The Fascial Evidence for the Treatment of Soft Tissue Injuries

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2017 EATA Symposium

“[I] would rather live in a world where my life is surrounded by mystery than live in a world so small that my mind could comprehend it.”
—Henry David Thoreau
Objectives

Discussion of:

- The historical perspective of fascia
- A few properties & characteristics of fascia and how those characteristics may affect how we think
- Linking the properties and characteristics to the current evidence regarding interventional treatments

Objectives

"A Flawed Foundation of Fascia"

A Historical Perspective

Fascia...

"permeates, divides, & subdivides every portion of all animal bodies; surrounding & penetrating every muscle & all its fibers, every artery & every fiber” Still A.T., 1899

Considered to be the organ of form & largest proprioceptive generator of our bodies

Components regulate fluid flow in the extracellular matrix (ECM)

Theorized to produce & distribute electrical activity through the ECM

"probably holds many of the keys to understanding muscle action & musculoskeletal pain, & may be of pivotal importance in understanding the basis of acupuncture & a wide range of alternative therapies" Benjamin M, 2009
"the integrity of the structure is derived from the balance of tension members not the compression struts"

R. Buckminster Fuller, 1955

Fly, by Kenneth Snelson

Michael Turvey, Professor, Ecological Psychology
University of Connecticut

Fascia Properties (cont)

Tissues rearrange/adapt in response to compression and/or tension ➔ transfer stress to adjacent structures & then return to its original position when tension is released.

Dr. Jean Claude Guimberteau

Clip from Strolling Under the Skin, 2005 & Muscle Attitudes 2010

Dr. Stephen Levin

Dr. Donald Ingber

Fascia Properties (cont)

The muscular force transmission system: Role of the intramuscular connective tissue

Andrea Carriera, PT, PhD, Miguel Antonio Martinez-Gonzales, PT, PhD, Carla Sacco, MD

The muscular force transmission system: Role of the intramuscular connective tissue

Antonio Carriera, PT, PhD, Miguel Antonio Martinez-Gonzales, PT, PhD, Carla Sacco, MD

Tissue of the body is connective tissue

Transmitted energy to muscle fibers

Muscles of the body are connective tissue

Fascia, the connective tissue between muscle and bone

Fascia provides a framework for muscle function

Fascia helps maintain muscle function

Fascia assists in muscle function

Fascia is connective tissue

Fascia assists in muscle function

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Fascia assists in muscle function
The process by which cells sense mechanical forces and convert them into changes in intracellular biochemistry and gene expression is a process called **mechanotransduction**.

Fascia is connected to all organs, muscles, nerves, & skin via the ECM scaffolds. Cells adhere to the ECM via binding of specific proteins (cell surface receptors) called Integrins.

**Fascia Properties**

- Cells sense mechanical forces and convert them into changes in intracellular biochemistry and gene expression.

**Fascia Tension is a different story for everyone.......**

**Fibroblast Characteristics**

1. Produce tropocollagen
2. Can differentiate into myofibroblasts
3. When deformed, they can remodel their cytoskeletons
4. Are an active participant in mechanotransduction
5. Can transmit metabolic and electrical information
6. Control and modulate the ECM environment
7. Play an active role in stimulating the inflammatory process
8. Regulate the pressure and flow of fluid that permeates fascia
9. Some fibroblastic cells produce hyaluronic acid
10. Secrete multiple growth factors which influence tissue repair & the metabolic environment.
Fascia Types

Superficial Fascia (Loose Areolar Tissue)

Deep Fascia (Dense Irregular Tissue)

Clip from Interior Architectures, 2011
Clip from Integral Anatomy V1, pt 2, Gil Headley, 2005

Fascia Types (cont)
Intramuscular Fascia

Fascia levels (deep-first)

Endomysium
Perimysium
Epimysium

Myofascial Neurophysiology

Myofascial tissue is highly innervated via specific receptors:

- Golgi Receptors
- Type Ib
- Pacinian Receptors
- Type II
- Ruffini Receptors
- Type II
- Interstitial (Myofascial Tissue) Receptors
- Types III & IV
- Free Nerve Endings (mechano & nociceptors)

In a similar fashion as Integrins, these receptors' signaling lead to changes in the tissue Schleip, 2003
Water constitutes around 80-85% of our bodies & ≈ 68% of the volume of our fascia tissue.
Effects of Interstitial Fluid Flow

So what does this all mean?

- Fascia is not an inert, passive tissue
  - It has the capacity to:
    - Transmit & maintain tension throughout the MSK system
    - Provide proprioceptive & kinesthetic feedback
    - Contract (leading to restrictions) & relax
    - Provide for layers of tissue to shear on one another
    - Regulate fluid flow
    - Be a source for Nociception

What can we do clinically to optimize fascial function?
Additional Techniques
Myofascial Decompression (MFD)  Myofascial Release

Why do these techniques work to enhance ROM & modify pain perception?

Some of the Proposed Mechanisms

- Gel to sol
- Piezoelectricity
- Body as a liquid crystal

Limitations (?)

- These effects are too transient & reversible
- It cannot explain the speed at which changes occur
- Potential explanation for initial relaxation, but increased stiffness post treatment as tissue rehydrates negates longer lasting effects

Most likely explanation for quick response:

- Realistically, the effect is multi-modal involving more than one mechanism

Moving forward from here
Want to learn more?

www.fasciaresearch.com

Thank you

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