Tuning the Athlete

Breathing and Lumbar Alignment

BY GEOFFREY BISHOP

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or an athlete to make it to an elite level, all systems must be perfectly tuned and ready to go. Regrettably, the lumbar spine's anti-gravity springing system and its relationship to breathing patterns are rarely addressed by manual therapists. Erik Dalton's Myoskeletal Alignment Techniques applied as described below have helped me understand the causal relationship between these two complex structures.

In March of 2008, just prior to the British Track and Field Olympic Trials, Mo Farah came to us at the Center for Altitude Training in Flagstaff, Arizona. Holder of the 2007 European Cross Country Championship, Farah relocated from London to Flagstaff to train in high altitude hypoxic conditions in hopes of qualifying for Great Britain's Olympic team. As world class athletes transition from sea level to 7,000 feet, the air thins and functional adaptations become more pronounced. Farah presented with a common condition where extreme exertion initiated shortness of breath accompanied by moderate low-back fatigue. Initially, our focus was on assessing and enhancing breathing function while removing postural kinks in the myoskeletal spring systems, illustrated below. Determined to maintain his title as the fastest man in Europe, Farah proved himself to be a very compliant client.

MUSCLE/JOINT REFLEXES

When screening for dysfunctional patterns in elite athletes, I'm always reminded of the phrase, It's all connected. This keeps me mindful of the importance of maintaining a global body view. In the myoskeletal method, recognizing the reflexogenic relationships between joints and muscles is the first line of defense in addressing chronic reflex muscle spasms. Although relaxation massage helps calm cutaneous receptors, long-term relief from back pain and accompanying diaphragmatic dysfunction requires that all facet joint capsules and ligaments be manually stretched to create joint-play. This process calms the joint's articular receptors and establishes proper function between osseous and myofascial structures.

Although most sports therapists are acutely aware of the importance of proper central tendon functioning, the crura and the arcuate ligaments may be underappreciated by many bodyworkers. From the anterior longitudinal ligament in the lumbar spine, fascial columns arise to become the right and left crus. Just lateral to these fascial columns we see the medial and lateral arcuate ligaments. These ligaments can hardly be considered independent structures from the connective tissue relationship that encompasses the superior portions of psoas major and quadratus lumborum muscles. These tents of the diaphragm have attachments on the bodies of L1, L2, and L3, the disks and at the inferior margin of the 12th rib.

What we found with Farah was a slight myoskeletal engine breakdown. Upon examination of the lumbar spine in the prone position (Image 1), it was visually apparent that some of his lumbar facets were rotated posteriorly indicating they were not closing on the right as he attempted lumbar extension via pelvic tilting. Since the diaphragm originates from the lower six ribs and the upper two or three lumbar vertebrae, it is essential to restore proper movement to avoid reflex respiratory spasm.

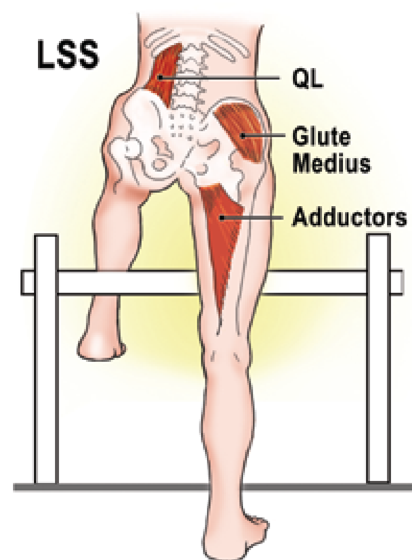
CORRECTING MOTION-RESTRICTED JOINT CAPSULES

In the left sidelying position (Image 1), Farah is asked to perform either pelvic tilts or hip flexion, both of which ask the facet joints to open. The therapist uses either thumbs or an elbow with a sustained headward pressure, applied to the tissues in the lamina groove, that asks any motion-restricted joints to open. This therapeutic maneuver helps restore joint play, downgrades the pain signals from mechanoreceptors, and eases the protective muscle guarding.

We can imagine how sidebending and rotation of Farah's lumbar structure, facets stuck open or closed, may lead to the existence of tensile forces through his breathing diaphragm and abdominal musculature, potentially contributing to pesky side stitch problems, and lower back discomfort. Any kink in the myofascial or skeletal kinetic chain through the thorax and lumbar spine results in diaphragmatic weakness resulting in loss of speed and endurance.

LATERAL SPRING SYSTEM

When the lumbar spring system loses its spring, the body must rely more on the quadratus lumborum (QL) to lift the hip to swing the leg through. Running on relatively flat trails or roads should leave this muscle more at peace. Optimal firing order during right stance phase requires that the gluteus medius/minimus fire prior to



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the QL so the pelvis can right sidebend allowing the left leg to smoothly swing through. Hikers and ultra runners on steep trails may indeed need to recruit the QL more frequently to assist contralateral adductors and gluteus

medius/minimus to lift the hip to get up over larger boulders. Without proper firing of the lateral spring system, repeated foot strike in activities such as running will soon tire the quadratus and deplete an athlete's energy.

Once motion restricted joints are normalized, the QL and lateral thoracolumbar fascia (Image 2) are addressed. When overworked, these tissues pull the ribs toward the hip and bow the spine. To begin correcting this condition, the therapist applies lateral to medial pressure in the lateral strands of fascia and muscle belly as client attempts slow, controlled hip-hikes. As a Golgi tendon organ release is felt, the therapist meets the next restrictive barrier and slowly sinks deeper into the tissue.

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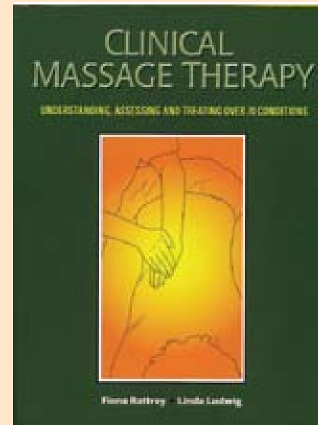

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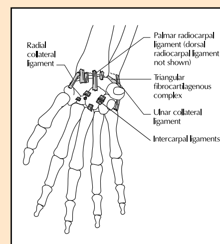

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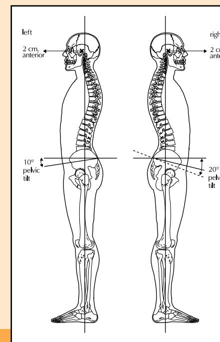

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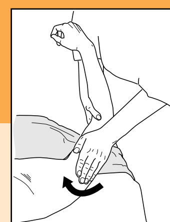

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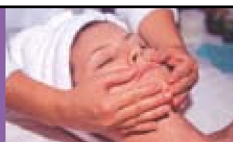

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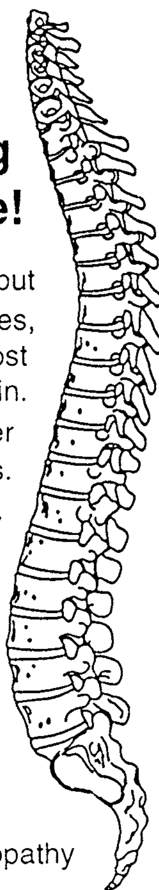

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FIRING ORDER OF THE BREATHING APPARATUS

One visual indicator of diaphragmatic inhibition is the presence of Gothic shoulders, in which the upper trapezius is overdeveloped, and middle and lower shoulder stabilizers are weak, which is commonly accompanied by winging of the scapula.

Another visual cue is the presence of paradoxical breathing. In paradoxical breathing, the therapist notes scalenes elevating the upper ribs, upon full inhalation, before the diaphragm drops down and the abdomen distends. Most detrimental would be a pattern of drawing the abdomen toward the spine, in an effort to breath only with the upper chest. In optimal breathing patterns, the diaphragm should drop down first until the abdomen wall has uncoiled to its limit and the pelvic floor has completely prolapsed inferiorly. At this point, the lower ribs (10–12) are allowed to expand laterally (“bucket handle movement”) while upper ribs (1–9) move more superiorly (“pump handle movement”).

> The pelvic floor anatomy should indeed be considered a crucial part of breathing function.

When the diaphragm is inhibited by an upper chest breathing pattern, the lumbar spine becomes unstable. This instability and lack of support from the lower diaphragm can result in facet joint and disc pathologies that further weaken muscles of respiration. Recall that power

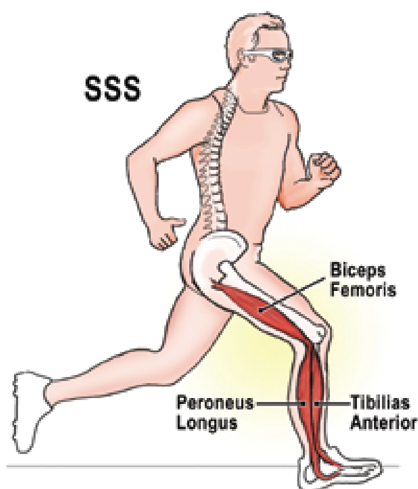
lifters take a big breath and hold it prior to performing a big lift. This maneuver increases intraabdominal pressure and secures spinal and core structures to prevent injury.

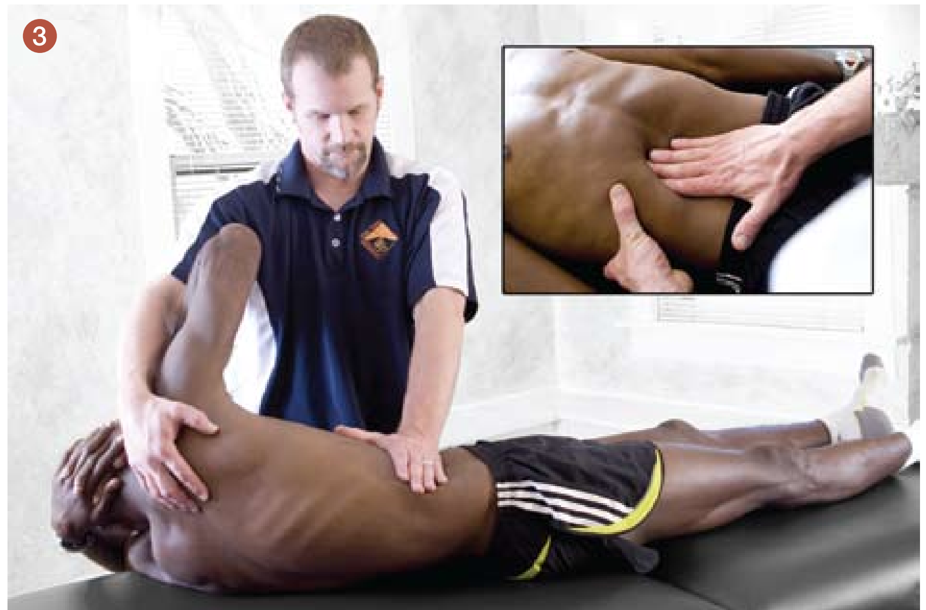
Note that the transversus abdominus (TA) plays a dual role as part of the breathing apparatus and also as an antigravity support structure. In labored expiration, the TA is called upon for expulsion of breath. As part of the antigravity spring system, when the TA contracts, it lifts the thorax off the lumbar spine which springs open the facets, hydrates the disks, and provides lumbar stabilization.

STIRRUP SPRING SYSTEM

Part of what exacerbated Farah's lower back pain was that he was running on uneven—sometimes even soft and sandy—surfaces while training in Flagstaff. In the presence of a soft running surface or shoes that are too cushioned, the body's stirrup spring system (SSS) is compromised.

When the body is at peak of counter rotation, just prior to heel strike, the gluteus maximus and bicep femoris are put on maximal stretch. This tension continues down through the tibialis anterior/peroneal stirrup and elevates the arch of the foot. As the athlete steps down, the arch collapses causing a strong tensional force to be transmitted up the lateral thigh, through biceps femoris, and through the sacrotuberous ligament to help the other spring systems rotate the pelvis and reciprocally counter-rotate the lumbar spine. The result is a smooth, cross-patterned gait.





Photography of Mo Farah by Tom Hamilton. Reprinted with permission from Geoffrey Bishop.

If this return pulse fails, due to things such as weak ankles and arches or bum knees, energy is lost into the ground and the body is forced to overwork other spring system muscles such as the lats, obliques, adductors, etc. Any kink along the lower kinetic chain in the SSS perpetuates aberrant firing order patterns that can dig into core structures such as the thoracolumbar fascia and transversus abdominis.

BREATHING TECHNIQUES

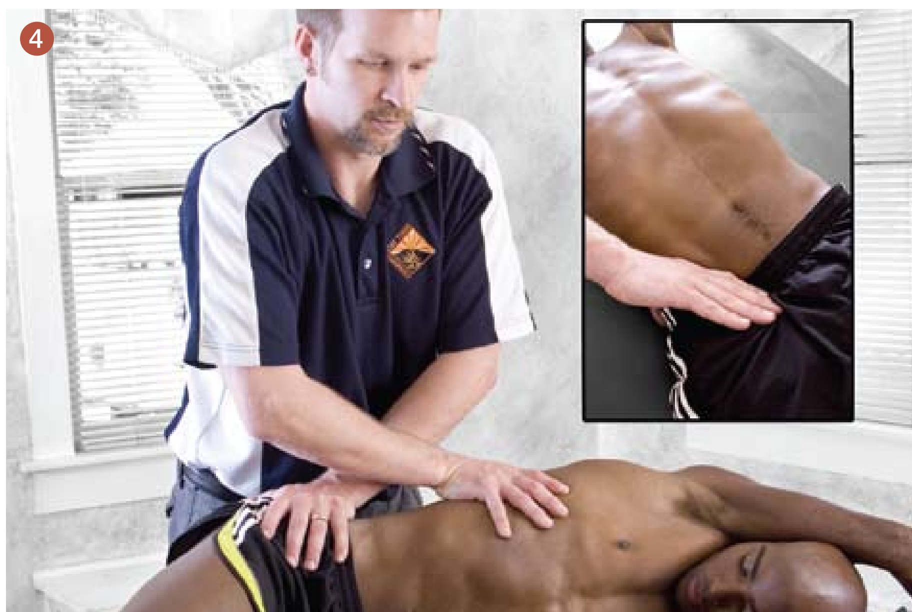
Diaphragm webbing techniques, (Image 3) are applied to separate the fascial adhesions that often occur in the diaphragm and liver area. Hand position may be reversed to palm up so the therapist can focus spot work with finger pads into these tensile fibers as they connect to the area of ribs 7–10 as this is often the site for exercise-related transient abdominal pains (ETAP), or side stitches. Deep exhalation efforts create relaxation and space allowing the therapist to sink deeper into this tissue.

Length and tension should be addressed in the lower fibers of the transverses abdominis, obliques, iliacus, and psoas relationships (Image 4, page 69) by meeting the resistance barrier and encouraging the tissue to move in an inferior and medial direction. Another useful tool in Myoskeletal Alignment is the use of client activated enhancers. I always have fun working with enhancers not only because they produce a better release, but they also force you to stay present with the client. For example, in those presenting with an anterior/inferiorly rotated ilium, I gently pin the iliacus and ask for a deep exhalation while they perform gentle pelvic tilts.

PELVIC FLOOR HEALTH

The pelvic floor anatomy should indeed be considered a crucial part of breathing function. When studying the various core muscles that make up the top of the abdominal cavity, one must not forget the pelvic floor that constitutes the bottom of this cylinder. As a client takes a deep inhalation, the sacrum should counter nutate and move inferiorly allowing the spine to lengthen. Recall that you get taller as you breathe in. Any obstruction in the breathing process from above may create a stopping point for the pelvic diaphragm as it drops down. The myoskeletal technique seeks to solve this problem by stimulating tone in the levator ani muscles of the pelvic floor while restoring balance to all pelvic ligaments and coccygeal structures.

A highly effective treatment that helped maximize deeper diaphragmatic breathing for Farah was to ask for a big inhalation effort (all the way down to the pelvic floor) against resistance (Image 5). When applying this technique, the therapist should apply palm pressure at the sacrococcygeal junction pushing gently headward. Ask the client to take a full breath while intentionally attempting to extend the sacrum down into your hand. This allows the client to assess the strength and tone of the pelvic diaphragm. The therapist may add finger and/or thumb pressure into the soft tissue of the levator ani muscle group (just medial to ischial tuberosity) to provide resistance and kinesthetic cueing. This pelvic floor tissue must be able to drop down upon full inhalation, allowing the abdominal contents to move anterior and inferior, thus creating space for the breathing diaphragm to tug inferior on the lungs. The lower abdominal cavity is also activated during this maneuver which encourages bladder, prostate, digestive, and reproductive health.



CREATIVE THERAPIES

We're all aware of the presence of aberrant postural and functional breathing patterns that affect our recreational and elite athletes. Hopefully, these simple observations concerning the relationship of the lumbar spine to the breathing process will encourage today's manual therapist to develop creative therapeutic programs to help our clients better enjoy sporting endeavors. The presence of side stitches, low-back fatigue, and aberrant gait allow unique insights into what is really going on in the body. We must all seek to engage our inner creative processes and enhance our skills to encourage people to continue with effective and fun exercise programs.

And as for Farah: he went on to qualify as part of the British Olympic team. At the 2008 Olympics he finished sixth in his 5,000 meter qualifying heat, so he did not make the finals. However, he achieved some personal bests at altitude and left pain-free, which, to me, is an indicator of a properly functioning myoskcletal spring system. **m&b**

Geoffrey Bishop is an Advanced Myoskeletal therapist and instructor with Erik Dalton's Freedom From Pain Institute. In Sedona, Arizona, Bishop instructs Myoskeletal Techniques as part of the core curriculum at Northern Arizona Massage Therapy Institute. He is CEO of Stay Tuned Therapeutics, a pain management and teaching clinic. He can be reached at staytunedaz@gmail.com.