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- Call 866-782-6258 (M-F, 8 AM-8 PM ET)
- Email customerservice@PhysicalTherapy.com

Myofascial Interventions: An Update on Current Research and Best Practices

By
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Associate Professor
California State University Dominguez Hills

Learning Objectives

As a result of this course, participants will be able to:

- Discuss the current science behind the myofascial system and the theories of my different myofascial interventions work
- Appraise the current evidence on common myofascial interventions such as roller massage, instrument assisted soft tissue mobilization, cupping, compression bands, and dry-needling
- Appraise the current evidence on best practices for the myofascial interventions discussed

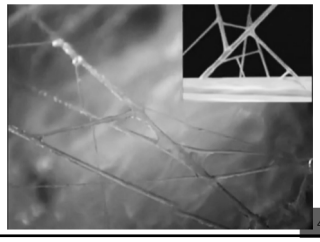
2

Brief Anatomy Review

3

Defining the Myofascial System

- *Definition:*
  - Fascia is connective tissue fibers, primarily collagen, that form sheets or bands beneath the skin to attach, stabilize, enclose, and separate muscles and other internal organs.
  - Fasciae are classified according to their distinct layers, their functions and their anatomical location.



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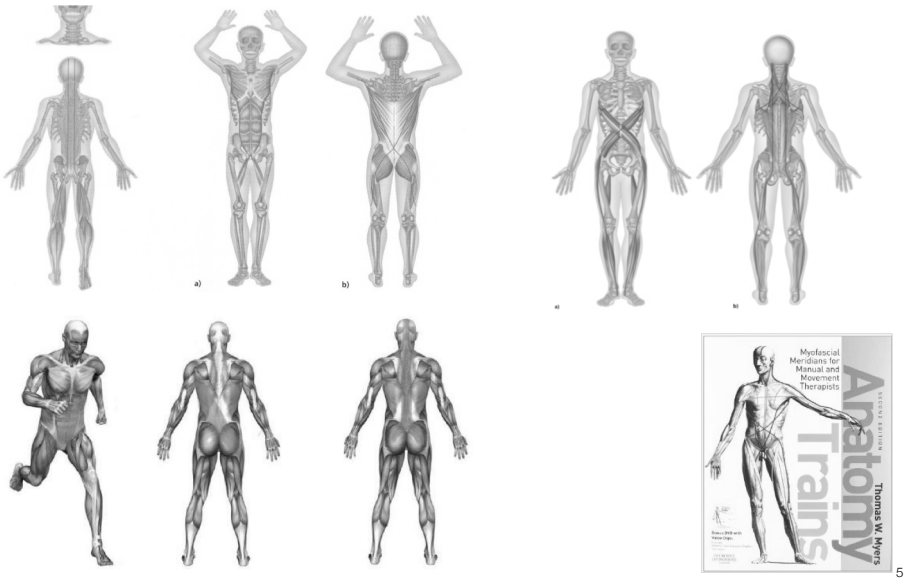
Myofascial Meridians (Slings)



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Basic Science

Components of the Myofascial System

6

Fascia and Movement

A. Force transmission

B. Pre-tension

C. Rich in contractile cells, proprioceptors and nociceptors

D. Interconnected tensional network for stability and communication

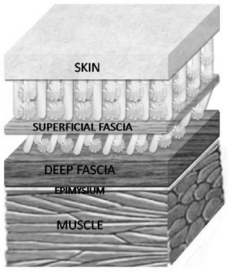
E. Adapts its fiber arrangement, length, and density according to local demand

F. Promotes sliding and reduces compartment friction during motion

7

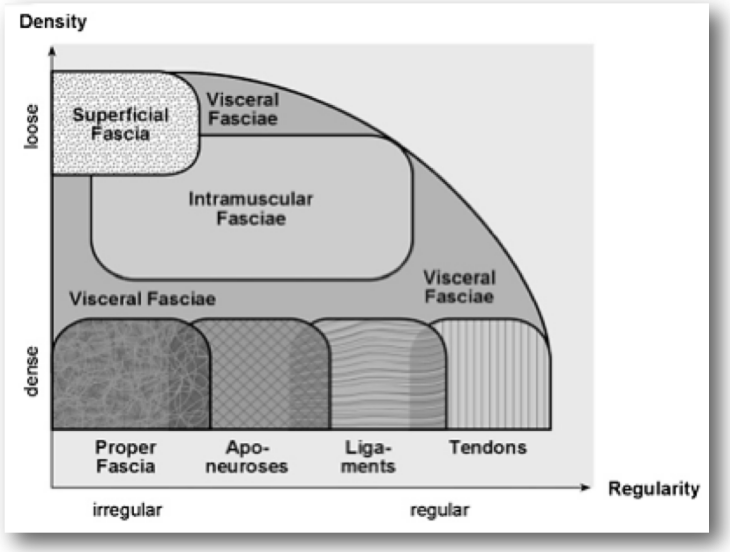
Classification

- Superficial fascia- comprised of the subcutaneous loose connective tissue containing a web of collagen, as well as some fibers of mostly elastin
- Deep fascia-formed by a connective membrane that sheaths all muscles. Devoid of fat and forms sheaths for the nerves and vessels, envelops various organs and glands.
- Epimysium-comprises the fascia that encloses each single muscle and is continuous with perimysium and endomysium. It is directly involved in the play of tension between the muscle spindles and the Golgi tendon organs



Langevin, H., Huijing, P. (2009)

8



Schleip & Muller J (2012)

9

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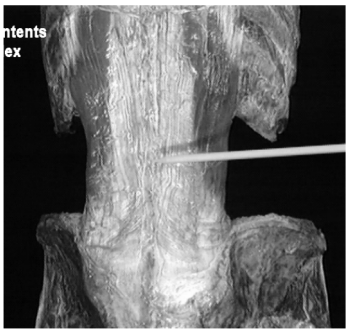
Up to half of the total force generated by the muscle is transmitted to surrounding connective tissues & neighboring muscles

Huijing et al. J.(1999)



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From “Muscle Attitudes”
by Jean-Claude Guimberteau M.D.

11

From “Skin, Scars and Stiffness”
by Jean-Claude Guimberteau M.D.

12

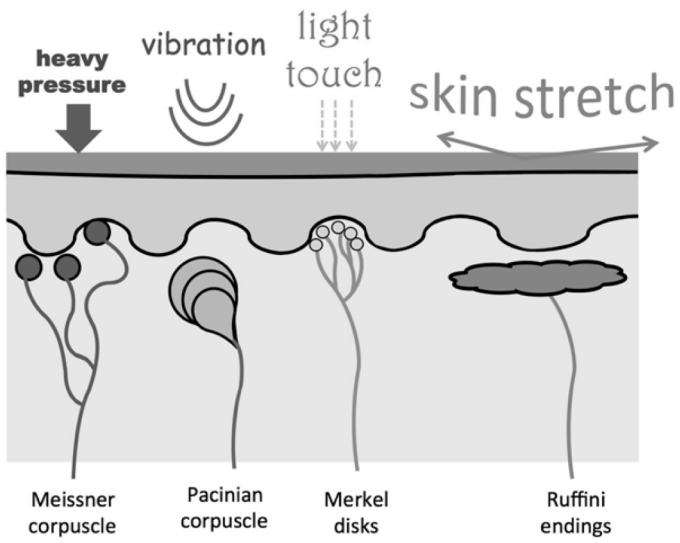

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Table 2
Stress Ranges for Plastic Deformation of In Vitro Fasciae, With Compression and Shear Ratios

Fascia Type	Stress Range, N/cm²	Compression and Shear Ratio Under Stress
Fascia lata*	1275.00-1949.00	Negligibly small
Plantar fascia*	869.65-1454.00	Negligibly small
General Fascia†	788.00-1997.00	Data not provided

* Predicted stress range based on the authors' original calculations.
† Experimental stress range based on analysis by Threlkeld[7] using Xsensor pressure mapping system (X3 Lite Seat System, Version 4.2.5; XSENSOR Technology Corp, Calgary, Canada).

Chaudhry et.al (2008)

*1275-1949 Newton per square centimeter=1849-2827 Pounds per square inch

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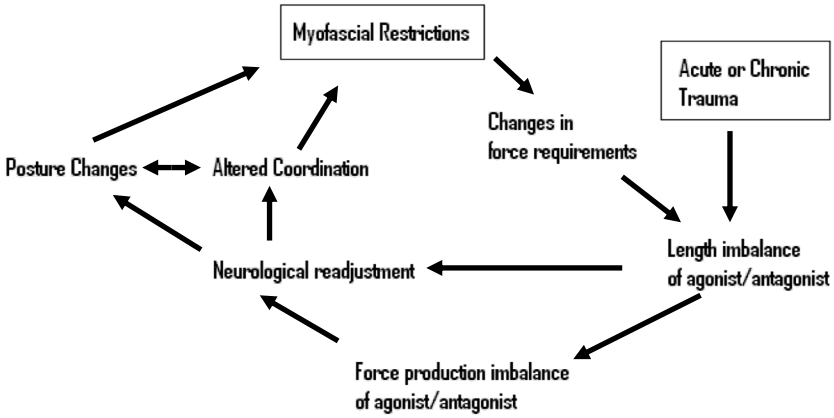
Myofascial Restriction

(Martin 2011)

Restriction in normal muscle function due to injury or biomechanical force imbalance



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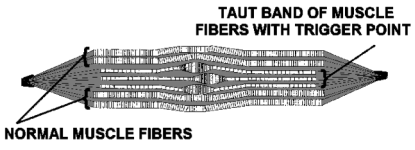
Trigger Points

(Martin 2011)

- Discrete, focal, hyperirritable spot in taut band of muscle
- Occurring in all patients with musculoskeletal pain
- Can be active or latent
- Symptoms:
  - Painful on compression
  - Referred pain/tenderness
  - Motor dysfunction
- No evidence for development mechanism of Trigger Points

  Acute and chronic trauma, chronic lengthening, sleep disturbance, anxiety



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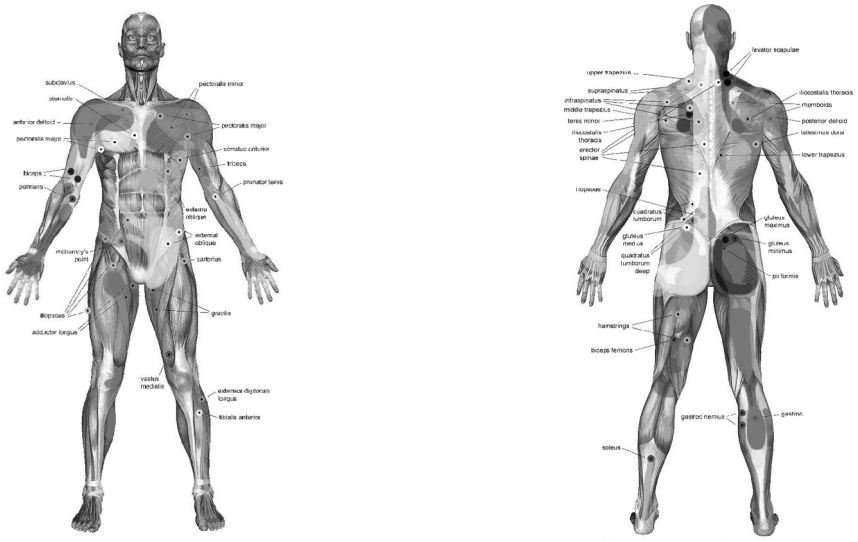
Common Trigger Point Sites



http://gotcherback.com/wp-content/uploads/2012/10/Trigger-Point-Back.jpg

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What are the theories behind myofascial release?

Drawing by ***Claude Serre***.

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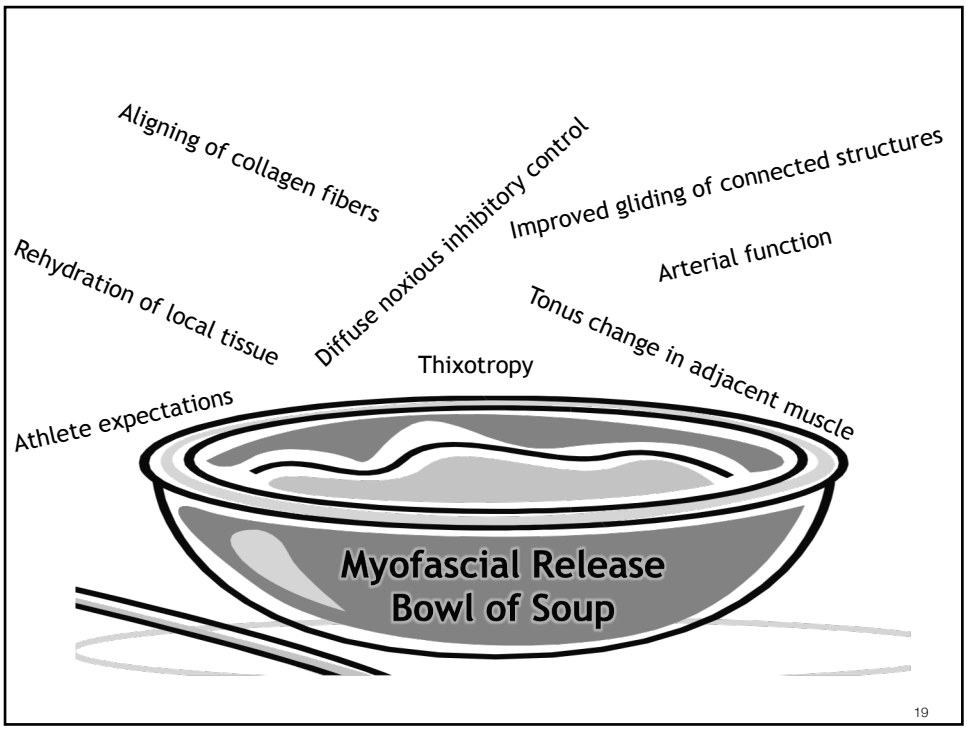
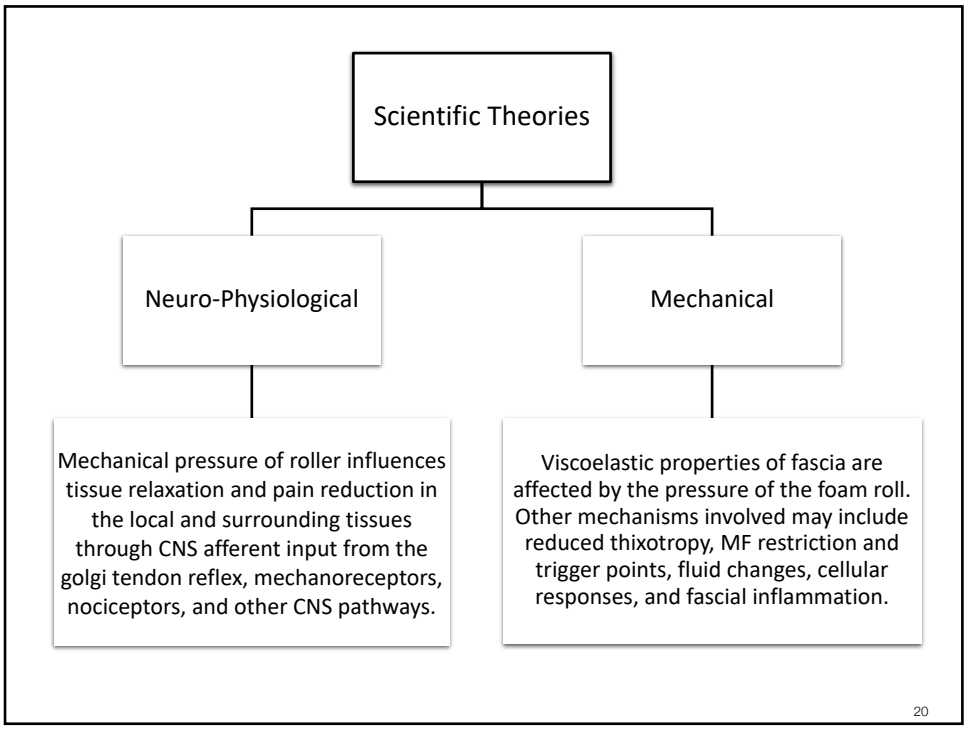

Aligning of collagen fibers
Diffuse noxious inhibitory control
Improved gliding of connected structures
Rehydration of local tissue
Arterial function
Tonus change in adjacent muscle
Thixotropy
Athlete expectations
Myofascial Release
Bowl of Soup
19


Scientific Theories
Neuro-Physiological
Mechanical
Mechanical pressure of roller influences tissue relaxation and pain reduction in the local and surrounding tissues through CNS afferent input from the golgi tendon reflex, mechanoreceptors, nociceptors, and other CNS pathways.
Viscoelastic properties of fascia are affected by the pressure of the foam roll. Other mechanisms involved may include reduced thixotropy, MF restriction and trigger points, fluid changes, cellular responses, and fascial inflammation.
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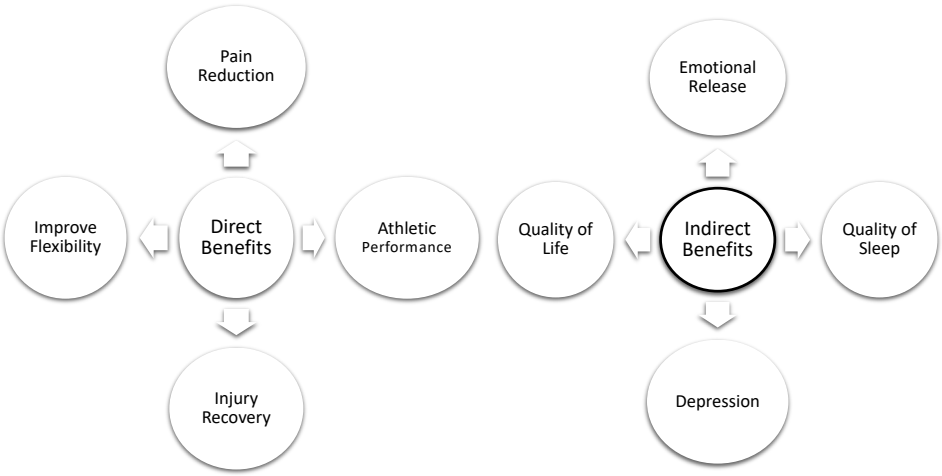
Reported Benefits



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Myofascial Release

- *Definition:* Myofascial release (MFR) is a collection of approaches and techniques that focuses on freeing restrictions of movement that originate in the soft tissues of the body through direct and indirect manual techniques.
- *History:*

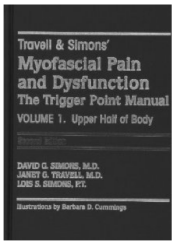
1940's
"Myofascial" first used

1960's
"Myofascial Release" first used

1976
"Myofascial trigger point"
Janet Travell

1983
Trigger Point Manual Book
Janet Travell

2015-2018
"Myofascial Therapy"
"Myofascial Trigger Point Therapy"
"Self-Myofascial Release"



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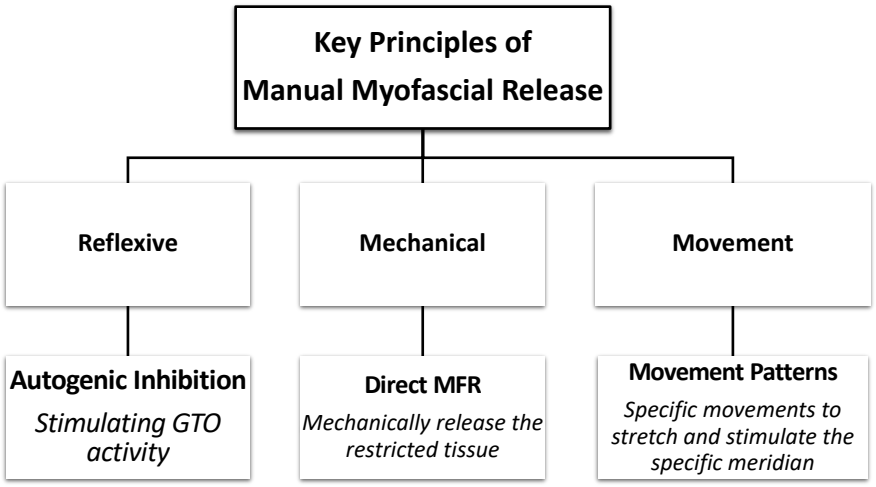
Key Principles of Treatment



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Myofascial Treatment

http://www.coloradobodyandsoul.com

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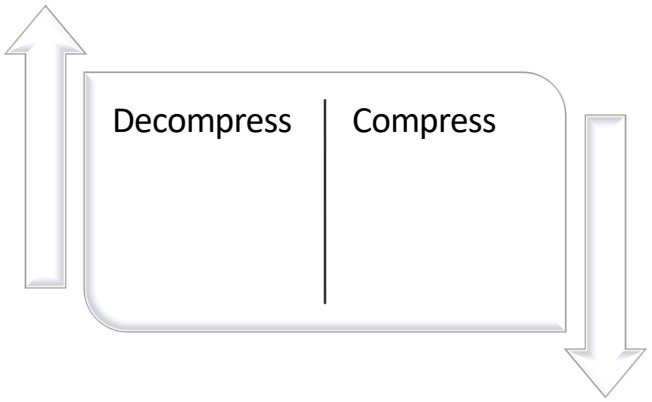
Myofascial interventions often do two things



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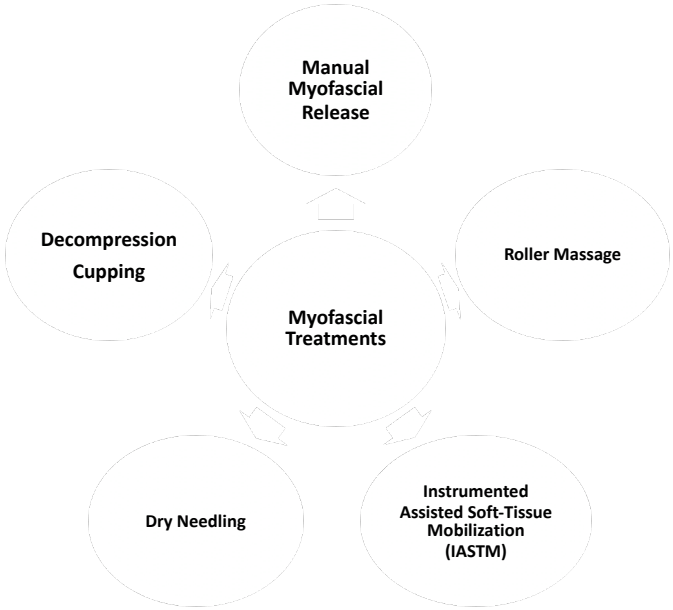
Common Myofascial Treatments



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What does the evidence say?

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CEBM Levels of Evidence

Level of Evidence	Grading Criteria
	A: Systematic Review of RCT's
Level 1	B: Individual RCT with narrow CI
	C: Series of cases (all or none)
	A: Systematic review of cohort studies
Level 2	B: Individual cohort study, RCT with drop outs >20%
	C: "Outcomes" Research or ecologic studies
Level 3	A: Systematic Review of case-control studies
	B: Individual case-control
Level 4	Case Series
Level 5	Expert's opinion

OCEBM Levels of Evidence Working Group*. "The Oxford Levels of Evidence ".
Oxford Centre for Evidence-Based Medicine. http://www.cebm.net/index.aspx?o=5653

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Manual Myofascial Therapy

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Myofascial Manual Therapy

- *Direct MFR:* tissue is loaded with a constant force until “release” occurs in the desired direction.
- *Indirect MFR:* tissue is lightly stretched and the therapist applies slow, steady pressure in the direction that the fascia can be felt to allow greatest ease of movement “unwinding”.
- *Trigger Point:* ischemic compression to a trigger point (latent or active).

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Myofascial Manual Therapy

- 2018: Laimi et al. *Clin Rehabil* (Level 1a)
- 2015: Ajimsha et al. *J Bodyw Mov Ther* (Level 1a)
- 2015: Yuan et al. *Man Ther* (Level 1a)
- 2013: McKenney et al. *J Athl Training* (Level 1a)

Interventions	**Parameters**
Treatment technique	Variable, often combined with other interventions
Treatment duration	Variable among studies
Outcome measures	Variable: Pain (0-10), Questionnaires
Long-term outcomes	Poorly reported

Target Population*: (+) results with orthopedic conditions, fibromyalgia, post breast cancer, TMD*

Bottom Line: *MF therapy shows positive outcomes. However, the research is varied with the type of technique, combined interventions, and poorly reported long-term outcomes.*

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Myofascial Trigger Point Therapy

Ischemic Compression

- 2018: Laimi et al. *Clin Rehabil* (Level 1a)
- 2015: Cagnie et al. *Arch Phys Med Rehabil* (Level 1a)
- 2015: Takamoto e al. *Eur J Pain* (Level 1b)
- 2015: Hains et al. *J Can Chiropr Assoc* (Level 1b)

Interventions	**Parameters**
Treatment technique	Ischemic compression (TP site)
Treatment duration	15-60 seconds of compression (i.e. 6 reps)
Outcome measures	Pain (0-10), ROM, strength, pain threshold, questionnaires
Long-Term Outcomes	6 months

Target Population*: (+) results with individuals with MF pain and TrP's*

Bottom Line: *Ischemic compression has shown moderate evidence for favorable outcomes for treating MF trigger points. However, the research is varied with the protocol for treatment and poorly reported long-term outcomes.*

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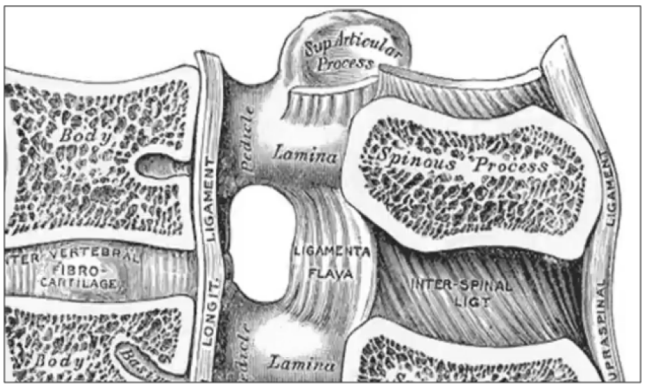
Dry Needling

- Video



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Dry Needling

- 2018: Liu et al. Arch Phys Med Rehabil (Level 1a)
- 2018: Vier et al. Braz J Phys Ther (Level 1a)
- 2018: Hu et al. Medicine (Level 1a)
- 2018: Hall et al. Physiotherapy (Level 1a)
- 2017: Espejo-Antunez et al. Complemt Ther Med (Level 1a)
- 2017: Gattie et al. J orthop Sports Phys Ther (Level 1a)
- 2016: Cox et al. J Orthop Sports Phys Ther (Level 1a)

Interventions	**Parameters**
Treatment technique	Dry needling (variable techniques)
Treatment duration	10-30 minutes
Outcome measures	Variable: Pain (0-10), Questionnaires
Long-Term Outcomes	Short: 3 days, Long: 6 months or longer

Target Population*: (+) results with individuals with MF pain*

Bottom Line: *Dry needling shows weak to moderate outcomes for treating TMD, LBP, and upper quarter shoulder pain. There is stronger evidence for the treatment of MF trigger points related to LBP and musculoskeletal disorders.*

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Roller Massage

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CONTINUED

Literature Review

2000 ⇨ 2017

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Systematic/Literature Reviews

- 2017: Kalichman,Ben. *J Bodyw Mov Ther* (Level 4)
- 2017: DeBruyne, Dewhurst, et al. *J Sport Rehab* (Level 4)
- 2015: Cheatham et al. *Int J Sports Phys Ther* (Level 1)
- 2015: Beardsley & Skarabot. *J Bodyw Mov Ther* (Level 1a)
- 2015: Ajimsha et al. *J Bodyw Mov Ther* (Level 1a)
- 2015: Schroeder & Best. *Curr Sports Med Rep* (Level 1a)
- *Consensus among reviews:*
  - Heterogeneity of methods among studies with different
    - Foam or massage rollers
    - Intervention parameters and outcomes
    - Different sample populations

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SMR Summary

- Pre-Exercise:
  - Improves flexibility without decreasing muscle performance
  - Shorter duration rolling (2 min or less)
- Post-Exercise:
  - Reduces DOMS
  - Longer duration rolling (2 min or greater?)
- Cadence:
  - No guidelines or standards
- Type of Roller:
  - High density (rigid) seems more effective
- Pressure:
  - Bodyweight most practical?

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What are the current scientific theories behind roller massage?

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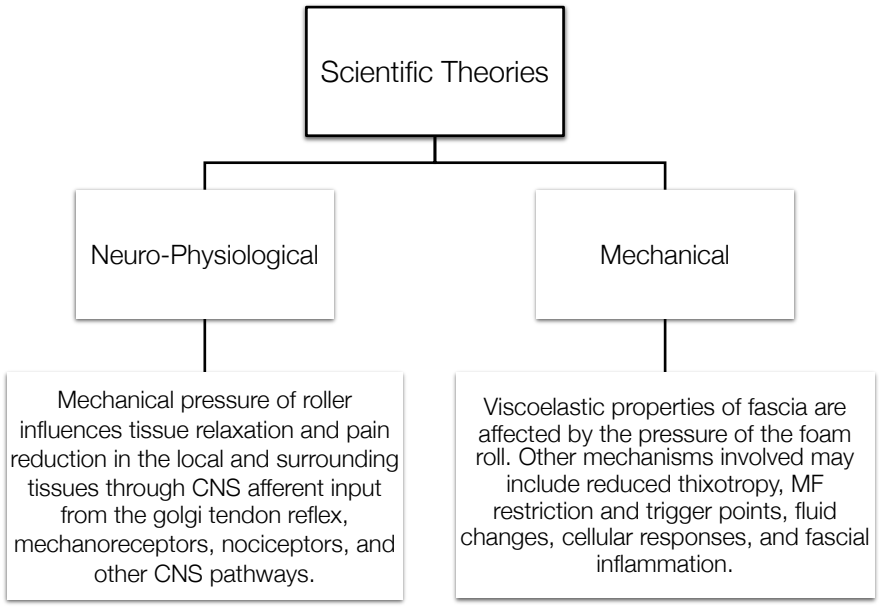

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Tissue Relaxation:

- For tissue relaxation, the roller pressure may induce a greater myofascial relaxation or "stretch tolerance" through CNS afferent input from the Golgi tendon reflex and mechanoreceptors
  - 2017: Cavanaugh et al. *Eur J appl Physiol (Level 1b)*
  - 2017: Cheatham and Kolber. *J Sports Rehab (Level 1b)*
  - 2017: Monteiro et al. *J Bodyw Mov Ther (Level 1b)*
  - 2016: Kelly and Beardsley. *Int J Sports Phys Ther (Level 1b)*
  - 2015: Aboodarda et al. *BMC Musculoskelet Disord (Level 1b)*

Pain Modulation:

- For pain, researchers have postulated that roller pressure may modulate pain through stimulation of cutaneous receptors (e.g. C-tactile fibers), mechanoreceptors, afferent central nociceptive pathways (gate theory of pain), and descending anti-nociceptive pathways (diffuse noxious inhibitory control).
  - 2018: Young et al. *J Appl Physiol (Level 1b)*
  - 2017: Cavanaugh et al. *Eur J appl Physiol (Level 1b)*
  - 2017: Cheatham and Baker. *J Bodyw Mov Ther (Level 1b)*
  - 2017: Cheatham and Kolber. *J Sports Rehab (Level 1b)*

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CONTINUED

What are clinical standards for roller massage in regards to indications and contraindications?

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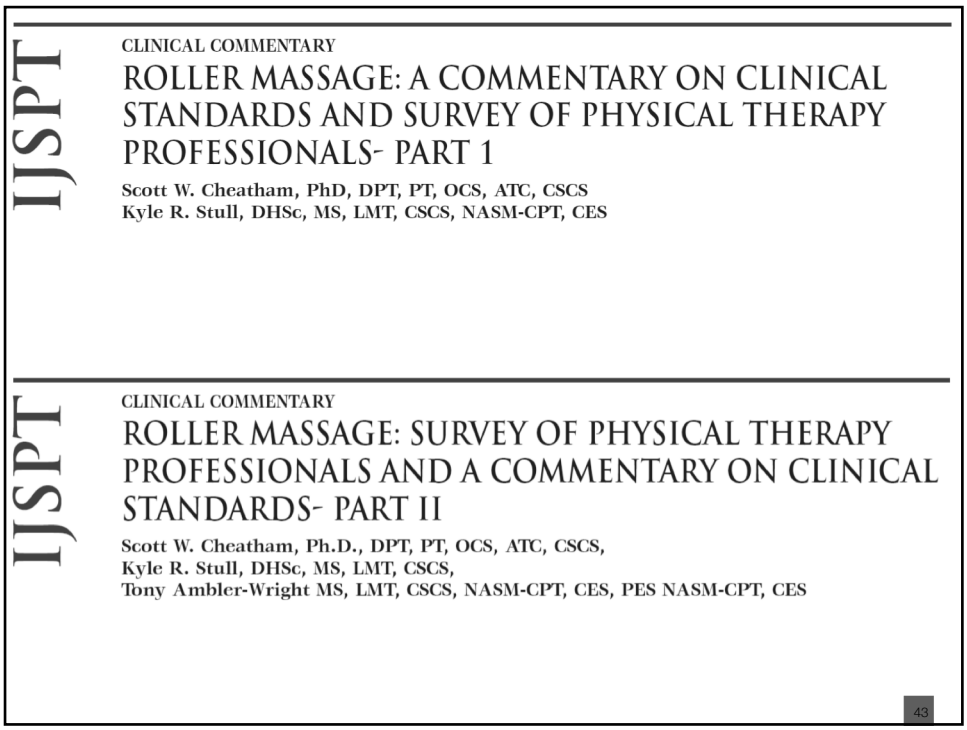

- Description:
  - "Roller massage is a type of self or assisted massage that uses a device to manipulate the skin, myofascia, muscles, and tendons by direct compression."
- Indications:
  - Warm-up, post-exercise recovery, and to increase joint ROM. RM may also have therapeutic benefits for individuals with fibromyalgia and myofascial pain syndrome.
- Assessment:
  - Patient reported outcomes: NPRS or VAS
  - Objective measures: ROM, pressure pain threshold, vertical and broad jump, agility tests, movement-based tests, sprints, maximum voluntary contraction, and isokinetic muscle strength.
- Precautions:
  - Hypertension, osteopenia, pregnancy, diabetes, varicose veins, bony prominences or regions, abnormal sensations (e.g. numbness), sensitivity to pressure, recent injury or surgery, inability to position body or perform RM, young children, older individuals, scoliosis or spinal deformity, and medications that may alter a clients sensation.

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Roller Massage Contraindications

- Skin rash, open wounds, blisters, local tissue inflammation, bruises, or tumors
- Osteoporosis
- Bone fracture or Myositis Ossificans
- Acute or severe cardiac, liver, or kidney disease
- Neurologic conditions resulting in loss or altered sensation (e.g. Multiple Sclerosis)
- Systemic conditions (e.g. Diabetes)
- Connective tissue disorders (Marfan syndrome)
- Medications that thin blood or alter sensations
- Chronic pain conditions (e.g. Rheumatoid Arthritis)
- Pregnancy (consult MD)
- Extreme discomfort felt by patient
- Deep Vein Thrombosis
- Cancer or malignancy
- Hypertension
- Acute infection (viral or bacterial), fever, or contagious condition
- Bleeding disorders (Hemophilia)
- Recent surgery or injury
- Peripheral vascular insufficiency or disease
- Direct pressure over varicose veins
- Direct pressure over face, eyes, arteries, veins, or nerves
- Direct pressure over bony prominences or regions (e.g. lumbar vertebrae)
- Severe scoliosis or spinal deformity

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CONTINUED

What are the practice patterns of health and fitness professionals?

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IJSPT

CLINICAL COMMENTARY

ROLLER MASSAGE: SURVEY OF PHYSICAL THERAPY PROFESSIONALS AND A COMMENTARY ON CLINICAL STANDARDS- PART II

Scott W. Cheatham, Ph.D., DPT, PT, OCS, ATC, CSCS,
Kyle R. Stull, DHSc, MS, LMT, CSCS,
Tony Ambler-Wright MS, LMT, CSCS, NASM-CPT, CES, PES NASM-CPT, CES

Journal of Sport Rehabilitation, (Ahead of Print)
https://doi.org/10.1123/jsr.2017-0366

Human Kinetics
ORIGINAL RESEARCH REPORT

Roller Massage: A Descriptive Survey of Allied Health Professionals

Scott W. Cheatham

Respondent results		
	Completed Surveys	**Response Rate**
Athletic Trainers	155	1.97%
Physical Therapists	685	3.06%
Fitness Professionals	202	16.68%
Total	1,042	3.3%

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	Physical Therapy (N=685)	**Athletic Training (N=155)**	**Fitness Profession (N=202)**
Sex			
Male	47.74% (327)	45.10% (70)	54.90% (111)
Female	52.26% (358)	54.90% (85)	45.10% (91)
***Primary practice setting**			
Outpatient clinic	87.73% (601)	14.83% (23)	0%
Hospital based clinic	16.79% (115)	5.80 %(9)	0%
University sports medicine or athletic training facility	3.21% (22)	56.13% (87)	7.42% (15)
High school athletic training facility	.006% (4)	31.61 % (49)	10.39% (21)
Fitness or wellness facility	1.75% (12)	3.22% (5)	86.63% (175)
Other setting (e.g. home, outdoors)	7.73% (53)	9.68% (15)	19.80% (40)
Years in practice			
Average years in professional practice	12 years (685)	5 years (155)	11 years (202)
***Immediate and lasting changes (> 2 weeks) with treatment**			
Increased joint ROM	40.14% (275)	61.11% (95)	76.24% (154)
Increased mobility	68.17% (467)	89.03% (138)	90.10% (182)
Decreased pain	80.30% (550)	87.74% (136)	84.65% (171)
No changes	6.71% (46)	1.93% (3)	5.44% (11)
Type of roller density believed to has greatest effect			
Hard density	30.80% (211)	49.03% (76)	33.66% (68)
Moderate density	50.51% (346)	41.93% (65)	43.07% (87)
Soft density	5.41% (37)	3.23% (5)	4.95% (10)
Other types of roller densities	13.28% (91)	5.81% (9)	18.32% (37)
Beliefs there is a gap in the current literature			
Yes	91.39% (626)	78.70% (122)	86.14% (174)
No	8.61% (59)	21.30% (33)	13.86% (28)

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	Physical Therapists (N=685)	Athletic Trainers (N=155)	Fitness Professionals (N=202)
***Type of roller used most often in practice**			
Foam Roller	80.00% (548)	95.48% (148)	71.28% (144)
Roller Massage Stick	44.67% (306)	71.00% (110)	3.96% (8)
Massage Ball	51.97% (356)	67.01% (104)	11.88% (24)
Other Devices	31.82% (218)	32.90% (51)	12.87% (26)
***Type of roller most often recommended to clients**			
Foam Roller	79.27% (543)	93.96% (146)	89.11% (180)
Roller Massage Stick	46.00% (315)	57.05% (88)	38.61% (78)
Massage Ball	62.63% (429)	79.19% (123)	84.16% (170)
Other Devices	21.75% (149)	17.45% (27)	32.17% (65)
None	79.27% (543)	1.34% (2)	3.46% (7)
Preferred length of roller to use with clients			
Half size (13-15 inches)	23.36% (160)	24.14% (37)	21.29% (43)
Full size (26-36 inches)	55.33% (379)	28.97% (45)	44.55% (90)
Both sizes	21.31% (146)	46.90% (73)	34.16% (69)
***Recommended place for clients to purchase devices**			
Manufacturer website	25.69% (176)	22.15% (34)	55.94% (113)
Generic website	80.58% (552)	89.93% (139)	75.74% (153)
Store (brick and mortar)	41.31% (283)	54.36% (84)	44.55% (90)
Medical clinic or business	23.06% (158)	6.71% (10)	24.25% (49)
Other	1.00% (69)	12.08 (19)	17.32% (35)

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	Physical Therapists (N=685)	Athletic Trainers (N=155)	Fitness Professionals (N=202)
***Reasons for choosing an RM intervention for clients**			
Performance enhancement	31.39% (215)	57.93% (90)	7.42% (15)
Injury prevention	40.73% (279)	85.52% (132)	24.75% (50)
Treatment of injury	82.04% (562)	84.83% (131)	10.89% (22)
Pre-exercise warm-up and post-exercise treatment	55.18% (378)	90.34% (140)	56.93% (115)
Time prescribed for pre or post-exercise session (per muscle group)			
30 seconds or less	6.57% (45)	1.38% (2)	12.38% (25)
30 seconds to 1 minute	26.42% (181)	33.79% (52)	38.61% (78)
1 to 2 minutes	37.51% (257)	38.62% (60)	35.64% (72)
2 to 3 minutes	18.98% (130)	20% (31)	7.92% (16)
No, I don't prescribe	10.52% (72)	6.21% (10)	5.44% (11)
Total time prescribed for pre or post-exercise session			
3 to 5 minutes	35.92% (246)	21.38% (33)	26.73% (54)
5 to 10 minutes	37.51% (257)	46.90% (73)	42.57% (86)
10 to 15 minutes	10.08% (69)	21.38% (33)	20.29% (41)
15 to 20 minutes	5.25 % (36)	5.16% (8)	5.95% (12)
No, I don't prescribe	11.24%(77)	5.18% (8)	4.46% (9)
Average cadence (speed) recommended when using device			
1-2 seconds	4.96% (34)	7.59% (12)	4.45% (9)
2-5 seconds	16.35% (112)	26.21% (41)	23.26% (47)
Self-paced cadence	47.45% (325)	42.07% (65)	47.02% (95)
No cadence taught	20.29% (139)	18.62% (29)	5.94% (12)
Other	10.95% (75)	5.52% (8)	19.33% (39)
Progression of clients through different roller densities (e.g. soft to hard)			
Always	3.79% (26)	6.90% (11)	26.24% (53)
Sometimes	44.68% (306)	71.03% (110)	46.04% (93)
Never	51.53% (353)	22.07% (34)	27.72% (56)

50

Progression of clients through different roller densities (e.g. soft to hard)			
Always	3.79% (26)	6.90% (11)	26.24% (53)
Sometimes	44.68% (306)	71.03% (110)	46.04% (93)
Never	51.53% (353)	22.07% (34)	27.72% (56)
***Clinical measures used to assess effects**			
Joint range of motion	58.97% (404)	41.67% (64)	21.78% (44)
Pressure pain threshold	16.93% (116)	18.75% (29)	1.48% (3)
Patient reported outcomes (e.g. pain scale)	80.14% (549)	69.44% (107)	56.93% (115)
Movement based testing (e.g. FMS)	42.48% (291)	36.11% (56)	75.74% (153)
No, I don't measure	7.44% (51)	19.44% (30)	3.46% (7)
Other	58.97% (404)	0.69% (1)	6.93% (14)
Recommended frequency for clients to use RM devices			
Daily	55.62% (381)	75.84% (117)	64.85% (131)
Weekly	24.63% (168)	10.07% (16)	22.27% (45)
Monthly	19.84% (136)	14.09% (22)	12.88% (26)
***Common modes of education**			
Live instruction	86.57% (593)	90.34% (140)	87.62% (177)
Video instruction	9.63% (66)	2.41% (19)	3.46% (7)
Self-guided program	21.17% (145)	4.66% (46)	3.96% (8)
Education materials (e.g. handout)	34.16% (234)	2.48% (53)	4.95% (10)

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CONTINUED

Methods for Teaching RM
&
Measuring Pain Perception

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What is the best way to teach RM to a client?

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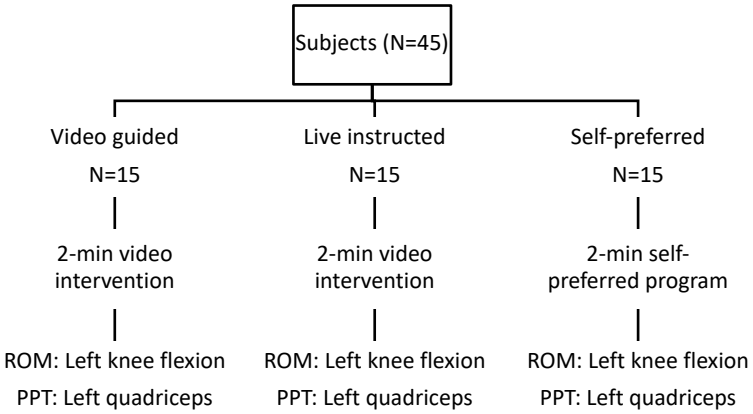
IJSPT

ORIGINAL RESEARCH

COMPARISON OF VIDEO-GUIDED, LIVE INSTRUCTED, AND SELF-GUIDED FOAM ROLL INTERVENTIONS ON KNEE JOINT RANGE OF MOTION AND PRESSURE PAIN THRESHOLD: A RANDOMIZED CONTROLLED TRIAL

Scott W. Cheatham, Ph.D., DPT, PT, OCS, ATC, CSCS[1]
Morey J. Kolber, PT, PhD, OCS, CSCS*D[2]
Matt Cain, MS, CSCS[1]

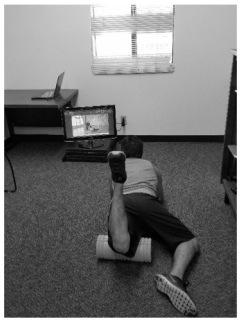


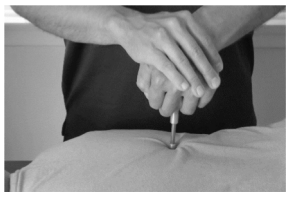
54

Bottom Line:

Pre-test, Post-test measures

- **ROM:** Gains in ROM (ave: 5°) were made regardless of instructional method.
- **PPT:** Gains in PPT (ave: 150 kPa) were made regardless of instructional method.
- Live instruction may be the best method initially to provide a prescriptive based program followed by a video or self-guided program.





55

CONTINUED

What is the best way to measure pain perception during and after RM?

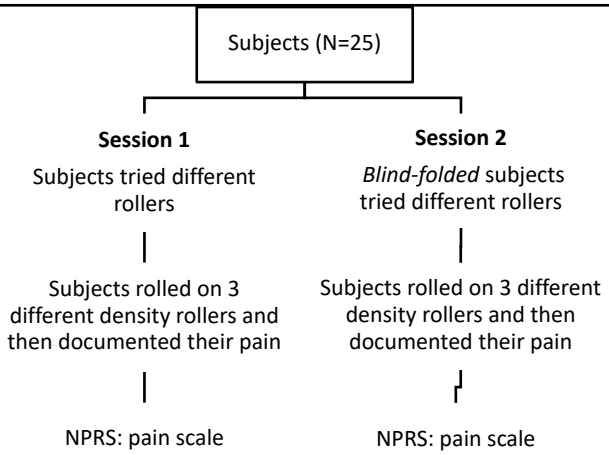
Does the NPRS help direct individuals with no experience to a specific roller device?

56

Roller Massage: Is the numeric pain rating scale a reliable measurement and can it direct individuals with no experience to a specific roller density

Cheatham SW, Stull K, Kolber MJ

Journal of the Canadian Chiropractic Association



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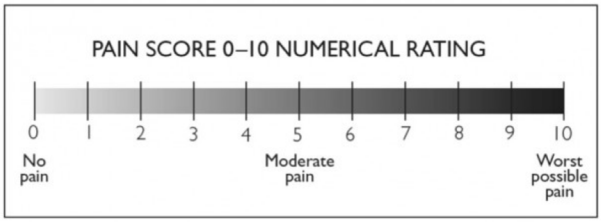
Bottom Line:

Pre-test, Post-test measures

- The NPRS appears to be a reliable measure and may help direct non-experienced individuals to a specific roller.
- Strong correlation between session #1 and session #2



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CONTINUED

What are the difference in pain perception among men and women after roller massage?

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Contents lists available at ScienceDirect

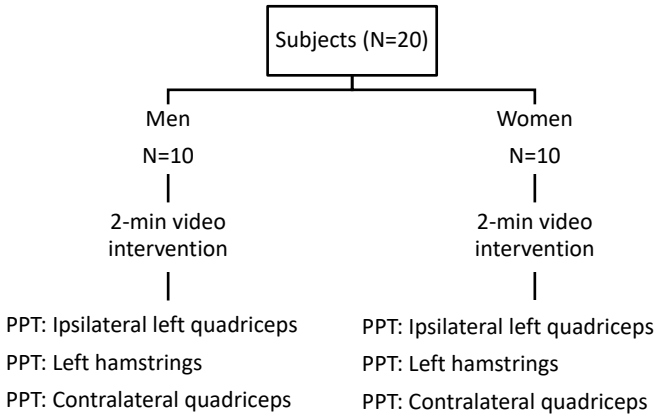
Journal of Bodywork & Movement Therapies

journal homepage: www.elsevier.com/jbmt

FASCIA SCIENCE AND CLINICAL APPLICATIONS: OBSERVATIONAL STUDY

Differences in pressure pain threshold among men and women after foam rolling

Scott W. Cheatham [a, *], Russell Baker [b]



60

Bottom Line:

Pre-test, Post-test measures

- **PPT:** Men and women demonstrated a similar reduction in PPT in the ipsilateral agonist, antagonist, and contralateral muscle groups.

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CONTINUED

What are the difference in pain perception among regional muscle groups?

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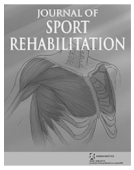
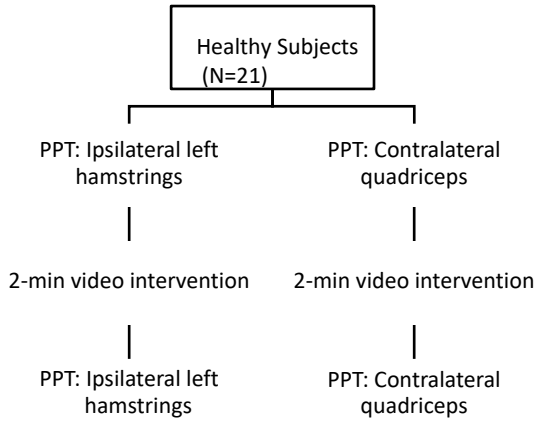


Journal of Sport Rehabilitation

ORIGINAL RESEARCH REPORT

Does Self-Myofascial Release With a Foam Roll Change Pressure Pain Threshold of the Ipsilateral Lower Extremity Antagonist and Contralateral Muscle Groups? An Exploratory Study

Cheatham SW, Kolber MJ



63

Bottom Line:

Pre-test, Post-test measures

- **PPT:** Rolling the left agonist (quadriceps) musculature produced immediate significant ($p<0.001$) post-test changes in the ipsilateral left antagonist (hamstrings) and contralateral quadriceps muscle.
- *Reciprocal inhibition and crossover effects??

64

Related Research

- Muscle Activation and ROM (Crossover/Reciprocal Inhibition):
  - 2018: Garcia-Gutierrez et al. *J Musculoskelet Neuronal Interact (Level 1b)*
  - 2018: Killen et al. *J Sport Rehabil (Level 1b)*
  - 2017: Cavanaugh et al. *J Strength Cond Res (Level 1b)*
  - 2016: Kelly & Beardsley. *Int J Sports Phys Ther (Level 1b)*
- Pressure Pain Threshold:
  - 2018: Cheatham & Kolber. *J Sport Rehabil (Level 1b)*
  - 2017: Cavanaugh et al. *Eur J Appl Physiol (Level 1b)*
  - 2017: Cheatham & Baker. *J Sport Rehabil (Level 1b)*
  - 2017: D'Amico & Gillis. *J Strength Cond Res (Level 1b)*
  - 2015: Pearcy et al. *J Athl Train (Level 1b)*
  - 2015: Aboodarda et al. *BMC Musculoskelet Disord (Level 1b)*
  - 2014: Jay et al. *Int J Sports Phys Ther (Level 1b)*

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CONTINUED

Types of Rollers

- Therapeutic effects of different density rollers
- Therapeutic effects of different surface type rollers
- Therapeutic effects of vibrating rollers
- Therapeutic effects of massage roller balls

What are the therapeutic effects of the different density rollers?

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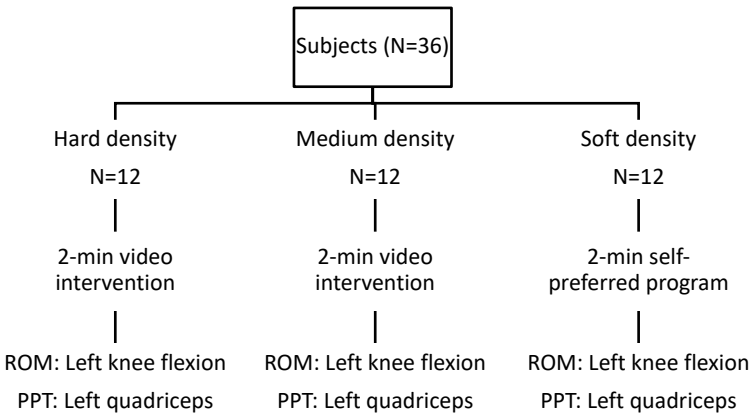
IJSPT

ORIGINAL RESEARCH

COMPARISON OF THREE DIFFERENT DENSITY TYPE FOAM ROLLERS ON KNEE RANGE OF MOTION AND PRESSURE PAIN THRESHOLD: A RANDOMIZED CONTROLLED TRIAL

Scott W. Cheatham, PhD, DPT, PT, OCS, ATC, CSCS[1]
Kyle R. Stull, DHSc, MS, LMT, CSCS, NASM-CPT, CES[2]



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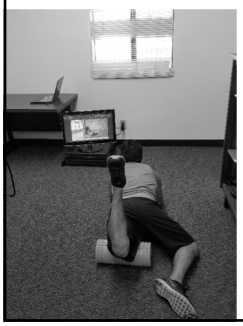
Bottom Line:

Pre-test, Post-test measures

- **ROM/PPT:** All three roller densities produced similar post-intervention effects on knee ROM (7-8°)and PPT (151-180 kPa).
- These observed changes may be due to a mechanical and neurophysiological response from the pressure applied by the roller.
- The client's pain threshold response may have an influence on treatment and preference for a specific foam roller.



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What are the therapeutic effects of the different surface type rollers?

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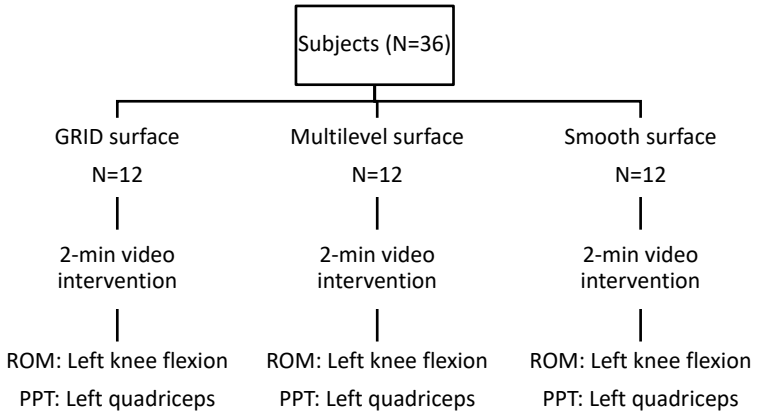

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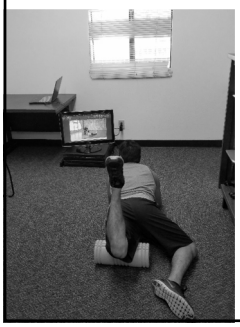
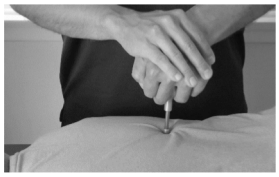
Bottom Line:

Pre-test, Post-test measures

- The GRID and multilevel surface rollers produced statistically greater post-intervention effects for:
  - **ROM:** Grid/Multilevel (5-6°) versus smooth surface roller (3°).
  - **PPT:** Grid/Multilevel (179-182 kPa) versus smooth surface roller (14 kPa).
- The therapeutic effects of the GRID and multilevel rollers may be due to the surface architecture.
- These roller types may provide a greater deformation of the local tissues which creates a mechanical and global neurophysiological effect.





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What are the therapeutic effects of the different vibration rollers?

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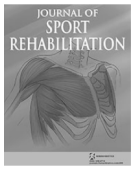
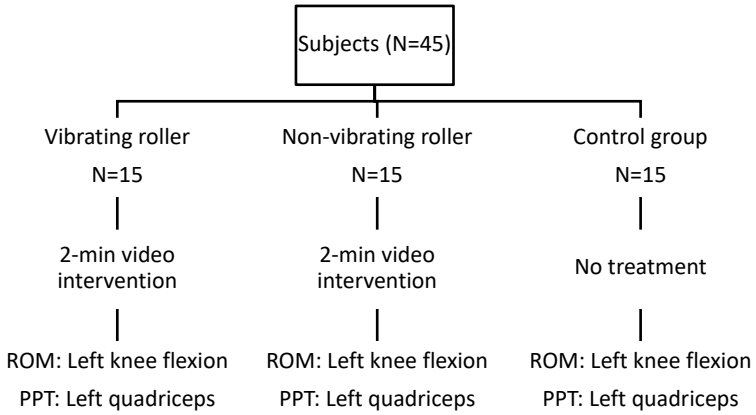
Journal of Sport Rehabilitation



ORIGINAL RESEARCH REPORT

Comparison of a Vibrating Foam Roller and a Non-vibrating Foam Roller Intervention on Knee Range of Motion and Pressure Pain Threshold: A Randomized Controlled Trial

Cheatham SW, Stull K, Kolber MJ



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Bottom Line:

Pre-test, Post-test measures

- **ROM:** Vibration and non-vibration roller produced greater post-intervention ROM (5-7°) than the control group (2°).
- **PPT:** Vibration roller produced statistically greater post-intervention PPT (180 kPa) than the non-vibration roller (112 kPa) and control group (62 kPa).
- A vibration roller may increase an individual's tolerance to pain greater than a non-vibration roller.

75

Related Research

- Pain perception:
  - 2017: Han SW, et al. *J Phys Ther Sci (Level 1b)*
  - 2016: Padua D, Clark M, et al. *Hyperice (Level 1b)*
- Crossover effect:
  - 2017: Garcia-Gutuierrez et al. *J Musculoskelet Neuronal Interact (Level 1b)*
- ROM:
  - 2016: Padua D, Clark M, et al. *Hyperice (Level 1b)*

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CONTINUED

What are the therapeutic effects of the different massage roller balls?

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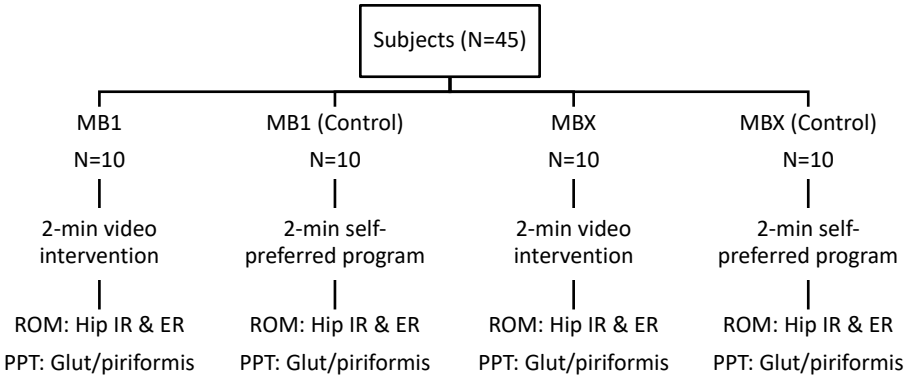
A roller massage ball intervention using TriggerPoint® Myofascial Compression™ Techniques produced greater changes in hip rotation range of motion and perceived pain in healthy individuals.

Cheatham SW, Stull K



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Bottom Line:

Pre-test, Post-test measures

MB1:

- **Hip ER:** an increase of approx. 10° for the video versus 2° for the control.
- **Hip IR:** an increase of approx. 7° for the video versus 2° for the control.
- **PPT:** an increase of 210 kPa for the video versus 44 kPa for the control.

MBX:

- **Hip ER:** an increase of approx. 8° for the video versus 1° for the control.
- **Hip IR:** an increase of approx. 5° for the video versus 1° for the control.
- **PPT:** an increase of 184 kPa for the video versus 30 kPa for the control.

MB1 vs MBX

- **Hip ROM & PPT:** The MB1 (moderate density) produced higher values that MBX (Hard density).

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CONTINUED

RM Exercise Prescription

- RM with active motion and no-motion
- Differences between experienced and non-experienced individuals after a prescribed RM program.
- RM treatment parameters

CONTINUED

What is the difference between roller massage with active motion & no-motion?

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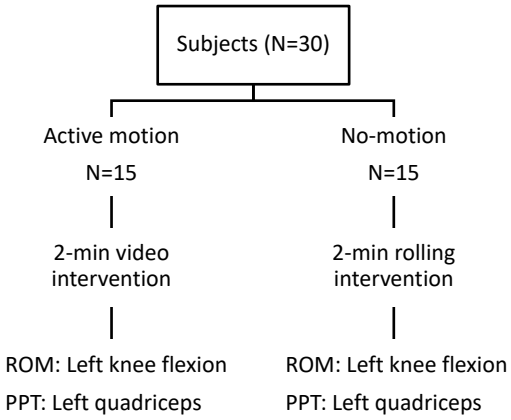
journal homepage: www.elsevier.com/jbmt

FASCIA SCIENCE AND CLINICAL APPLICATIONS: RANDOMIZED CONTROLLED TRIAL

Comparison of a foam rolling session with active joint motion and without joint motion: A randomized controlled trial

Cheatham SW, Stull K



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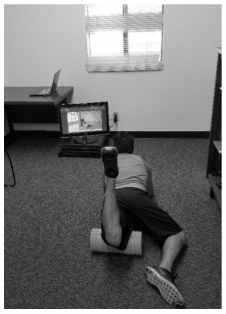
Bottom Line:

Pre-test, Post-test measures

- **ROM:** The AROM group demonstrated greater post-test ROM (8°) than the non-motion group (5°).
- **PPT:** AROM group produced statistically greater post-intervention PPT (180 kPa) than the non-motion group (133 kPa).
- These observed changes may be due agonist muscle activity causing changes in ROM and pain of the antagonist muscle (reciprocal inhibition).



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What the difference among experienced and non-experienced individuals after RM?

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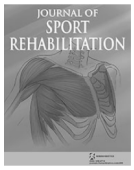
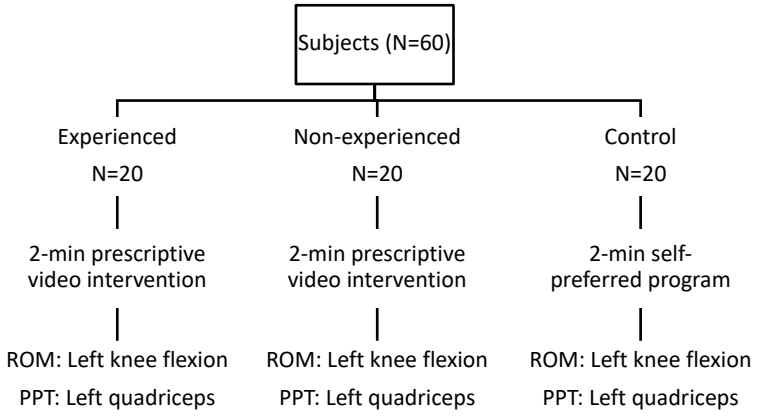


Journal of Sport Rehabilitation

ORIGINAL RESEARCH REPORT

Roller massage: difference in knee joint range of motion and pain perception among experienced and non-experienced individuals after following a prescribed program.

Cheatham SW, Stull K



85

Bottom Line:

Pre-test, Post-test measures

- **ROM/PPT:** Experienced and non-experienced individuals have similar post intervention responses in ROM (8° vs. 7°)and PPT (180 kPa vs. 169 kPa) with a prescribed RM program.
- A prescribed RM program may produce better outcomes than a self-preferred program.

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Related Exercise Prescription Research

- Treatment Time:
  - 2018: Phillips et al. *J Strength Cond Res (different dosage times) (Level 1b)*
  - 2018: Macgregor et al. *Sport Med Open (consecutive days) (Level 1b)*
- ROM/Muscle Activation/Muscle Performance:
  - 2018: Hall et al. *Int J Sports Phys Ther (Level 1b)*
  - 2018: Mandoni et al. *J Strength Cond Res (Level 1b)*
  - 2018: Monteiro et al. *Int J Sports Phys Ther (Level 1b)*
  - 2017: de Souza, et al. *J Sport Rehabil (Level 1b)*
  - 2017: Monteiro et al. *Int J Sport Phys Ther (Level 1b)*
  - 2017: De Bruyne et al. *J Sport Rehabil (Level 1b)*
- Cardiorespiratory/Vascular Responses:
  - 2018: Lastova et al. *J Strength Cond Res (Level 1b)*
  - 2017: Hotfiel et al. *J Strength Cond Res (Level 1b)*
- Cadence:
  - 2018: Wilke et al. *J Sports Rehabil (different speeds) (Level 1b)*
- Movement Based Testing
  - 2017: Monteiro et al. *Int J Sports Phys Ther (Level 1b)*

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Related Exercise Prescription Research

- ROM/Flexibility: (- negative) findings
  - 2017: Grabow et al. *J Sports Sci Med (Level 1b)*
  - 2016: Murray et al. *Int J Sports Phys Ther (Level 1b)*

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RM Combined Interventions

Related Combined Intervention Research

- RM and static/dynamic stretching:
  - 2018: Lee et al. *J Sports Sci (Level 1b)*
  - 2018: Killen et al. *J Sport Rehabil (Level 1b)*
  - 2018: Smith et al. *J Strength Cond Res (Level 1b)*
  - 2018: Rickman et al. *J Strength Cond Res (Level 1b)*
  - 2017: SU et al. *J Sport Rehabil (Level 1b)*
  - 2017: Behara & Jacobson. *J Strength Cond Res (Level 1b)*

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CONTINUED

2018

What we have learned

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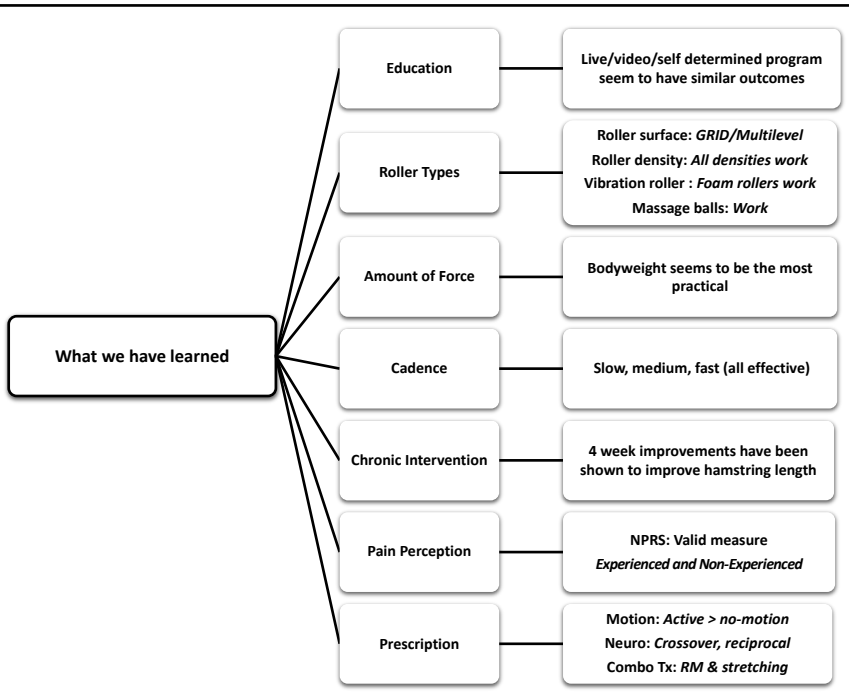

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Recommendations

RM devices

- Roller type: *GRID or multilevel*
- Roller density: *All densities seem to work*
  - *Moderate is most requested by clients. *Match to client's needs**

Education

- Teaching: "Live" and use video to reinforce RM technique

Assessment

- ROM: *Clinometer app or digital device (more accurate)*
- Pain perception: *NPRS or algometry (clinically)*
- Movement testing: *OHS, SLS, FMS*
- Performance tests: *Vertical and broad jump, agility tests, sprints, maximum voluntary contraction, and isokinetic muscle strength.*

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Recommendations

RM Prescription

- Warm-up: ≤ 2-min x 1-5 bouts (self cadence + BW + joint AROM)
- Cool down: ≥ 2-min x 1-5 bouts (self cadence + BW + joint AROM)
- Combo Tx: RM + stretching (static and dynamic) good to do pre and post event.
- ROM/flexibility: Rolling for short bouts may enhance flexibility in LE muscles without effecting performance.
- Pain: Rolling for 2-min or less seems to decrease PPT in the ipsilateral agonist, antagonist, and contralateral muscles.
  - *May be good for treating clients with musculoskeletal injuries*

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Instrumented Assisted Soft-Tissue Mobilization

95

Instrumented Assisted Soft-Tissue Mobilization (IASTM)

- *Definition:* various shaped tools are used to augment the mobilization of soft-tissue mobilization.
- Several patented tools and approaches exists

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Tools of the Trade

- Graston® Technique

- Gua Sha Tools

- Hawk Grip®

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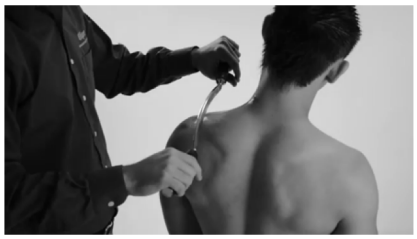
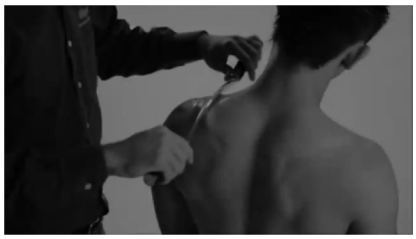
IASTM Technique (Videos)



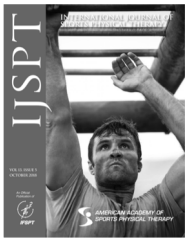


Courtesy: Myofascial Releaser ® http://www.myofascialrereleaser.com

98

What are clinical standards for Instrument Assisted Soft-Tissue Mobilization (IASTM) in regards to indications and contraindications?

99



International Journal of Sports Physical Therapy

Instrument assisted soft-tissue mobilization: a commentary on clinical practice guidelines for rehabilitation professionals
Cheatham SW, Baker RT, Kreiswirth E. (In Review)

100

Suggested Instrument Assisted Soft-Tissue Mobilization Guidelines	
Description	***"Instrument assisted soft-tissue mobilization is a skilled intervention that includes the use of specialized tools to manipulate the skin, myofascia, muscles, and tendons by various direct compressive stroke techniques."***
Indications	***Case reports/series:*** *calf pain, patellar tendinopathy, knee arthrofibrosis post patellar tendon repair, Achilles tendinopathy, Dupuytren's contracture, axillary web syndrome, chronic costochondritis, plantar fasciitis/heel pain, lumbar compartment syndrome, de Quervain's tenosynovitis, tibialis posterior strain, medial epicondylitis, lateral epicondylitis, hyperactive gastrocnemius in hemiparetic stroke patient, pseudo angina pectoris, post-operative ACL repair, benign joint hypermobility syndrome, hamstring tendinopathy, and tissue extensibility dysfunction.* ***Clinical trials:*** *warm-up, carpel tunnel syndrome, myofascial trigger points, shoulder impingement, posterior shoulder range of motion, chronic low back pain, non-specific thoracic spine pain, hip and knee ROM, ankle instability, and ankle ROM.*
Precautions	**Petechiae, anti-coagulant medications, medications that may alter sensation, patient intolerance/hypersensitivity, cancer, vericose veins, hypertension, burn scars, acute inflammatory conditions, rheumatoid arthritis, congestive heart disease/circulatory disorders, pacemaker, kidney dysfunction, pregnancy, diabetes, and abnormal sensations (e.g. numbness).**
Assessment	***Patient reported outcomes*:** NPRS, VAS, modified Oswestry Disability Index ***Objective measures:*** joint ROM, pressure algometry, 2 point-discrimination, vertical jump height, 40-yard sprint speed, electromyography, and star excursion balance test.
NPRS: numeric pain rating scale; VAS: visual analog scale; ROM: range of motion	

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Instrument Assisted Soft-Tissue Mobilization Contraindications	
• Acute injury or infection (viral or bacterial), fever, or contagious condition	• Petechiae (severe) or ecchymosis
• Skin rash, open wounds, blisters, local tissue inflammation, or tumors	• Treatment over surgical hardware
• Osteoporosis (advanced)	• Cancer or malignancy
• Unhealed bone fracture or myositis ossificans	• Hypertension (uncontrolled)
• Acute or severe cardiac, liver, or kidney disease	• Congestive heart disease/circulatory disorders
• Neurologic conditions resulting in loss or altered sensation (e.g. Multiple Sclerosis)	• Bleeding disorders (Hemophilia)
• Systemic conditions (e.g. diabetes)	• Recent surgery or injury (unhealed surgical site)
• Connective tissue disorders (e.g. Ehlars-Danlos syndrome, Marfan's syndrome)	• Peripheral vascular disease or insufficiency
• Medications that thin blood or alter sensations	• Thrombophlebitis or osteomyelitis
• Chronic pain conditions (e.g. Rheumatoid Arthritis)	• Direct pressure over face, eyes, arteries, veins (varicose veins), or nerves
• Pregnancy (consult MD)	• Direct pressure over bony prominences or regions (e.g. lumbar vertebrae)
• Severe pain felt by patient	• Epilepsy (unstable)

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Center for Disease Control Levels of Disinfection	
High-level disinfection	These disinfectants kill all organisms, except high levels of bacterial spores, and is effected with a chemical germicide cleared for marketing as a sterilant by FDA. Typically, they are not used for generalized disinfecting.
Intermediate-level disinfection	These disinfectants kill mycobacterium, most viruses, and bacteria with a chemical germicide registered as a "tuberculocide" by EPA.
Low-level disinfection	These disinfectants kill some viruses and bacteria such as HIV and HBV with a chemical germicide registered as a hospital disinfectant by the EPA.

EPA: Environmental Protective Agency

IASTM Safe Treatment Sequence Recommendations	
Step 1	Before and after treatment the clinician's hands should be cleaned. CDC guidelines recommend hand washing with soap and water or rubbing hands together using an alcohol-based hand sanitizer (e.g., gel or wipe) for a minimum of 15 seconds.[83] The medical professional may choose to follow PPE guidelines and wear gloves during treatment but should still follow pre and post hand hygiene procedures.
Step 2	Before treatment, the body region is inspected and cleared for treatment. Then the patient's skin (at the treatment site) is cleaned with a low-level sanitizing wipe (e.g. Purell®) that is safe for the skin, or 60-70% isopropyl alcohol to further reduce the risk of infection.[84-86]
Step 3	The IASTM treatment is administered using the lubricant and PPE procedures, as needed.
Step 4	During the prescribed treatment, the medical professional monitors for changes in the patient's status (e.g., skin color changes such as petechiae, sensitivity to treatment, etc.)
Step 5	Upon completion of treatment, the body region is re-inspected and cleaned again using a sanitizing wipe or isopropyl alcohol.
Step 6	The medical professional concludes with post treatment hand hygiene, disposing of any PPE, and cleaning of the instruments.

PPE: Personal protective equipment (e.g. gloves)

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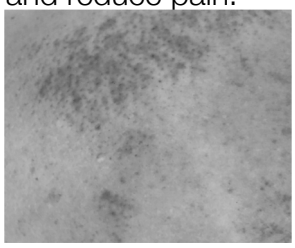
- Contraindications:
  - Petachia: red and purple spots due to bleeding from broken capillaries near the skin's surface from excessive pressure applied by the tool.
  - Bruising/Ecchymosis
- Note: Gua sha: traditional East Asian IASTM technique that promotes scraping skin until petachia appear.
  - The petachiae caused by the scraping is believed to be blood stasis. The Gua sha treatment is supposed to relieve blood stagnation and reduce pain.



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Does IASTM provide benefits?

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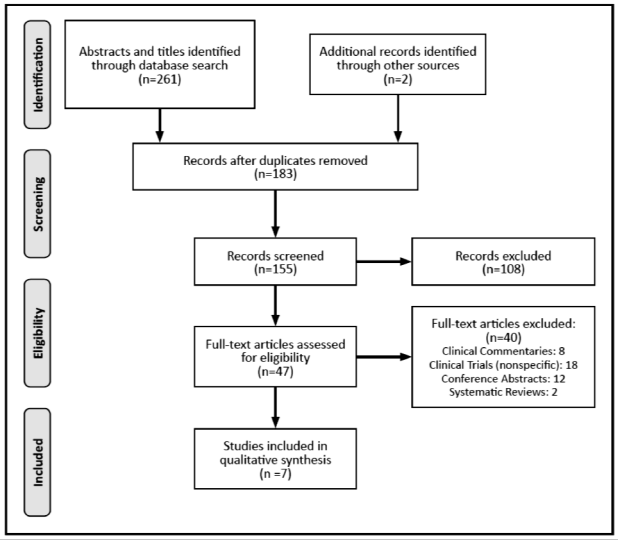
Journal of the Canadian Chiropractic Association

The efficacy of instrument assisted soft tissue mobilization: a systematic review (2016)
Cheatham SW, Lee M, Cain M, Baker RT



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Results

- *A total of 7 controlled trials were appraised.*
  - Five of the studies measured an IASTM intervention versus a control or alternate intervention group for a musculoskeletal pathology.
  - The results of the studies were insignificant (p>.05) with both groups displaying equal outcomes.
  - Two studies measured an IASTM intervention versus a control or alternate intervention group on the effects of joint ROM. The IASTM intervention produced significant (P<.05) short term gains up to 24 hours.

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Qualified Studies

	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10	Item 11	Total Score
Blanchette and Normand[32]	Y	Y	N	Y	Y	N	N	Y	Y	Y	Y	8
Burke et al[35]	Y	Y	N	Y	Y	N	N	Y	Y	Y	Y	8
Gulick[36]	Y	Y	N	Y	Y	N	N	Y	Y	Y	Y	8
Laudner et al[37]	Y	Y	N	Y	Y	N	N	Y	Y	Y	Y	8
Markovic[14]	Y	Y	N	Y	N	N	N	Y	Y	Y	Y	7
Schaefer and Sandrey[38]	Y	Y	N	Y	Y	N	N	Y	Y	Y	Y	8
Brantingham et al[34]	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	10

Pedro Criteria: Item 1(Eligibility criteria), Item 2 (Subjects randomly allocated), Item 3 (Allocation concealed), Item 4 (Intervention groups similar), Item 5 (subjects were blinded), Item 6 (Therapists administering therapy blinded), Item 7 (All assessors blinded), Item 8 (At least 1 key outcome obtained from more than 85% of subjects initially allocated), Item 9 (All subjects received treatment or control intervention or an Intention-to-treat analysis performed), Item 10 (Between group comparison reported for a least on variable), Item 11 (study provides both point measures and measures of variability for at least one key outcome)

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Conclusion

- The literature measuring the effects of IASTM is still emerging.
- The current research indicates insignificant results which challenges the efficacy of IASTM as a treatment.
- This may be due to the methodological variability among studies.
- *There appears to be some evidence supporting its ability to increase short term joint ROM.*
  - *Note: 5/7* studies reported using the Graston® technique but modified or excluded parts of the protocol.
  - This creates a challenge for clinicians because the Graston® technique is based upon a sequential protocol and the current evidence failed to use this treatment strategy.

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Other Systematic Reviews

- *2017 Kim et al. J Exerc Rehabil (Level 1a)*
- *2018 Hussey et al. J Sports Rehabil (Level 1a)*

**Support the same conclusions*

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IASTM Research

- 2018: Kim et al. *Int J of Sports Med* (Level 1b)
- 2018: Rhyu et al. *Technol Health Care*(Level 1b)
- 2018: Kim et al. *J Back Musculoskelet Rehabil* (Level 1b)
- 2018: Gulick. *J Bodw Mov Ther* (Level 1b)
- 2017: Coviello et al. *Int J of Sports Phy Ther* (Level 1b)

Interventions	**Parameters**
Treatment technique	IASTM
Treatment duration	Variable (40 seconds to 10+ minutes)
Outcome measures	VAS, ROM, pain threshold, strength, EMG activity
Long-Term Outcomes	Poorly reported

Target Population*: Athletic performance, ROM, pain threshold, muscle strength*

Bottom Line: *The research on IASTM is still emerging but is variable among methodology. The current evidence provides moderate support for different medical conditions.*

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Cupping (Dry or Wet)

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Cupping

- 2018: Lu et al. *Clin Exp Hypertens* (Level 1a) (Wet)
- 2018: Ma et al. *Complement The Clin Pract*(Level 1a) (General)
- 2018: Bridgett et al. *J Altern Complement Med* (Level 1a) (General)
- 2017: Wang et al. *J Back Musculoskelet Rehabil* (Level 1a) (General)
- 2017: Li et al. *Complement Ther Clin Pract* (Level 1a) (General)
- 2017: Zhang et al. *Chin Med* (Level 1a)(General)
- 2016: Al Bedah et al. *J Altern Complement Med* (Level 1a)(Wet)

Interventions	**Parameters**
Treatment technique	Wet or dry cupping
Treatment duration	Variable
Outcome measures	Variable
Long-Term Outcomes	Poorly reported

Target Population*: Hypertension, Ankylosing Spondylitis, athletes, LBP, knee osteoarthritis, pain related conditions*

Bottom Line: *The research on western cupping is still emerging but is variable among methodology. The current evidence provides weak support for different medical conditions.*

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Questions ?

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Thanks!!!

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