

# ***The Anatomy of the Sinew Channels (Jingjin)***

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## **Sinew Channel Evolution**

Originally described in Chapter 13 of the Ling Shu - 2<sup>nd</sup> century BC (Nguyen, V. 2005), (Deadman, P. 2007).

Tom Myers – Anatomy Trains 2002 (Myers, T 2014)

## **Fascial Connections**

- Fascia Research Society defines fascia as:
- “A connective tissue that interweaves and connects all parts of the human body and is a body-wide tensional force transmission network.” (Klinger, W. 2015).
- This continuous tensional fascial network and the discontinues bony framework is a tensegrity structure.
- Tensegrity comes from the terms ‘tension’ and ‘integrity’, thus the integrity of the structure is determined by the tension.
- Tensegrity structures have discontinuous compression struts (like the bones in the body) and a continuous tension net (like the fascia, especially the myofascia).
- The myofascial structures are part of this continuous fascial network.
- The epimysium, perimysium, and endomysium surround and invest the muscle, muscle fascicles, and muscle fibers respectively.
- These myofascial layers are continuous with the tendon. The tendon is continuous with the fibers of the periosteum.
- However some fibers of the tendon are also continuous with the surrounding tendon of the muscle, which shares attachment space on the bony landmark.
- These interconnected structures are on the same myofascial plane and are in a relatively straight line of pull and do not have any structures which cut through the line. They create a continuous line of pull which communicates mechanical information through the myofascial system. These are being referred to as ‘myofascial meridians’ and they can be seen as an evolution of the understanding of the sinew channels.

## **Fascia and Proprioception**

- During the International Fascia Research Congress, held at Harvard Medical School in 2007, three teams from different countries reported, independently, their findings of a rich presence of sensory nerves in fascial tissues (Schleip, R. 2015).
- The nervous system seems to be around six times more proprioceptively interested in what goes on in the fascial matrix than it does in detecting changes in the muscle itself (Van der Wal, J. 2009).
- About 80% of all peripheral nerve afferent fibers come from the myofascial tissue. The body wide connective tissue network is certainly our most important organ for proprioception (Schleip, R. 2003).
- The superficial fascial layers of the body are, in fact, much more densely populated with proprioceptive nerve endings than the connective tissues situated internally. In particular, the transition zone between the fascia profunda and the subdermal loose connective tissue seems to have the highest sensorial innervation (Tesarz, 2011).

## **The Sinew Channels (*Jingjin*): *Ling Shu***

- The *Jing Jin* were first described in Chapter 13 of the *Nei Jing Ling Shu*. These descriptions of channel topography are at times, vague and difficult to interpret, with very little information that has been added since that time.
- The *Jing Jin* follow the same relative pathways as the primary channels but are not generally considered to attach to the *Zang Fu*.

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- This chapter in the *Ling Shu* describes the disorders associated with each channel that includes: pain, contracture and movement restrictions mostly from an attack of Wind and Cold.

### **Building a Current Model for the Sinew Channels**

- The sinew channels lie alongside and are nourished by the primary channels. The primary channel's circulation of Qi and Blood expands to the muscles, tendons, ligaments and joints. Acupuncture points on the primary channel can be used to regulate the sinew channel and if there is stagnation in the primary channel then there is malnourishment in the sinew channel (Keown, D. 2016), (Low, R 1983), (Ni, Y 1996).
- Some current authors have assigned specific muscles and fascial structures to the sinew channels (Kendall, D 2002), (Legge, D. 2010), (Maciocia, G 2006). We feel there is considerable room for exploration of the anatomy of these channels and an updated categorization of the tissues for each channel. This will then create clinically successful treatment outcomes.
- This process involves listing the anatomical structures that are in each channel, describing how these structures are linked, where certain sinew channels converge, and exploring how each sinew channel functionally interacts with one another. When the channels become imbalanced, the external structure is offset and a predisposition to injury can occur.

Our view of the sinew channels is from:

- Traditional channel theory and *Lingshu* descriptions of the *jingjin*.
- Modern Western anatomical fascial research.
- Postural imbalances and functional anatomy
- Ongoing cadaver studies in the Sports Medicine Acupuncture Certification program.
- Clinical observation

### **Assessment of the Jingjin**

- Classically, palpation for *ashi* points and movement restrictions along the sinew channels was the primary method of assessment(Nguyen, V. 2005).
- In addition to palpation, the following examinations will help to “zero in” where the fixed pain site (*ashi* point) is located:
  - Orthopedic Evaluative Testing
  - Manual Muscle Testing

### **Classical Assessment and Treatment of the Jingjin**

- Classically, palpation for *ashi* points and movement restrictions along the sinew channels was the primary method of assessment (Nguyen, V. 2005).
- Treatment of the sinew channels was described in the *Lingshu* as using heated needle with rapid puncture (*fan zhen jie ci*) at *ashi* points. Depth is often interpreted as superficial, though Vietnamese scholar, Nguyen Van Nghi, in his commentary of the *Lingshu* states that depth of needle depends on the acquired knowledge of the doctor (Nguyen, V. 2005).
- Sinew channels do not have points of their own and are classically treated with *ashi* points. However, some translators assert that the sinew channels start at the well-*jing* points and that these points can be used for treatment.

### **Treatment of the Jingjin: Binding Regions**

- The sinew channels are described to bind (Deadman, P. 2007), [also translated as ‘insert’ (Nguyen, V. 2005), and ‘to fruit’ (Low, R. 1983), (Cecil-Sterman, A. 2012)] in certain areas. These are mostly regions of musculotendinous junctions, tendons, and ligaments. They are primarily in the regions of the major articulations (wrists/ankles, elbows/knees, shoulder/hips, occiput and face).
- We consider binding areas that have increased tension in the tensegrity structure, especially when postural imbalances have directly contributed to the tension.
- Other areas of binding can be inferred with additional insight modern anatomy.

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### **Treatment of the Jingjin: Reunion Zones**

- Reunion zones are acupuncture points , four in total, one each for the three arm Yang and Yin sinew channels and the three leg Yang and Yin sinew channels.
- Temporal region ST 8 or GB 13: Three Arm Yang
- Under the axilla - GB 22: Three Arm Yin
- Cheek bone - SI 18 or ST 3: Three Leg Yang
- Above the pubic bone - Ren 3: Three Leg Yin

### **Assessment and Treatment of the Jingjin: A Current Model**

We propose the following strategy for assessment and treatment using the sinew channels for musculoskeletal injury.

- Practitioner uses OET, MMT and palpation to diagnose the injury which leads to the affected sinew channel.
- The practitioner palpates the fixed pain site and obtains a subjective assessment of the patient's pain. Pain scale 1-10.
- Acupuncture points on the primary channel can be used to regulate the sinew channels (Low, R 1983), (Ni, Y. 1996), (Keown, D. 2016).
- Practitioner palpates or applies acupuncture to key points that “rids obstructions in the channels” such as well-*jing*, connecting-*luo*, accumulating *xi*-cleft, and specific motor points. The practitioner will then need to re-assess the fixed pain site for a reduction of pain.
- Practitioner treats the sinew channel, channel correspondences in combination with the TCM differential diagnosis of the patient.

### **Treatment of the Jingjin: Channel Correspondences**

As seen in the tensegrity model discussed previously, balance is achieved through an even tension between tensional units (sinew channels).

With postural and muscle imbalances that have contributed to an area of injury, there is a remarkable relationship to TCM's channel correspondences.

- Internal/External
- Six Divisions
- Midday/Midnight

When force is applied, it is spread throughout the entire structure. If too much force is added, the structure will often break at a distance away from where the force is added, usually at a weak point in the structure. Thus, with postural and muscle imbalances there is a greater likelihood of injury during athletic events, training and other activities which load the body tissues.

### ***Yaoyan Syndrome***

- The extra point *yaoyan* is located 3.5 cun lateral to the lower border of the L4 spinous process. Anatomically, this point is located on the superior edge of the iliac crest where the lateral aspects of the thoracolumbar fascia, iliocostalis lumborum and quadratus lumborum attaches. The *yaoyan* region is defined as the soft tissue attachment sites that extend from the extra point *yaoyan* to UB 25 (*dachangshu*).

### ***Yaoyan Syndrome Assessment***

- The practitioner will often find an elevated ilium with *yaoyan* syndrome.
- The practitioner is behind the patient and places their fingertips over the highest point of each ilium on the lateral aspect of the body. The practitioner will need to push their fingertips into the patient's body to feel the top of each ilium and then compare the relative heights of the right and left sides. If one side is higher, this is the side of the elevated ilium.
- When balanced, the LIV and GB sinew channels provide a counter to each other and balance the medial and lateral portions of the body.

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- An elevated ilium will make muscle imbalance on both sides of the pelvis. These include:
  - The ipsilateral gluteus medius and minimus locked-long and the adductors and quadratus lumborum are locked-short.
  - The opposite will occur on the contralateral side.
  - The same dynamic is in effect during movement. The gluteus medius and minimus stabilize and prevent the ilium from rising during weight bearing.

### **Manual Muscle Test – Gluteus Medius/Minimus**

- Place the patient in a supine position and abduct the hip to 30-35°
- The practitioner places the driving hand around the lateral malleolus of the test leg and stabilizes the opposite leg at the ankle. The leg is raised 1-inch off of the table.
- While the patient resists, the practitioner pushes the leg into adduction. Be aware that the leg does not drag on the table and create a false reading.

### **Manual Muscle Test – Adductor Longus**

- With the patient in a supine position with their legs straight, the practitioner brings both legs to the side so that the test leg is adducted approximately 10°-15° over the midline.
- The practitioner raises the test leg 1-inch off of the table and stabilizes the opposite leg on the anterior tibia just above the ankle.
- While the patient resists, the practitioner pulls the test leg into abduction. Be aware that the leg does not drag on the table and create a false reading.

### **Palpation of Yaoyan**

- Palpation of *Yaoyan* is at two depth levels (superficial and deep) and involves two different sinew channels.
- Superficial is along the UB sinew channel and involves the iliocostalis and thoracolumbar fascia.
- Deep is along the LIV sinew channel and involves the quadratus lumborum and thoracolumbar fascia.

### **Description of the Liver Sinew Channel from the *Lingshu***

*"The Zu Jueyin (Li) Jing Jin begins on the top of the great toe, ascends and inserts anterior to the medial malleolus, follows along the tibia and inserts inferior to the tibial tuberosity, goes up the medial aspect of the thigh, and inserts in the genital system to anastomose to the other Jing Jin." Ling Shu, Ch. 13, translation*

*Ling Shu, Ch. 13, translation*

*by Nguyen Van Nghi*

### **Liver Sinew Channel (Myofascial Anatomy)**

- Main Branch
  - Adductor hallucis brevis, flexor hallucis brevis, lumbricals
  - Flexor digitorum longus, flexor hallucis longus
  - Knee capsule
  - Gracilis, adductor longus and brevis, pectineus
- Connects with:
  - Iliacus, quadratus lumborum, psoas major, diaphragm, parietal pleura, scalenes
- The Liver Sinew channel has attachments into the adductors, especially adductor longus which takes it to the pubic ramus and continues onto the iliacus. The iliacus is continuous with the quadratus lumborum (Myers, T. 2014). This is at a deeper level than the more superficial tissue which makes up the Gallbladder jingjin.

### **Description of the Gallbladder Sinew Channel from the *Lingshu***

- *"The Zu Shaoyang (GB) Jing Jin begins at the extremity of the fourth toe, inserts on the lateral malleolus, goes along the lateral surface of the lower leg and inserts in the lateral aspect of the knee."*

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- A branch departs from the fibula, reaches the front of the thigh and inserts at *Futu* (ST 32); another climbs to the buttock area (gluteal region) and inserts at *Gan Gu* (coccyx).
- A vertical vessel reaches the hypochondria region, goes to the anterior surface of the thorax, attaches to the breast and inserts at *Quepen* (supraclavicular fossa).

### **Gallbladder Sinew Channel (Myofascial Anatomy)**

- Extensor digitorum brevis
- Toe extensors and peroneus tertius
- Iliotibial band, gluteus maximus (*converges with UB SC*)
- Gluteus medius and minimus
- Latissimus dorsi
- Abdominal obliques (internal and external)
- Intercostals (internal and external), serratus anterior
- Pectoralis major
- Upper trapezius
- Temporalis

### **Description of the Urinary Bladder Sinew Channel from the Lingshu**

- “*The Zu Taiyang (Bl) Jing Jin (tendinomuscular channel) begins at the extremity of the little toe, inserts at the lateral malleolus, climbs and inserts in the knee, goes back down to the lateral malleolus and inserts at the heel, reascends the posterior aspect of the lower leg and reaches the popliteal fossa.*
- *A vessel inserts in the lateral region of the calf, reaches the popliteal fossa, inserts at the buttock, goes along the spinal column and reaches the nape.*
- *A vessel inserts on the mastoid, reaches the cranium, redescends to the face and inserts at the nose.*
- *A vessel branches out like a net around the eye, descends, and inserts on the cheekbone.*
- *Another vessel departs from the posterolateral region of the axilla and inserts at Jianyu (LI 15).*
- *Another vessel penetrates into the subaxillary region, ascends to Quepen (ST 12, supraclavicular fossa) and inserts at Wangu (GB 12).*
- *Another vessel departs from Quepen (ST 12) and goes to the cheekbone.”*

### **Urinary Bladder Sinew Channel (Myofascial Anatomy)**

- Abductor digiti minimi
- Plantar fascia, lateral band
- Gastrocnemius
- Hamstrings – biceps femoris, semitendinosus
- Sacrotuberous ligament, multifidus triangle and sacral ligaments
- Gluteus maximus
- Thoracolumbar fascia
- Erector spinae and transversospinalis
- Cervical extensors
- Suboccipitals
- Galea aponeurotica (occipitalis and frontalis)
- Facial muscles
- Branches from the thoracolumbar fascia include: latissimus dorsi – pectoralis major (clavicular head) – SCM, platysma; and trapezius

### **Yaoyan Syndrome Treatment**

- Practitioner palpates the fixed pain site and obtains a subjective assessment of the patient’s pain. Pain scale 1-10.
- Practitioner palpates or applies acupuncture to key points that “rids obstructions in the sinew channels” such as well-*jing*, connecting-*luo*, accumulating *xi*-cleft and specific motor points. The practitioner re-assess the fixed pain site for a reduction of pain.
- Common points that take pain away from the Yaoyan region are:

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- Superficial *Yaoyan*: Biceps femoris long head MP, Piriformis MP, UB 58 (*feiyang*), UB 63 (*jinmen*).
- Deep *Yaoyan*: Adductor longus MP, LIV 5 (*ligou*), LIV 3 (*taichong*).
- Local treatment involves needling *Yaoyan* at the most painful vector.
- Adjacent points can be added to treat an elevated ilium, the quadratus lumborum MP (LIV sinew channel) and the gluteus medius and minimus MP (GB sinew channel) can be included. This treatment is complimented by adding these distal points GB 40 (*quixu*) and LIV 5 (*ligou*).
- Myofascial release after needling.
- Superficial *Yaoyan* (Iliocostalis): Practitioner holds head at occiput with the non-treating hand and uses the thumb of treating hand to sink into levator scapula at *dijia*.
- Patient slowly rotates to the contralateral direction while the practitioner performs a lengthening stroke from *dijia* to the scapular attachment just superior to SI 13 (*quyuan*). Thumb pressure is anterior (deep) to the trapezius muscle.
- Deep *Yaoyan* (Quadratus lumborum): Practitioner places one hand on lateral hip and the fingers of the working hand sink into the QL attachment at the ilium with the fingers parallel to the ilium.
- The practitioner turns the hand so that the fingers are parallel to the lateral border of the QL.
- The practitioner encourages the patient to descend their ilium while lengthening towards the QL rib attachment.

### **Motor Point Locations: Yaoyan Syndrome**

- Quadratus lumborum  
L: 3 cun lateral from the lower border of the spinous process of L2, slightly lateral to UB 52 (*zhishi*). Thread the needle obliquely from lateral to medial starting 3.5-4 cun lateral to the spine, level with UB 52.
- Piriformis  
L: Halfway between UB 53 (*baohuang*) and UB 54 (*zhibian*). Needle perpendicular to the skin, 2-3 inches deep.
- Gluteus medius  
L: At the junction of the medial third and lateral two-thirds of a line joining the PSIS and the
- superior border of the greater trochanter. The practitioner can feel for the gluteal aponeurotic line (GAL), named by the author, is an anatomical tissue that connects these two bony landmarks. The GAL can be palpated with a cross-fiber technique and it feels like a “linear bump”. This gluteus medius motor point is located deep to the GAL. Needle perpendicular to the skin, 2-2.5 inches deep.
- Gluteus minimus  
L: On the lateral aspect of the body, midway between the top of the iliac crest and the superior border of the greater trochanter. Needle perpendicular to the skin, 1.5-2 inches deep.
- Adductor longus  
L: 3 cun inferior to LIV 10 (*zuwuli*) and 0.5-1 cun lateral. Needle perpendicular to the skin, 1-1.5 inches deep. *Caution is advised: The femoral artery is in close proximity to the location of this motor point; ensure that the needle is inserted medial to the pulse.*
- Biceps femoris  
L: Long head: 1 cun lateral to UB 37 (*yinmen*).

### **Levator Scapula Syndrome**

- The levator scapula is a common cause of neck and periscapular pain. Pain can be acute or chronic and is usually aggravated with ipsilateral cervical rotation.
- The levator scapula is part of the hand *taiyang* Small Intestine *jingjin* and this syndrome is commonly found with emotional stress and postural imbalances such as of an elevated scapula.

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## **Levator Scapula Syndrome Assessment**

- When the levator scapula is in spasm, the patient examine for an elevated scapula on the side of pain.
- This can be assessed by measuring the inferior angle of both scapulae.
- The clinician should also assess the balance of the shoulder girdle to the pelvic girdle.

## **Levator Scapula Palpation**

- Common painful areas of the levator scapula are:
- Motor Point:
- Palpate in a perpendicular and cross-fiber direction at the extra point *dijia*.
- Lower Insertion Site:
- Cross-fiber in an oblique direction the dense tissue of the levator scapula near its inferior attachment site at the superior-medial corner of the scapula slightly superior to SI 13 (*quyuan*).

## **Description of the Small Intestine Sinew Channel from the *Lingshu***

- “*The Shou Taiyang (SI) Jing Jin begins at the extremities of the fifth finger, inserts in the wrist, runs along the forearm to insert in the medial epicondyle at the place where tapotement triggers a feeling of fullness along the fifth finger, goes up the arm and inserts inferior to the axilla.*
- *A vessel reaches the posterior aspect of the axilla, goes around the scapula, passes in front of Zu Taiyang (Bl) and inserts in the mastoid.*
- *A vessel penetrates into the ear, reaches the supra-auricular area, goes back down to insert in the chin, then reascends to the lateral commissure of the eye. ”*

## **Small Intestine Sinew Channel (Myofascial Anatomy)**

- Abductor digiti minimi
- Flexor carpi ulnaris (ulnar head)
- Triceps, anconeus
- Infraspinatus, teres minor, supraspinatus
- Levator scapula

## **Levator Scapula Syndrome Treatment**

- Practitioner palpates the fixed pain site and obtains a subjective assessment of the patient's pain. Pain scale 1-10.
- Practitioner palpates or applies acupuncture to key points that “rids obstructions in the sinew channels” such as well-*jing*, connecting-*luo*, accumulating *xi*-cleft and specific motor points. The practitioner re-assess the fixed pain site for a reduction of pain.
- Common points that take pain away from the levator scapula are:
- Flexor carpi ulnaris MP
- Abductor digiti minimi MP
- SI 7 (*zhizheng*)
- Local treatment involves needling *dijia* and the inferior attachment of levator scapula.
- Acupuncture to the quadratus lumborum motor point if there is an elevated ilium. Treat the most reactive tissue at *yaoyan*: superficial or deep.
- In the case of an elevated scapula and elevated ilium, the practitioner can observe and treat the sinew channel relationships:
- Levator scapula (Small Intestine) and quadratus lumborum (Liver) involves a midday-midnight relationship. Distal points to help regulate the imbalance: SI 6 (*zhizheng*) and LIV 5 (*ligou*).
- Levator scapula (Small Intestine) and iliocostalis (UB) involves a six division relationship. Distal points to help regulate the imbalance: SI 3 (*houxi*) and UB 65 (*shugu*)
- Myofascial Release after needling: Practitioner holds head at occiput with the non-treating hand and uses the thumb of treating hand to sink into levator scapula at *dijia*. Patient slowly rotates to the contralateral direction while the practitioner performs a lengthening stroke from *dijia* to the scapular attachment just superior to SI 13 (*quyuan*). Thumb pressure is anterior (deep) to the trapezius muscle.

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## **Motor Point Locations – Levator Scapula Syndrome**

- Levator scapula  
L: Extra point dijia, 0.5-1 cun posterior to SI 16 (*tianchuang*). Perpendicular needle insertion 0.5-1 inch deep.
- Flexor carpi ulnaris  
L: At the junction of the middle and proximal thirds of a line joining the medial epicondyle and HT 7 (*shenmen*). Perpendicular needle insertion, 0.5-0.75 inch deep.
- Abductor digiti minimi  
L: Halfway between SI 3 (*houxi*) and SI 4 (*wangu*) on the Small Intestine (*xiaochang*) channel. Perpendicular needle insertion, 0.5 inch deep.

## **References**

- Callison, M. (2007). *Motor Point Index: An Acupuncturist's Guide to Locating and Treating Motor Points*. San Diego, CA: AcuSport Seminar Series LLC.
- Callison, M. (2017). *Sports Medicine Acupuncture: An Integrated Approach Combining Sports Medicine and Traditional Chinese Medicine*.
- Cecil-Sterman, A., & Didner, P. (2012). *Advanced acupuncture: A clinic manual*. New York: Classical Wellness Press.
- Deadman, P., Al-Khadaji, M., & Baker, K. (2007). *A manual of acupuncture*. Hove, East Sussex, England: Journal of Chinese Medicine Publications.
- Earls, J., & Myers, T. W. (2010). *Fascial release for structural balance*. Chichester, England: Lotus Pub.
- Jacob C. Van Der Wal, Md, Phd. (2009). The Architecture of the Connective Tissue in the Musculoskeletal System - An Often Overlooked Functional Parameter as to Proprioception in the Locomotor Apparatus. *International Journal of Therapeutic Massage & Bodywork: Research, Education, & Practice*, 2(4). doi:10.3822/ijtmb.v2i4.62
- Kendall, D. E. (2002). *Dao of Chinese medicine: Understanding an ancient healing art*. Oxford: Oxford University Press.
- Klinger, W., Schleip, R. (2015) Fascia as a body-wide tensional network: Anatomy, biomechanics and physiology. In *Fascia: In sport and movement*. 1 Handspring Publishing 2015.
- Legge, D., & Vance, K. (2010). *Jingjin: Acupuncture treatment of the muscular system using the meridian sinews*.
- Low, R. H. (1983). *The secondary vessels of acupuncture: A detailed account of their energies, meridians, and control points*. Wellingborough, Northamptonshire: Thorsons.
- Maciocia, G. (2006). *The channels of acupuncture: Clinical use of the secondary channels and eight extraordinary vessels*. Edinburgh: Churchill Livingstone.
- Muscolino, J. E. (2011). *Kinesiology: The skeletal system and muscle function*. St. Louis, MO: Mosby/Elsevier.
- Myers, T. W. (2014). *Anatomy trains: Myofascial meridians for manual and movement therapists* (3rd ed.). Edinburgh: Churchill Livingstone.
- Netter, Frank H. (2014) *Atlas of Human Anatomy* (6th ed.) Philadelphia, PA: Saunders Elsevier, 2014.
- Nguyen, V. N., Tran, V. D., & Recours-Nguyen, C. (2005). *Huangdi Neijing Ling Shu*. Sugar Grove, NC: Jung Tao Productions.  
Ni, Y., & Rosenbaum, R. L. (1996). *Navigating the Channels of Traditional Chinese medicine*. San Diego: Oriental Medicine Center.
- Purslow, P. P. (2010). Muscle fascia and force transmission. *Journal of Bodywork and Movement Therapies*, 14(4), 411-417. doi:10.1016/j.jbmt.2010.01.005

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- Schleip, R. (2003). Fascial plasticity – a new neurobiological explanation: Part 1. *Journal of Bodywork and Movement Therapies*, 7(1), 11-19. doi:10.1016/s1360-8592(02)00067-
- Schleip, R., & Baker, A. (2015). Fascia as a Sensory Organ. In *Fascia in sport and movement*.
- Stecco, C., Hammer, W. I., Vleeming, A., & Caro, R. D. (2015). *Functional atlas of the human fascial system*. Edinburgh: Elsevier.
- Tesarz, J., Hoheisel, U., Wiedenhöfer, B., & Mense, S. (2011). Sensory innervation of the thoracolumbar fascia in rats and humans. *Neuroscience*, 194, 302-308. doi:10.1016/j.neuroscience.2011.07.066
- Keown, D. (Writer). (2016, August 22). *The Transport Points* [Video file]. In *The Transport Points*. Retrieved September 21, 2016, from <https://vimeo.com/179746015?from=outro-embed>