

Foam Rolling, Flexibility, and Fascia: Myths and Misconceptions

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Objectives

1. What is Foam Rolling? i.e., “Self-Myofascial Release”
2. What is Myofascial Release?
3. What does MFR do?

Overview

- Background
- History
- Products
- Efficacy
- Practical Applications

BACKGROUND AND HISTORY

“Myofascial Release”

- 1920s – Neidner – *Fascial Twist*
- 1920s – Dicke – *Connective Tissue Massage*
- 1950s – *Rolfing* – holistic soft tissue manipulation
- 1976 – Travell – *Myofascial Trigger Points*
- 1980s – Ward, Barnes – *Myofascial Release*
- 1980s – *Self-Myofascial Release* = Foam roller





High-density PVC,
supports up to 400LBs

Special design for
back relaxing

Quality EVA,
strong and never
deformed













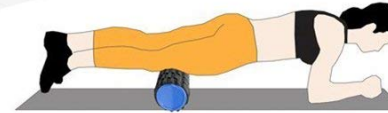
HAMSTRINGS

Place a foam roller under your right knee with your leg straight. Cross your left leg over your right ankle. Put your hands on the floor for support. Roll your body back and forth for 30 seconds. Repeat on the other side.



QUADRICEPS – AND – HIP-FLEXORS

Lie face down on the floor with a foam roller above your right knee. Cross your left leg over your right ankle. Your elbows on the floor for support. Roll your body back and forth for 30 seconds. Repeat on the other side.



ILIOTIBIAL-BAND

Lie on your left side and place your left hip on a foam roller, hands on the floor. Cross your right leg over your left, and place your right foot flat on the floor. Roll your body back and forth for 30 seconds. Repeat on the other side.



Exercise Guide

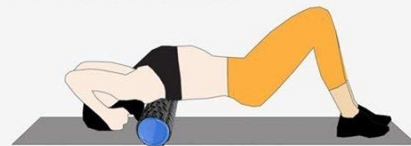


GLUTES

Sit on a foam roller on the back of your right thigh, below your glutes. Cross your right leg over the front of your left thigh. Roll your body back and forth for 30 seconds. Repeat on the other side.

UPPER BACK

Lie face up with a foam roller under your mid back. Hands behind your head and pull your elbows toward each other. Raise your hips. Slowly lower your head and upper back downward, your upper back bends over the foam roller. Roll back and forth for 30 seconds.



LOWER BACK

Lie face up with a foam roller under your mid back. Your knees should be bent with your feet flat on the floor. Raise your hips off the floor slightly. Roll back and forth for 30 seconds.

The Ultimate Guide to Foam Rolling



What does foam rolling do?

- *break up adhesions and scar tissue and speed up the healing and recovery process after your workout*
 - <https://www.shape.com/fitness/workouts/10-ways-use-foam-roller>
- *release tightness and muscular tension ... prevent muscle soreness, tightness ...*
 - <https://www.beachbodyondemand.com/blog/big-benefits-of-foam-rolling>
- *increases blood flow to your muscles and creates better mobility, helping with recovery and improving performance*
 - https://www.huffingtonpost.com/2014/03/18/foam-rolling-mistakes_n_4980975.html

EFFICACY

Questions?

- Does foam rolling **break down scar tissue and adhesions?**
—
- Does foam rolling **increase ROM/Flexibility/mobility, and decrease tightness?**
—
- Does foam rolling **improve blood flow and recovery?**
—
- Does foam rolling **improve performance?**
—

Fascia

Definition

- 2017 – Adstrum, Hedley, Schleip, Stecco, & Yucesoy

Histology

- 2006 – Stecco et al.

Function

- 2003 – Schleip
- 2012 – Kumka & Bonar

Fascia and Fascial System

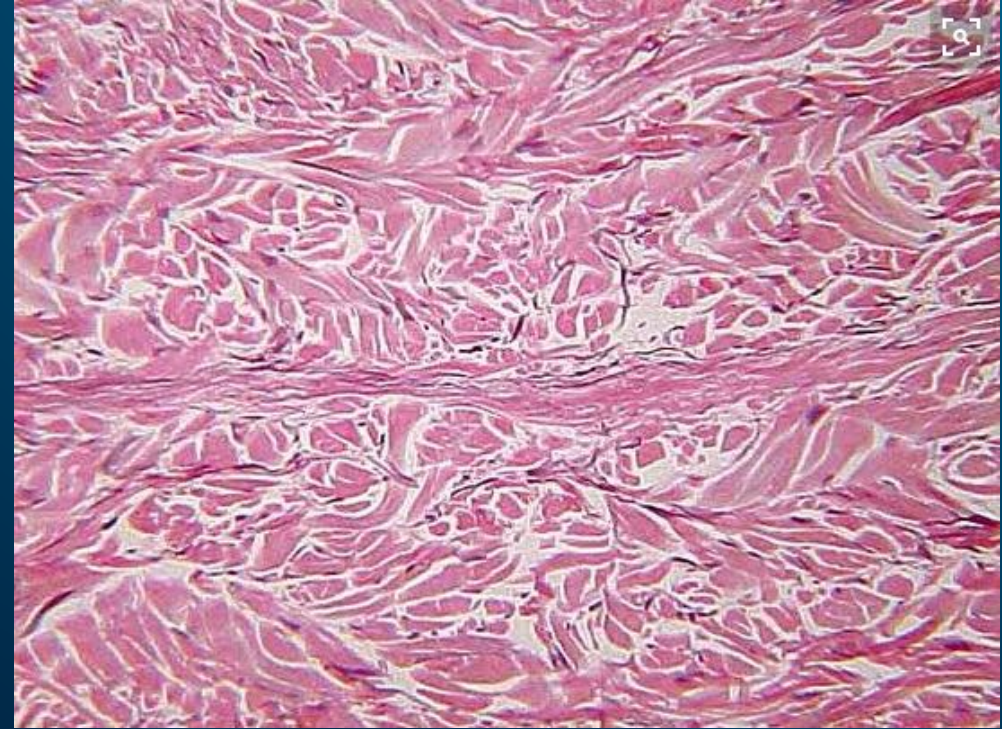
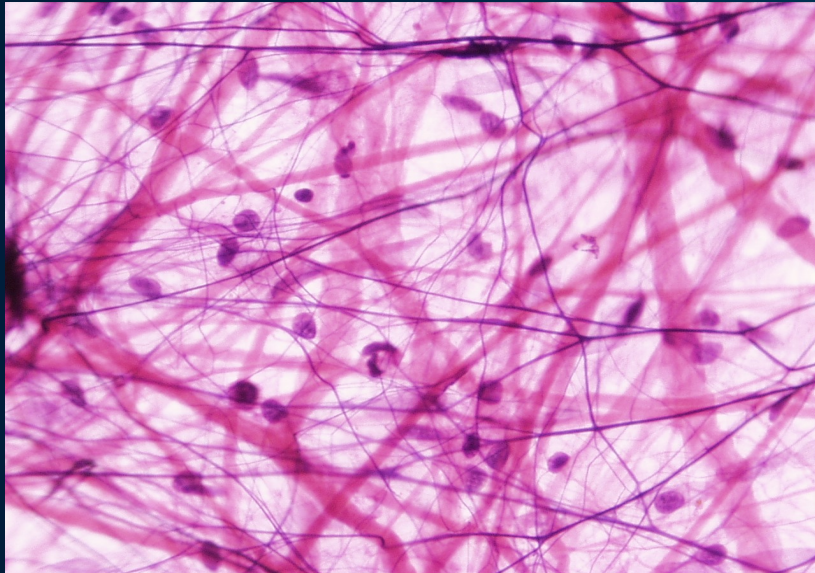
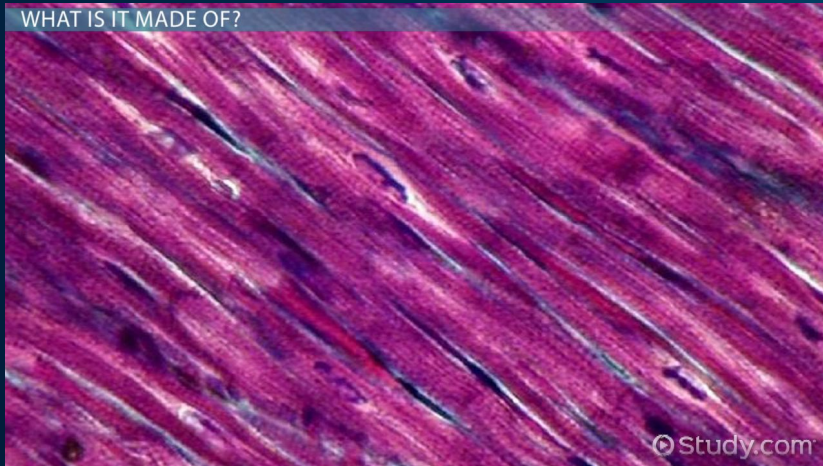
- *Fascia – 3-D continuum of soft, collagen containing, loose and dense connective tissues that permeate the body. It incorporates elements such as adipose tissue adventitia and neurovascular sheaths, aponeuroses ... everything!*
- *Fascial System – interpenetrates and surrounds all .. endowing the body with a functional structure, and providing an environment that enables all body systems to operate in an **integrated** manner*

– Adstrum, S., Hedley, G., Schleip, R., Stecco, C., & Yucesoy, C. A. (2017). Defining the fascial system. *Journal of Bodywork & Movement Therapies*, 21(1)

Histology

- ECM
 - Ground substance – GAGs, proteoglycans, etc.
 - Fibres – collagen, elastin, reticular





Fascia – Fibre Types



Histology

- Cells
 - Fixed (adipose cells, fibroblasts, mast cells, etc.)
 - Transient (plasma cells, lymphocytes, neutrophils, eosinophils, etc.)
 - Fibroblasts – synthesize ECM
 - Myofibroblasts
 - Sensory receptors

Table 1 Fascial mechanoreceptors in myofascial manipulation

	Responsiveness to manipulation	Results of stimulation
<p>Golgi</p> 	Probably only responsive to muscular contraction or to very strong manipulation.	Tonus decrease in related striated motor fibers.
<p>Pacini</p> 	Only responsive to high velocity or vibratory techniques	<ul style="list-style-type: none">● Increased local proprioceptive attention
<p>Ruffini</p> 	Specially responsive to lateral stretch	<ul style="list-style-type: none">● Increased local proprioceptive attention● Inhibition of sympathetic activity
<p>Interstitial</p> 	<ul style="list-style-type: none">● 50% of these are high threshold pressure units (HTP)● Other 50% are sensitive to low pressure (LTP)	<ul style="list-style-type: none">● Increased local proprioceptive attention● Increase in vasodilation and respiration● Stimulation of HTP may produce pain and increase plasma extravasation

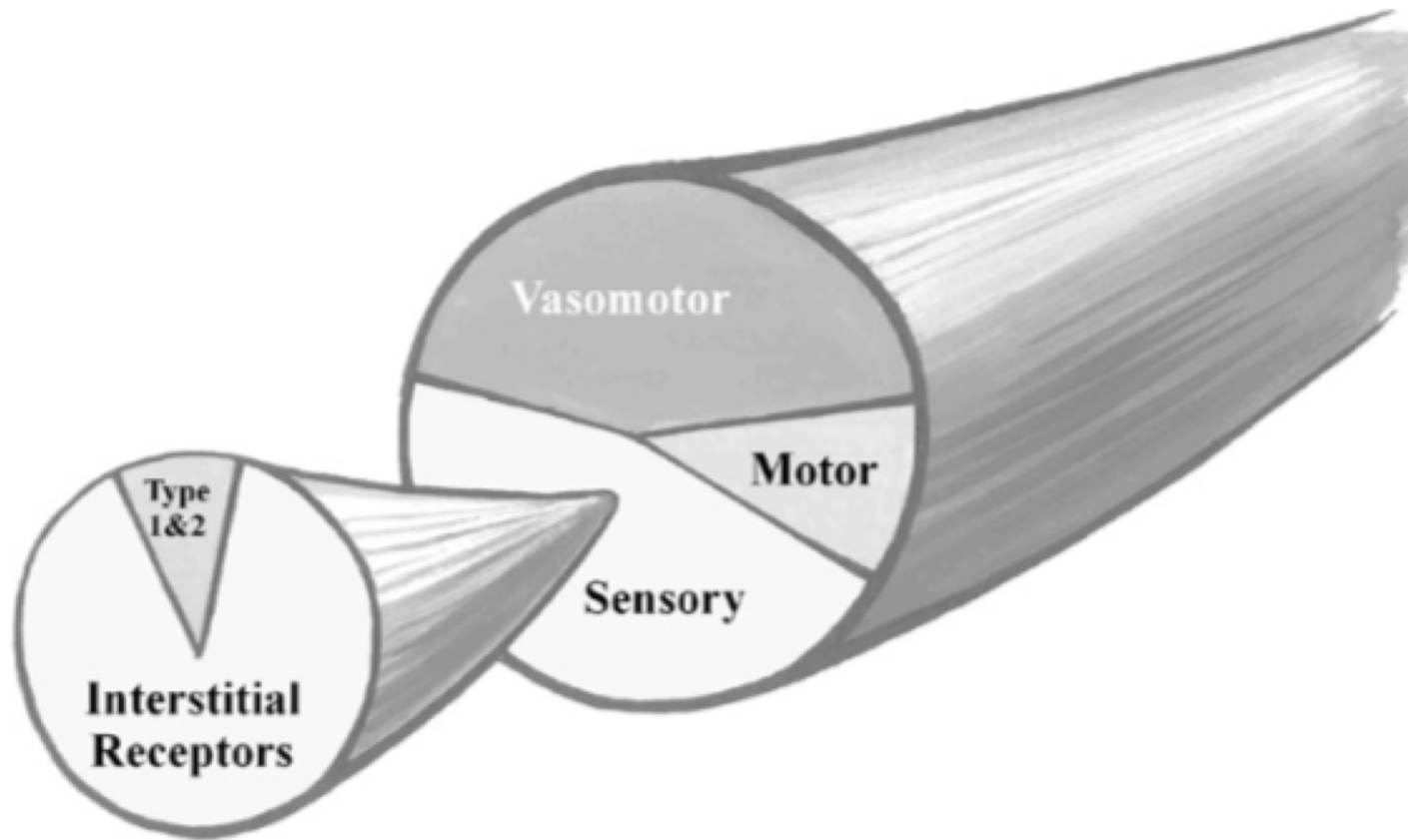


Fig. 2 Within a typical muscle nerve there are almost three times as many sensory neurons than motor neurons. Note that only a small portion of the sensory information comes from types I and II afferents which originate in muscle spindles, Golgi receptors, Pacinian and Ruffini endings. The majority of the sensory input comes from the group of types III and IV afferents or interstitial receptors which are intimately linked with the autonomic nervous system. Figure by Twyla Weixl, Munich, Germany.

Functions

- Force transmission, mechanotransduction
- Immune, inflammatory
- Muscle tone regulation
- Sensory
 - Findley, Thomas, & Shalwala, M. (2013). Fascia Research Congress Evidence from the 100 year perspective of Andrew Taylor Still. *Journal of Bodywork & Movement Therapies*, 17(3), 356–364.
 - Findley, TW. (2009). Second international fascia research congress. *International Journal of Therapeutic Massage and Bodywork*, 2(2), 1–6.
 - Tozzi, P. (2012). Selected fascial aspects of osteopathic practice. *Journal of Bodywork & Movement Therapies*, 16(4), 503–519.
- More??????????

Fascia Classifications

- Linking
 - Dynamic
 - Passive
- Fascicular
- Compression
- Separating
 - Kumka, M., & Bonar, J. (2012). Fascia: a morphological description and classification system based on a literature review. *The Journal of the Canadian Chiropractic Association*, 56(3), 179–191.

Category	Function	Tissue	Histology	Examples
Linking – Dynamic	Movement, stability, force transmission, muscle pretension	Dense Regular Parallel ordered Unidirectional	Collagen Actin-myosin Pacinian corpuscles Free nerve endings	Thoracolumbar ITB Pectoral
Linking – Passive	Continuity, passive force transmission Proprioception	Dense Regular woven Parallel ordered Multidirectional	Collagen Elastin GTO Pacinian corpuscles Ruffini corpuscles	Rectus sheath Plantar aponeurosis ATF
Fascicular	Force transmission, proprioception, movement control neurovascular protection connect vascular and adventitia	Dense Regular Parallel ordered Multidirectional Loose Dense Irregular	GTO Collagen	Coverings: nerve, muscle, tendon, bone
Compression	Stocking, compression, tension compartmental effects Venous return Proprioception, muscular efficiency and coordination	Dense Regular woven Parallel ordered Multidirectional	Collagen Elastin Ruffini corpuscles	Brachial fascia Antebrachial fascia
Separating	Compartmentalizes Limits spread of infection Promotes sliding between tissues Support and shock absorption Responds to stretch, distention	Dense Irregular Loose	Collagen ECM Reticular fibres Elastin Pacinian corpuscles Ruffini corpuscles	Parietal fascia Visceral fascia Investing fascia

Linking – Dynamic

Function	Tissue	Histology	Examples
Movement, stability, force transmission, muscle pre-tension	Dense Regular Parallel ordered Unidirectional	Collagen Actin-myosin Pacinian corp Free nerve endings	Thoracolumbar ITB Pectoral

WHY DO WE FOAM ROLL?

Trauma



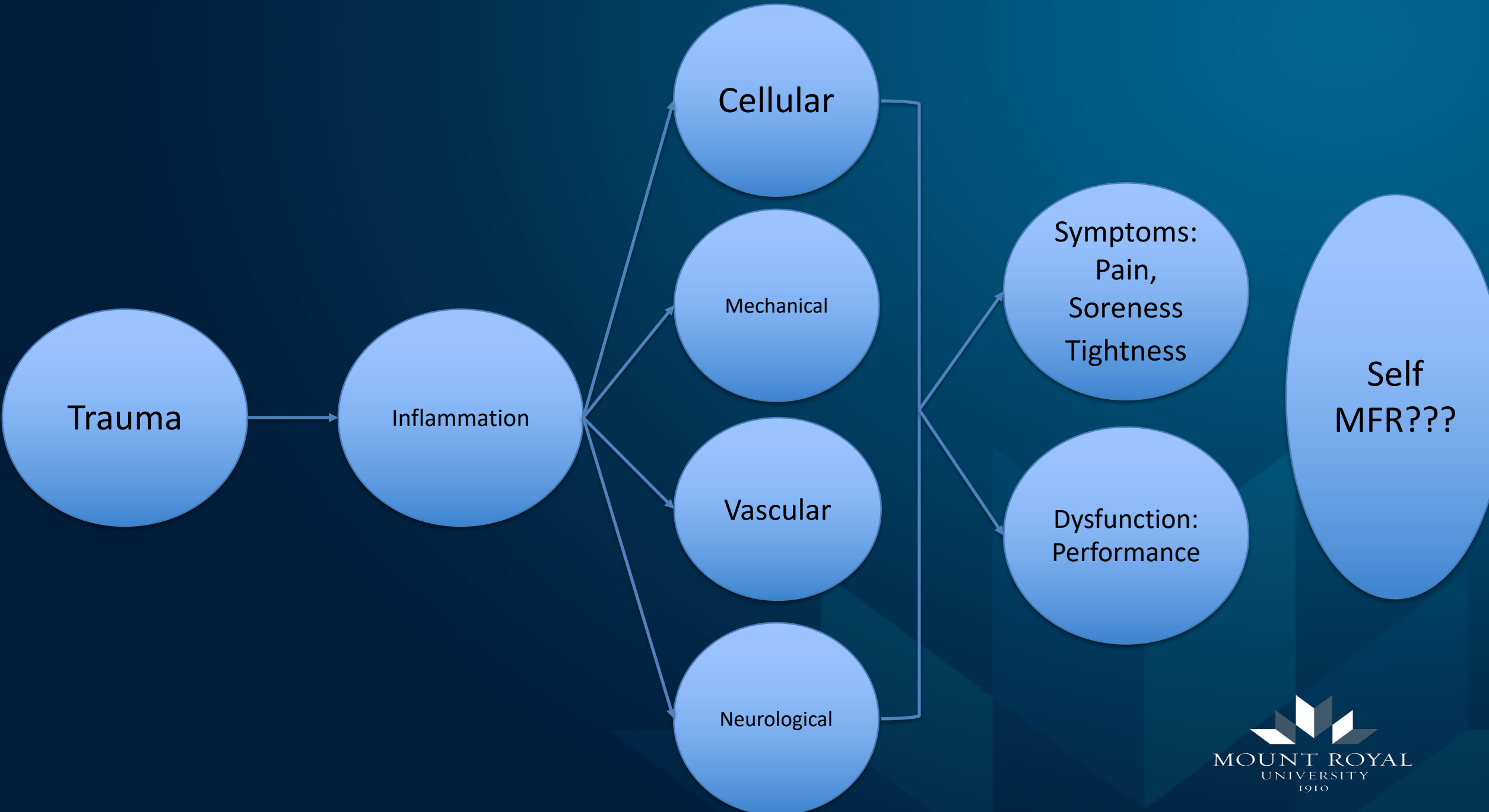
MOUNT ROYAL
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graph LR; A((Trauma)) --> B((Inflammation))
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Trauma

Inflammation



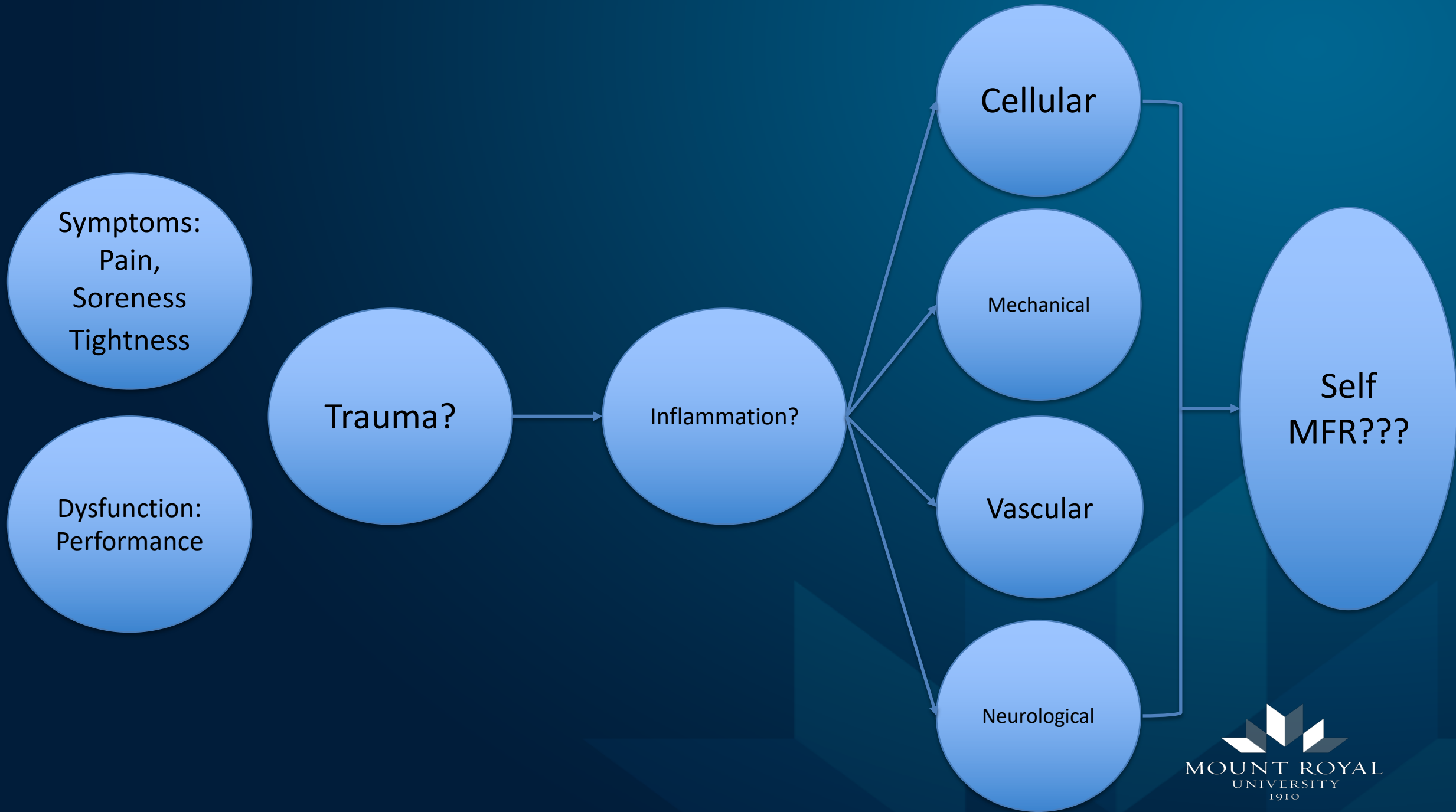
Symptoms:
Pain,
Soreness
Tightness

Dysfunction:
Performance

Symptoms:
Pain,
Soreness
Tightness

Dysfunction:
Performance

Trauma?



Trauma – Fibrosis

- **Cellular, mechanical** response with Trauma
 - Release of cytokines, macrophages, Sub P, etc.
 - Chronic fibrogenic cytokines – **excessive fibroblast proliferation**
- **Neurological response – Noci sensitization**
 - Sub P (noci neuropeptide) – **Fibrogenesis**
 - Zügel, M., Maganaris, C. N., Wilke, J., Jurkat-Rott, K., Klingler, W., Wearing, S. C., et al. (2018). Fascial tissue research in sports medicine: from molecules to tissue adaptation, injury and diagnostics. *Br J Sports Med*, bjsports–2018–099308–9.

Can we manipulate fascia?

- **Thixotropy model** – gel-to-sol model
 - (Twomey & Taylor, 1982)
 - 3.5kg x 60 min vs. clinical practice
- **Piezoelectricity model** and **Cellular Response model**
 - (Tozzi, 2012)
 - Similar to bone adaptation and wound healing – takes long time
- **Fascial Adhesions model** – surgical
 - (Hedley, 2010)
- **Fluid flow model**
 - (Chaitow, n.d.)

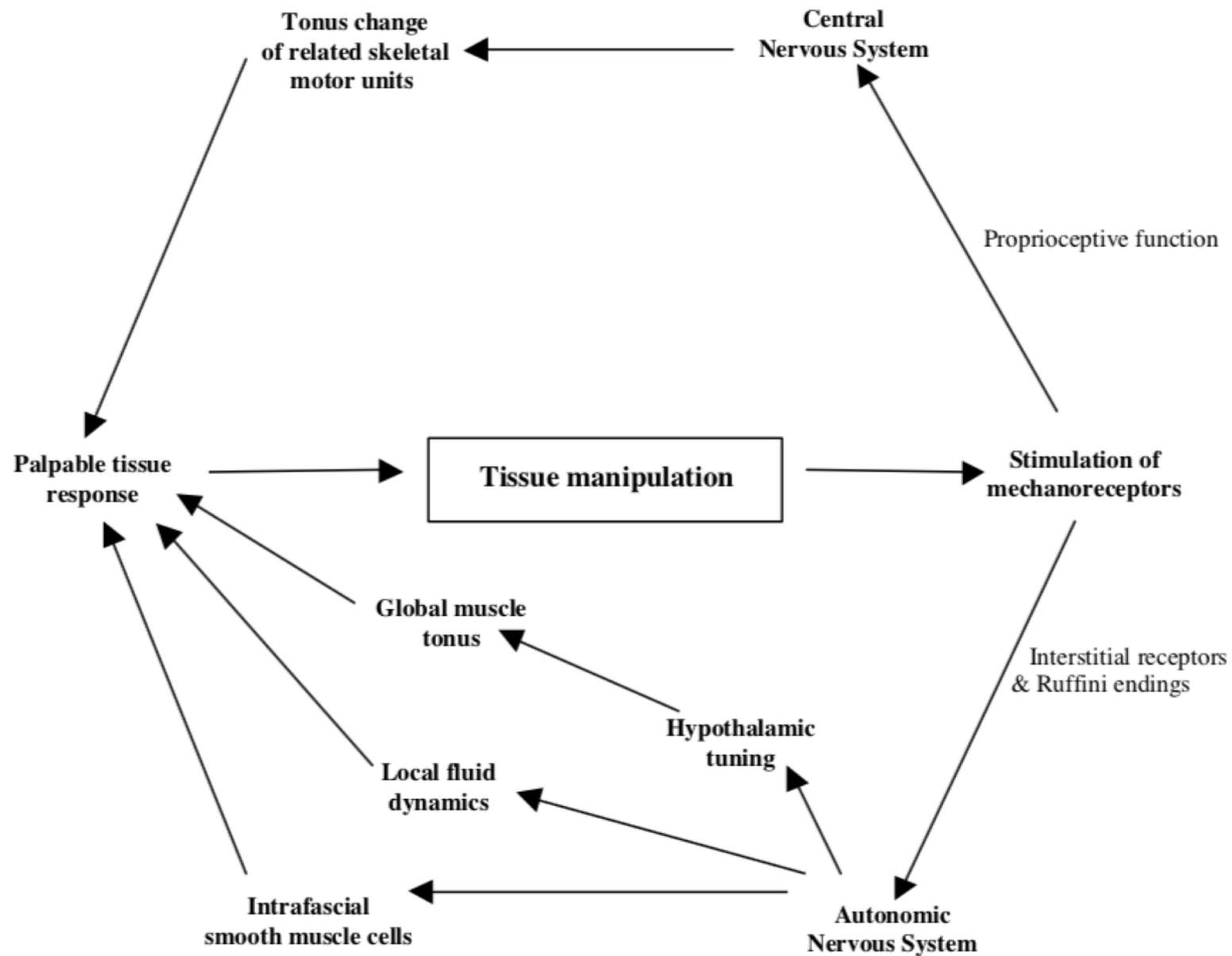
What is needed to manipulate fascia?

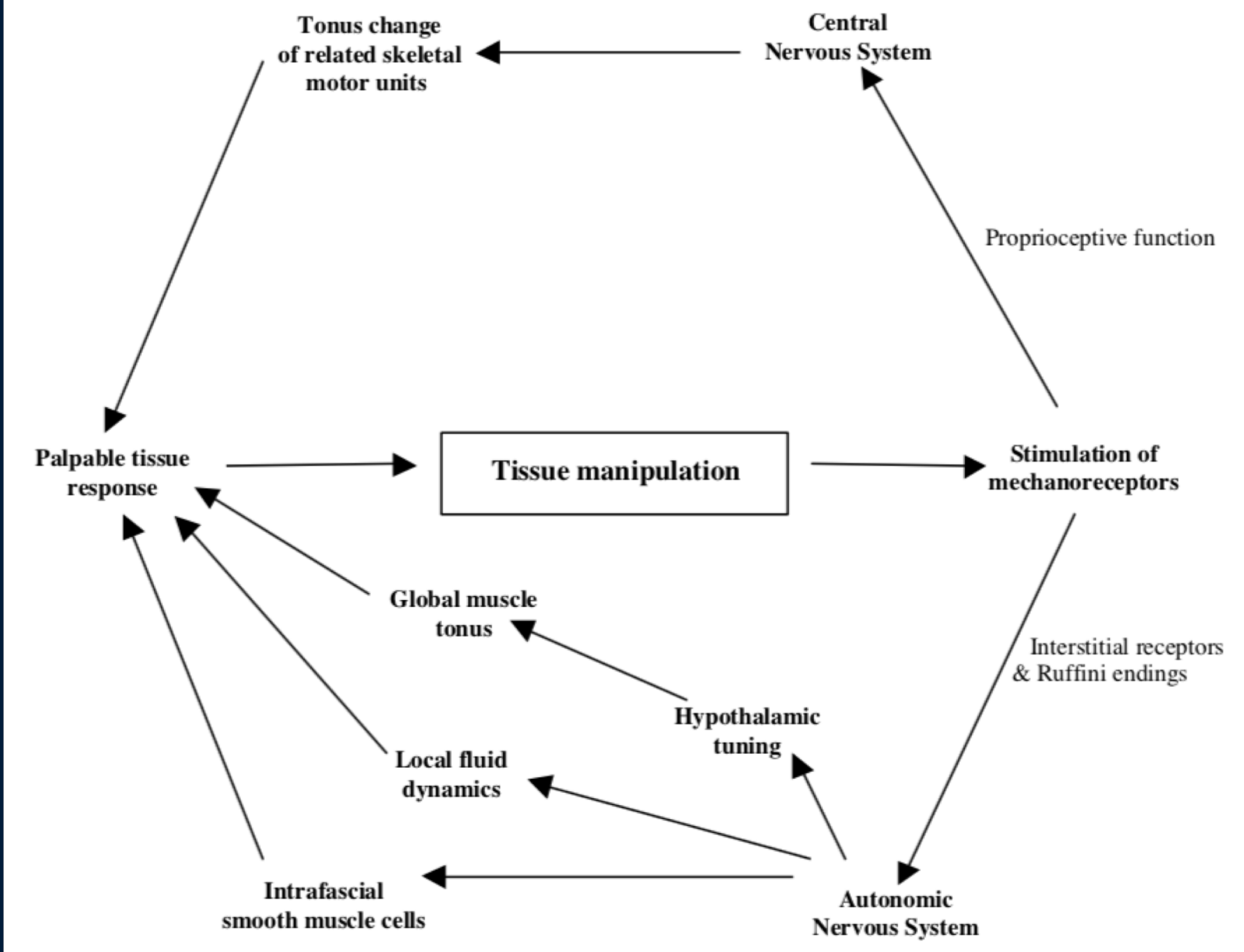
- “forceful stretch of 3-8% elongation” – **tearing, inflammation**
 - Permanent 18mm distal ITB elongation - **>60kg**
 - Or, 1 – 1.5% elongation – 60 min for deformation without tearing and inflammation
 - **Microfailure** at **24 – 115 kgs** (similar to high velocity thrusts)
 - Schleip, R. (2003b). Fascial plasticity – a new neurobiological explanation: Part 1. *Journal of Bodywork & Movement Therapies*, 7(1), 11–19.

Can we “stretch” fascia?

- 2017 Original research
- ITBTFL subjected to simulated clinical-grade stretch
- Stretch rate = 5mm/sec
- 40 sec static stretch/40 sec rest x 4 reps, (0 tension during rest)
- Significant elongation at proximal end of ITBTFL
- Due to TFL or ITB proper??
- Limitations:
 - Cadaver
 - 73 – 92 y/o specimens
 - TFL only
 - Wilhelm, M. et al. (2017). Deformation Response of the Iliotibial Band-Tensor Fascia Lata Complex to Clinical-Grade Longitudinal Tension Loading In-Vitro. *International Journal of Sports Physical Therapy*, 12(1), 16–24.

HOW DOES THE TISSUE CHANGE WITH FOAM ROLLING?



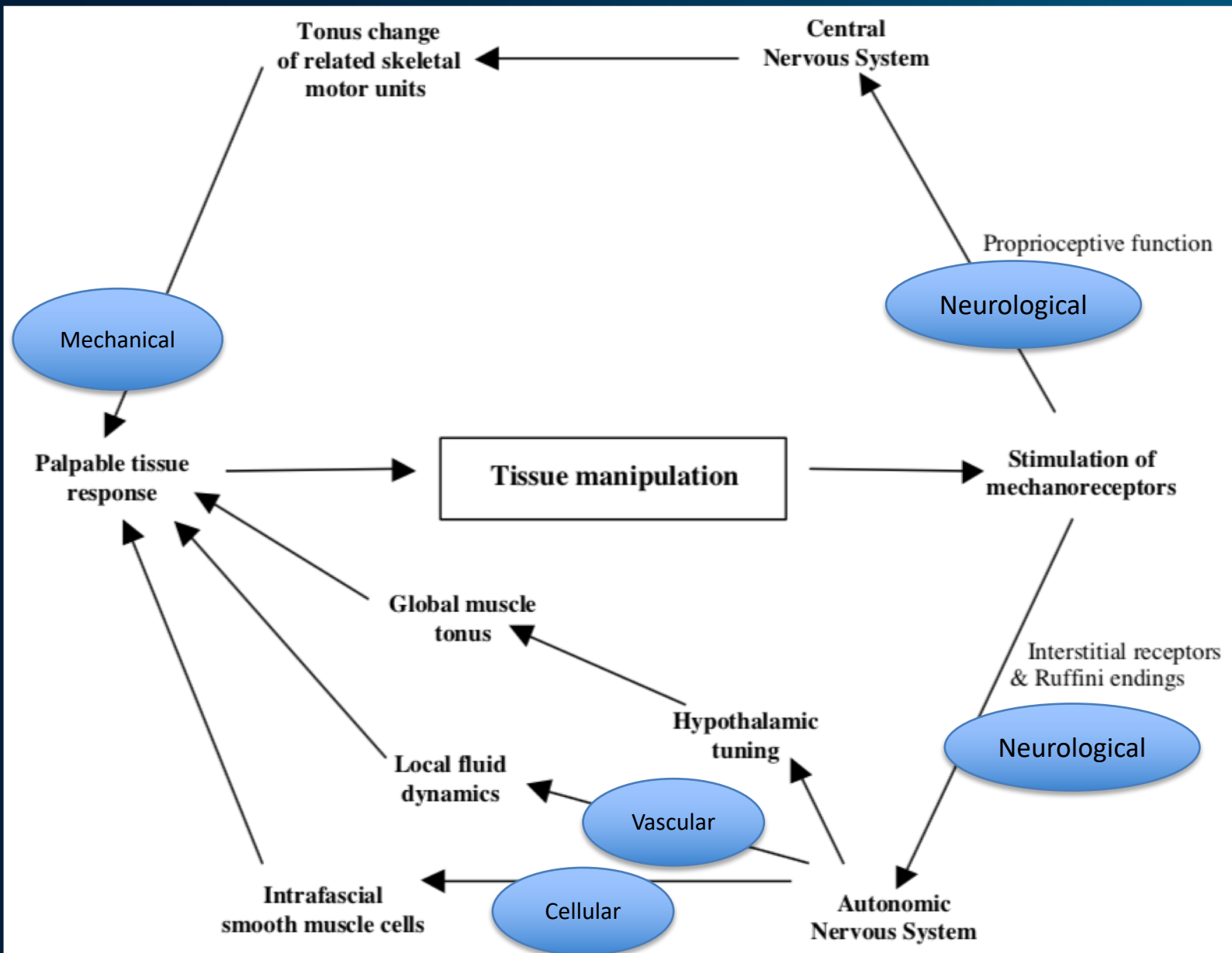


Cellular

Mechanical

Vascular

Neurological



Questions?

- Does foam rolling break down scar tissue and adhesions?
—
- Does foam rolling increase ROM/Flexibility/mobility, and decrease tightness?
—
- Does foam rolling improve blood flow and recovery?
—
- Does foam rolling improve performance?
—

Systematic Reviews

- **Short-term Increase ROM, flexibility – does not last**
 - (Kalichman & Ben David, 2017; Cheatham, Kolber, Cain, & Lee, 2015; Beardsley & Škarabot, 2015)
- **Decrease pain**
 - (Cheatham, Kolber, Cain, & Lee, 2015; Laimi et al., 2018)
- **Decreases DOMS**
 - (Cheatham, Kolber, Cain, & Lee, 2015; Beardsley & Škarabot, 2015)
- **No effect – strength, performance**
 - (Kalichman & Ben David, 2017; Cheatham, Kolber, Cain, & Lee, 2015; Beardsley & Škarabot, 2015)

Cellular

Mechanical

Vascular

Neurological

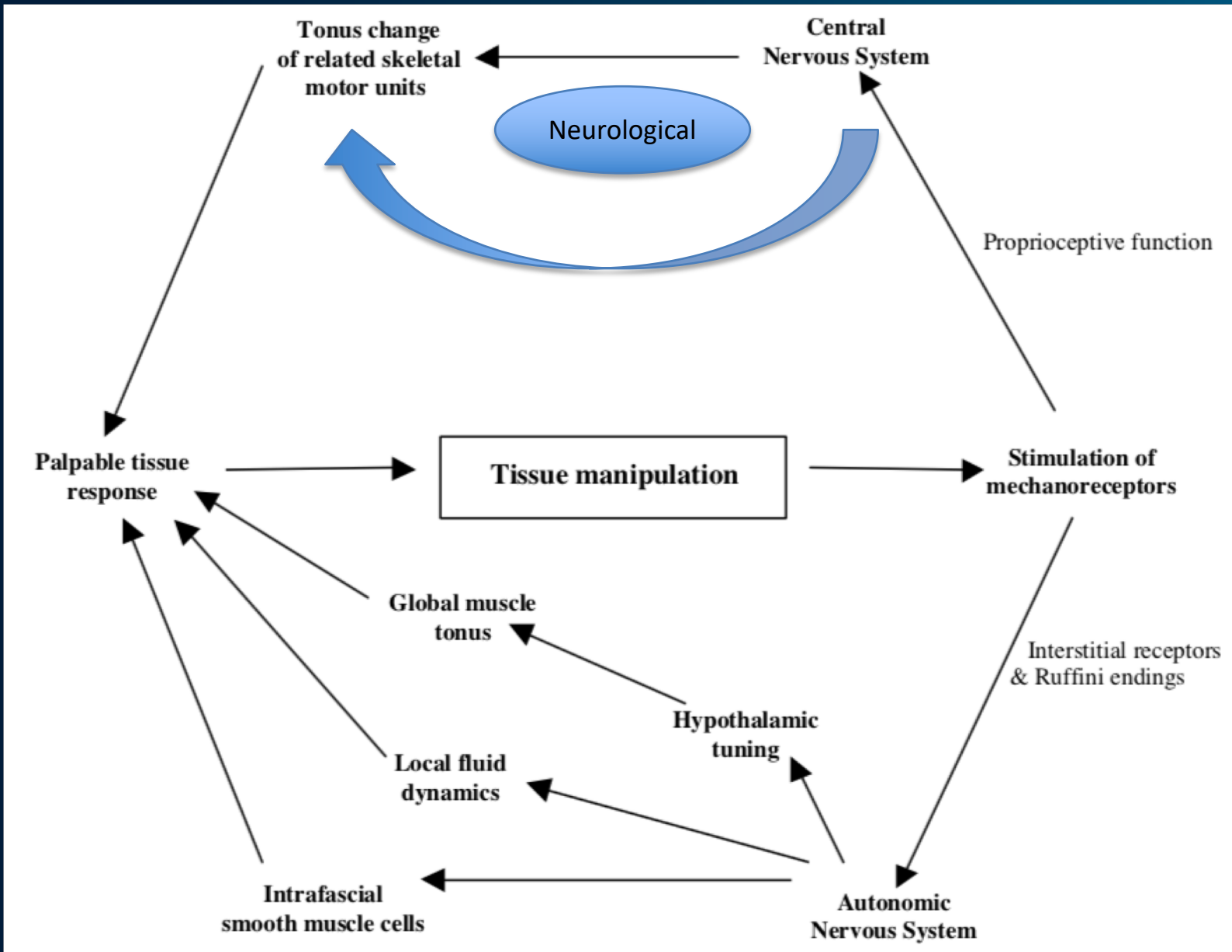
Original Research

- Increased mobility
- No change in ROM
- No change in mechanosensitivity (pain)

– (Griefahn, Oehlmann, Zalpour, & Piekartz, 2017)

Questions?

- Does foam rolling break down scar tissue and adhesions?
 - Not really
- Does foam rolling increase ROM/Flexibility/mobility, and decrease tightness?
 - Temporarily
- Does foam rolling improve blood flow and recovery?
 - Yes – lymphatics??
- Does foam rolling improve performance?
 - Depends



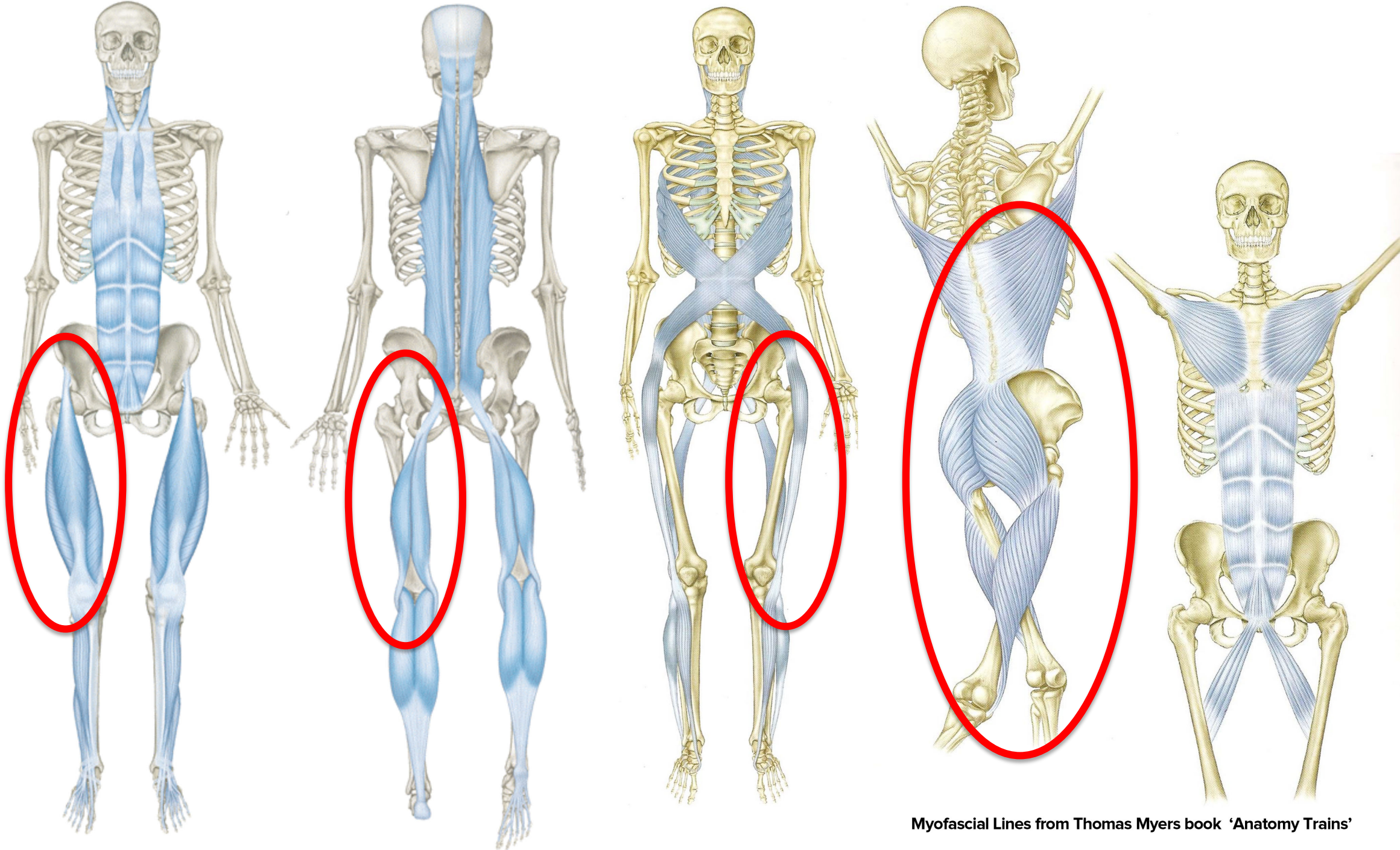
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- Ackerley, R. et al. (2017). Emotions alter muscle proprioceptive coding of movements in humans. *Scientific Reports*, 1–9.

Original Research

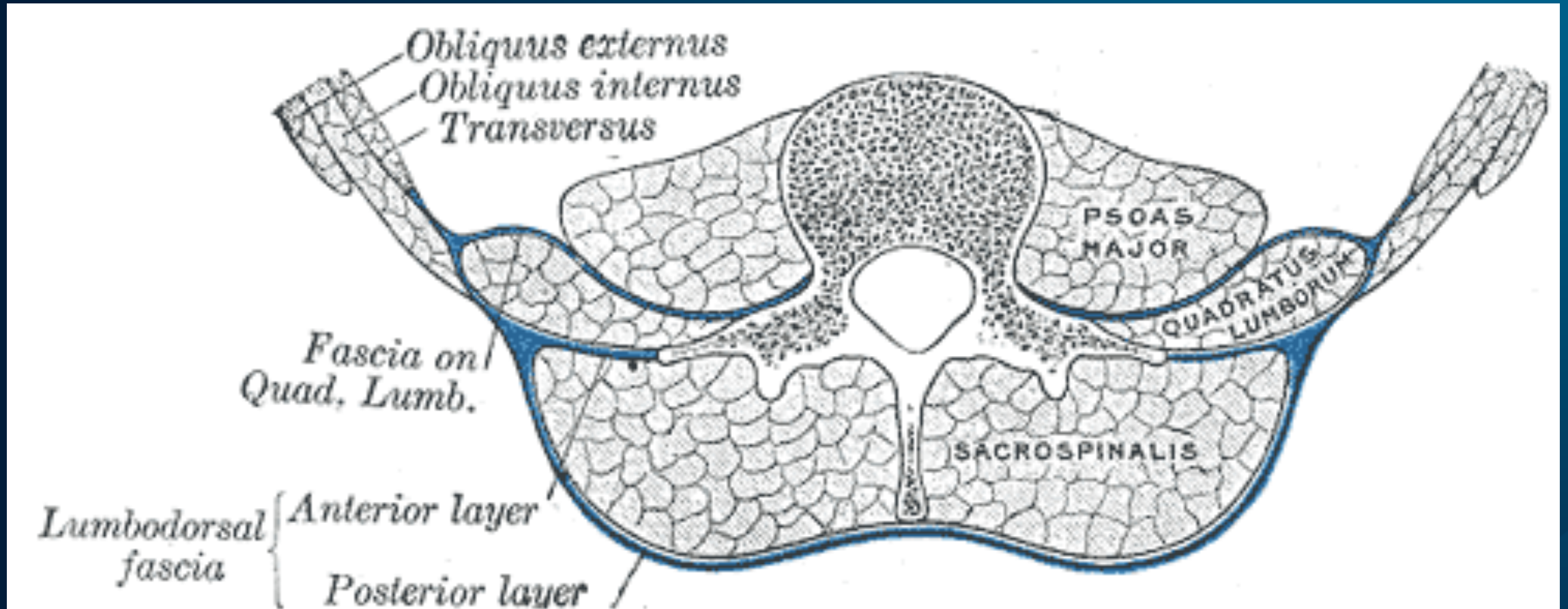
- Positive cross over effects
 - Strength
 - (Kelly, Beardsley, 2016)
 - Pain management
 - (Cheatham & Kolber, 2018)

PRACTICAL APPLICATION

	Do	Don't
Pain	Comfortable	Pain
Speed	Slow	Fast
Duration	Long	Short
Rest time	Short	Long
Direction	Fibre specific	Treat all tissue the same
Pressure	Horizontal or vertical	Treat all tissue the same
Palpation	Go with?	Go against?
Other	Add movement	Mechanical pressure only
	Attentional focus	Instagram, Snapchat, Tinder
	Individual trial and error	One size fits all



Myofascial Lines from Thomas Myers book 'Anatomy Trains'



Thank you

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