotics or over-the-counter inserts) are prescribed.

## ESTABLISHING A NEW PARADIGM- "TOP-DOWN"

The obvious question is: "Are all chronic running-related injuries caused by improper foot motion?" If the answer is "no", or "maybe not," this leads to more questions.

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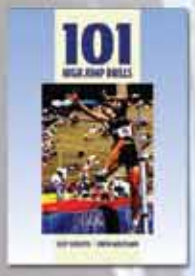




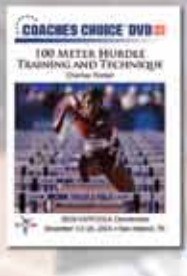


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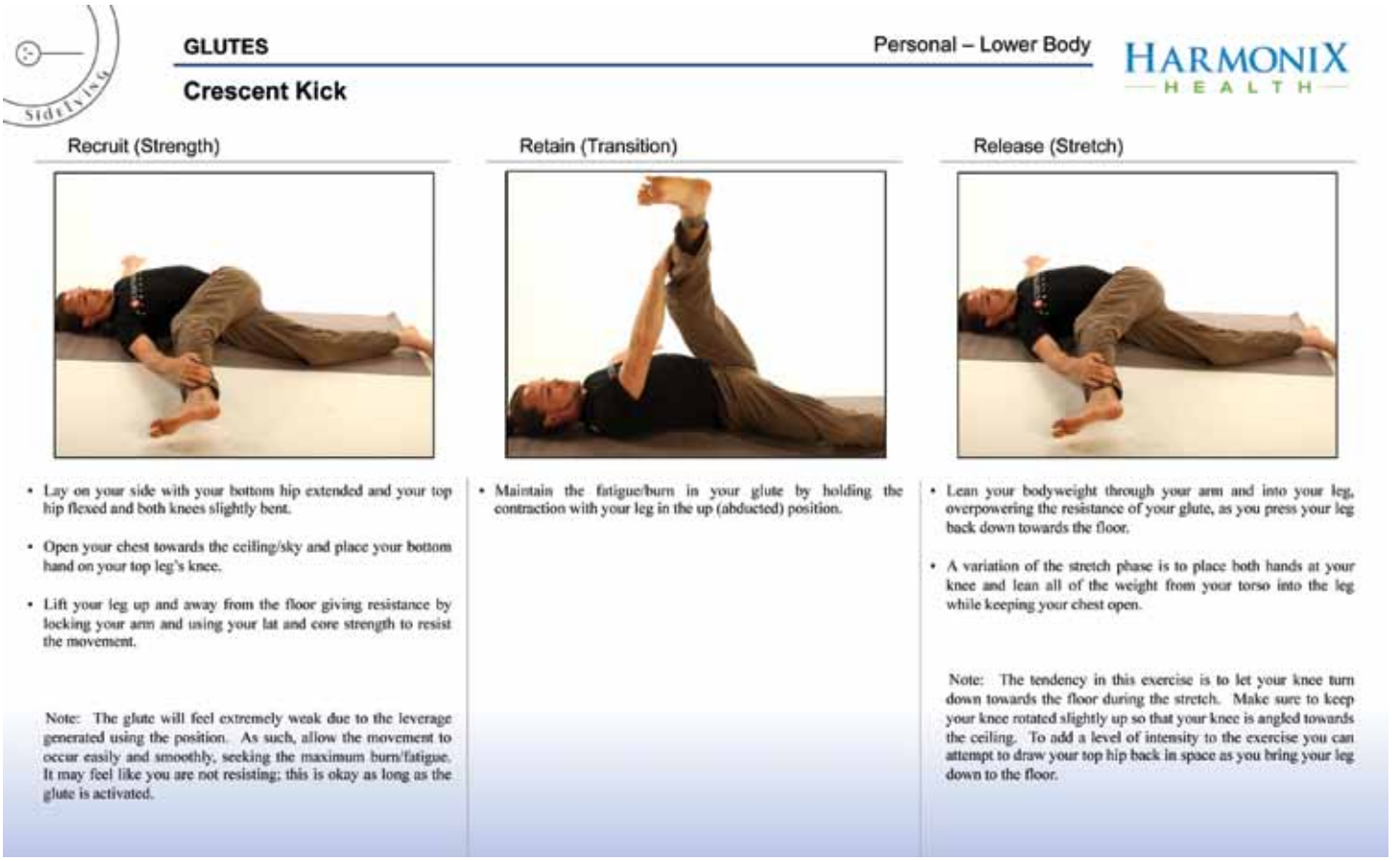


Specifically, the next question could be, "If the foot is not the culprit for all running-related injuries, what part of a runner's anatomy could be a culprit?" The knee is not the answer, because it is a "dumb" joint. Although it functions, like the foot, in three dimensions, it is essentially a hinge. It is the nexus of the lower and upper leg; however, its movements are dictated to it, it does not do the dictating.

Runners often suffer hip injuries, but the ball and socket joint is not the culprit in chronic injuries, so chronic running injuries of the hip are not the hip itself, but usually the soft tissue surrounding the hip. Since the soft tissue (muscles/tendons/ligaments) surrounding the hip attach or insert in the pelvis, a new model for understanding running injuries begins to emerge. Specifically, due to shortening of the psoas muscle and hamstring muscles (normally the biceps femoris short-head), the glutes, specifically the gluteus medius, become very tight, and thus functionally shorter than normal. This shortening requires compensatory movements through the recruiting of other soft tissue structures and joints that can lead to muscle imbalances, tendonitis and fascial damage.

The majority of running problems arise from an imbalance in the gluteal muscles that result in an anterior pelvic tilt. The gluteus medius is responsible for adducting, extending and laterally and medially rotating the hip. Simply, it is the most important muscle in the runner's body, and how well it functions dramatically affects your quadriceps, psoas, smaller hip flexors, adductors and overall pelvic stabilization. Since running involves a relatively small, fixed range of forward motion, there is constant tension between the front and back of the leg muscles, placing the gluteus medius in constant contraction. Without proper strength and proper health of this muscle, running injuries will arise. Specifically, an inhibited/weak gluteus medius recruits the psoas to stabilize the lumbo-pelvic region, thus anteriorly rotating the ilium. It is not simply that the psoas is strong and the hamstrings are weak (although it could be case), but more that one muscle group/system "won out" over the other.

Many runners also experience IT Band Syndrome, which can be both a symptom and a cause of an anterior pelvic tilt. An anterior pelvic tilt can be a major causative factor in IT Band Syndrome because the gluteus maximus, tensor fascia lata (TFL) and gluteus medius all have fibers that run into the IT band and consequently are responsible for its proper function. Since the IT band originates at the anterior iliac crest (hip), its middle portion lies on top of the vastus lateralis, and it ultimately inserts on the lateral aspect of the tibia any change in pelvic tilt can directly impact the IT band. Similarly, weakness, fibrosis and fascial contraction of the proximal aspect of the IT band and its affect on surrounding anatomical structures are some of the reasons pelvic tilt can occur and is not easily corrected. So, iliotibial band tightness can be both a symptom and a cause of an anterior pelvic tilt.

If the pelvis is not stabilized due to weakness or fibrosis (scar tissue), risk of injury increases to the local joint complexes, which are the low back (SI joint) and knees. Patella-femoral syndrome's etiology is anterior loading on the soft tissue struc-

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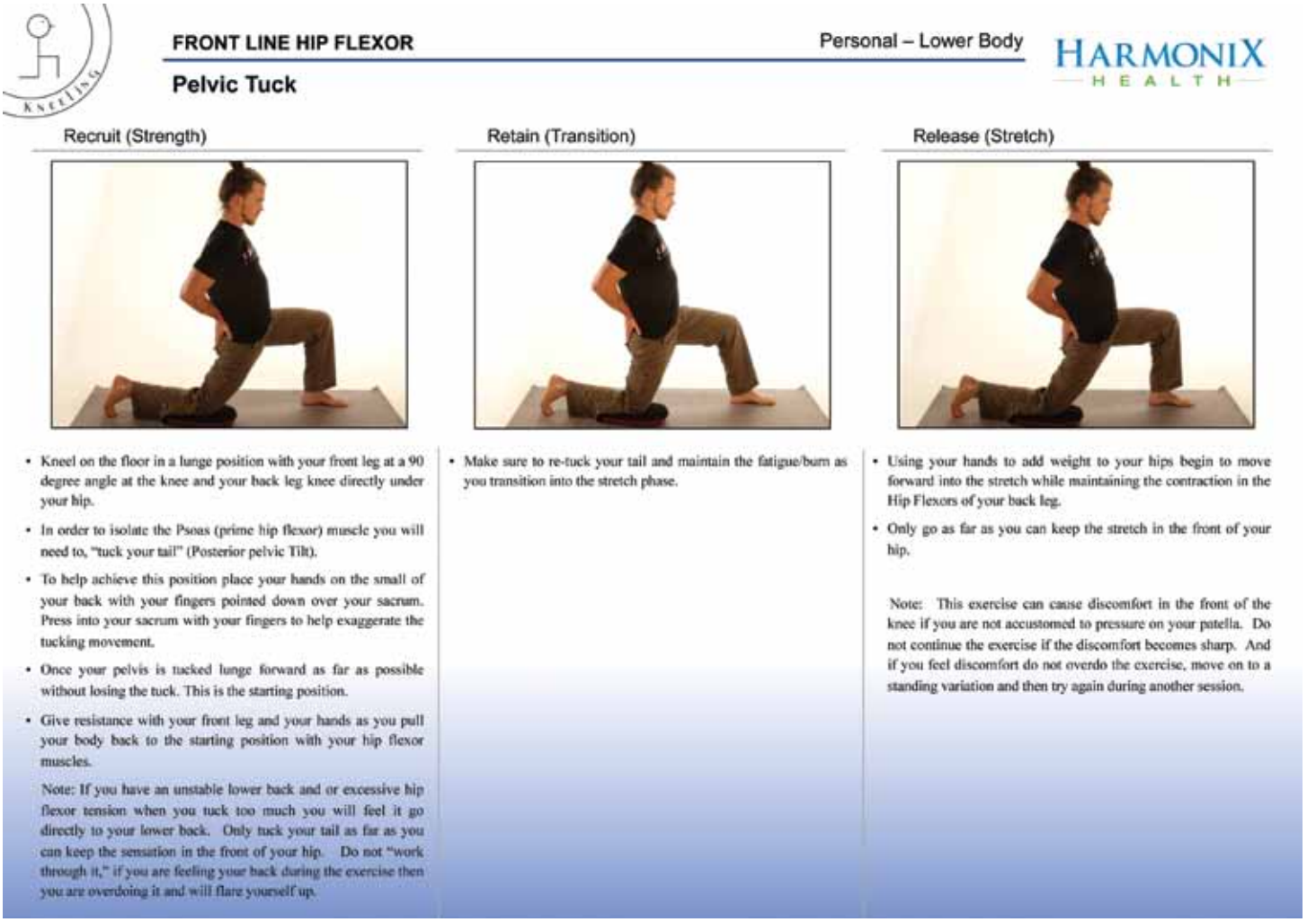


tures of the knee due to dysfunction of the pelvis. An anterior pelvic tilt causes lengthening and tightening of the hamstring resulting in abnormal loading of the knee capsule and anterior ligaments. Overuse in these tissues is the main reason for dysfunctions to appear in the first place. Overuse injuries are always multi-factoral, meaning that the first incident of pain is a result of multiple dysfunctions that have developed over a period of weeks or months, even years. There are a multitude of dysfunctions (aberrant motion patterns, weakness, nerve entrapment etc.) but for the sake of simplicity only fibrosis will be discussed.

## FIBROSIS

The biggest problem that most runners encounter is destabilization in the hip complex, which is most responsible for the action of running. Classically, with overuse, weak and/or tight tissue becomes hypoxic (lacking oxygen) resulting in the creation of fibrous tissue. Muscle fiber direction runs in precise orientation in relation to the movement required. However, fibrous tissue lies with a disorganized orientation that has a destructively powerful influence on our bodies. A series of compensations occur, usually soft tissue tightening resulting in more fibrosis. Once compensation reaches a certain level, a pain response occurs that may not be from the original source of dysfunction.

A greater understanding of soft tissue injuries has emerged in the past few years transitioning from an inflammatory model to a degenerative model. Tendon biopsy studies have shown that in chronic injuries inflammatory cells were not found, but rather degenerative cells like fibroblasts. One of the important discoveries in the past few years is the myofibroblast found in fascia. The myofibroblast is a cell that contracts when exposed to degenerative stimuli, but does not contract with acetylcholine or other muscle stimulants. The premise of fascia, which covers our entire body, contracting has the potential to be a significant component of common ailments like low back, hip, and foot pain. Most running injuries are overuse in nature and have physical manifestations of fibrotic adhesions and fascial damage. Evaluating running injuries through the degenerative model allows an examination of the efficacy of common treatment methods.

## TREATMENT TECHNIQUES

Active Release Techniques ® (ART) is a manual method


which focuses on removing fibrotic adhesions from muscles, ligaments, tendons and nerves. ART providers evaluate soft tissue structures for fibrous adhesions and use a direct tension based contact for removal. There are also multiple instrument-based forms of myofascial release for removing adhesions and lengthening fascia. As discussed, removing adhesions from the pelvic complex and proper strengthening of the gluteus medius is essential for proper stabilization of the pelvis to avoid anterior pelvic tilt.

Included in this article are four Dynamic Contraction Technique stretches that specifically target the glutes and hamstrings, helping alleviate the muscle and fascial tension caused by the repetitive, small-range motion of distance running. DCT works by isolating a muscle using concentric contractions to recruit specific muscle fibers until a perceivable "burning" sensation is felt. Once the intended muscle is fatigued (burning) an isometric contraction is used to maintain the muscle fatigue while transitioning into an eccentric contraction. The eccentric contraction is the means by which DCT exercises facilitate the release of both muscle and fascial tension. The mechanism of the DCT resides in the unique mechanical function of the eccentric contraction. When muscle tissue is sufficiently fatigued around areas of tension in the body and then subjected to an eccentric contraction there is a distinct translation of an external force to that of an internal force directly opposing the area of restriction in the muscle or fascia. This physiological phenomenon allows the user of DCT to systematically reintegrate their muscle and fascial systems optimizing function and performance.

Distance training without stretching (dynamic), strengthening and bodywork (such as ART®, deep tissue massage, and acupuncture) will ultimately exacerbate inherent muscle imbalances by creating chronic muscle tension. It is the goal of this article to present another paradigm, the "top-down" model for evaluating injuries caused by anterior pelvic rotation, and to offer treatment options (ART® and DCT) to keep runners healthy and injury free.

*Joe Puleo is the Head Men's & Women's Track & Field and Cross Country Coach at Rutgers University – Camden and the co-author of the book Running Anatomy.*