Unlock The Power of Fascia: Innovative Strategies for Tendon Health, Injury Prevention & Athletic Performance

PRESENTED BY CHAD BENSON PTAcademy.ca





SCAN ME



Agenda

Statement of Problem and Key Concepts

Vector Variability, Resilience & Injuries



Connective Tissue Anatomy & Physiology

5 Step Proven Process

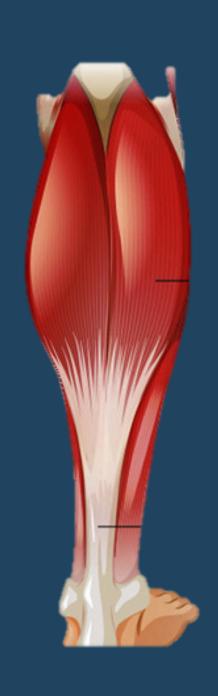
MFC, Mobility & Stability, Eccentric & Loaded eROM, eROM Elastic Recoil

Session Deliver and Programming

Movement Management & Movement Examples

Programming Overview (Achilles)

Assessments Knee Over Toe (half kneel) Myofascial Scrub + Foam Roller Compression **Heel Banded Dorsi** Mobility Banded Heel Lock Circles (Posterior Tib / Arch) Stability 1FT elevated heel raise & General Strengtl Rear Ft Kickstand Squat Loaded Weekend at Bernies Wall Falls & Leaning eROM Heel Raise Drops **Drop Step** LMT / Recoil Repeated Box or Pogo Jump,



Statement of problem (weak point)

Injuries:

- Most occur at the MTJ
- Most occur during quick or unexpected lengthening

Life:

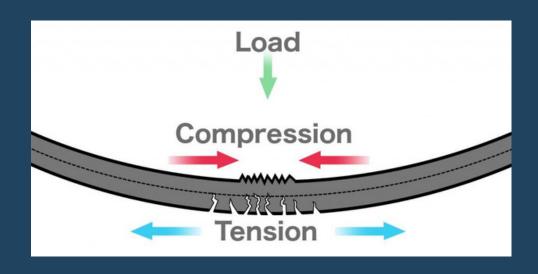
- Most people sit 6.5 8h a day
- Automation has significantly impacted moderate to intense activity levels

Fitness:

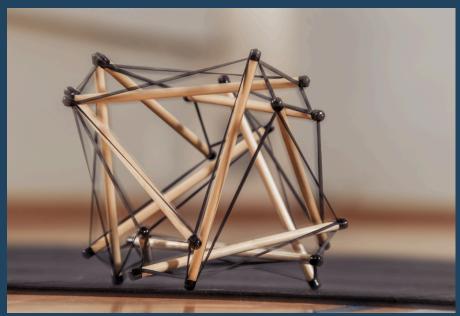
- Most participants train through flexed joint ROMs
- Most rarely incorporate ballistic stretch into their training programs

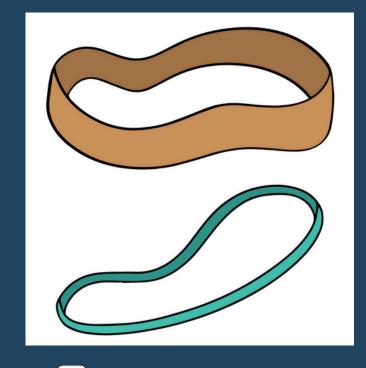
RESILIENCE

TENSILE FORCE



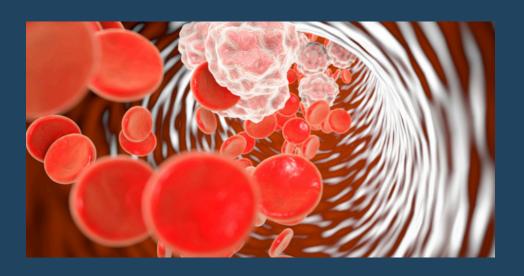
TENSEGRITY





STIFFNESS
(RESISTANCE TO
LENGTHENING

CIRCULATION



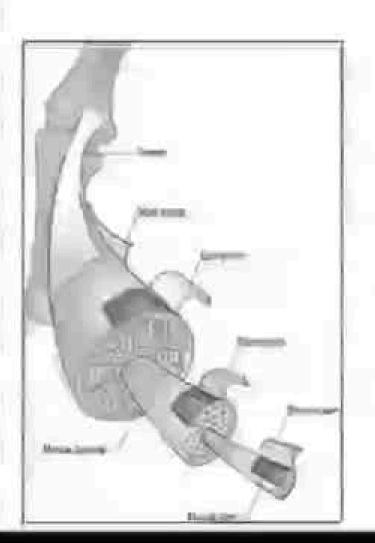


Orthopaedic Journal of Sports Medicine

Is It All About the Fascia?

A Systematic Review and Meta-analysis of the Prevalence of Extramuscular Connective Tissue Lesions in Muscle Strain, Injury

Jan Wilke, "1 PhD, Lurz Hespanhol, 15 PhD, and Martin Behrens," PhD



Insgesamt wurden 16 Studien ermittelt.

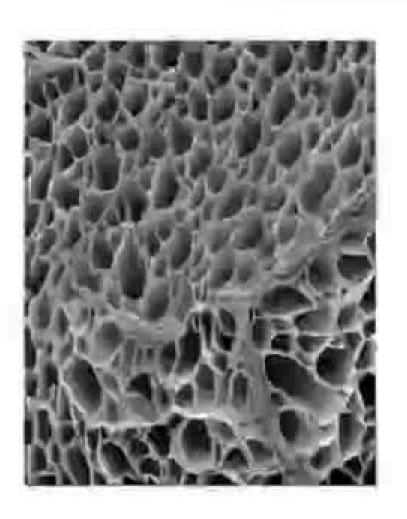
Die Prävalenz von Überlastungsschäden in bildgebenden Untersuchungen betrug:

32,1 % für myofasziale Läsionen 68,4 % für myotendinöse Läsionen, 12,7 % für isolierte muskuläre Läsionen.

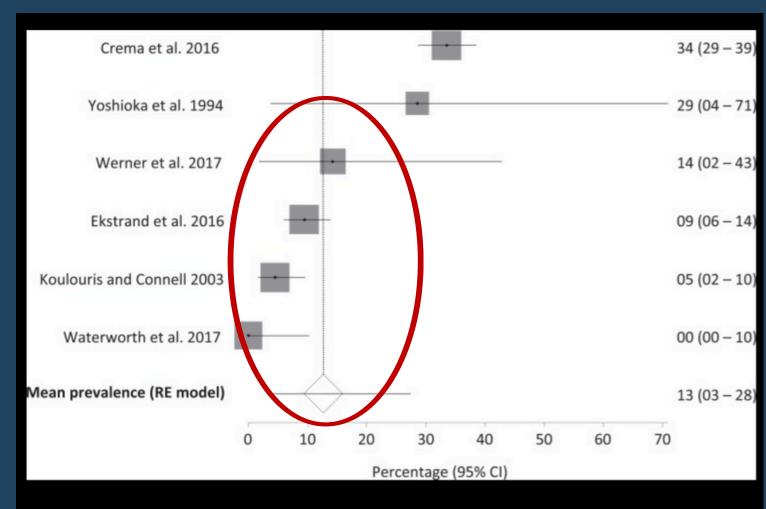






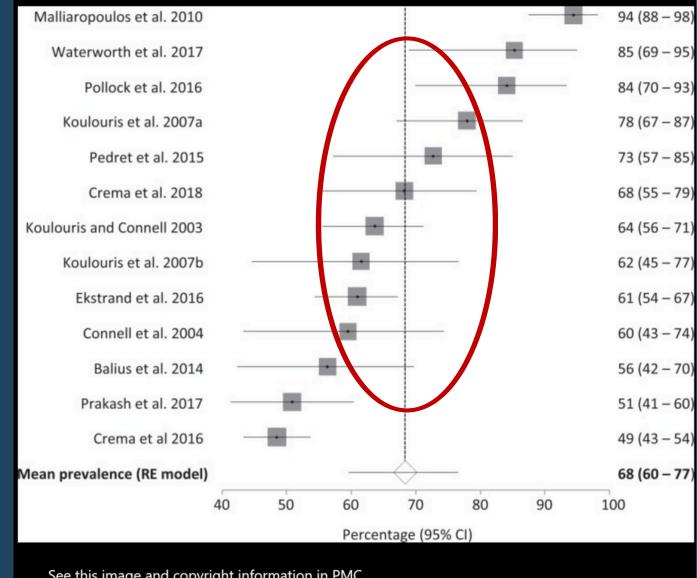


Site of Musculoskeletal Injuries



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Figure 4. Forest plot displaying the individual and pooled prevalences (random effects [RE] meta-analysis) of isolated muscle damage in muscle strain injury. Values displayed are mean proportions and 95% Cls.



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Figure 3. Forest plot displaying the individual and pooled prevalences (random effects [RE] meta-analysis) of myotendinous damage in muscle strain injury. Values displayed are mean proportions and 95% Cls.



Rehabilitation and Return to Sport After Nonsurgical Treatment of Achilles Tendon Rupture

Binkley, Helen M. PhD, ATC, CSCS, NSCA-CPT, FNSCA; Douglass, Dillon ATC; Phillips, Kristi PhD, ATC; Wise, Stephanie L. MS, ATC, CSCS

Author Information ⊗

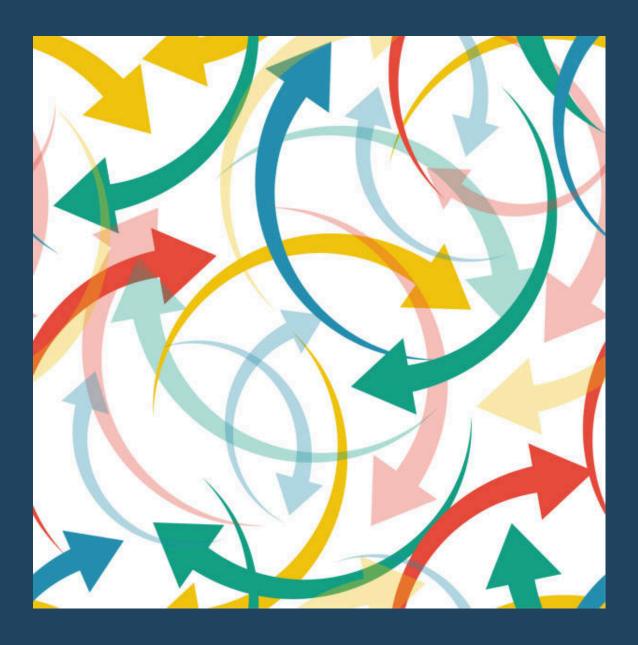
Strength and Conditioning Journal 42(3):p 90-99, June 2020. | DOI: 10.1519/SSC.000000000000536



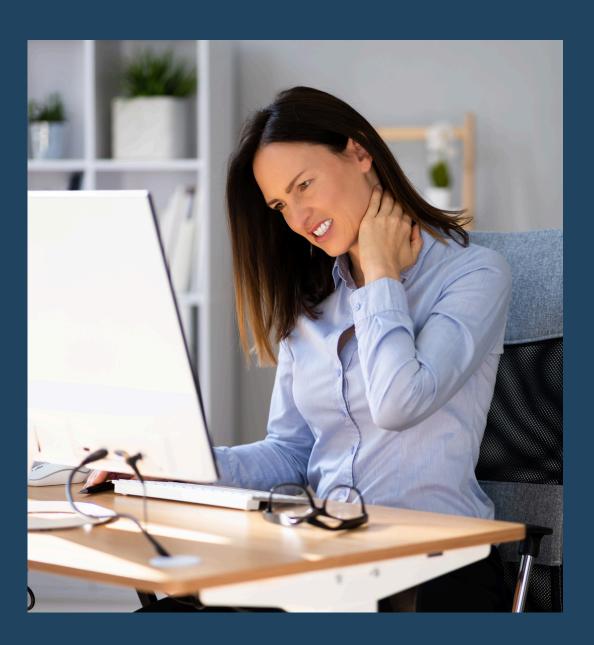
(A) Ultrasound of normal achilles tendon tear.
(B) Ultrasound of 95% achilles tendon tear.

Limited Vector Variability

(ROM, direction, speed, load, complexity)







Vector Variability

Load
(Light to
Heavy)

Speed (Slow to High)

ROM (All Ranges) **Directions**(All Vectors)

What is MyoFascia

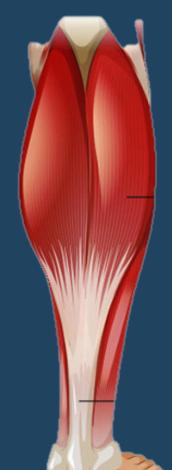
Contractile Tissue

- Sarcomere
- Titan
- Myofibril
 - Myotatic stretch reflex

Connective Tissue / Fascia

- Collagen
- Tendon
- Fascicles + length
- Loose & dense connective tissue

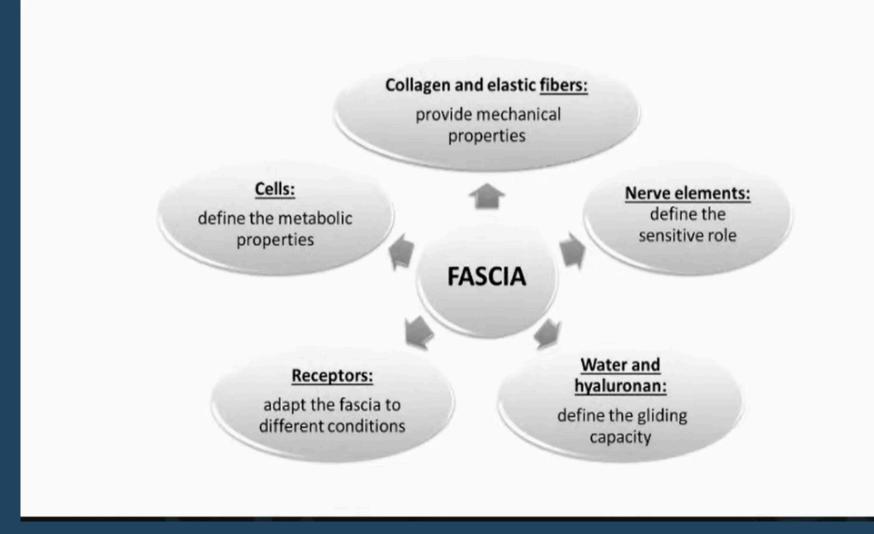




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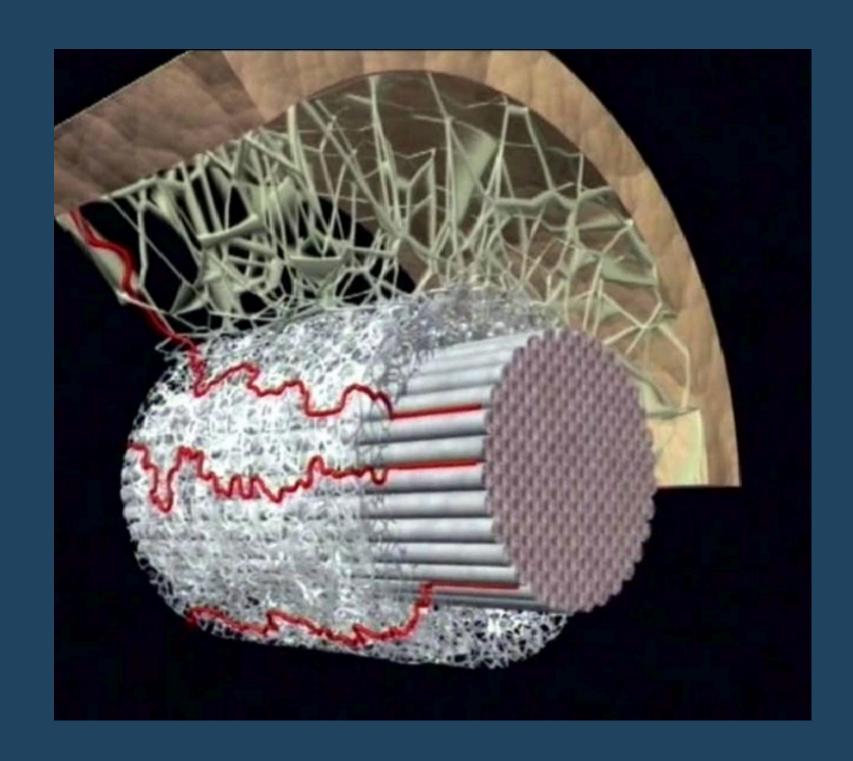
1.WHAT IS FASCIA MADE OF?

fascia represents a complex structure composed of various kinds of cellembedded in abundant extracellular matrix and rich in nervous fibers.



"The fascial system is highly innervated and rich with blood vessels, lymphatics, and hormonal and neurotransmitter receptors. Given its ubiquity, fascia may serve as a "watchman," receiving and processing information on whole body health."

Frontiers | Fascia as a regulatory system in health and disease



Tendon Info

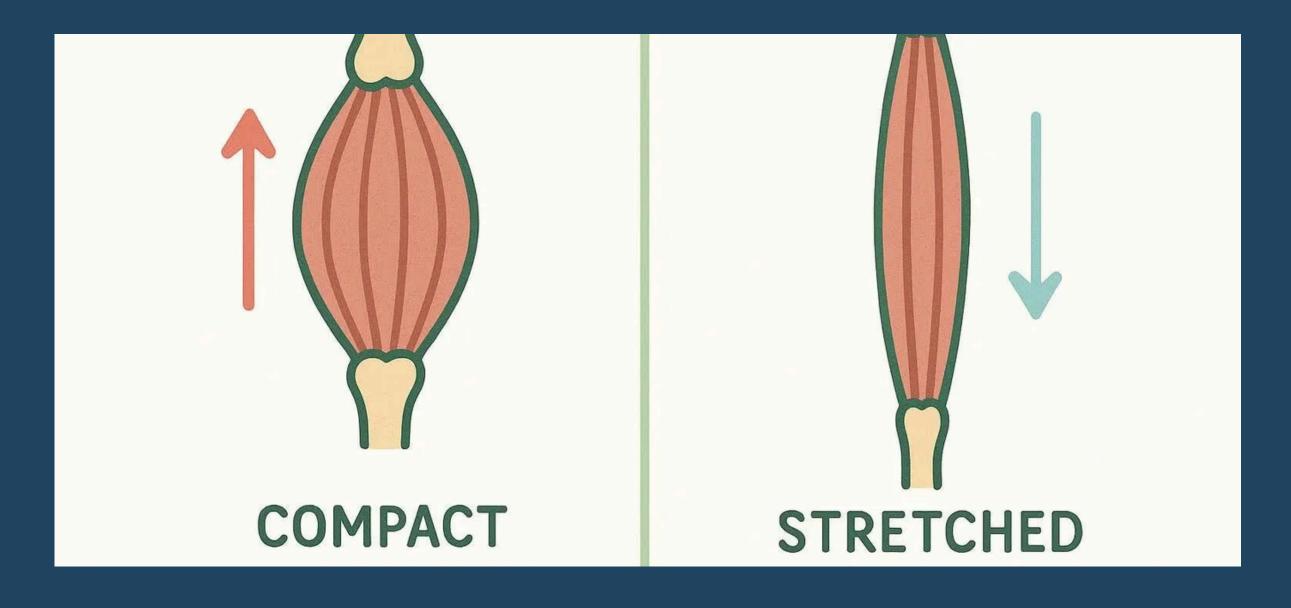
https://www.physio-pedia.com/Tendon_Biomechanics

Tendon

- Loading / Stretch
- Creep
- Distal Vs Proximal

https://youtu.be/yVoRgTaxCrg





For maximizing adaptation in healthy tendons: Utilize a high-intensity loading protocol. This can involve heavy, slow resistance training that includes both contraction types, both for function and biochemical changes compared to isolated eccentric loading alone.

Tendon Adaptation to Load

ACTA PHYSIOLOGICA

Region specific patellar tendon hypertrophy in humans following resistance training

M. Kongsgaard, S. Reitelseder, T. G. Pedersen, L. Holm, P. Aagaard, M. Kjaer, S. P. Magnusson

Results:

1.MVC increased for heavy-leg (15 ± 4%, P < 0.05),

1. Not aware of the resistances used

2. Quadriceps CSA increased in heavy-legs (6

1. Proximal PT CSA $(104 \pm 4 \text{ mm}2)$

2. Mid-tendon CSA (118 \pm 3 mm2)

3. Distal tendon CSA (127 ± 2 mm2, P < 0

3. Heavy-leg PT CSA increased at the proxim ± 2% respectively (P < 0.05)

4. Light-leg PT CSA increased by $7 \pm 3\%$ (P < $0.\overline{05}$) at the proximal tendon

5. PT stiffness increased in heavy-legs (P < 0.05) – no change in light-legs.

Takeaway (6 ± 4%).

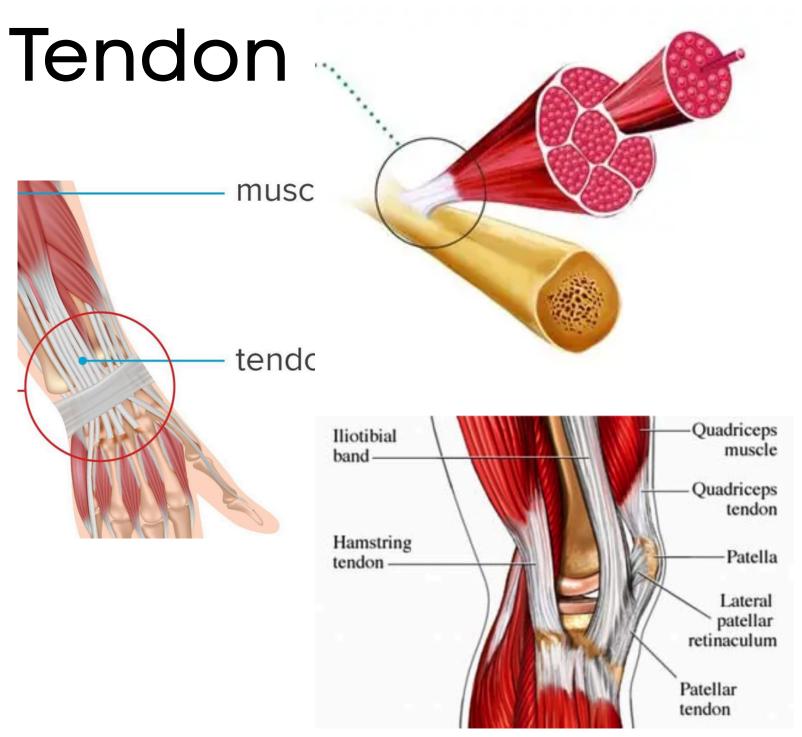
Heavy Strength

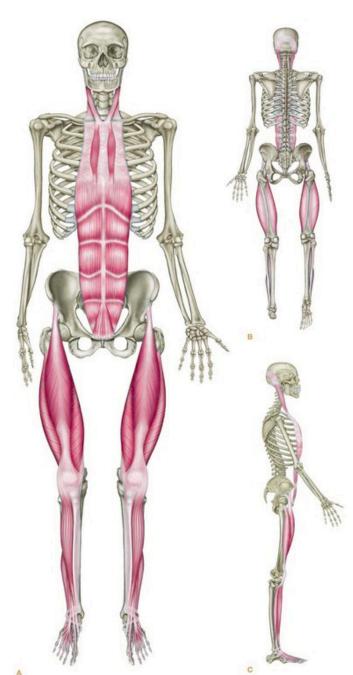
Training Improves

Tendon Function



% and 4



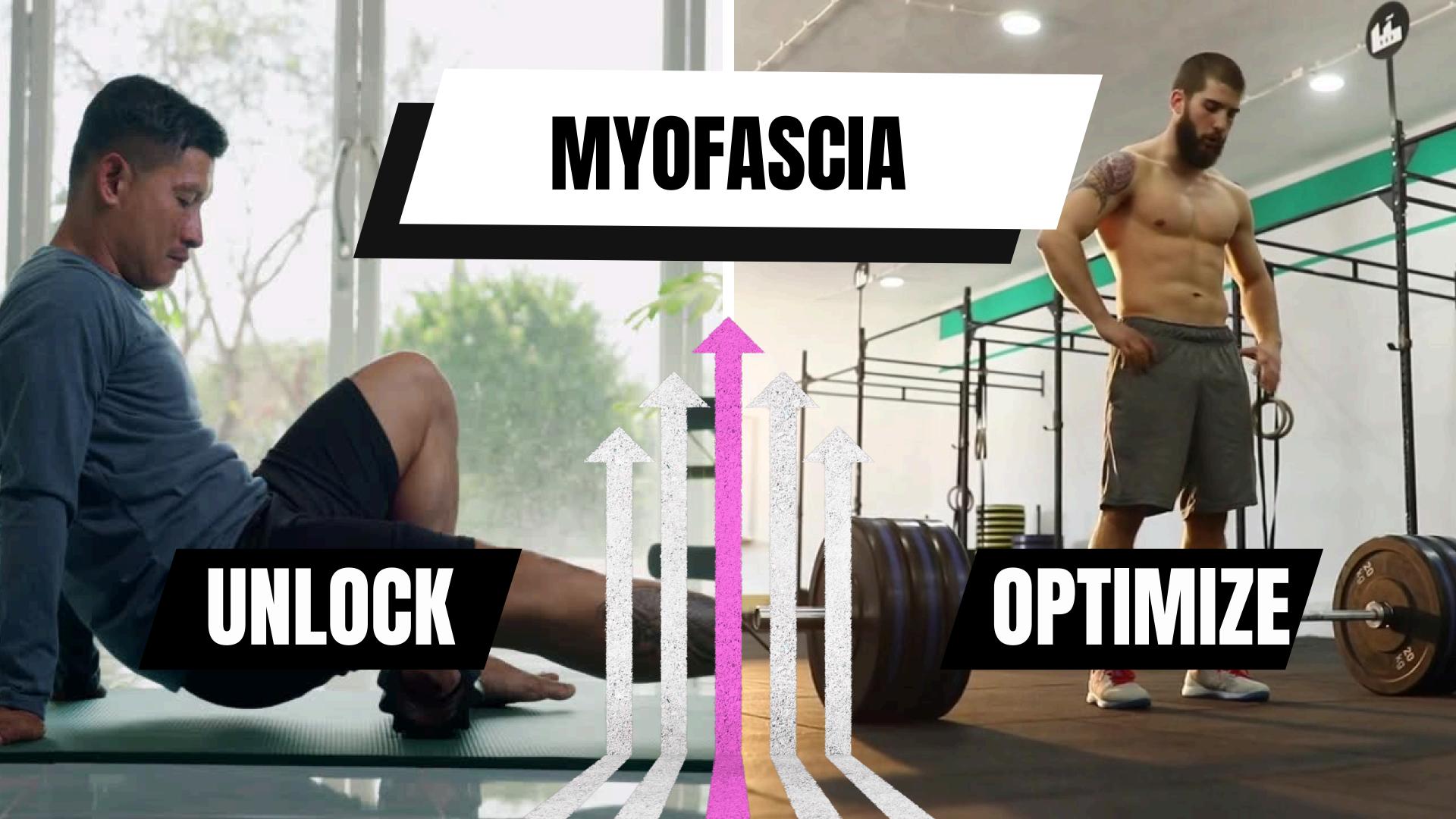


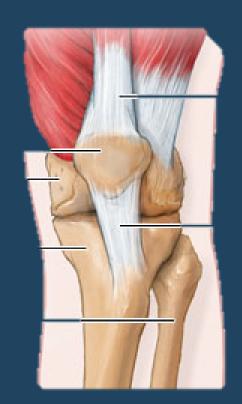
Understanding Fascia in Movement

Fascia plays a crucial biomechanical role - transferring force from lower to upper limbs.

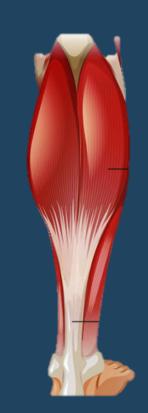
& interconnecting fascial lines







Fascia is a thin connective tissue that surrounds and holds every organ, blood vessel, bone, nerve fiber, and muscle in place.



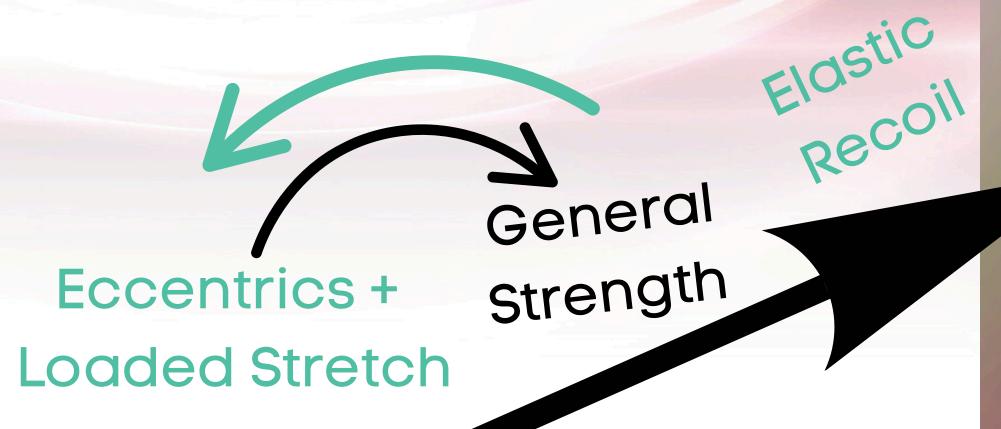


UNLOCKING MYOFASCIAL COMPONENTS & OUTCOMES

- 1. Circulation
- 2. Tissue Compression / Pressure
- 3. Vibration
- 4. Stretch
- 5. Load [mechanotransduction]
- 6. Vector Variability



5 Step Proven Process



Mobility +
Stability

MY^{Ofdscion} Compression

STEPI

MYOFASCIAL COMPRESSION



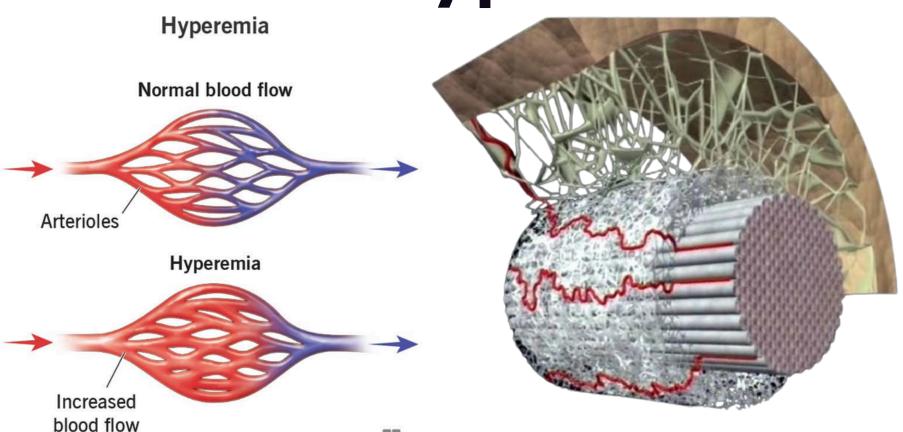
Compression based foam rolling is an effective way to improve circulation, vasodilation, hyaluronic acid production, decreased threat levels, flexibility & improved performance.

Foam rolling: Compress, scrub, glide your way into superior workout prep and pain-free movement.

#Science

Exercise Hyperemia: Reactive hyperemia can contribute to the increased blood flow observed during exercise, as muscles demand more oxygen and nutrients.

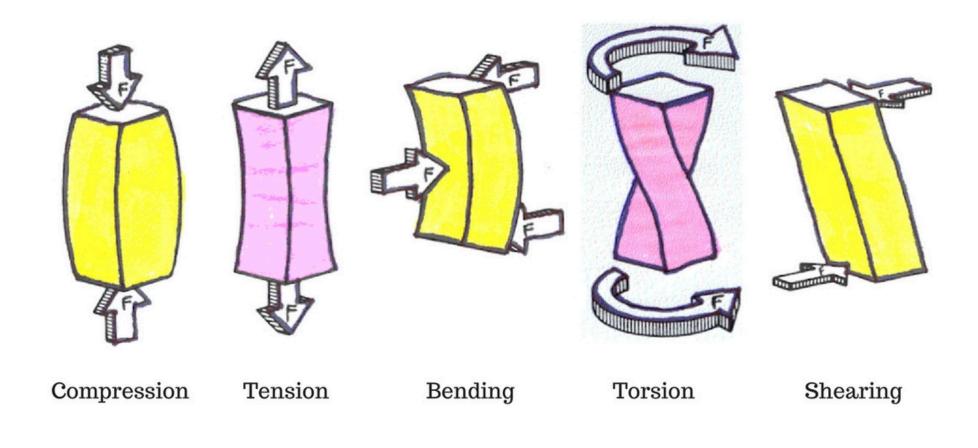
Physiology of Compression: Reactive Hyperemia



Factors Influencing Blood Flow

- 1. Duration of the compress.
- 2. Tissue metabolic activity
- 3. Hydration levels

Foam Rolling Techniques





Posterior / Back Longitudinal Line

MFC: neck extensors, erec. spin., hamstrings, gastroc, plantar fascia

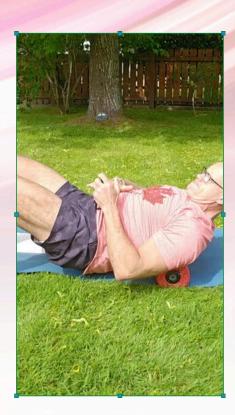




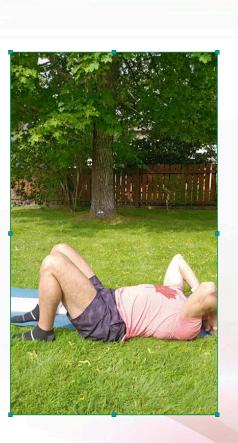












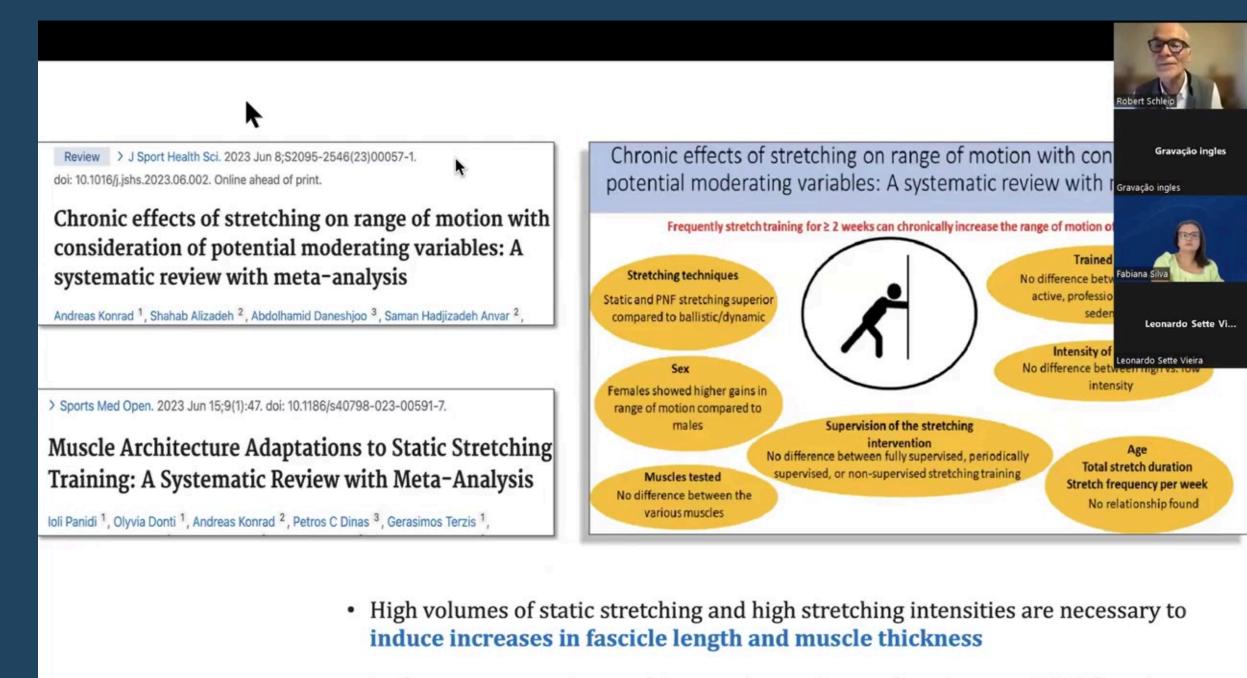


Load: Eccentric Training Overview

- Up to 150% stronger than concentric contractions.
- Uses less mechanical energy
- A high percentage of injuries occur during muscle lengthening phase
- Most injuries & pain are in the fascia
- The structural and mechanical adaptations to the myofascia remain poorly understood.
 - Eccentric training is believed to induce lengthening of muscle fascicles and to be associated with the addition of sarcomeres in series within muscle fibers.
 - greater adaptations in the <u>distal region</u> compared to the central region.

Titin, spanning half the sarcomere, acts as a molecular spring during eccentric muscle actions, contributing to the increased force output (Dawes, 2025)

LOADED MOVEMENT / STRONG STRETCH TRAINING



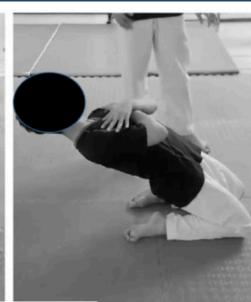
 In that respect, static stretching may be used not only to increase ROM, but also to enhance muscle performance

Strong Stretch = Loaded Stretch

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C



LOADED MOVEMENT / STRONG STRETCH TRAINING



Medial gastrocnemius muscle

Plantaris tendon

Soleus muscle

Lateral malleolus

Flexor retinaculum

Calcaneus

Particulario de la control de



 In that respect, static stretching may be used not only to increase ROM, but also to enhance muscle performance

Strong Stretch = Loaded Stretch

Training Strategy – Load Loaded Isometrics





Front Physiol. 2020; 11: 723.

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Published online 2020 Jun 26. doi: 10.3389/fphys.2020.00723

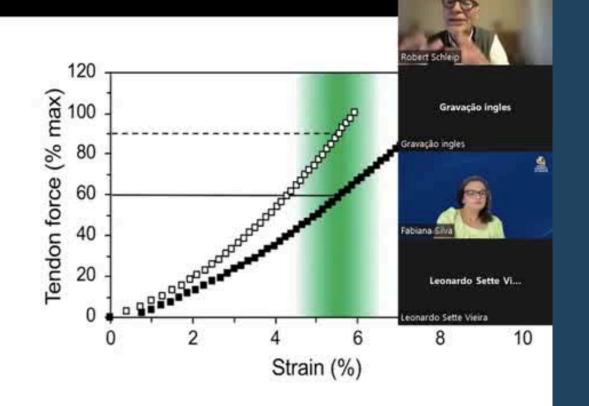
Individualized Muscle-Tendon Assessment and Training

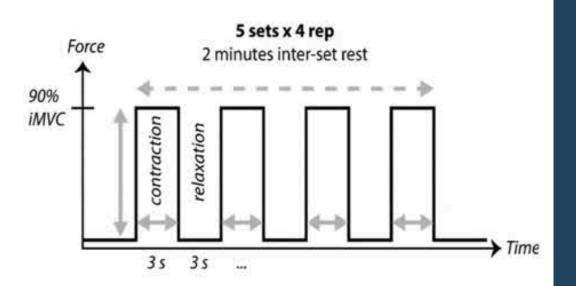
> Front Physiol. 2021 Mar 10;12:626225. doi: 10.3389/fphys.2021.626225. eCollection 2021.

A Functional High-Load Exercise Intervention for the Patellar Tendon Reduces Tendon Pain Prevalence During a Competitive Season in Adolescent Handball Players

> Scand J Med Sci Sports. 2021 Aug;31(8):1708-1718. doi: 10.1111/sms.13979. Epub 2021 May 24.

Prevention of strain-induced impairments of patellar tendon micromorphology in adolescent athletes

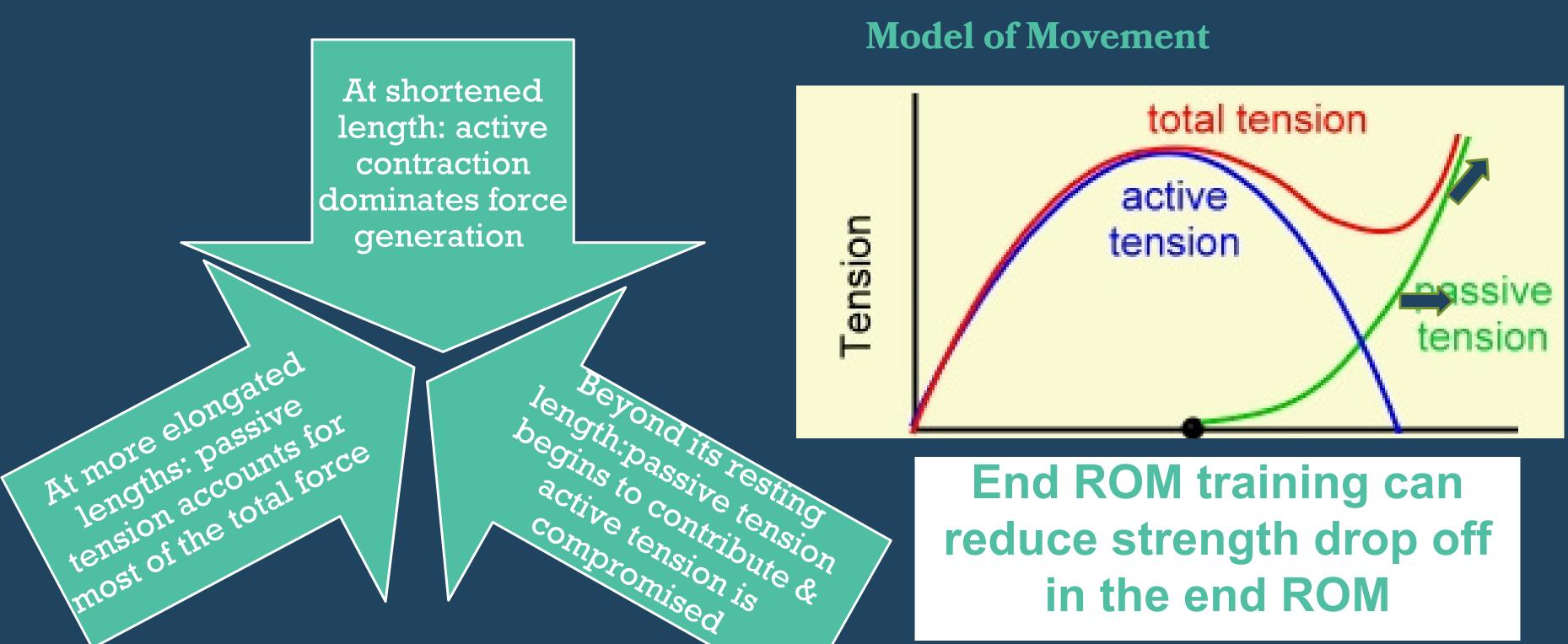




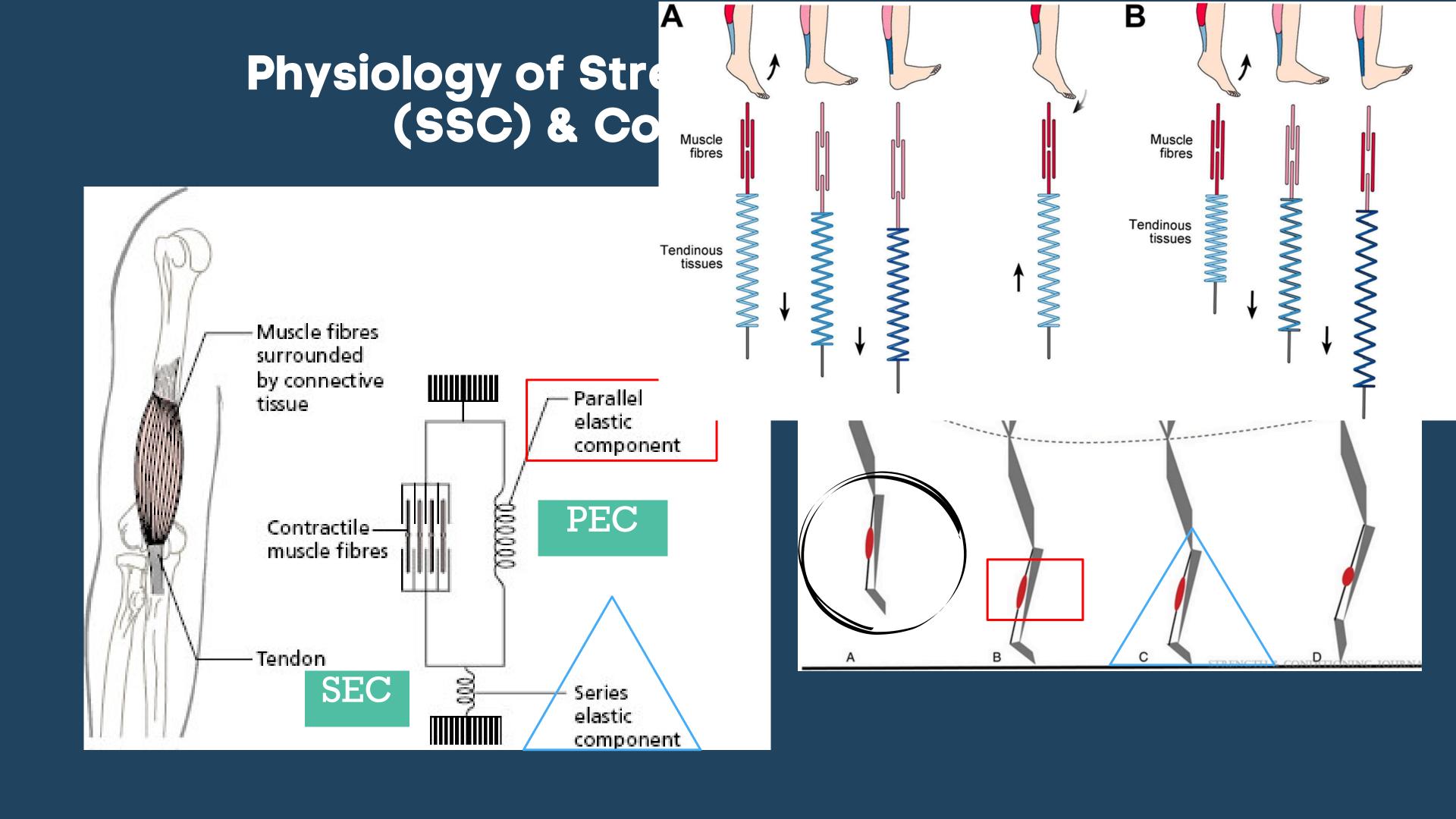
A Functional High-Load Exercise
Intervention for the Patellar Tendon
Reduces Tendon Pain Prevalence
During a Competitive Season in
Adolescent Handball Players

- Frequency: 2 times per week
- Number of sets: 5
- Repetitions per set: 4 •
 Intensity: moderate to high •
 Loading duration per repetition: 3-6 s
- Rest between sets: 1-2 min Duration: approx.15 min

Physiology of Stretch Shortening Cycle (SSC)



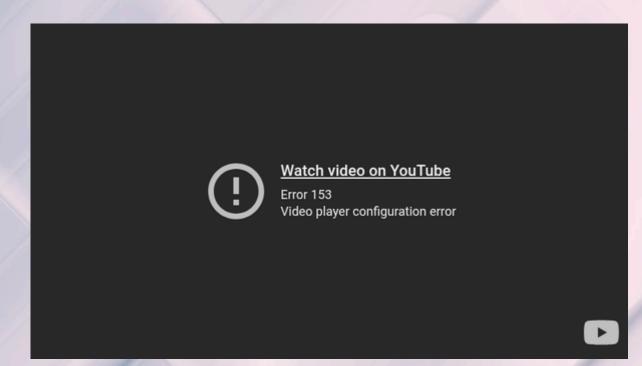


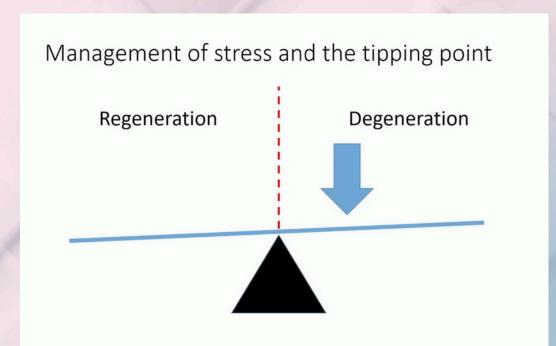




FREEDOM OF MOTION PRINCIPLE Mobility + Stability & Load Balance







Programming Foundations

Vector Var.

Shift:

Tilt:

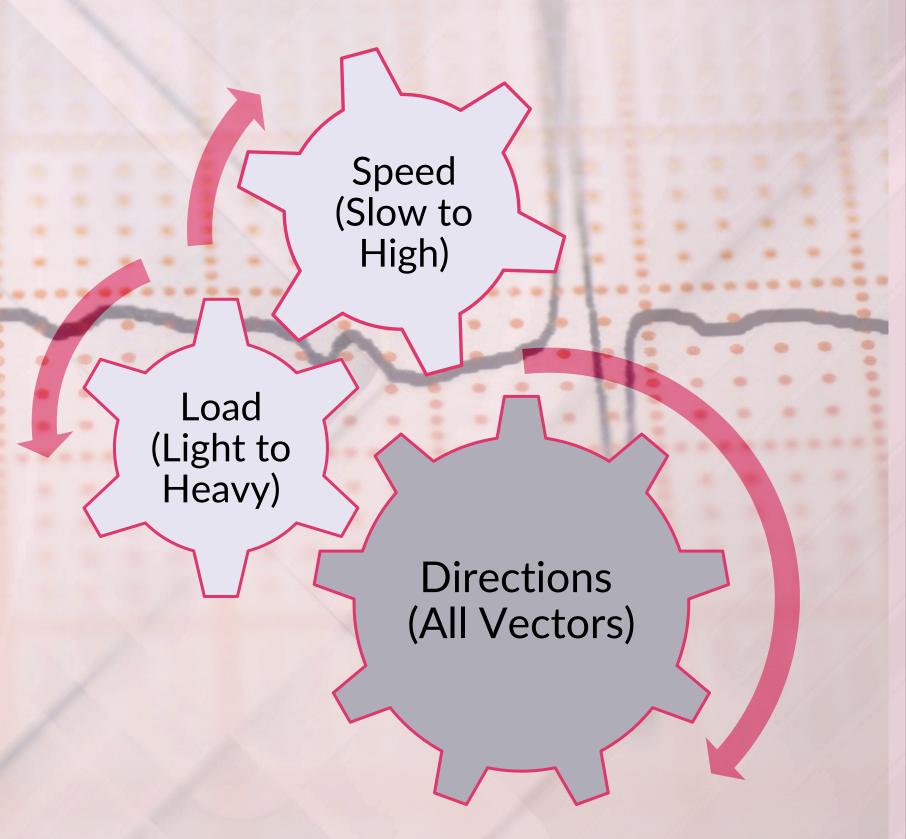
Reach:

Spin:

Pulse & Gyrate:

Vector Variability

- ROM
- Speed
- Load
- Directions
- Fatigue



Unlocking > Optimizing Fascia Programming



Phase 1&2: Establish Full ROM & Activate NS

- MFC (15-30s per location) Use Pin & Move
 Assisted → Resisted Dynamic w Iso ROM (shoulder ext)
 General Strength

Phase 3: Progressively Load eROM & Ecc. Strength

- 3 to 5s Eccentric Strength & eROM Isometrics (calf raise)
 110% 130% of concentric RM (option: 2 limb up, 1 down)
- Drop & Stops

Phase 4: Strength & Power eROM recoil / SSC & LMT

- Multidirectional bounce / SSC (light loads)
- Expl. (controlled ecc. + explosive concentrics & Uni .Strength
- LMT / Slow SSC @ approximately 15-25% of MAX

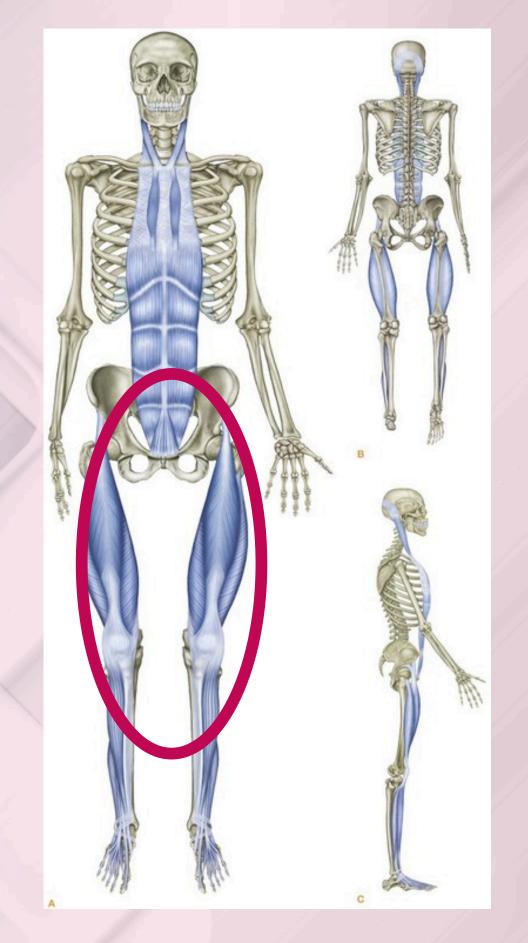
Phase 5: Full ROM SSC & Elastic Recoil

- 30-50% of RM mid ranges (SLOW SSC / Max Strength / Fast SSC Complex)
- BW or 10% overspeed (FAST SSC band pogo jump)



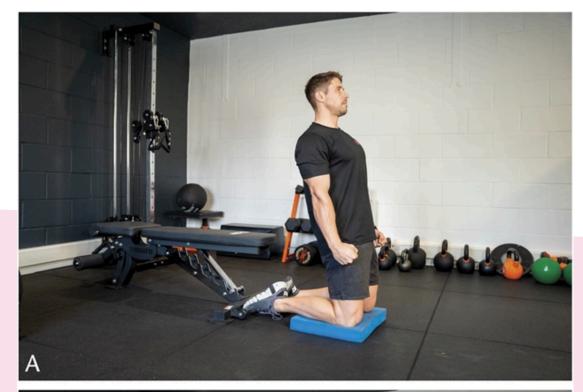
Programming Overview

Assessments	Thomas
Myofascial Compression	3 Way Quad + Knee Flexion
Mobility	Reach & Rotate Half Kneel Bicep Curl
Stability	Banded Leg Extension Reverse Nordic
Loaded eROM	Drop & Stop Squat Bench Reverse Nordic Weekend at Bernies
LMT / Recoil	Leg Swings Repeated Jump Squat Pogo Jump Squats



REVERSE NORDIC PROGRESSION







EXERCISE TECHNIQUE

The Reverse Nordic

Weldon, Anthony^{1,2}; Dos'Santos, Thomas³; Bright, Thomas E.^{4,5}; Sapstead, Gareth W.⁶; Beato, Marco⁷; Lincoln, Merrick A.⁸

Editor(s): Dawes, Jay PhD, CSCS*D, NSCA-CPT*D, FNSCA

Author Information ⊗

Strength and Conditioning Journal 47(3):p 364-379, June 2025. | **DOI**: 10.1519/SSC.00000000000875

REVERSE NORDIC PROGRESSION



Various studies:

- 1.0–8 weeks that include the reverse Nordic
- 2. Results:
 - 1. Increased muscle thickness, fascicle length, and pennation angle of the vastus medialis, vastus lateralis, and rectus femoris.
 - 2. Strength training that induces functional and morphological adaptations of the quadriceps fem.
 - 3. Athletic performance, injury resilience, and rehabilitation









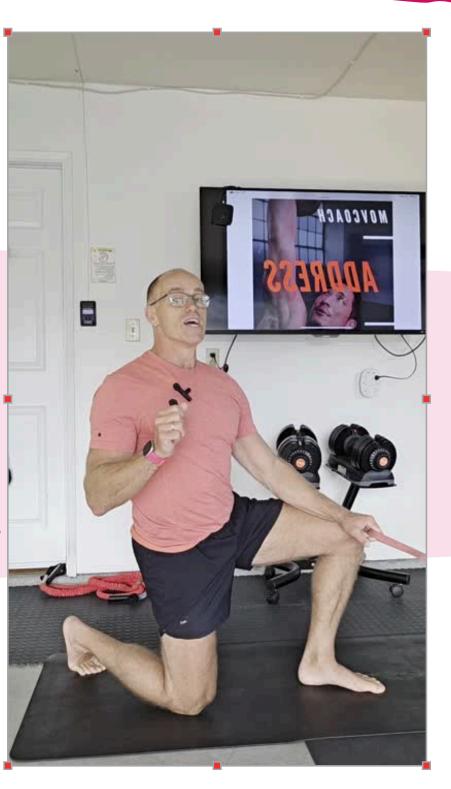


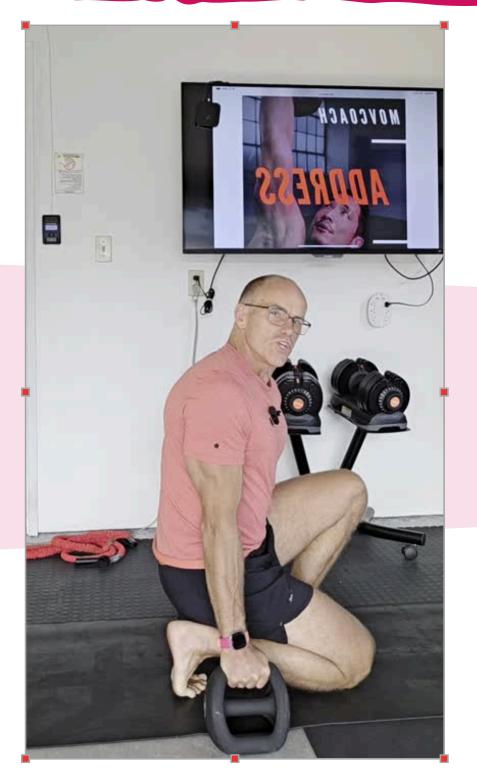
REVERSE NORDIC PROGRESSION



Execution Notes:

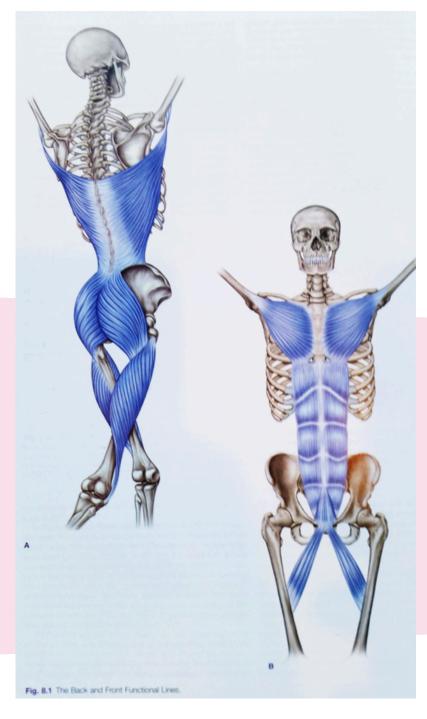
- Maintain the starting position (i.e., a straight line from the knees to the head) and hip extension.
- Control the body
 backward with the
 shoulder blades moving
 toward the floor until a
 maximum point of
 flexion or desired depth
 is reached or the athlete
 can no longer
 controllably resist knee
 flexion
- Start w bodyweight or light loads

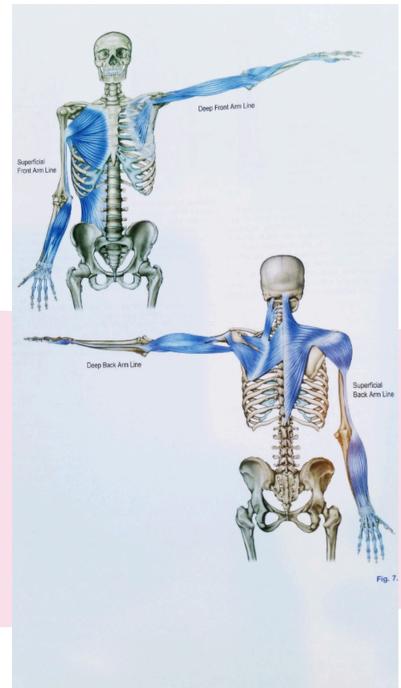






Functional + Arm Front & Back Lines





Spinal Rotation

Pecs & Adductors

Rib Grab Bow and Arrow

Rotated Paloff Press

Side to Side Knee Drops

Twisting Arm Swings & Spins

How to Unlock Clients

DO NO HARM ... NEVER cross the tissue tipping point

Perform FMA (functional movement assessment) 2

Find a potential driver through check point technique

3

Integrate the results of the FMA w specific P2P movements

4

Perform asymmetrical P2P movement Rx (until movement errors are minimized) 5

Individualize the training program (warm-up, active recovery & cooldown)

- Improve myofascial glide, pain & circulation
- Corrective movement techniques

In Summary

- Muscle & fascial adaptations are angle & Vector specific.
- Muscle & fascia recovery at approx. the same rate (48-72hr). Tendon recovery may require longer (72-96h)
- Train strength at all angles & ranges of motion to ensure complete development of contractile and connective elements.
 - TEC (transverse)
 - SEC (serial)
 - PEC (parallel)

Tendon & Fascia Training Fundamentals

- Stiffer muscle-tendons resist strain & recoil faster
- Plyometric / loaded movement and strength training improve muscletendon stiffness
- Inhibitory effect of the GTO can be minimized through progressive, structured tendon, plyometric and strength training
- Train all speeds, ROM, intensities & directions (appropriately)



FREE Download - Practical Seminar



Part 1 & 2: Recorded:

https://www.ptacademy.ca/product/fascia-tendon-optmization-seminar/

PTA Excelerated Personal Training Certification (3 weekends)

<u>Excelerated PTS Personal Training Certification (ptacademy.ca)</u>

<u>Excelerated PTS Personal Training Certification</u> (3 payment plan - monthly)

Date: Nov 2025 Intake

Promo Code \$200 (Oct 31) - pta200





Upcoming Courses

Biomechanics unlocked:

Jan 31 & Feb 7



BIOMECHANICS UNLOCKED:

GAIT & TRANSFERABLE STRENGTH







Session Title & Link	https://www.ptacademy.ca/product/excelerated-pts- personal-training-certification/
Date & Time	Personal Training Certification Nov 14th - Dec 6th
Location (Hybrid)	Club 16 Richmond + Zoom Labs
Instructor(s)	Chad Benson + Industry Experts
CEC's	Min of 40 Contact Hr
Price & Promo Code	Code: PTA 200

Table 4 Phase 3 rehabilitation progression

Rehabilitation Guidelines

Phases	Exercises	Recommendations
Early phase III	Single-leg heel raises on step (with weight) Eccentric heel raises (with weight) Eccentric heel drop Quick rebounding heel-raises Slide board	Increase 5–10 lbs as goal sets and reps are achieved and maintained Exercises should be performed in a straight-leg and bent-knee position
Mid-phase III	Single-leg heel raises on step (with weight) Eccentric heel raises (with weight) Eccentric heel drop Quick rebounding heel-raises Double-leg ankle hops Double-leg side to side hops Double-leg standing jumps Double-leg hurdle jumps Double-leg box jumps (forward and lateral) 180-Degree jumps Hexagon drill	Increase 5–10 lbs as goal sets and reps are achieved and maintained Exercises should be performed in a straight-leg and bent-knee position Hurdle and box jump height from 4 to 12 inches Ensure athlete demonstrates proper landing technique
Late phase III	Single-leg heel raises on step (with weight) Eccentric heel raises (with weight) Eccentric heel drop Quick rebounding heel-raises Single-leg ankle hops Single-leg hurdle jumps Single-leg box jumps (forward and lateral) Single-leg zig zag drill Multiple box-to-box jumps Lateral shuffles Agility ladder drills Figure-8's and pattern runs	Increase 5–10 lbs as goal sets and reps are achieved and maintained Exercises should be performed in a straight-leg and bent-knee position Hurdle and box jump height from 12 to 36 inches Ensure athlete demonstrates proper landing technique STRENGTH & CONDITIONING JOURNAL

Table 2 Tendon forces during exercise

Achilles Tendon Load by Exercise (BW)

Seated		
Seated calf raise	0.15	
Cycling	1.0	
Standing		
Romberg stance	0.72	
Tandem stance	1.4	
Unilateral standing	1.66	
Walking	1.5–3.5	
Squat	1.47	
Forward lunge	1.64	
Bilateral heel raise	1.21	
Unilateral heel raise	2.91	
Bilateral jump	1.52	
Unilateral jump	4	
Hopping	5	
Running	5–12	
BW = body weight.		
Adapted from Refs. 20,42,47.	ITIONING JOURNAL	

Achilles Tendons

Exercise Progression to Incrementally Load the Achilles Tendon

 $\label{eq:josh_relation} JOSH~R.~BAXTER^1, PATRICK~CORRIGAN^2, TODD~J.~HULLFISH^1, PATRICK~O'ROURKE^3, and KARIN~GRÄVARE~SILBERNAGEL^3$

TABLE 1. Achilles tendon loading indices and metrics for rehabilitation exercises.

	Exercise	Loading Index	Loading Peak (BW)	Loading Impulse (BW s)	Loading Rate (BW⋅s ⁻¹)
Tier 1	Seated heel raise (2-leg)	0.100	0.5 ± 0.2	0.6 ± 0.2	2.7 ± 1.0
	Seated heel raise (1-leg)	0.128	0.7 ± 0.2	0.7 ± 0.3	3.6 ± 1.5
	Squat	0.167	1.1 ± 0.3	0.8 ± 0.2	4.0 ± 1.9
	Low step up (leading leg)	0.213	1.6 ± 0.4	0.7 ± 0.3	10.1 ± 5.0
	High step up (leading leg)	0.241	1.8 ± 0.3	0.8 ± 0.2	11.4 ± 3.4
	Standing heel raise (2-leg)	0.248	1.6 ± 0.2	1.2 ± 0.2	8.7 ± 2.7
Tier 2	Rebounding heel raise (2-leg)	0.282	2.5 ± 0.7	0.5 ± 0.1	19.9 ± 10.6
	Lunge (leading leg)	0.285	2.1 ± 0.6	1.2 ± 0.5	8.4 ± 3.7
	Low step down (leading leg)	0.310	2.2 ± 0.5	0.9 ± 0.2	22.9 ± 6.1
	Low step up (trailing leg)	0.341	2.9 ± 0.4	1.1 ± 0.2	14.2 ± 4.7
	High step down (trailing leg)	0.342	2.6 ± 0.3	1.2 ± 0.2	16.6 ± 6.0
	Walk (stance)	0.359	3.3 ± 0.3	0.8 ± 0.1	18.7 ± 2.7
	Low step down (trailing leg)	0.369	2.9 ± 0.3	1.3 ± 0.3	15.1 ± 5.0
	Forward jump (2-leg)	0.414	3.2 ± 1.0	1.2 ± 0.4	25.4 ± 8.5
	High step down (leading leg)	0.429	3.2 ± 0.6	1.1 ± 0.2	34.2 ± 7.5
	High step up (trailing leg)	0.432	3.7 ± 0.6	1.1 ± 0.2	22.1 ± 7.0
	Lunge (trailing leg)	0.435	2.4 ± 0.5	2.4 ± 0.7	11.5 ± 3.3
	Counter movement jump (2-leg)	0.474	3.4 ± 0.3	1.5 ± 0.3	32.5 ± 5.3
	Rebounding heel raise (1-leg)	0.476	4.2 ± 0.9	1.1 ± 0.1	26.2 ± 10.5
	Standing heel raise (1-leg)	0.493	3.0 ± 0.3	2.5 ± 0.6	13.1 ± 3.4
Tier 3	Drop jump (2-leg)	0.519	3.6 ± 0.6	1.7 ± 0.3	34.4 ± 6.7
	Hopping (2-leg)	0.555	4.8 ± 1.8	0.6 ± 0.2	56.3 ± 26.0
	Run (stance)	0.600	5.2 ± 0.9	0.7 ± 0.1	58.1 ± 12.7
	Forward hopping (2-leg)	0.656	5.2 ± 2.6	1.3 ± 0.5	58.4 ± 33.4
	Counter movement jump (1-leg)	0.705	4.9 ± 0.6	2.4 ± 0.5	46.2 ± 7.1
	Forward jump (1-leg)	0.740	5.4 ± 1.1	2.3 ± 0.4	46.9 ± 11.1
Tier 4	Hopping (1-leg)	0.764	6.7 ± 1.6	1.3 ± 0.2	62.1 ± 16.9
	Drop jump (1-leg)	0.852	5.5 ± 0.8	3.0 ± 0.4	59.2 ± 9.1
	Lateral hopping (1-leg)	0.904	7.3 ± 2.4	2.1 ± 0.7	67.7 ± 25.9
	Forward hopping (1-leg)	0.924	7.3 ± 1.9	2.3 ± 0.3	67.1 ± 18.5



¹Department of Orthopaedic Surgery, Pearlman School of Medicine, University of Pennsylvania, Philadelphia, PA; ²Department of Physical Therapy, Movement and Rehabilitation Sciences, Northeastern University, Boston, MA; and

³Department of Physical Therapy, University of Delaware, Wilmington, DE

Contractile - Connective Complex (Squat: Patella & Achilles)

Exercise	Phase 1	Phase 2	Phase 4
Contractile Dominant	Banded Loaded Sumo Squat	Goblet Squat (slow ecc)	Barbell Squat
Loaded Fascial & Tendon Dominant	Sphynx Rock & Heels Elevated Squat	Hop Hop or Weekend B Drop (fast ecc)	KB CM Jump Squats (slow SSC)
Unloaded or Assisted	FR on Calf, Heel Banded Dorsiflexion	Vibration Split Kneel Shifting Dorsiflexion	Pogo Jump (Fast SSC)