Translating fascia research into techniques you can use (Part II)

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This two-part article explores how fascia research findings are informing and advancing massage and bodywork therapies. In the last issue of *In Good Hands*, we proposed that interventions may be most effective when they:

1) focus on areas that place tension on fascia (adhesions, fibroses and scars) since this causes surrounding fascia to remodel
2) incorporate a global perspective and approach to the body
3) include techniques that 'speak to' relevant neural mechanoreceptors.

We have devoted the last part of the previous article and all of this one to applications for working with mechanoreceptors.

These articles endeavour to combine Robert Schleip's research and theories with techniques from Til Luchau's (Advanced-Trainings.com) *Advanced Myofascial Techniques* series of workshops. We are deeply indebted to both as teachers, friends and fascial pioneers. This exploration exists due to their generous sharing of ideas and materials. We strongly encourage readers to learn more from them directly (see Resources).

Working with mechanoreceptors

Dr Robert Schleip is one of the world's foremost researchers and an authority on how manual therapy can address sensory receptors in order to affect tissue tone, body awareness and deeply-established movement patterns. He proposes that understanding four types of mechanoreceptors (sensors that respond to tension and pressure) can expand the tools available to manual therapists. In the last article, we reviewed the Pacini and Golgi mechanoreceptors and presented techniques for addressing each.

As promised, we are back to continue our discourse, this time focusing on interstitial and Ruffini receptors.

After discussing relevant locations, potential effects and the quality of touch needed, we will demonstrate specific techniques for addressing each mechanoreceptor type. To present this information in a practical way, we have chosen techniques appropriate for working with back pain. When applied together, this series of techniques could provide structure for a session that incorporates:

1) *preparation* of the client and the area to be worked
2) *differentiation* of restricted tissues and structures
3) *integration* of any shifts that have taken place - an optimal progression for enhancing structure and function over the long term.

The Interstitial Receptors

Historically, scientific literature has referred to these structures as interstitial muscle receptors and considered them predominantly nociceptive (pain) sensors. Fascia researchers are finding that this thinking is limited on both counts: these free nerve endings prove to be abundant within fascia as well as muscular tissue, and many are proving to have mechanoreceptive properties, making them responsive to normal mechanical pressure or distortion and not just pain. Often disregarded, interstitial receptors turn out to be everywhere, and may be an important factor in understanding and treating chronic pain.

Before we discuss ways to address chronic pain, a little more background is necessary. A typical motor nerve is composed of three types of fibers: vasomotor (responsible for blood vessel dilation and constriction), motor and sensory. For whatever reason, the body seems to place greater importance on sensory input than motor output, as there are three times as many sensory (afferent) fibers as those dedicated to motor (efferent) activity. Most of these sensory nerves (80%) are classified as Type III and IV - the interstitial receptors. The remaining 20% of the sensory nerves are composed of Type I and II receptors, which include the Golgi, Pacini and the soon-to-be-discussed Ruffini mechanoreceptors.

How might this help us aid clients experiencing chronic pain? Well, studies suggest that interstitial receptors can develop bad habits. In the presence of extended pain and certain neuropeptides, these receptors become overly sensitive, resulting in stronger and more chronic firing than may actually be appropriate to the stimulus. In this state, the 'hypersensitive' mechanoreceptor may communicate pain information that is not commensurate with the stimulation. This theory provides some insight into chronic back pain and other cases that exist with no measurable mechanical nerve irritation. There appears to be a lot more to learn about chronic back pain than the popular nerve root-compression model can explain.

If we are correct in thinking that overly sensitive interstitial receptors play a significant role in chronic pain, how can we help these sensors reset firing levels to reflect the actual level of stimulation? It is likely that myofascial interventions can 'speak' to these intrafascial mechanoreceptors, which are closely linked to the autonomic nervous system. Based on the current research (Schleip, 2003), it appears that manual stimulation can alter proprioceptive input to the central nervous system, changing the tonus regulation of the tissue.

According to Dr. Schleip:

"In the case of a slow deep pressure, the related mechanoreceptors are most likely the slowly adapting Ruffini endings and some of the interstitial receptors."

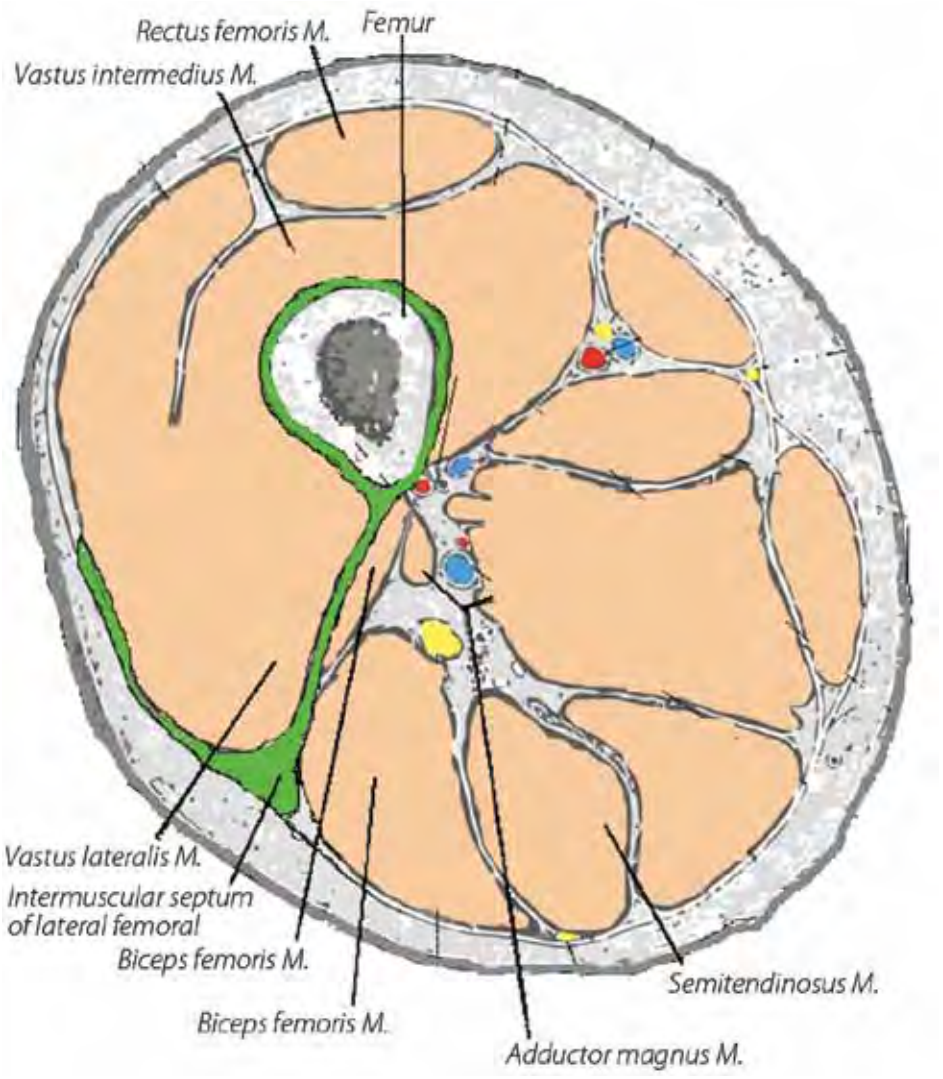
Now that we understand how interstitial receptors may be linked to dysfunctional pain patterns, let's look at a couple of techniques that use this principle.

Interstitial Receptors: Frozen Hose Technique

The Type III and IV receptors are the most abundant of the mechanoreceptors. Found almost everywhere, their densest location is in the periosteum (the fascial membrane that lines the outer surface of bones). Strong stimulation of interstitial receptors has been shown to increase vasodilation (affecting the autonomic nervous system) and extrusion of plasma from blood vessels, affecting changes in the viscosity of the fascia's extracellular matrix. These changes may be what manual practitioners are feeling when they sense a therapeutic shift or softening in tissue.

Our intention is to recalibrate interstitial receptors to reestablish more functional firing patterns. To do this, we need to go where these mechanoreceptors are most abundant - the periosteum, intermuscular septa, interosseous membranes or other fascias connected to bone. There seem to be an equal number of interstitial receptors that respond to low threshold pressure as to high pressure so both rapidly changing and sustained pressure may be effective. We also want to engage the autonomic nervous system (ANS) in a way that is meaningful and integrating. With this intent, we recommend taking a strong, slow, sensitive approach, working deeply with the periosteum while looking for signs of manageable ANS activity.

The following technique works with the periosteum of the femur via the iliotibial band. The iliotibial band makes a good handle for this work because "for much of its length, the iliotibial tract is anchored to the femur by the lateral intermuscular septum" (Hollinshead, 1997).



▲ **Image 1:** This thigh cross-section shows how the fascia of the iliotibial band is continuous with the periosteum of the femur, via the septum between the vastus lateralis and biceps femoris.

A cross-section of the thigh (Image 1) shows how the iliotibial band connects not only with the surface structures of the fascia lata but also goes deep between the vastus lateralis and biceps femoris, wrapping around the periosteum of the femur.

The Technique

In the Frozen Hose Technique, the client is sidelying. Make sure the client's shoulders and hips are stacked vertically (not rolling forward or back), with knees bent. Wrap your hands around the iliotibial band, with your finger pads gently sinking in at the edges (Images 2 & 3). Keep your grasp firm but take care not to pinch the skin. Gently but firmly roll the iliotibial band anteriorly and posteriorly.

If it doesn't want to roll in one direction see if you can free it up by rolling it into this direction and waiting for a release. Once it is less restricted, roll the iliotibial band again but take it in a direction that creates a stretch away from the bone below. Wait for a release in the tissues. Although your grasp is firm, this technique should not be painful. Use a sensing touch and check with your client to make sure the intervention is well within their comfort level.

This technique is an effective way to address even the very tightest iliotibial bands. For many clients this area is so tight that simply rolling the tissue away from the bone provides a deep stretch into the periosteum. If there is enough slack, lift the iliotibial band away from the femur as you roll the tissue.

You can also experiment with 'crimping' the iliotibial band by taking your hands in opposing directions (much as if you were trying to break up ice in a 'frozen hose', hence the imaginative name for this technique). Keep stretching the iliotibial band away from the bone.

Remember that your intention is to provide a deep, steady stimulation that engages the autonomic nervous system at a noticeable but manageable level. Look for signs of your client's heightened proprioceptive presence such as slower, deeper breathing or pupil dilation. It is important that your input is not painful or invasive, overloading the ANS. If you see signs of withdrawal or discomfort, you are not interacting with the tissue in a meaningful way. Remember that our intention is to provide a stimulus that is strong enough to interrupt the habitual response pattern of the interstitial receptors without reinforcing the current dysfunctional firing patterns. If the sensors can respond in a non-habitual way to your input, you are introducing a wider range of response options and you have a better chance to work effectively in this area in the future.

Although many myofascial therapists have been taught to lean a fist or an elbow into the iliotibial band to lengthen the tissue distally from the hip, this approach may not be producing the results they expect. A study using a three-dimensional mathematical model calculated that the force needed to produce deformation of high-density fascia (such as fascia lata) was too strong to be achieved by manual manipulation (Chaudhry et al, 2009). Techniques like the Frozen Hose approach may be a better option because they address Type III and IV receptors and may be able to affect long-term changes in the tissue tonus.

Ruffini Receptors: Seated Back Work with Ball Technique

The Ruffini receptors register mechanical deformation within tissues that regularly experience stretch. Ruffini endings are found in all types of dense connective tissue (muscle fascia, tendons, ligaments, aponeuroses and joint capsules) but are particularly abundant in peripheral joints, outer capsular layers and the dura mater.

▲ **Images 2 and 3:** In the Frozen Hose Technique, gently sink your finger pads around the anterior and posterior edges of the iliotibial band. Firmly roll the iliotibial band to create a deep stretch in the periosteum below. Wait for a release. If there is enough slack, lift the iliotibial band away from the femur or create a "crimp in the hose" by taking your hands in opposing (anterior/posterior) directions. Images courtesy ActionPotential, Inc.

Similar to the interstitial receptors, addressing the Ruffini organs can lower sympathetic tone via the ANS. These sensors are most responsive to techniques that introduce slow, deep pressure (Yahia et al, 1992) and a tangential or oblique stretch. Once you engage the tissue with your knuckles, forearm or hands allow your weight to sink in at an angle that creates a shearing of the tissue layer on the layer below then wait for the tissue to change under your touch. Go slowly. In addition to changes in tissue quality, look for global changes in the client's ANS (warm feet, easier, more expansive breath or perhaps a relaxing of hands or feet).

The Technique

The Seated Back Work with Ball Technique is an excellent approach to changing the tissue tone of the thoracolumbar fascia, which is so often compressed and tight from dysfunctional postural patterns. Position the client so they are seated with hips slightly higher than the knees, and knees slightly posterior to ankles. Have the client bend over a medium-sized Swiss Ball that is not overly inflated and has a little give (Image 4). This position decompresses the lumbars while providing support for the low back.

▲ **Image 4:** In the Seated Back Work with Ball Technique, engage the tissue on either side of the spine, allow your weight to sink in at an angle that takes the tissue inferiorly and slides the tissue layer on the one below it. Your pressure should have a slow, melting quality. Image courtesy ActionPotential, Inc.

Further protect the lumbars by making sure they are positioned anterior to the sacroiliac joints. Lastly, make sure the client's head is turned to the side, with neck and shoulders relaxed.

Take a slight rocker stance, with one foot forward and the other behind you. Contact each side of the client's spine with the dorsal side of each hand. Adjust your angle to create a direction that will allow you to impart a tangential force in the tissue. Gently sink into the tissue until you feel resistance and slide the lumbar fascia towards the sacrum. Your pressure should have a slow, melting quality and should be directed inferiorly, rather than anteriorly. Hook into the tissue layer and only slide at the rate that the tissue allows. Look for systemic changes in breathing, temperature or signs of relaxation. The client may be able to facilitate this differentiation of layers by gently pushing into the legs and feet, which will allow the spine to lengthen superiorly while you coax the outer tissue layer inferiorly.

Conclusion

Fascia science is making it clear that changes in soft tissue cannot always be explained solely by mechanical means (breaking adhesions, elongating tissue etc.). But where one theoretical door closes, another opens. If it is correct that we cannot lengthen iliotibial bands and plantar fascias simply by leaning into them (which, for some of our clients, will come as an enormous relief!), it is likely that there are other effective ways to benefit these areas. Perhaps we just need to speak to the body in a different way. In much the same way as it helps to be fluent in multiple languages when you travel the globe, manual therapists need to have a grasp of different ways of speaking to the body. One language that seems crucial is that of the nervous system.

This two-part article shares just a few insights arising at the forefront of fascia research. Keeping up with the latest scientific findings challenges our assumptions and motivates us to create informal experiments in our practices, often uncovering unexpected connections and expanding our awareness with clients.

If you are interested in learning more, and contributing to the discussion, we highly recommend that you attend the next Fascia Research Congress in Vancouver, British Columbia, March 28-30th, 2012. The Congress is devoted to bringing together scientists and clinicians to inform each other's work. Hope to see you there.

Bethany Ward, MBA and Larry Koliha split their time between teaching and private practice. Faculty members of Advanced-Trainings.com, which offers continuing education seminars internationally, Ward and Koliha also teach at the Rolf Institute® of Structural Integration, Boulder, Colorado. Ward is President of the Ida P. Rolf Research Foundation, a non-profit that supports Structural Integration research and stewards the International Fascia Research Congress. After presenting at AMT's 2011 Conference this October, Bethany and Larry will be teaching Advanced Myofascial Techniques workshops in Sydney, Melbourne and the Gold Coast. For classes and dates, go to www.advanced-trainings.com

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Resources

DVDs (in alphabetical order):

- *Advanced Myofascial Techniques DVD series*
  www.advanced-trainings.com
  Five volumes of hands-on techniques for bodyworkers and manual therapists, with Til Luchau, Certified Advanced Rolfer and Director, Advanced-Trainings.com Faculty.
- *Integral Anatomy Series, 4 Vol.*
  www.gilhedley.com
  Explore the systematic documentation of tissues and dissection perspectives missing from the established anatomical texts and videos.
- *International Fascia Research Congress DVDs & Proceedings Books (2007 & 2009)*
  www.fasciacongress.org
  View the complete recordings of speaker presentations on DVD and access related full-text articles and abstracts written by the world's leading fascia scientists.
- *The Nature of Fascia*
  www.terrarosa.com.au
  Dr. Robert Schleip discusses mechanoreceptors and fascia in depth.
- *Strolling Under the Skin*
  www.guimberteau-jc-md.com/en
  View some of the most fascinating images of living fascia ever recorded.

Websites

- Access fascia research articles at Dr. Schleip's website: *www.fasciaresearch.com*
- Learn more about the International Fascia Research Congress: *www.fasciacongress.org*
- Find out how to support ongoing fascia and structural integration research at the Ida P. Rolf Research Foundation website: *www.rolfresearchfoundation.org*
- Peruse Advanced-Trainings.com's article and video library at: *www.advanced-trainings.com*