

Muscle Recruitment for Peak Performance

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Introduction

- Is everything turned on and ready to go?
- Short term muscle recruitment and activation strategies
 - Dynamic Warm Up
 - Foam Rolling
 - Perturbations
- Long term muscle recruitment strategies
 - Turn off/Turn on
 - Correcting muscle imbalances

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Dynamic Warm Up

- Rationale
 - Improve blood flow
 - Increase hormonal activity
 - Increase arousal
 - Rehearse movement patterns
 - Stimulate nervous system

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Dynamic Warm Up

- Rehearse Movement Patterns
 - Turn on key players
 - Activate specific muscles used in your sport
 - Take joints through full ROM
- Stimulate Nervous System
 - A good warm up will increase in intensity
 - Culminating in short burst, maximal intensity
 - Increased core temperature increases neuron transition speed

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Make Up of a Warm Up

- Core temperature increase drills (Aerobics)
- Self Myofascial Release (Foam Rolling)
- Controlled joint mobilization drills
- Increased speed mobilizations
- Nervous system drills

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Make Up of a Warm Up

- Activate all joints
 - Special attention to hips
 - Do NOT forget the shoulders!
- Ensure "core" is activated
- Progress from slow/controlled to most explosive
- Progress from linear to multi-directional

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Example Exercises

- Squat/Can Opener
- Scorpions
- Arm Circles
- Tuck Jumps
- Grapevine
- Inchworms/Cobra
- Greatest Stretch in the World
- Hip Swivel
- Squat to Stand
- Prone Windshield Wiper
- Glute Bridge
- Kneeling Groin Mobilizations
- Rapid response footwork

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Example Exercises

- Inverted Toe Touch
- Knee Hug
- Quad Stretch/Toe Touch
- Straight Leg Swings (Front/Back; Side/Side)
- Lateral Squats
- Prone Ys
- Lunge w/ Rotation
- Reverse Lunge w/ Backward Lean
- Skipping
- Spidermans
- Cross Behind Reverse Lunges
- Leg Cradles
- Various Bounds

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Foam Rolling

- Not just a 36" piece of foam
- An invaluable tool in performance
- Used mainly for self myofascial release (SMR)
 - Eliminates trigger points
 - Softens connective tissue which can restrict movements
 - Stimulates local blood flow
 - Stimulates nervous system activity



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Foam Rolling

- Techniques
 - SMR requires long slow strokes
 - Deep pressure can be applied
 - CNS activation requires light, quick movements
 - DO NOT GO TOO DEEP/HARD
 - A deflated soccer/volleyball may also be a good tool

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Breakout

- Foam Rolling/ "The Stick" Demonstration



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Perturbations

- Small controlled taps on a limb
- Causes the muscles to contract/relax to protect the joint
- Increases neural drive to muscles surrounding that joint
- Pressure should be short, light and random

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Breakout

- Prisoner Squat Perturbations

Muscular Imbalances

- It's not a matter of recruiting muscles, it's recruiting the right ones.
- Muscular imbalances are the key to decreased performance
- Some muscles are overactive, while others are underactive
 - It's the relationship between the two that is of concern

Tonic vs. Phasic Muscles

- Muscles can be characterized as tonic (postural), phasic (movement) or a mixture of the two
- The relationships between tonic and phasic muscles are the key to understanding common musculo-skeletal problems

Tonic Muscles

- Involved in repetitive and rhythmic activity
- Activated in flexor synergies
- Prone to tightness or shortness
- Lowered "irritability threshold"
 - Activated very easily
- Contain mostly slow twitch fibers
 - The degree to which is very individualistic
- Larger capacity for work

Phasic Muscles

- Work eccentrically against the force of gravity
- Activated in extensor synergies
- Prone to weakness or inhibition
- Contain mostly fast twitch fibres
 - The degree to which is very individualistic
- Easily fatigued

Tonic vs. Phasic Muscles

- | | |
|--|---|
| <ul style="list-style-type: none"> ■ Tonic Muscles <ul style="list-style-type: none"> ■ Gastroc-Soleus ■ Tibialis Posterior ■ Hip Adductors ■ Hamstrings ■ Rectus Femoris ■ Iliopsoas ■ Tensor Fascia Lata ■ Piriformis ■ Thoraco-lumbar extensors ■ Quadratus Lumborum ■ Pectoralis Major ■ Upper Trapezius ■ Levator Scapulae ■ Scalenes ■ Sternocleidomastoid ■ Upper Limb Flexors | <ul style="list-style-type: none"> ■ Phasic Muscles <ul style="list-style-type: none"> ■ Peroneus Longus, Brevis ■ Tibialis Anterior ■ Vastus Medialis, Lateralis ■ Gluteus Maximus, Medius, Minimus ■ Rectus Abdominus ■ Serratus Anterior ■ Rhomboids ■ Lower Trapezius ■ Deep neck flexors ■ Upper limb extensors |
|--|---|

Tonic vs. Phasic Muscles

- Usually tonic and phasic muscles appear as agonistic and antagonistic couples
 - Eg: Psoas vs. Glute Max
 - Upper Trapezius vs. Lower Trapezius
 - Hip Adductors (Magnus) vs. Glute Medius
- Reciprocal Inhibition
 - When a muscle contracts, causes the antagonist to relax
 - This perpetuates the tonic/phasic muscular imbalances

Upper/Lower Crossed Syndrome

- Vladimir Janda coined the terms Upper and Lower Crossed Syndromes
- Over time, muscular imbalances develop in a predictable pattern

Upper/Lower Crossed Syndrome

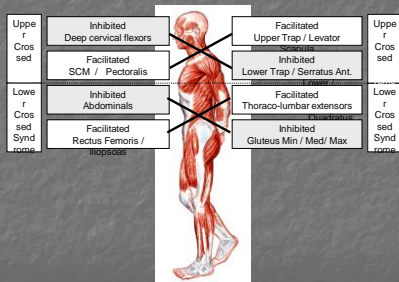


Figure 1 : Janda's Muscle Imbalance Syndromes

Assess & Correct

- Detailed assessment can reveal potential imbalances
- Posture assessment

The Assessment

- Static Screens
 - Side Posture
 - Line begins at ear
 - Midway through shoulder
 - Slightly posterior to hip joint
 - Slightly anterior to knee
 - Slightly anterior to ankle



The Assessment

- Side Posture
 - Head Forward
 - Shortened Sternocleidomastoid
 - Weak Deep Neck Flexors
 - Corrective Exercises
 - Chin Tucks
 - Shoulders Forward
 - Tight anterior shoulder girdle (pecs, lats..)
 - Weak scapular musculature (mid traps, rhomboids)
 - Corrective Exercises
 - Chest/Lat Stretches
 - Ys Ts Ls



The Assessment

- Side Posture
 - Increased lordosis/anterior pelvic tilt
 - Shortened Lumbar Erectors, Psoas, Rectus Femoris, TFL
 - Lengthened Hamstrings, Abdominals, Glutes
 - Corrective Exercises
 - Hip Flexor Mobilizations
 - OV Lunge Walk
 - Glute Bridges
 - High Step Ups



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The Assessment

- Side Posture
 - Flat Back/Sway Back Posture
 - Opposite of Lordosis/Anterior Pelvic Tilt
- Front/Back Posture
 - Shoulders Level
 - Dominant hand shoulder will be lower
 - Look for scapular level as well
 - Lower scapula may indicate
 - Weak Lower Traps
 - Dominant Upper Traps
 - Tight QL, Obliques

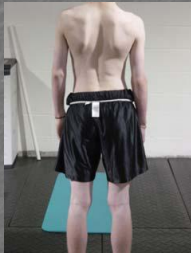


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The Assessment

- Front/Back Posture
 - Hips Level
 - High Side Hip
 - Weak Hip Abductors
 - Tight Hip Adductors
 - Corrective Exercises
 - Side Lying Leg Raise
 - Adductor Stretches



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The Assessment

- Front/Back Posture
 - Knee Alignment
 - Normal = Knees straight, toes out 15
 - Knock Knees
 - Possibly due to Anterior Pelvic Tilt
 - Shortened Hamstrings, Adductors, TFL
 - Weak Glutes (especially Gluteus Medius)
 - Corrective Exercises
 - Walking Lunges
 - Side Lying Leg Raises
 - Hamstring Stretches (Inchworms)

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The Assessment

- Front/Back Posture
 - Foot Alignment
 - Foot Pronation
 - Shortened Calves, Peroneals, Hip Int.
 - Weak Tibialis Ant., Hip Ext. Rotators



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The Assessment

- Active Component
 - Thoracic Spine Rotation
 - Seated with arms crossed and stick across chest
 - Twist as far to one side as possible
 - Result
 - Looking for an angle of 60
 - Corrective Exercises
 - Thoracic Ext. on Roller
 - Bent Over Thoracic Spine Rotation
 - 3 Point Plank Rotation



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The Assessment

- Active Component
 - Pec Major Length
 - Lie face up with arms abducted to 90 and palms up
 - Result
 - Arms should make full contact with floor without the shoulder joint shifting forward
 - Corrective Exercises
 - Scapular Pushup
 - Pushup Plus
 - Prone Trap Raise (Ys)
 - Chest Stretching

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The Assessment

- Active Component
 - Shoulder Int. Rotation
 - Lie face up with shoulder and elbow bent to 90
 - Rotate the shoulder to bring the palm of your hand to the floor
 - Result
 - Should achieve 70° of ext. rotation
 - Corrective Exercises
 - Sleeper Stretch
 - Prone Internal Rotation



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The Assessment

- Active Component
 - Thomas Test
 - Sit on edge of table/bench. Bring 1 knee to chest. Allow other leg to hang down. Let the knee bend.
 - Result
 - If back of thigh does not touch = tight Psoas
 - If knee does not hang to 90° = tight Rectus
 - If leg falls to the outside = tight TFL
 - Corrective Exercises
 - Hip Flexor Mobilizations
 - Overhead Lunge Walk
 - Reverse Lunge with Over the Back Reach

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The Assessment

- Active Component
 - Seated Hip Int. Rotation
 - Sit as tall as possible with feet hanging in the air. Rotate foot outward without shifting weight
 - Results
 - Normal result is 35°
 - Corrective Exercises
 - Split Stance Hip Swivels
 - Hip Airplanes
 - Lying Knee to Knee Pull Ins
 - Prone Windshield Wipers



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The Assessment

- Active Component
 - Ankle Dorsiflexion
 - Without wearing shoes, stand facing a wall in a split stance. Knees should be in line with midline of foot. Both heels must stay on ground. Lean forward and touch knee to wall.
 - Results
 - Normal range is 37° from wall
 - Corrective Exercises
 - Rocking Ankle Mobility
 - Wall Ankle Mobility (same as the test)

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The Assessment

- Active Component
 - Single Leg Squat
 - Stand on one leg with the other one bent. Squat down to a knee angle of 60°
 - Results
 - Midline of the knee should stay in midline with the foot
 - If knee moves medial, then there is instability in the hip
 - Corrective Exercises
 - Side Lying Leg Raise
 - Clamshells
 - Lateral Tubing Walks



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The Assessment

- Active Component
 - Glute/Hamstring Firing Pattern
 - Lie face down with legs straight. Raise one leg off the floor with knee straight. Evaluator places 1 hand on the hamstring, the other on the glute. Feel the order of firing
 - Results
 - Normal result is glute contracting SLIGHTLY before the hamstring
 - Corrective Exercises
 - Long Walking Lunges
 - High Box Step Ups

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Conclusions

- Short and Long term solutions for muscle recruitment and activation
- Short term involves a pro-active dynamic warm up
- Long term involves assessing and correcting muscular imbalances to activate key players in the kinetic chain

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References

- Kritz, MF, et. al. Static Posture Assessment Screen of Athletes: Benefits and Considerations. NSCA Strength and Conditioning Journal, 30(5): 18-27, 2008.
- Cressey, E. et. al. Assess & Correct: Breaking Barriers to Unlock Performance.

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