

## POSSIBILITIES AND LIMITATIONS OF FASCIA ORIENTED CONCEPTS IN RESEARCH AND TREATMENT OF LOW BACK AND PELVIC PAIN

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### **Fascia: from the Cinderella of Orthopedic Science towards a New Miracle Tissue?**

During many decades fascial tissues were mostly regarded as inert packing organs within the field of musculoskeletal medicine. Their description hardly took on more than a few paragraphs in classical anatomy textbooks, compared with the detailed attention given to muscular tissues and the skeleton. While precise measurement of bones and muscles had been possible for a long time (via X-ray, EMG), the ubiquitous fascial net was hard to grasp in terms of a reliable quantitative assessment.

Enhanced by the first Fascia Research Congress in 2007 plus a subsequent coverage in 'Science' (Grimm 2007) a drastic shift of attention could be observed during recent years. The number of research papers on fascia in peer-reviewed journals has shown a rapid rise (Findley 2012). Similar to the rapidly growing field of glia research in neurology, there is now a global recognition that this underestimated contextual tissue plays a much more important role in health and pathology than was estimated during previous decades.

Among the many surprising fascial properties, which are now being discovered and investigated, are the following:

- The bodywide fascial web as an interconnected tensional force transmission network (Turina et al. 2013)
- The elastic storage capacity of fascial tissues in sports (Kawakami et al 2002)
- Adaptive tonicity changes in fascial tissues, driven by cellular dynamics (Schleip et al. 2006)
- Fascia as sensory organ for proprioception (Stecco et al. 2007, Schleip 2012)
- Nociceptive properties of fascial tissues (Tesarz et al. 2011).

This general trend has also affected the field of low back pain research. Recent studies suggest a potential role of the lumbar fasciae in the force transmission between lumbopelvic trunk and legs (Willard et al. 2102) as well as between arms and lower back, see Fig. 1 (Carvalhais et al. 2013). Changes in the morphology of the lumbar fascia have been observed between chronic low back pain patients compared to normal controls (Langevin et al. 2011). In addition the presence of nociceptive nerve endings has been documented in the lumbar fascia of both rats and humans (Tesarz et al. 2011).

Based on these inspiring developments some authors and practitioners now suggest that fascia oriented treatments may provide ultimate solutions to a vast majority of back related questions and pathologies. The question therefore merits exploration: What are the limits and possibilities of a fascial oriented focus in the investigation of low back and pelvic pain as well as in the related clinical treatment?

### **New Research Possibilities**

While fascial tissues such as the lumbar fasciae or the iliotibial tract can sustain substantial tensional forces, their thickness is very small; ranging usually between 0.3 and 1.7 mm. In the past most imaging methods were not able to recognize small but significant changes in these planes (e.g. a thickness increase of 20%).

In addition, the stiffness and elasticity of these sheet-like tissues were commonly assessed by manual palpation only, however without clear objective parameters.

Due to technological advances several new assessment tools are now available which make a more reliable investigation of fascial tissues and fascial properties possible. Among these are modern sonographic technologies, which allow for a resolution of 0.1 mm and less, if applied to tissues like the superficial layer of the lumbar fascia. Furthermore, sonographic elastography has advanced to a degree where it promises to replace the refinement of at least some manual tissue palpations, in terms of measuring tissue stiffness (Sconfienza et al. 2013). Similarly, mechanographic myometry tools, like the newly available and portable MyotonPro, allow for measuring the viscoelastic parameters, such as the elastic storage capacity, in fascial tissues situated close to the surface (Aird et al. 2012).

Advances in histology - including the use of biopsies and of microdialysis - also offer promising aspects for this field, in addition to the rapid improvements in the field of matrix biology.

### **Current Research Limitations**

Nevertheless, many pathological fascial adhesions, such as in peripheral nerve disorders are still not recognizable in many cases, no matter how agonizing they may be for the patient. Often they are only visible during subsequent surgery in that area (Brüggemann et al. 2010). Measurement of deeper layers would require magnetic resonance imaging, which is usually associated with financial restrictions as well as limitations in terms of client positioning (Xie et al. 2013).

Many recent investigations on fascial properties have been performed on rodent animals. Extrapolation of the related findings may be questionable, particularly in relation to the lumbopelvic area in humans, which serves a different function in us bipeds than in quadruped animals.

When it comes to clinical research an increasing difficulty is posed by severe differences in language and mentality that are frequently found between fascia oriented clinicians and academic researchers (Grimm 2007).

### **Treatment Possibilities**

Several manual therapies claim to be able to improve myofascial pain conditions via massage-like manipulation of related fascial tissues. These include the Rolwing method of Structural Integration (Fig. 2), osteopathy, chiropractic, connective tissue massage, various brands of myofascial release, and others.

Anecdotal reports are usually positively overwhelming, including successful treatment cases which would otherwise been headed for low back surgery. Randomized controlled trials exist for osteopathic as well as chiropractic treatments, indicating that at least in some circumstances these manual treatments are effective treatments for acute back pain (Liccardione et al. 2005, Rubinstein et al. 2013).

A recent study suggests that application of 10 minutes of daily yoga-like static trunk extension seems to exert analgesic effects in previously inflamed lumbar fascial tissues of

rats (Corey et al. 2012). It remains to be seen whether a related therapeutic application with humans may induce similar beneficial improvements.

Besides manual therapies, multiple forms of tool-assisted therapies exist, which claim to improve low back and/or pelvic pain conditions via stimulation of fascial tissues. These include metal needles, such as in acupuncture or dry needling, as well as various rubbing and vibratory devices. For acupuncture as well as Gua Sha randomized trials tend to suggest clinical improvements in acute back pain in at least some cases.

A diminished lateral shear motion of the superficial layer of the lumbar fascia during passive lumbar flexion has been observed in low back patients (Langevin et al. 2011). It is possible that this feature is a result of pain induced immobility rather than the cause of it. However, a surprising richness of proprioceptive nerve endings has subsequently been found in the sliding zone between this fascial layer and the overlying subcutaneous connective tissue (Tesarz et al. 2011). While a lowered lumbopelvic proprioceptive acuity has been described as a contributing factor in back pain (Lee et al. 2010), it seems possible that an inhibited sliding motion between lumbar superficial fascial layers may be part of these dynamics. Based on that background the recent rat study by Bove & Chappelle (2012) deserves particular attention, which showed that post-surgical adhesions could be lysed with a gentle myofascial mobilization.

### **Treatment Limitations**

While the above described release of fresh fascial adhesions is impressive, it is questionable whether the force and time parameters of manual treatments are sufficient to alter the biomechanical properties of more dense tissues, such as are found in long term fibrotic adhesions, at least when viewed as an immediate effect of the mobilization (Chaudhry et al. 2008).

The missionary attitude of many fascia related complementary medicine practitioners could play an influential factor in the important psychosocial dynamics of low back pain. While being helpful in many aspects of the treatment, the same mentality could go along with a partial blindness of the related practitioner towards factors that contradict her/his optimistic treatment expectations. Bias control is a difficult feature in manual therapies and related studies. Mehling et al. (2005) suggested several methodological modifications for related clinical studies, which promise significant improvements in estimating the magnitude of the involved psychosocial expectation factors. Unfortunately very few fascia related clinical studies have attempted to incorporate these methodological suggestions.

Finally, fascia oriented treatments will find their limitations in all those cases, in which low back or pelvic pain is clearly caused by non fascial causes, such as in a sequestered intervertebral disc herniation with accompanying cauda equine syndrome, or in endometriosis related pelvic pain.

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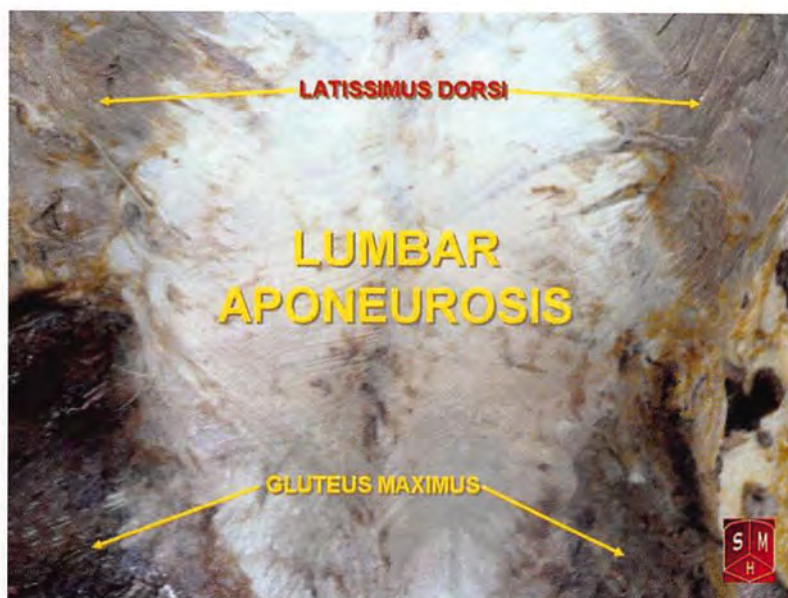
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**Fig. 1:** The lumbar aponeurosis of healthy persons tends to express a lattice-like fiber orientation. This arrangement allows for a strain transmission between arms and lumbar fascia (via the latissimus dorsi) as well as between the upper legs and the lumbopelvic region (via the gluteus maximus).



**Fig. 2:** In the Roling method of Structural Integration the lumbar fasciae are treated with slow but strong manual pressure and shear application (up to 100N per hand) with the aim of increasing proprioceptive refinement and loosening fascial adhesions in this area. During the maneuver demonstrated here the patient is instructed to perform a smooth lumbar flexion in slow motion while gently breathing into the hands of the practitioner at her back. The practitioner tries to hold the tissues medial (preventing them to slide laterally apart) and also moves them slowly in a caudal direction during the client's forward bending motion.