An Introduction to Instrument-Assisted Soft Tissue Mobilization

Mike Ploski, PT, ATC, OCS, GTS

Mike’s Bio


CENTINELA HOSPITAL MEDICAL CENTER
INGLEWOOD, CALIFORNIA
PLAYER FITNESS CENTER
Coppertone
FootJoy
Advil
CENTINELA HOSPITA
PLAYER FITNESS CENTER

Conflict of Interest

I am employed by Graston Technique, LLC but have no financial or other relationship with any commercial product they sell. No specific brand of instruments will be promoted in this presentation.

What is IASTM?
Instrument-Assisted Soft Tissue Mobilization

- Use of instruments to achieve effects and benefits of soft tissue mobilization
- Can be a number of different materials/instrument types

History of IASTM

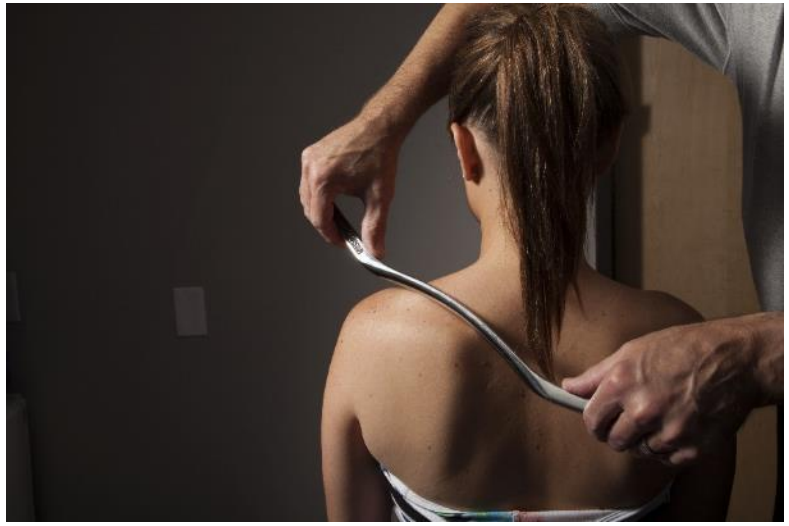
- Gua Sha – Ancient China
  - 400 BC?
- Strigil – Greek / Roman
  - 5th Century BC
- Graston Technique
  - 1994
  - ASTYM
- 2011 – GT Patents expire
  - IASTM

IASTM vs Gua sha

Soft tissue mobilization to affect pain and mobility

Targets muscles, tendons, ligaments, and fascia

Petechiae is avoided



Skin **scraping** to affect blood stasis

Remove energy blockage

Targets skin and capillaries

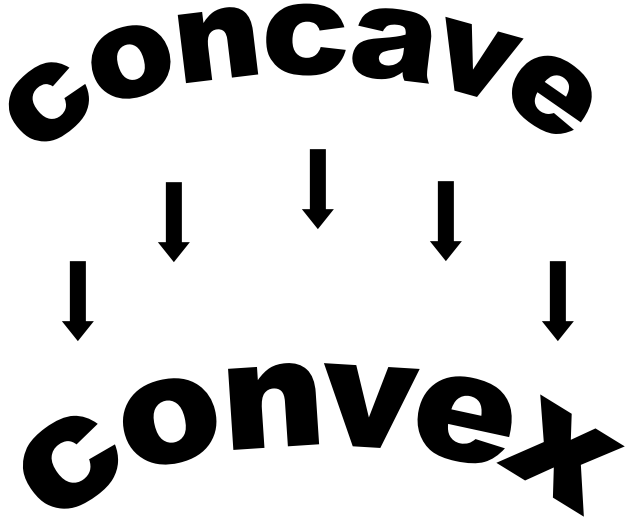
Intended petechiae

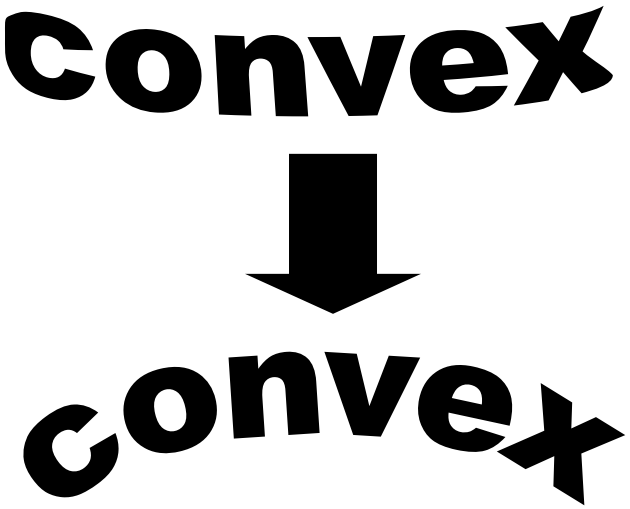
How Do the Instruments Work?

- Instruments detect and amplify the abnormal texture of soft tissue restrictions to the hands, similar to how a stethoscope amplifies the sound of a heartbeat.

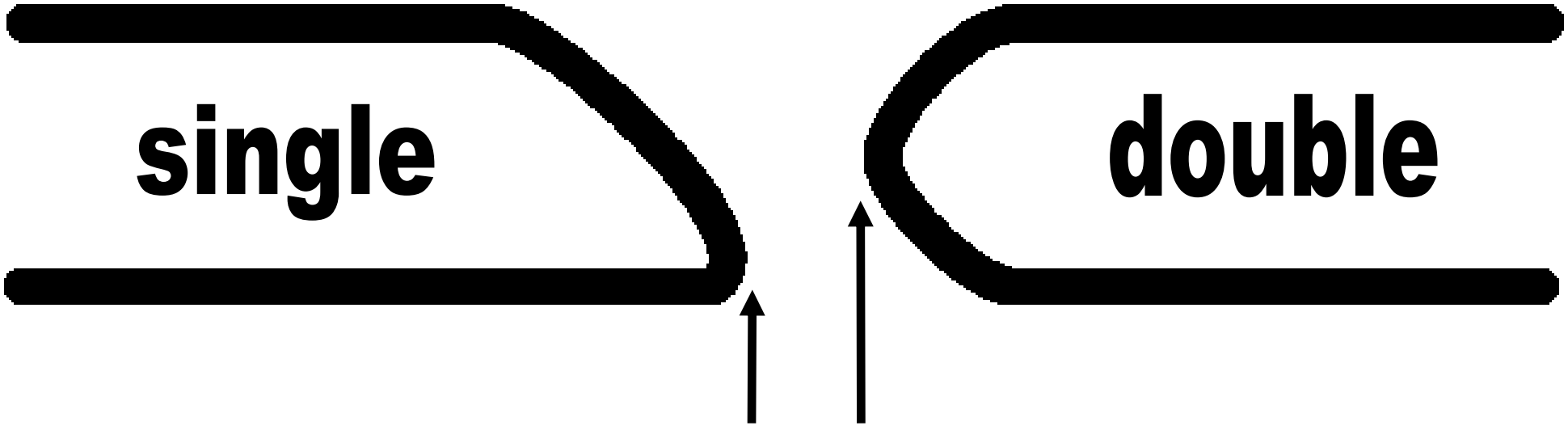
- Instrument edges are more precise and do not compress vs fingertips

Shape of the Instruments





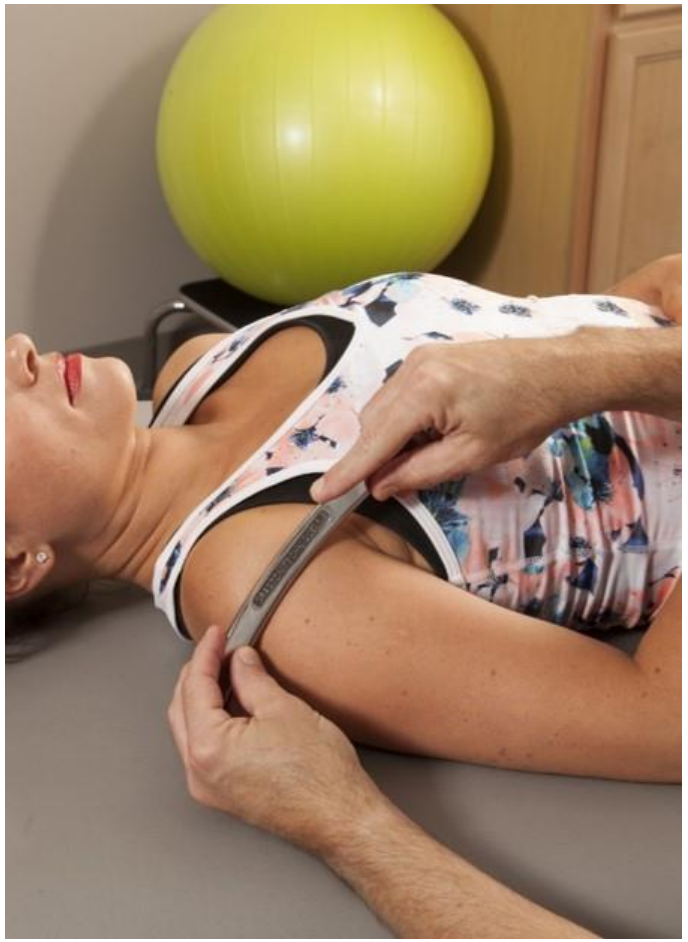
Bevel Edges of the Instruments



Benefits of IASTM

For **Clinicians:**

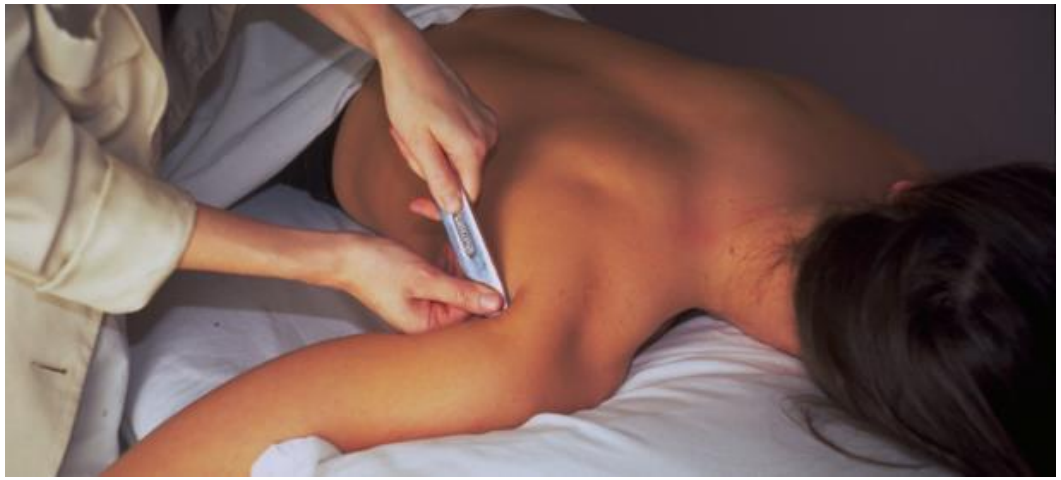
- Increased diagnostic skills
- Increased mechanical advantage (instruments as levers)
- Decreased treatment time
- Decreased clinician fatigue
- Increased specificity of tissue treatment



Benefits of IASTM

For the **Patient:**

- More comfortable and more effective than CFM
- Quicker, improved outcomes
- Patients feels abnormal tissue texture as the clinician does which tends to facilitate their involvement and interest in their treatment



IASTM Applications

- Assessment
- Pro-inflammatory
  (tendons & ligaments)
- Myofascial release
  (muscles / fascia)
- Facilitation
- Inhibition
- Improve ROM
- Trigger Point release
- Pain modulation
- Scar mobilization
- Edema reduction
- Mechanical leverage

Clinical Indications

Tendinopathies

- Lateral epicondylosis
- Medial epicondylosis
- Supraspinatus tendinosis
- Achilles tendinosis
- Patellar tendinosis
- De Quervain’s syndrome*

Fascial Syndromes

- Plantar fasciitis
- ITB syndrome
- Chronic compartment syndromes
- Trigger finger

Myofascial Pain Syndromes

Clinical Indications

- Ligament Pain Syndromes
  - MCL/LCL sprains
  - Coronary ligament sprains
  - AC ligament sprains
  - Ankle sprains
  - Ulnar collateral sprains
- Edema Reduction
- Scar Tissue/Adhesions
  - Postsurgical
  - Traumatic
- Entrapment Syndromes
  - Carpal/tarsal tunnel
  - Ulnar entrapment
  - Thoracic outlet
- Movement Dysfunctions
- Secondary Soft Tissue Lesions Associated With Other Diagnoses*

Relative Contraindications

- Cancer
- Burn Scars
  (mature scars, 9 months post-healing)
- Kidney Dysfunction
- Pregnancy
- Medications – anticoagulants, steroids, hormone replacements, NSAIDS, fluoroquinolone antibiotics, herbal supplements
- Patient Age

Relative Contraindications

- Varicose Veins
- Osteoporosis
- Body Art
- RSD/Chronic Regional Pain Syndrome (CRPS)
- Polyneuropathies
- Unhealed, Closed, Non-complicated Fractures
- Autoimmune Disorders
- Diabetes
- Vitamin C & D/Calcium Deficiencies

Relative Contraindications

- Rheumatoid Arthritis/Ankylosing Spondylitis
- Congestive Heart Failure
- Around Pacemakers, Insulin Pumps, etc. (Soft tissue work might dislodge/disrupt.)
- Acute Inflammation
- Lymphedema
- Post-injection
- Flu or Illness with Flu-like Symptoms

ABSOLUTE CONTRAINDICATIONS

- Open wounds/unhealed suture sites/sutures
- Thrombophlebitis
- Uncontrolled hypertension
- Inflammatory conditions due to infection
- Unstable fractures

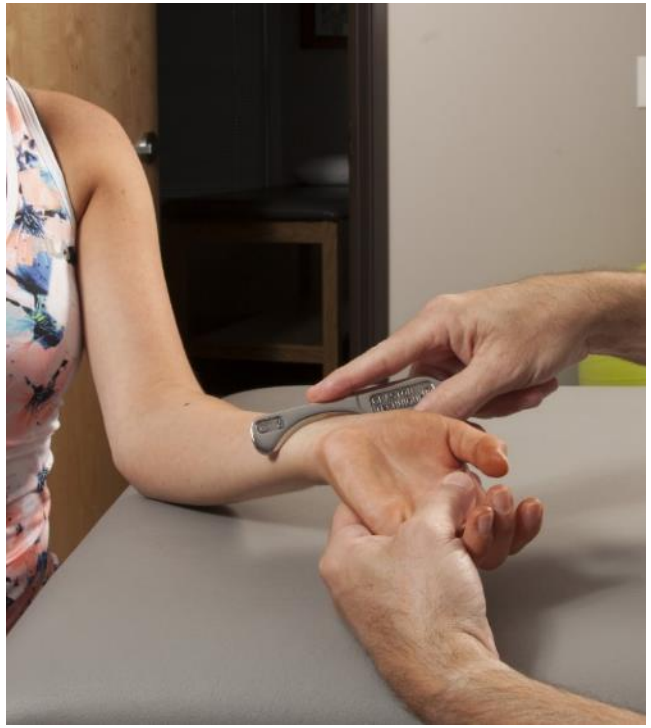
ABSOLUTE CONTRAINDICATIONS

- Contagious or infectious skin conditions
- Hematoma/myositis ossificans *
- Osteomyelitis
- Insect bite of unexplained origin

Intensity

Treatment Intensity Is Varied By Manipulating The Various Dosage Parameters

- Instrument (Angle & Edge)
- Pressure
- Depth of Penetration
- Session Duration
- Rate
- Frequency
- Amplitude
- Direction

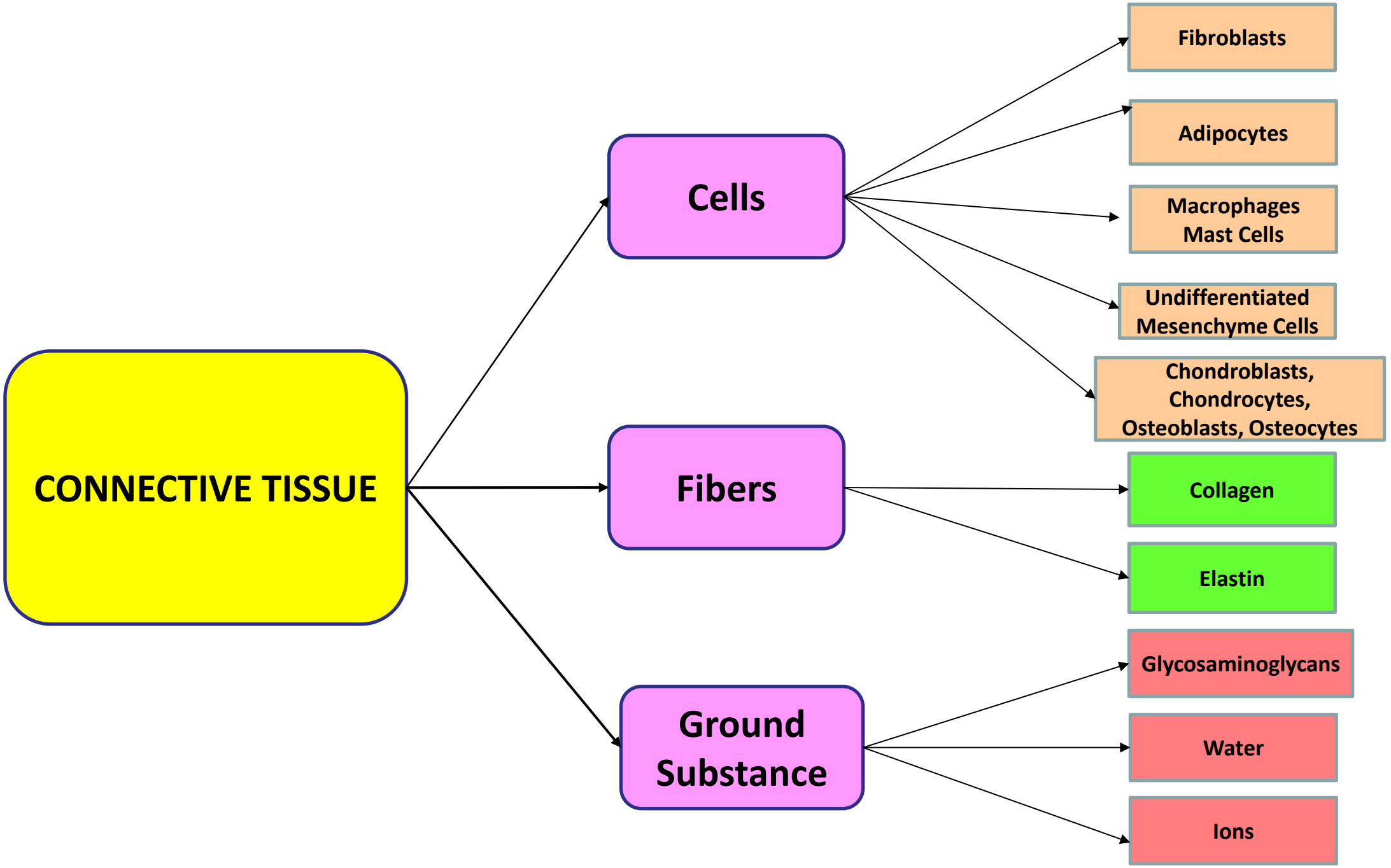


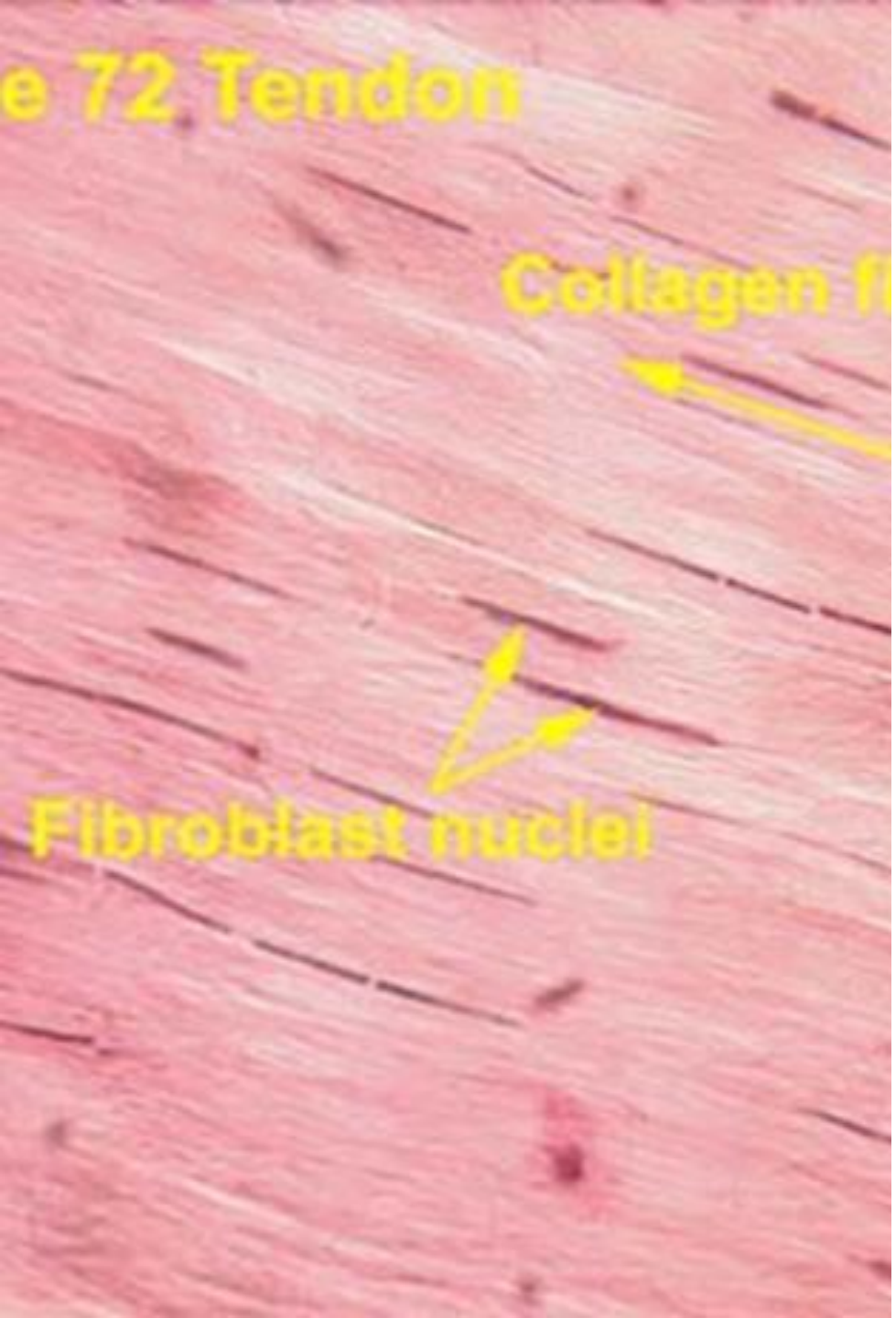
Scientific Basis

- **Connective Tissue Types and Composition**
- **Effects of Immobilization on Connective Tissue**
- **Mechanotransduction**
- **Physiological Effects of IASTM**
- **Summary of Evidence**

What Do We Know About Connective Tissue?

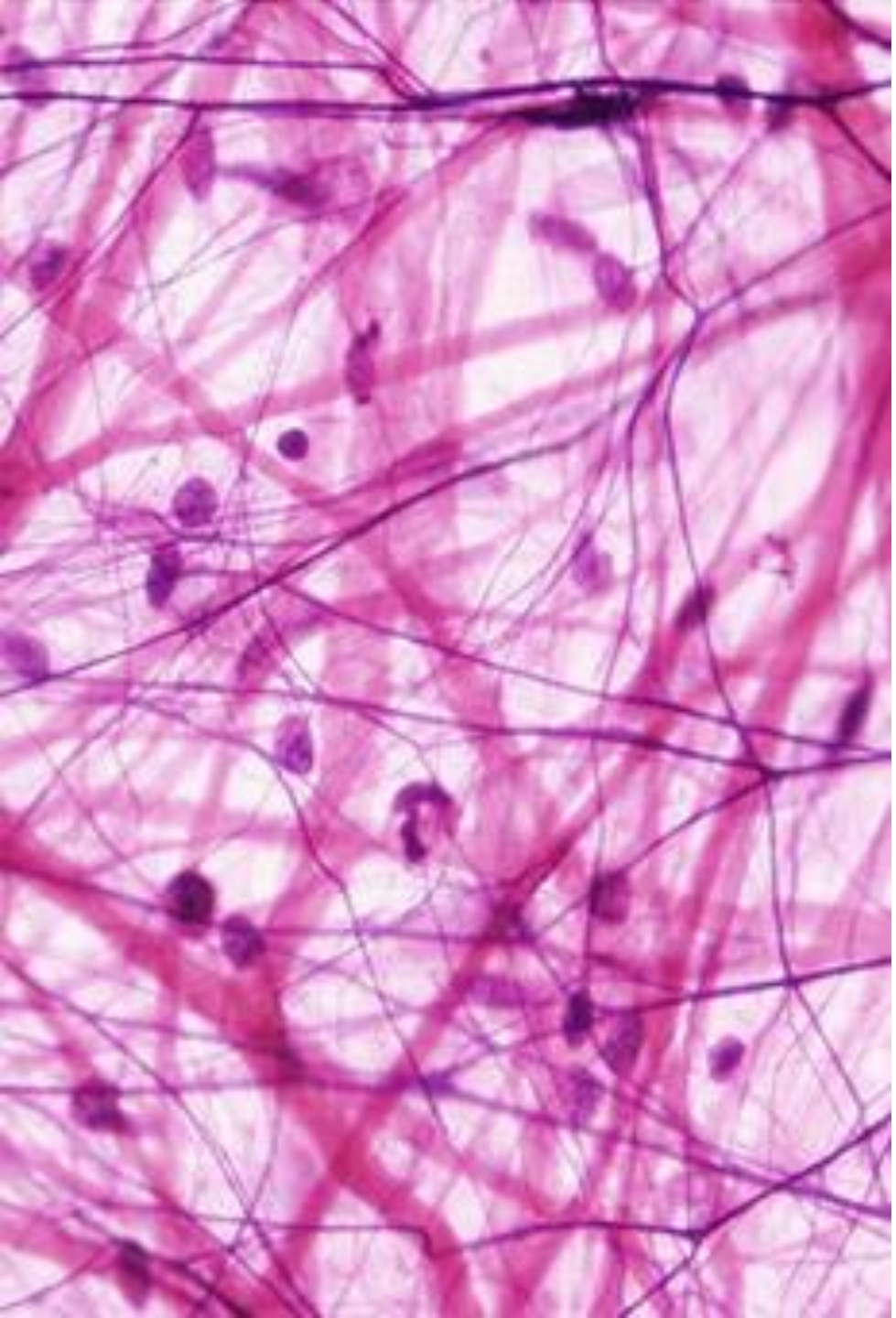
- **Functions to support & “connect” the other tissues of the body**
- **Consists of cells in an extracellular matrix**
- **Composition of extracellular material differentiates the various types**


CONNECTIVE TISSUE
Cells
Fibroblasts
Adipocytes
Macrophages
Mast Cells
Undifferentiated
Mesenchyme Cells
Chondroblasts,
Chondrocytes,
Osteoblasts, Osteocytes
Fibers
Collagen
Elastin
Ground
Substance
Glycosaminoglycans
Water
Ions



Fibroblasts

- Produce and maintains the ECM.
- Change in form as a response to load.
  - Elongation
- Form scars.
  - Fibroblast-to-**myofibroblast** differentiation during tissue repair.



Extracellular Matrix (ECM)

- Produced by **fibroblasts**
- Fibers and ground substance
- Provides structural support
- Regulates intercellular communication and physiologic changes (Growth, wound healing, metastasis etc.)
- Deformed by mechanical load
- Stage for mechanotransduction

Culav EM, Clark CH, Merrilees MJ. Connective tissues: matrix composition and its relevance to physical therapy. *Phys Ther*. 1999; 79: 308-319.

Connective Tissue Types

Dense, regular

- **Ligaments & tendons**

Dense, irregular

- **Aponeurosis, joint capsules, periosteum, retinaculum, ITB, dermis of skin and fascial sheaths**

Loose, irregular

- **Superficial fascia, nerve and muscle sheaths, internal organ sheaths**

Physiological Effects of IASTM: Instrument-Assisted Soft Tissue Mechanotherapy

- Increased Fibroblastic Activity
- Enhanced Blood Perfusion
- Increased Stem Cells
- Davis' Law / Physical Stress Theory
- Altered Neural Activity

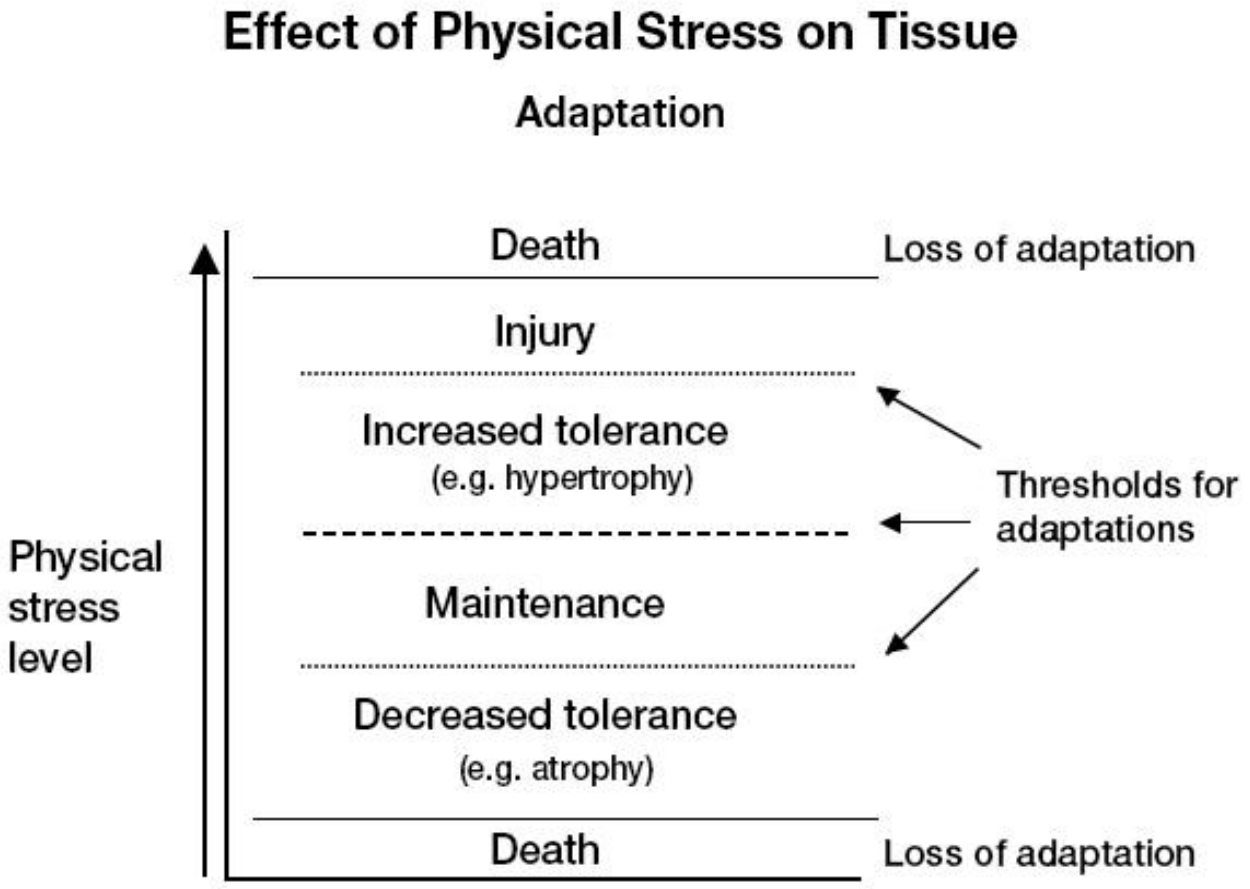
Physiological Effects of IASTM: Instrument-Assisted Soft Tissue ***Mechanotherapy***

- The use of mechanical force to achieve a physiologic response.
- Virtually all cells are ***mechanosensitive.***
- When the cell surface senses a mechanical stimulus, a biochemical chain reaction occurs.
- Directs cellular activity influencing growth, remodeling, and repair, with the ultimate outcomes being altered tissue mass, structure, and quality.
- Nearly every intervention in musculoskeletal rehabilitation introduces mechanotherapies, extrinsically via therapist intervention or intrinsically via the prescription of exercise therapy.

Thompson WR, Scott A, Loghmani MT, Ward SR, Warden SJ (2016). **Understanding Mechanobiology: Physical Therapists as a Force in Mechanotherapy and Musculoskeletal Regenerative Rehabilitation.** *Physical therapy*, 96(4), 560-569.

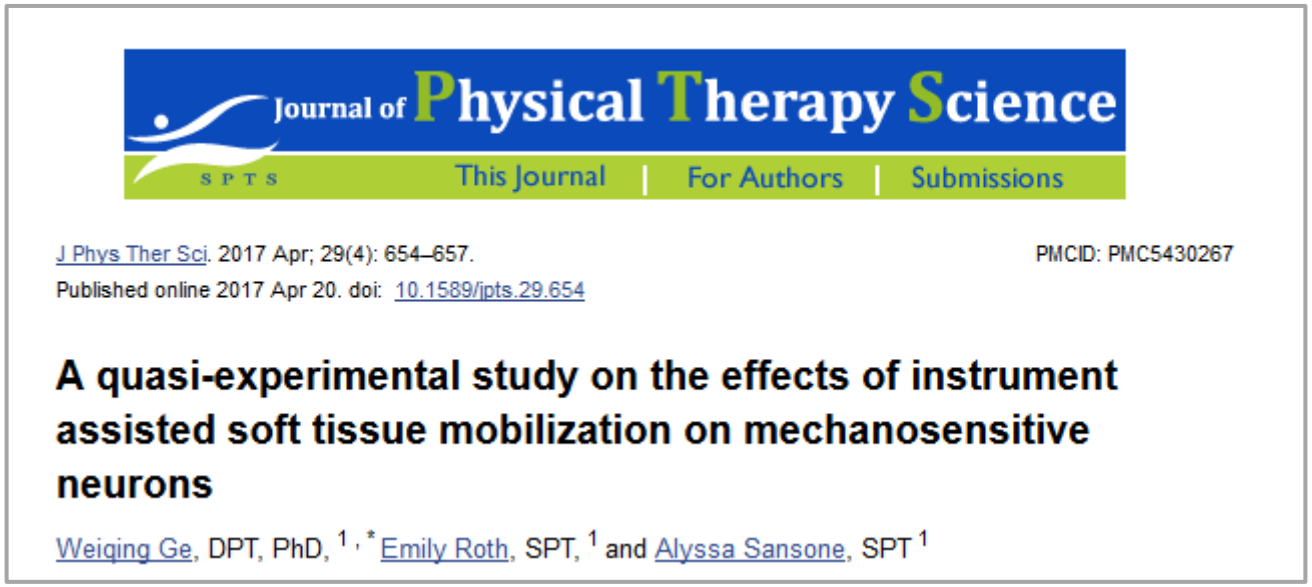
The Physical Stress Theory

- Injury
- Hypertrophy
- Maintenance
- Atrophy



Mueller MJ, Maluf KS (2002). Tissue adaptation to physical stress: a proposed "Physical Stress Theory" to guide physical therapist practice, education, and research. *Physical therapy*, *82*(4), 383-403.

Neurophysiological Effects: Altered neural activity



Journal of Physical Therapy Science

SPTS This Journal | For Authors | Submissions

J Phys Ther Sci. 2017 Apr; 29(4): 654–657. PMCID: PMC5430267

Published online 2017 Apr 20. doi: 10.1589/jpts.29.654

A quasi-experimental study on the effects of instrument assisted soft tissue mobilization on mechanosensitive neurons

Weiqing Ge, DPT, PhD, [1,*] Emily Roth, SPT, [1] and Alyssa Sansone, SPT [1]

- Effects of IASTM on activities of mechanosensitive neurons
- 23 subjects received 10-minute application of IASTM to anterior thigh
- Increased 2-point discrimination
- IASTM alters neural activities of mechanoreceptors
- More than a mechanical effect

Clinical Effectiveness of IASTM

- Improving ROM
- Effects of IASTM on tendons
- Evidence to support the use of IASTM

IASTM and ROM

- Effect of IASTM vs stretching
- RCT - 50 healthy track and field volunteers
- 8 treatments over 5 weeks
- IASTM and exercise was more effective than stretching for improving weight bearing dorsiflexion

Volume 22 Issue 3, May 2017

RESEARCH REPORT

The Effect of Graston Massage Therapy on Talocrural Joint

Authors: Thomas G. Palmer , ATC, CSCS[1], D, Bradley Wilson [1], Mallory Kohn , AT

AFFILIATIONS

[1]University of Cincinnati [2]Goldey-Beacom College [3]Ohio University

Thomas Palmer is an assistant professor in the College of Applied Health-Rehabilitation Scier exercise science courses at the graduate and undergraduate level, University of Cincinnati, Cir

Brad Wilson is an associate professor in Human Services, teaching exercise science courses level, University of Cincinnati, Cincinnati, OH.

Mallory Kohn specializes in different forms of manual therapy and clinical outcomes and is the Goldey-Beacom College, Wilmington, DE.

Sarah Miko is a graduate assistant specializing in different forms of manual therapy and the ar Ohio University, Athens, OH.

Matthew Hoch, PhD, ATC, Old Dominion University, is the report editor for this article.

Volume: 22 **Issue:** 3 **Pages:** 66-75

https://doi.org/10.1123/ijatt.2015-0096

ABSTRACT PDF

IASTM and ROM

Journal of Sport Rehabilitation, (Ahead of Print)
https://doi.org/10.1123/jsr.2019-0397

Human Kinetics
ORIGINAL RESEARCH REPORT

Comparison of the Graston Technique® With Instrument-Assisted Soft Tissue Mobilization for Increasing Dorsiflexion Range of Motion

Holly M. Bush, Justin M. Stanek, Joshua D. Wooldridge, Stephanie L. Stephens, and Jessica S. Barrack

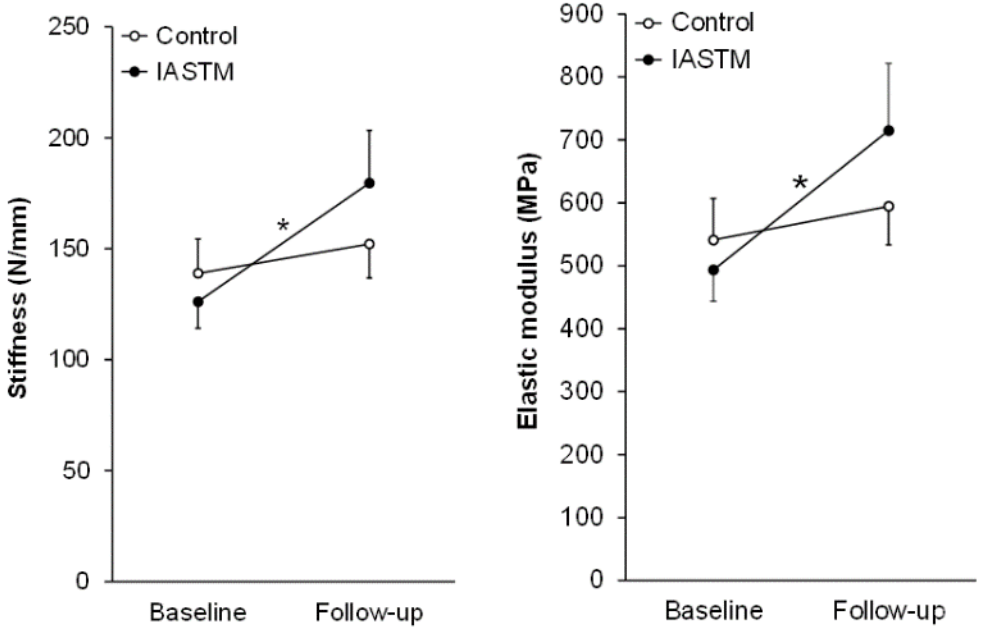
- IASTM did not produce a significant effect
- IASTM + exercise did produce a significant increase in ankle dorsiflexion ROM
- IASTM + exercise is most effective

IASTM and Tendons

Instrument assisted soft tissue mobilization alters material and mechanical properties in healthy, shortened Achilles tendons

Amy J Bayliss, DPT, PT; Trent Crandall, SPT; Danielle L Farmer, SPT; Stuart J Warden, PhD, PT

Purpose/Hypothesis: Clinical consequences of a shortened Achilles tendon include an increased risk for lower extremity injury, an increased likelihood of developing Achilles tendinopathy and reduced running economy. The purpose of this ongoing study is to explore the impact of instrument assisted soft tissue mobilization (IASTM) on Achilles tendon material and mechanical properties in healthy subjects with reduce



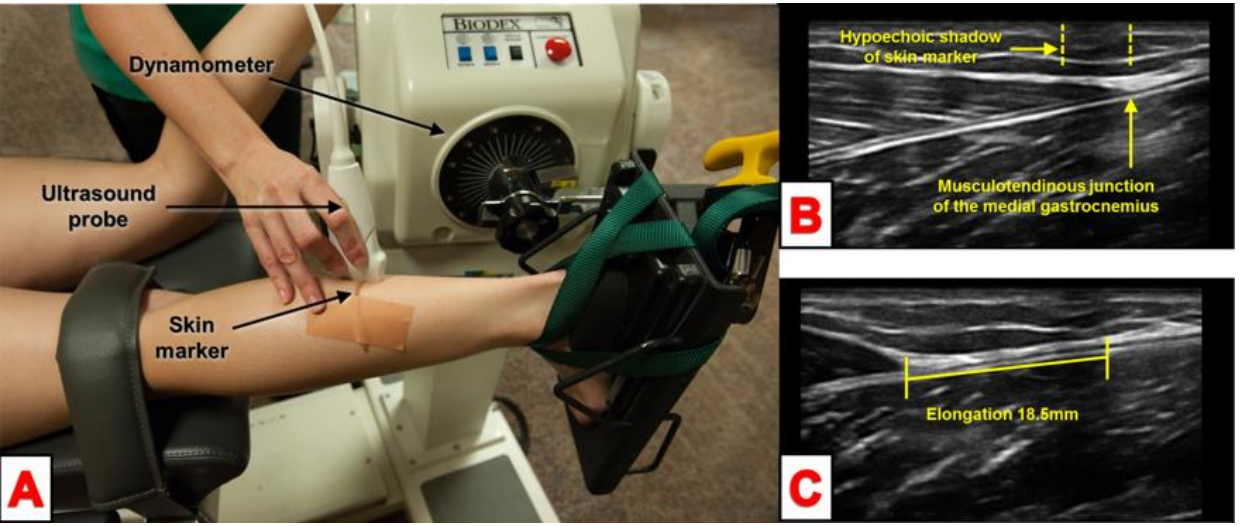
- 6 adults with shortened Achilles tendons
- 8 sessions of IASTM and stretching vs stretching alone
- Assessed with real time US imaging and dynamometry
- 28% gain in elastic modulus with IASTM vs 4% gain with stretching alone
- Increase in tendon resting length
- IASTM induced adaptation of the mechanical and material properties of healthy, shortened Achilles tendons
- Increase in elastic modulus hypothesized to enable more effective force transfer and may alter injury risk

IASTM and Tendons

Instrument-assisted soft tissue mobilization alters material and mechanical properties in Achilles tendinopathy

Jethro McConnell, Sarah Cruser, Stuart J. Warden, Amy J. Bayliss
Physical Therapy, Indiana University, Indianapolis, IN.

PURPOSE/HYPOTHESIS: Clinical consequences of Achilles tendinopathy include pain and limited participation in sporting and physical activities. The degenerative process associated with tendinopathy alters the mechanical and material properties of the tendon. The purpose of this ongoing study is to explore the impact of instrument assisted soft tissue mobilization (IASTM) on Achilles tendon material and mechanical properties in subjects with Achilles tendinopathy.



- Three adults with unilateral Achilles tendinopathy
- 8 sessions of IASTM combined with stretching over a 4-week period
- Used real time ultrasound imaging and dynamometry at both baseline and follow-up
- 34.5% gain in elastic modulus and a 31.8% gain in stiffness following IASTM
- Mean VISA-A scores improved 13 points
- Average gain of 2.2 cm a weight bearing lunge test
- 2 subjects reported a full recovery
- IASTM appears to be effective for improving function and altering material and mechanical properties in midportion Achilles tendinopathy

The Effects of IASTM on Cases of Chronic Tendinopathy Measured by Diagnostic Ultrasound

by
Kelsey K Labodi
Master of Science Thesis
North Dakota State University

- 15 collegiate athletes diagnosed with either patellar (13 participants) or Achilles (2 participants) tendinopathy
- 4 treatments of IASTM (2x / wk x 2 weeks)
- Significant decrease in the amount of tendinosis, a significant increase in LEFS scores, but no significant change in NPRS scores
- The area of tendinosis started to improve after 2 treatments
- This study refutes current theory that interventions designed to treat tendinopathy cannot improve tendon structure

Systematic Reviews

- 7 RCTs appraised
- 5 reported to use GT, but excluded parts of the protocol
- Evidence is still emerging
- Weak evidence supporting ability to increase ROM
- Best evidence to date followed the GT protocol

The efficacy of instrument assisted soft tissue mobilization: a systematic review

Scott W. Cheatham, PT, PhD, DPT, OCS, ATC, CSCS[1]
Matt Lee, PT, MPT, CSCS[2]
Matt Cain, MS, CSCS, USAW-I[3]
Russell Baker, DAT, ATC[4]

Background: *Instrument assisted soft tissue mobilization (IASTM) is a popular treatment for myofascial restriction. IASTM uses specially designed instruments to provide a mobilizing effect to scar tissue and myofascial adhesions. Several IASTM tools and techniques are available such as the Graston® technique. Currently, there are no systematic reviews that have specifically appraised the effects of IASTM as a treatment or to enhance joint range of motion (ROM).*

Contexte : *La mobilisation des tissus mous assistée par instrument (MTMAI) est un traitement populaire pour la restriction des tissus myofasciaux. La MTMAI utilise des instruments spécialement conçus pour fournir un effet de mobilisation sur les tissus cicatriciels et les adhérences myofasciales. Plusieurs outils et techniques de MTMAI sont disponibles, comme la technique Graston[MD]. Actuellement, il n'y a aucun examen systématique ayant notamment évalué les effets de la MTMAI comme*

Systematic Reviews

Journal of Athletic Training 2019;54(7):808–821
doi: 10.4085/1062-6050-481-17

www.natajournals.org

Therapeutic Interventions

Instrument-Assisted Soft Tissue Mobilization: A Systematic Review and Effect-Size Analysis

Cristina B. Seffrin, MS, LAT, ATC; Nicole M. Cattano, PhD, LAT, ATC; Melissa A. Reed, PhD, ACSM-CEP, MA; Alison M. Gardiner-Shires, PhD, LAT, ATC

West Chester University, Pennsylvania

- 13 articles met inclusion criteria
- Moderate evidence supports the use of IASTM for improving ROM in uninjured participants, and improving pain and function in select injured patients

Summary

- **IASTM is a form of Mechanotherapy – the use of mechanical forces to achieve physiologic changes**
- **Varying dosage will vary the therapeutic effect**
- **Moderate evidence supports the use of IASTM to modulate pain, improve ROM, and improve function**
- **Best evidence to date followed the GT protocol (IASTM + Exercise)**

Lab

Please Be Careful

The instruments will not break, but treatment edges can be damaged.

Pick them up <u>one at a time</u>

Do not pick them up together in one hand

Do not bang, clank, clutch or drop them

Thank You

General Principles

- Monitor treatment edge at all times
  (adjust for changing contours)
- Envision anatomy/consider the entire kinetic chain
- General to specific
- Superficial to deep (tension vs. slack)
- Apply instrument to lesions as if it was
  *the face of a clock**
- Make bilateral comparisons

Gentle Hold

Feel the Vibration of the Instrument

Demo #1:
Anterior Thigh & Knee

Sweep Quads
GT1

Sweep Quads
GT5

Sweep Quads
GT4

Sweep Patella
GT2

Demo #2: Hamstrings

Sweep Hamstrings
GT1

Sweep Hamstrings
GT5

Sweep Hamstrings
GT4

Sweep HS
on stretch / AROM
GT1

Sweep HS
on stretch / AROM
GT4

NOTE: Caution Around Common Peroneal Nerve at Head of Fibula.

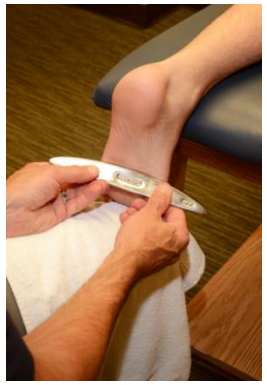
Demo #3: Calf, Achilles, and Plantar Fascia

Sweep Calf
GT1, GT4, GT5

Dorsiflex ankle to
Treat Calf on Stretch
GT4, GT5

Flex Knee
To Treat Soleus
GT4, GT5

Treat
Plantar Fascia
GT4

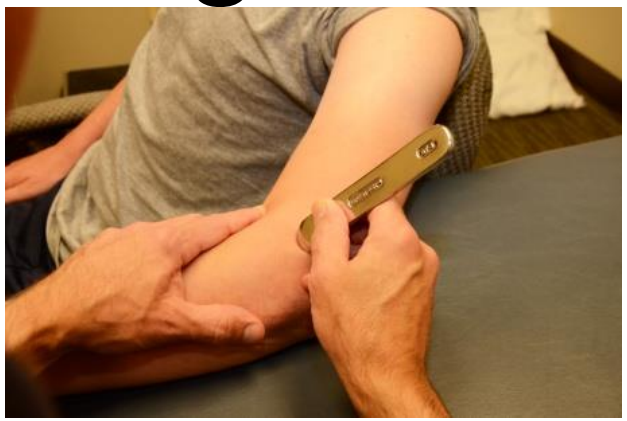


Treat
Plantar Fascia
On Stretch
GT4

Treat Achilles
GT2, GT6

Demo #4: Tendons and Ligaments

Strum
Medial Epicondyle



Strum
Lateral Epicondyle

Strum
Intercarpal ligaments

Strum
Ankle Ligaments

Strum
Collateral Ligaments

Strum
Patellar Tendon

Demo #5: Instruments as Levers

Handhold for S.O. Release

Suboccipital Release

Scapular Mobs

Any Application That You Would Like to See???

Questions