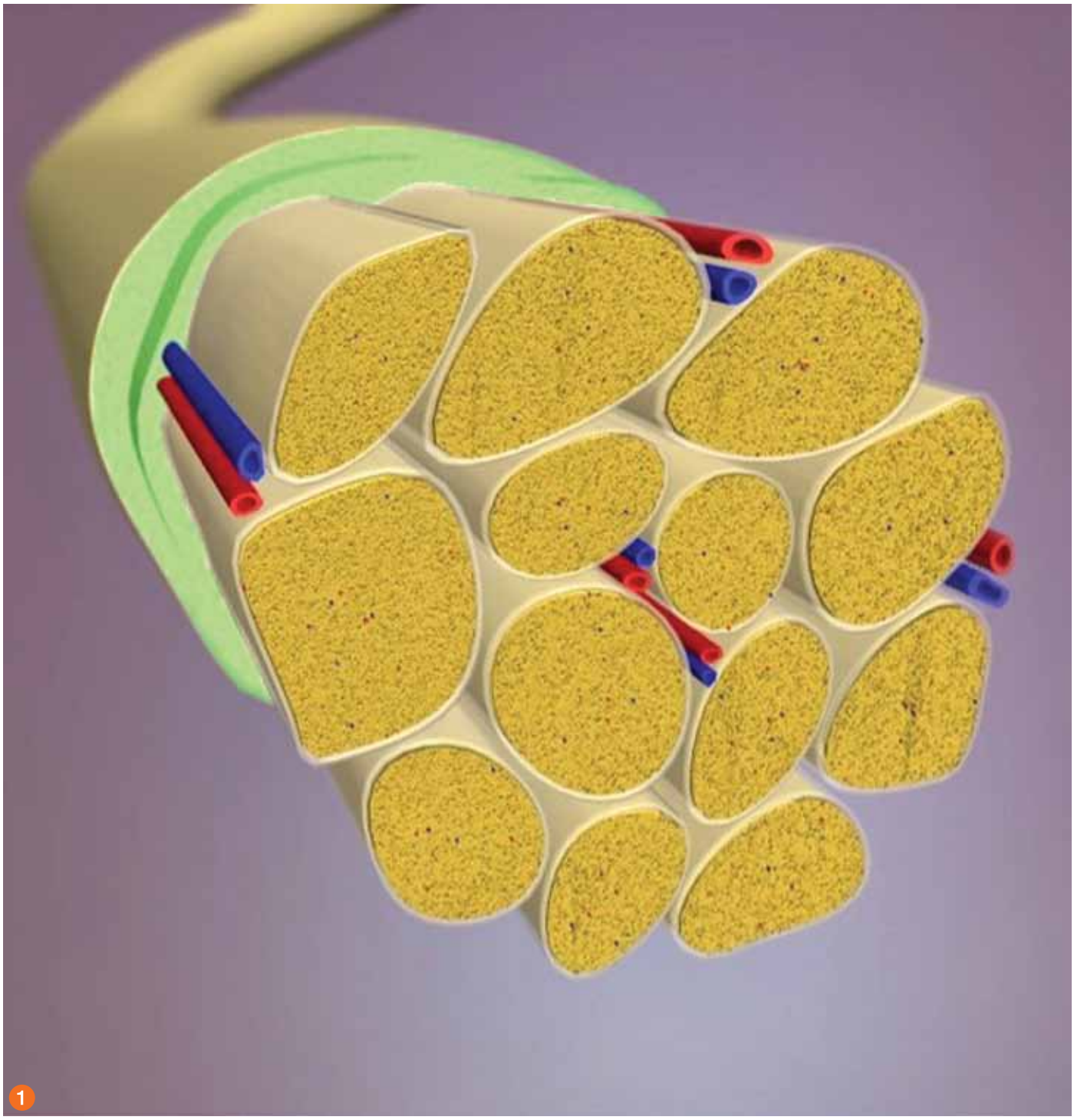
BY TIL LUCHAU



A peripheral nerve's connective tissue includes the inner perineurium (light tan), which encloses bundles of axons (dark beige), and the epineurium (green), the outer wrapping of the nerve, which contains the nerve's internal blood supply (red and blue). *Image courtesy Primal Pictures. Used with permission.*

ASSESSING SCIATIC NERVE GLIDE, PART 2

Nerves are not wires. Although both nerves and wires transmit electrical impulses, nerves are much more than electrical cables. Nerves, because they are living, perceptive, and sentient structures, are sensitive to being crowded, confined, or overstretched. When the sciatic nerve is entrapped or irritated, pain in the low back, buttock, and lower limb is the result.

As explained in the last article ("Assessing Sciatic Pain," July/August 2011, page 110), sciatic pain arises from either axial origins (typically at the spinal nerve roots), or from appendicular causes (distal entrapments in the buttocks, hip, or leg). In this article, I will list some of the most common appendicular sciatic nerve entrapment sites, and describe one way of determining where appendicular entrapment may be occurring. In the next article, I will introduce hands-on methods from Advanced-Trainings.com's Advanced Myofascial Techniques series that have proven both safe and effective for easing appendicular sciatic pain.

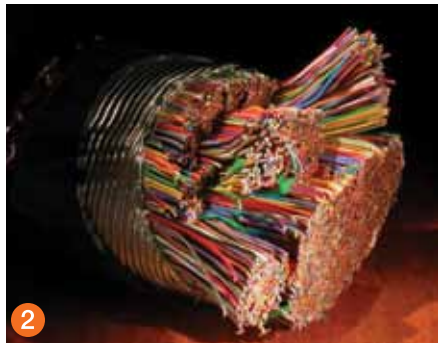
UNDERSTANDING NERVE ENTRAPMENT

In order to understand sciatic nerve entrapment, it is helpful to review some important features about nerves in general, and the sciatic nerve in particular. The neurons that make up the sciatic nerve are the longest in the body—originating in the spinal cord and extending to the hip, leg, and foot. Like all peripheral nerves, these neurons are wrapped and bundled within various layers of connective tissue, the outermost layer being the epineurium (Images 1 and 3), which is a continuation of the arachnoid and dural layers surrounding the central nervous system. The connective tissues of a nerve function to:

1. Help maintain its internal electrochemical environment.
2. Carry the nerve's intrinsic blood vessels and sensory nerves.
3. Give the nerve its structure, tensile resilience, and elasticity.

Impingement (compression or tension) on the nerve impairs all three of these functions, causing internal inflammation of the nerve, reducing its blood flow, and diminishing its ability to glide and stretch.

Elastic glide is particularly relevant to our work. The long neurons within the sciatic nerve stretch an additional 3.5–5 inches with normal hip, knee, and ankle motions.[1] This causes a significant amount of gliding movement between the epineurium and the surrounding intermuscular septa, muscle sheathes, and supporting fascias. A nerve gliding within these surrounding connective tissues can be compared to a tendon's movement within its surrounding bursa. As with other connective tissues, the epineurium sheath around



Although living nerves are much more complex than wires, a nerve's connective tissue layers are analogous to the layered wrappings around an electrical cable. *Image courtesy periodictable.com. Used with permission.*

The epineurium (pink) and its finer enervating sensory filaments (nervi nervorum, yellow), which are involved in pain of the nerve itself.

Because the sciatic nerve stretches as much as 5 inches with lower limb movements, the Sciatic Nerve Glide Test can help locate sciatic nerve entrapment sites. If knee extension and ankle dorsiflexion increase sciatic symptoms, nerve tethering in the hip or leg is likely, usually at the site of pain, or at a place proximal to it along the nerve's pathway. *Images courtesy Advanced-Trainings.com.*

a nerve may itself become adhered or tethered to surrounding structures; it may also become hardened and thickened from strain or injury. Since this protective sheath contains blood vessels that supply the nerve, adhesions or hardening of the epineurium can choke the nerve's circulation, worsening the internal inflammation.

Impingements on the nerve sheath may also cause pain directly—the sheath itself is highly enervated by smaller sensory nerve filaments (the nervi nervorum, Image 3) that are thought to be responsible for many cases of neuropathic pain (pain related to dysfunction of the nerve tissues themselves).[2]

Most importantly for manual therapists, remember that you can't rub nerve inflammation away. This is the key point for effective work with sciatica (and other nerve pain). Since sciatic nerve inflammation is caused by pressure, applying more pressure won't help. With this in mind, it is usually best to avoid direct manual pressure on the sciatic nerve; instead, our goal is to increase "nerve glide": decompress the nerve's passageways, and release nerve sheathes from adjoining structures to restore normal neural movement, freedom, and elastic sliding.

SCIATIC NERVE GLIDE TEST

Appendicular sciatica can be related to sciatic nerve entrapment at any of these sites:

- Under, over, through, or around the piriformis or other rotators.
- Between quadratus femoris/gluteus maximus.
- In the intermuscular septum between biceps femoris/adductor magnus in the posterior thigh.

These entrapment sites can be assessed with the Sciatic Nerve Glide

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Test. To perform the test, have your client lie supine with the hip and knee flexed on the affected side (Image 4). Direct your client to actively straighten the bent knee of the raised leg (Image 5). Extending just the knee from 90 degrees to fully straight stretches the sciatic nerve about 1.5–2.5 inches; adding ankle dorsiflexion (as pictured) typically adds another half inch of stretch.[3] Thus, if straightening the affected leg increases sciatic symptoms, nerve tethering in the hip or leg is a likely contributor to the sciatic pain.

You can get even more specific about where to begin your work by asking your client to compare the sensations of straightening the affected and unaffected legs, and to direct you to any sites of increased pain. Nerve pain typically radiates distally, so the entrapment causing pain resulting from this test is usually at the site of pain, or proximal to it.[4] So it makes sense to start at the site of reported pain and work the nerve pathway proximally from there, retesting to track for any changes.

VARIATIONS TO THE SCIATIC NERVE GLIDE TEST (NOT PICTURED)

1. Increased sciatic pain when bringing straightened leg across the body (hip flexion and adduction with knee extension) can indicate piriformis involvement.
2. Placing the sole of the passive leg on the table by raising the knee can help differentiate between lumbar and nonlumbar tethering. Since the knee-up position decreases lumbar extension, suspect tethering at the lumbars (axial sciatica) if raising the knee on the passive side decreases pain.

Use what you learn from performing the Sciatic Nerve Glide Test to choose where to work next. Myofascial techniques (such as those we'll describe in our next installment), as well as stretching the rotators, gluteus, or hamstrings, are often particularly effective ways to release the neural sheath adhesions or myofascial restrictions you've discovered with the Sciatic Nerve Glide Test.

This test itself can also be as helpful as a take-home client exercise to mobilize a tethered nerve. Clients should be cautioned not to do too many repetitions at one time, or to repeat the maneuver more than once per day, so as to avoid continually irritating an already inflamed sciatic nerve.

OTHER CAUSES OF APPENDICULAR SCIATIC PAIN

In addition to the soft-tissue impingements listed above, the following issues can also contribute to appendicular sciatic pain:

- Prolonged sitting, either from direct pressure on the sciatic nerve from wallets, bucket seats, etc., or from postural strain resulting from hip flexion contracture or posterior pelvic rolling (slumping).
- Driving can increase leg tightness from pressing on the gas pedal, as well as from sitting (driving is also a risk factor for disc issues).
- Hypertrophy (overdevelopment and enlargement) of the piriformis, rotators, or hamstrings, especially when combined with repetitive motions (as in prolonged exercise).
- Structural and tissue changes of pregnancy and postpartum.
- Direct trauma to the sciatic nerve, tumors or infections, or scarring or thickening of adjacent soft tissues.

Some of the above causes suggest their own solutions, which often involve changes in activities or ergonomics. There are also many reports of appendicular sciatic relief being found in regular stretching (yoga's Pigeon Pose or Eka Pada Kapotasana, in particular), or from balanced strengthening (strengthening abductors, for example, can counterbalance hypertoned rotators and adductors).

Because appendicular sciatic entrapments are most often soft-tissue restrictions, they frequently respond quite well to focused and thorough hands-on myofascial work. In our next article, I'll describe hands-on techniques for working with the appendicular sciatic nerve entrapments you identified with the Sciatic Nerve Glide Test. **m&b**

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NOTES

1 Iain D. Belth et al., "An Assessment of the Adaptive Mechanisms Within and Surrounding the Peripheral Nervous System, During Changes in Nerve Bed Length Resulting from Underlying Joint Movement," from: Moving in on Pain: Conference Proceedings—April 1995 Butterworth-Heinemann; 1st edition (December 27, 1995): 194–6.

2 A.K. Asbury and H.L. Fields, "Pain Due to Peripheral Nerve Damage: An Hypothesis," Neurology 34 (1984): 1,587–90.

3 Iain D. Belth et al., "An Assessment of the Adaptive Mechanisms Within and Surrounding the Peripheral Nervous System, During Changes in Nerve Bed Length Resulting from Underlying Joint Movement."

4 As mentioned in the text, the entrapment site is usually at or proximal to the place where pain is felt by the client. However, referral patterns are common (typically involving gluteus maximus, medius, and minimus; rotators; or hamstrings), and like other referred pain, these are sometimes unpredictable and aren't easily explainable by direct neural connections.