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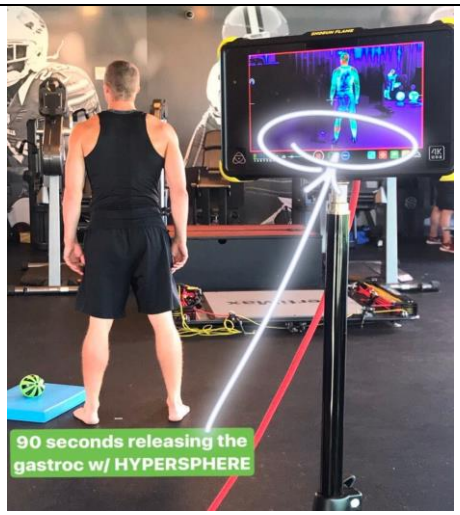
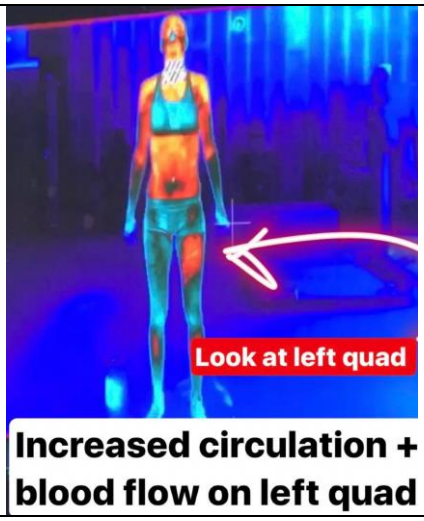
Hyper-Mobility, Stability, and Performance: Nervous System-Based Activation *by Chad Benson MSc, PTS Author*

The sitting disease and automation are killing our nervous systems, proprioception, function, metabolism, and mobility. Today more than ever, clients walk in the door deactivated. Even those who work out regularly spend most of their time in low nervous system activation. In this seminar, you'll learn how to use vibration technology to prevent injury, optimize performance, systematically apply warm-up, and prep clients for their workout and their day.

Benefits of Muscle Stimulation & Vibration: vibration therapy causes muscles to repeatedly eccentrically and concentrically contract resulting in nervous system activation, injury prevention & performance enhancement via:

1. Improved circulation & muscle thermogenesis: https://drive.google.com/file/d/0B37decpR5tu3OS1qWTZQTHRxejA/view





2. Improved mobility & ROM
3. Improved proprioception & posture
4. Muscle Co-contraction joint stability
5. Improved bone density
6. Improved force & power:
    - preconditioning exercise performed with WBV at 50 Hz seems to enhance on-ice sprint performance in ice-hockey players.
    - 60s of WBV with partial squat enhanced the performance score on the QFT (Dot drill)

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7. Increased pain threshold

Methods to Improve Muscle Activation

- Activate pressure & vibratory receptors (Pacinian Corpuscles)
    - WBV (whole-body vibration)
    - Muscle stimulation
    - *Application:* feet & hands in static hold positions (i.e. standing 2ft, 1ft, squat, split squat, plank, side plank, bridge
- Activate weak / lengthened muscles & mechanoreceptors
    1. Oscillatory Rolling / Massage
        - *Application:* shifting foam rolling (no vibration req'd)
    2. MSV (muscle & movement specific vibration)
        - *Application:* perform movement while standing on, holding or trapping vibratory device btwn bodyparts
- Improve ROM = Inhibit tight / short muscles & mechanoreceptors
    - Mobility: pin & hold foam rolling (Rx: no vibration x30—60s)
    - Mobility: pin & overstimulate (Rx: Level 2-3 until muscle fatigues x60+s)
    - Stability: vibratory stimulation to create co-contraction of muscles & joint stability. (Level 1-3x 10-20s: depends on experience & body type)
- Activate Core & CNS (vibration can be integrated via MSV)
    - Core activation
    - Balance & joint reactivity
- Activated Fascial System
    - Stretch shortening cycle / fascial loading
        - **SAQ** (ladders, cone, line, micro hurdle)
        - **Plyometrics** (hops, jumps, bounds)
        - **Loaded movement training** (tubing, kettlebell, Bulgarian Bag, med balls)

CORE ACTIVATION: A strong core provides the ability to support the effort and forces from the upper and lower extremities so that muscles and joints can perform in their safest, strongest and most effective positions.

- Core Activation 1: https://youtu.be/-JIC01S0RwI
- Core Activation 2: https://youtu.be/J6Z8l9zBsT8

The CNS recognizes stability & therefore approves / permits efferent activation of muscles in the limbs. from the spine and the peripheral nerves it houses: “Core” refers to the muscles of the torso that are responsible for both movement and stability. It is the base from which movement forces are generated. Proper core leads to:

- A decreased risk of injury, particular the lower back
- More efficient movement & greater ceiling for strength
- A greater capacity to generate speed
- Improved balance and muscular coordination
- Improved posture

SAQ & Plyometrics: dynamic movement, performed at relatively high velocity & moderate loads, recruits not only slow but fast twitch muscle fiber. *In addition to* a dynamic warm-up that includes reactive & perturbation based balance designed to wake-up fast twitch fibers, SAQ & Plyo’s fire up the fast these muscle fibers during. At the end of SAQ / Plyo’s the entire NS should be ready to handle high load (strength) or high velocity (power). Use the following SAQ progression for optimal activation.

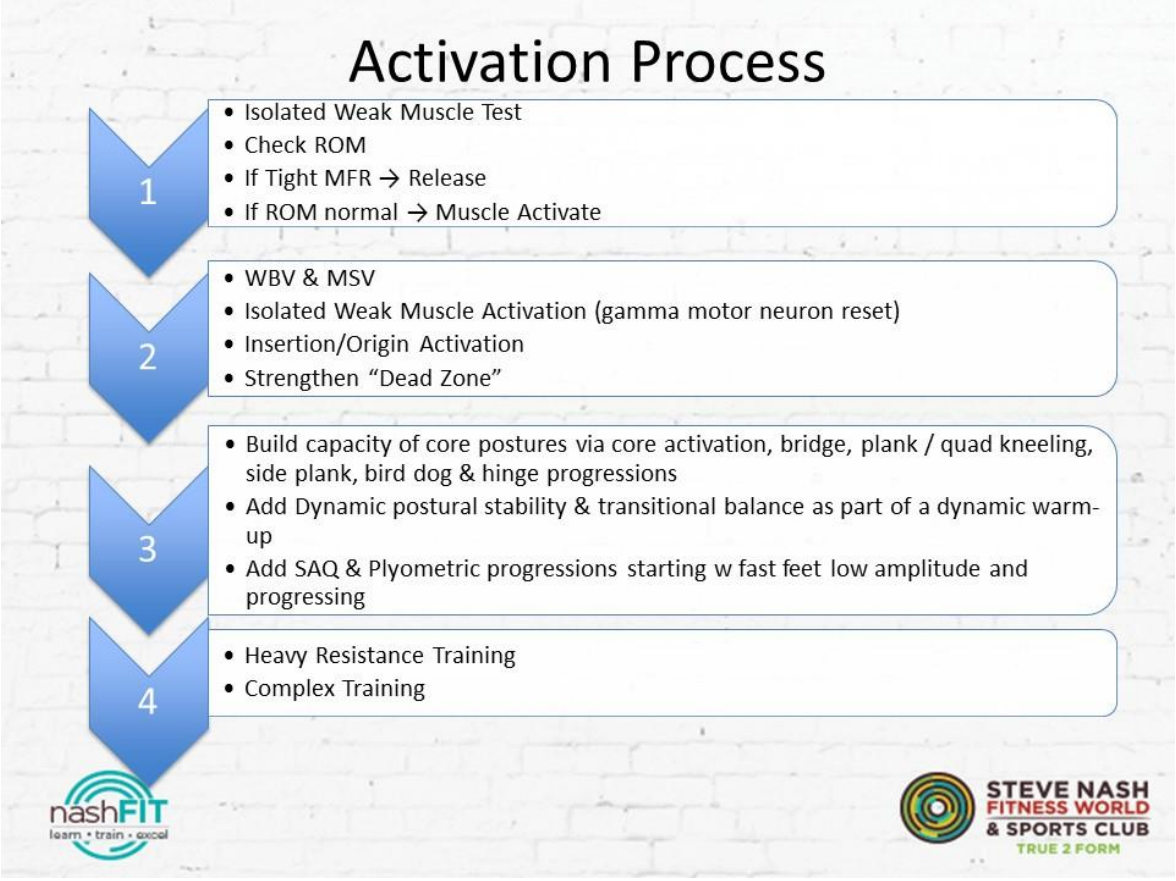
1. Fast ft, small distance movement (ladder or line drills)
2. Deceleration plyometrics
3. Ladder or hurdle agility drills
4. Front end & back end mechanics / resisted movement drills

Loaded Movement Training: The fascial / body’s natural elastic system is optimally loaded when 1. Load & 2. Velocity are integrated to create optimize muscle & core reactivity. This style of training has been made popular by:
Functional Patterns: https://www.instagram.com/functionalpatterns ,
Kettlebell & Pavel: https://www.instagram.com/strongfirst
ViPRpro & Michol Dalcourt: https://www.instagram.com/viprpro
Keys to Success:

1. Light to moderate loads
2. Progress complexity
3. Multidirectional / different angles
4. Smooth & timely transitions
5. Load outside of base of support

Activation Training Guidelines & Reminders

- Create movement symmetry and therefore joint stability
- Level the pelvis (i.e. bridge, side plank, plank)
- Learn to ACTivate your core musculature
- Think about driving movement from the center out.
- Core neutral is the foundation from which strong movement is created
- Time your core bracing and breath based the required efforts. This will help create spinal & pelvic stability.
- The optimal core driven warm-up sequence is: combine a & b for new clients, b & c for more advanced clients
  a. **WBV & MSV + SMR** (pin & move) **= 5 min**
  https://youtu.be/gIInxp70OJY
  b. **Core Activation** / Active Isolated/ End Range of Motion **= 5 min**
  c. Dynamic Warm-up or Partner Standing Core **= 5 min**
  https://youtu.be/LGrd2oNLFHk
- Manage the killers of function (speed, ROM, intensity, complexity & volume)
- On SAQ days, the dynamic warm-up HR should be appropriate to their fitness assessment & training session (i.e. bring them to but not exceed that training zone)



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Activation Library / Protocol	*Activation Library / Protocol*
Sphere & Vyper (Non Assisted) • 2Hand Supine Overhead Reach • Hamstring Calf March (low to high) • Btwn Knees Bridge • Supine Ext. Rotations (hitchhiker) • Prone Cobra (hand lift-off) Plank on Hand • Standing Bottom of Ft https://youtu.be/mJ2yIvKm32g	Sphere & Vyper (Assisted) • Erector / Spinal Rolls • Lats w Overhead Reaches • Low Trap Back Stroke • Quad / IT Band + Ham Curl • Side Plank w Glute Med Activation • Seated Rec Fem SLR Activation https://youtu.be/PqAR6-RF38g
Partner Core Series (x4-6/) ○ Supine 3 Way No Movement (End Ranges) ○ All Fours 2 Way ○ Stand 4 Way (no movement) ○ Stand Chest Press Rotations ○ Floor Glute Push, Adductor Pull	Deceleration Patterns ○ Walk Walk Lunge Stop ○ Cycle Cycle Drop w Fwd Hinge ○ Lateral Bound Bound Freeeze (requires movement space) ○ 1ft Jump & Land
Loaded Movement (Bands) ○ High Knee March to Run ○ Power Walk – Run ○ Lat Push – Bound ○ Bear Crawl	Loaded Movement (Tubing) ○ Side Plank Resisted Hip Drive ○ Rotated Pallof Press ○ Rotated Kneel2Stand Chest Press ○ Hinge Pulls ○ Overhead Pivots ○ Cycle Cycle Drop w Press ○ Judo Rotating Press

Pamukoff DN, Ryan ED, Blackburn JT. The acute effects of local muscle vibration frequency on peak torque, rate of torque development, and EMG activity. J Electromyogr Kinesiol 24: 888–894, 2014.

The acute effects of local muscle vibration frequency on peak torque, rate of torque development, and EMG activity.

Whole Body and Local Muscle Vibration Reduce Artificially Induced Quadriceps Arthrogenic Inhibition

Pamukoff, D. et al. (2016). Whole-Body and Local Muscle Vibration Immediately Improve Quadriceps Function in Individuals With Anterior Cruciate Ligament Reconstruction, Physical Medicine & Rehabilitation, Volume 97, Issue 7, Pages 1121–1129.

Acute Effect of Whole-Body Vibration Warm-up on Footspeed Quickness
Donahue, Ryan B.; Vingren, Jakob L.; Duplanty, Anthony A.; More
Journal of Strength & Conditioning Research. 30(8):2286-2291, August 2016.

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