SYSTEMIC DRY NEEDLING

Thoracic Mobility: The Missing Link to Core Stability

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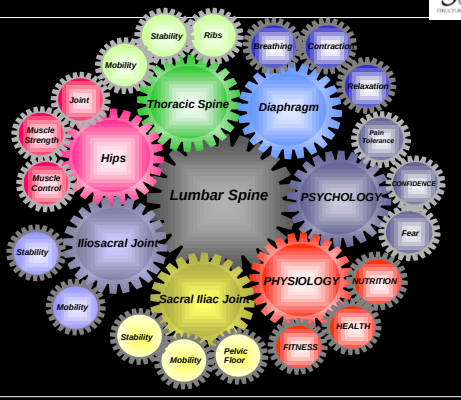
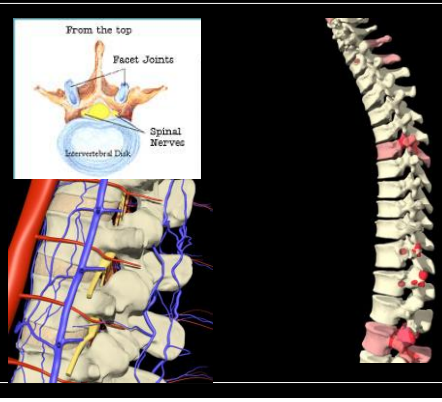
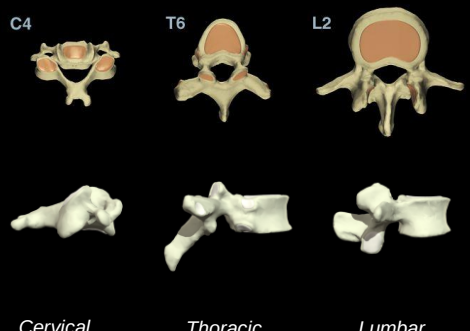
S&F: STRUCTURE AND FUNCTION



Thoracic Anatomy

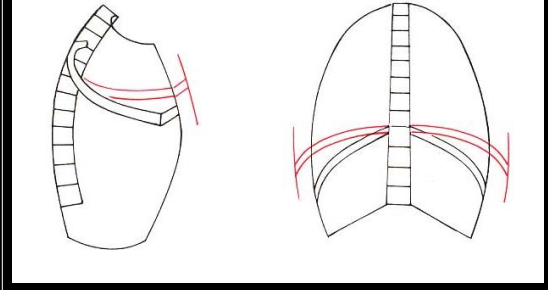


Vertebrae



The Rib

Rib Mobility During Breathing



Osteokinematics

- Flexion/ Extension
- Rotation
  - About 2 degrees per segment
  - 12 segments total = 24 degrees of total rotation
    - Lumbar spine is 10-12 degrees of rotation
- Side bending
  - Limited by the ribs

Associated Osteokinematics

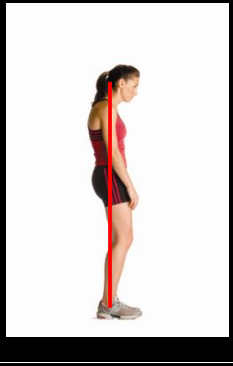
- Bilateral shoulder flexion and extension
  - Requires thoracic extension
- Unilateral shoulder flexion/ ER
  - Requires thoracic extension and ipsilateral rotation
- Unilateral shoulder extension/ IR
  - Requires thoracic flexion and contralateral rotation

Ideal Alignment

- Upright posture
  - Co-activation of flexors and extensors
  - Co-activation of adductors/ abductors
  - Co-activation of internal/ external rotators

Posture

- Balance is disturbed in the body
- "Old system" takes over
- Occurs with injury, central nervous dysfunction, fatigue, and even fear



Brugger's Cogwheel Diagram

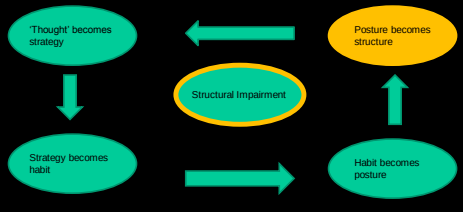
- Favoring of the older system in static posture
- Can effect breathing
- Creates a nocioceptive chain
  - Lewitt, The Journal of Orthopedic Medicine 21(1) 1999, 52-57

Figure 1. Brügger's cogwheel diagram: the pelvis tilted forward, the back lordotic, the neck erect with the chin tucked in

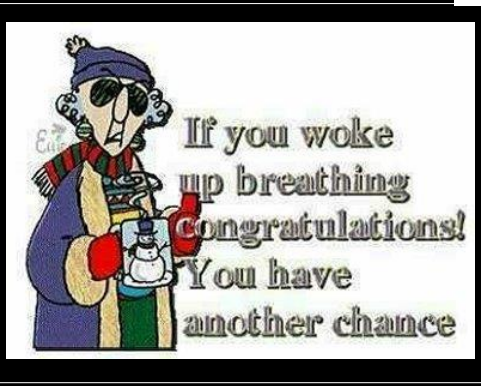
Posture

"Posture follows movement like a shadow"

- Sherrington 1906



*Adapted from Tom Myers *What is Fasica? Webinar with The Benjamin Institute 5/10/11*



Respiration vs. Breathing

- We must differentiate between the spontaneous act of oxygenation, and the act of breathing for other purposes outside of respiration
  - *Respiration* is the exchange of gases, as oxygen cannot be stored in the body
  - *Respiration* depends on the oxygen needs of the body
  - *Breathing* influences our actions and emotions and is influenced by our actions and emotions

Respiration is automatic, breathing is conscious

Calis-Germain, 2006

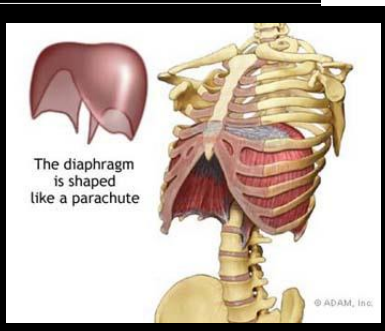
Respiration vs. Breathing

- Two principle types of breathing
  - Costal
  - Diaphragmatic
  - Both have variations
- Neither one is right or wrong
  - Simply adapt for the purpose or task at hand
  - Important to practice a variety of techniques, especially if you use one variation more than others

Diaphragm

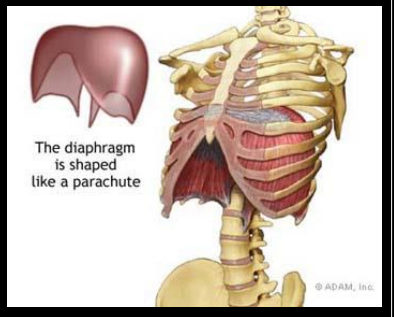
Sternal Part
•Attached at the posterior aspect of the xiphoid

Costal Part
•Arises from anterior surfaces of inferior 6 ribs and costal cartilage
•Muscular slips intertwine with fibers of the TA



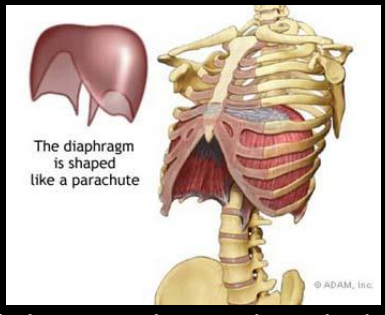
Diaphragm

Lumbar Part
•Attaches to the anterior surface of the first 2-3 lumbar vertabrae and discs (crua)
•L and R crua attach at T12/ L1



Diaphragm

Lumbar Part
•Med and Lat Arcuate LL forms a fibrous arch (read DIRECT ATTACHMENT) between TL fascia, psoas, crus, and QL



**** Gives cause for direct anatomical connection between breath, rib position and lumbar spine *****

Relationships

- Breath facilitates movement
- Movement facilitates breath
- Breath facilitates stability
- Stability facilitates mobility

Breath Facilitates Movement

- Inhalation
  - Thoracic extension
  - Shoulder flexion, scapular elevation, humeral internal rotation
- Exhalation
  - Thoracic flexion
  - Shoulder extension, scapular depression, humeral external rotation
- Combination
  - Lateral flexion/side bend (unilateral breathing)
  - Rotation

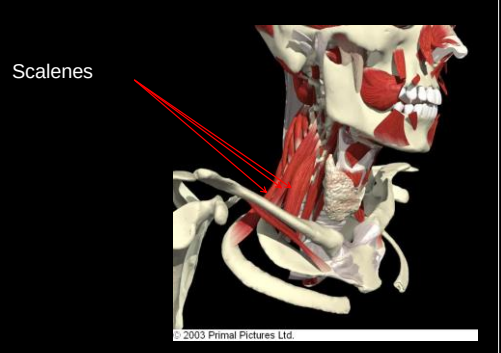
Movement Facilitates Breath

- Thoracic Extension
  - Anterior inhalation
- Spine Flexion
  - Posteriolateral breathing
- Lateral Flexion
  - Unilateral breathing

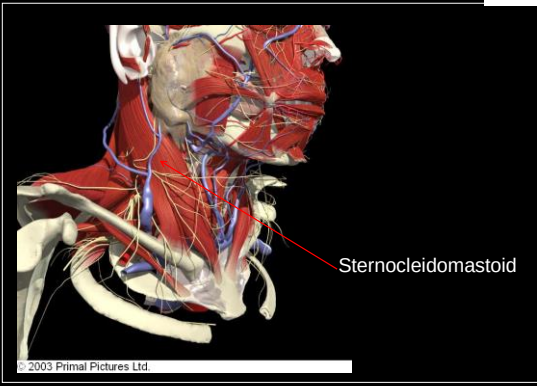
Breath Facilitates Stability

- Maintenance of optimal spinal position (axial elongation) during movement
  - Inhalation when hips flex or shoulder extend
  - Exhalation when hips extend or shoulders flex
- Diaphragmatic breath provides connection to spine and facilitation of force couple between pelvic floor, abdominal region, and spinal intrinsics
- Forced exhalation increases oblique activation and force couple increasing intra-abdominal pressures

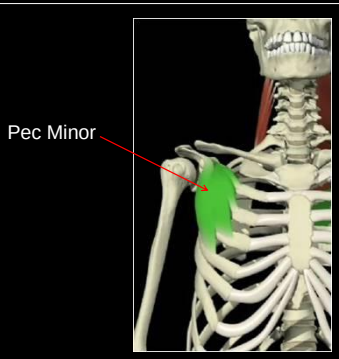
Scalenes



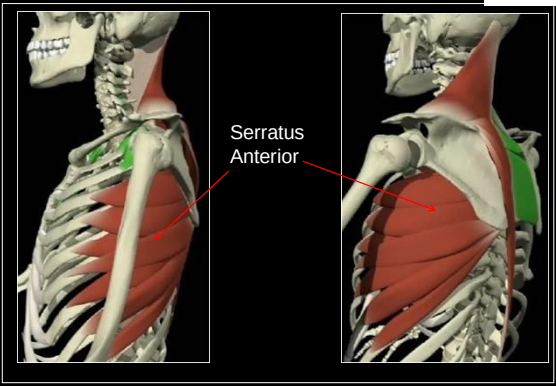
SCM



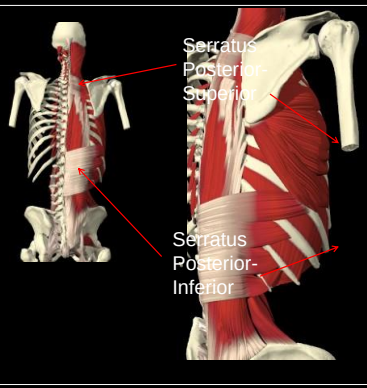
Pec Minor



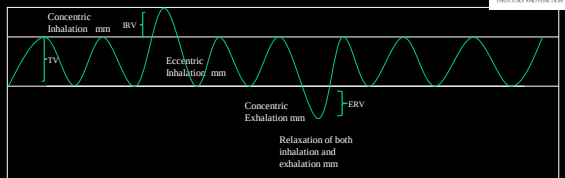
Serratus Anterior



Serratus Posterior



Tidal Volume and Reserves



Normal tidal volume

- Generally uses diaphragm
- Low use of inspiratory mm during inhalation
- Relaxation of inspiratory mm during exhalation

Inspiratory Reserve Volume

- Inspiratory muscles work more concentrically and eccentrically
- Expiratory muscles relax

Expiratory Reserve Volume

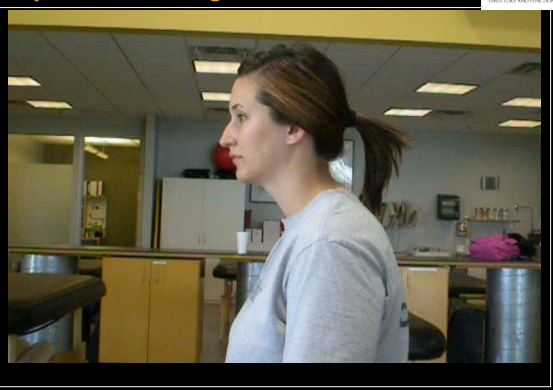
- Concentric work of expiratory mm
- Relaxation of inspiratory mm

COMPENSATORY POSTURES & MOVEMENTS

Static Posture

8 weeks of training

Apical Breathing



Hypertonus of the Paraspinals

Kolar, 2008

Static Posture

Inspiratory Position of the Chest

Kolar, 2008

Rainbow Breathing

Lateral Side Breathing

Interventions

- General mobility
- Jt specific mobility

PA Mobs with Wedge

Sitting Thoracic Mobilizations

TLRR1

TLRR2

Tennis Ball T/S Mobility

Pec Minor Release: Floor

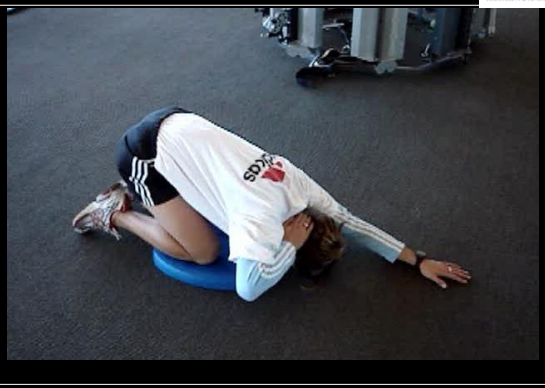
Pec Minor Release: Wall

Floor Slide

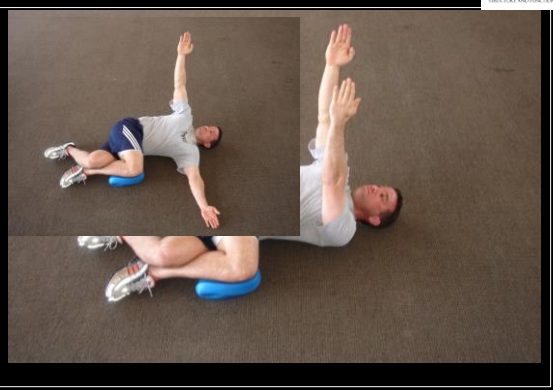
Wall Sit

Supine Lat Stretch with Expiration

Mid Thoracic Stretch- Heel Sit

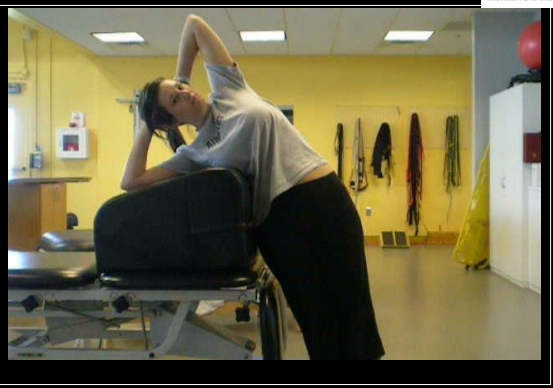


Active Thoracic Rotation



Active Rotation/ Extension in OHS

Assisted Lateral Side Bend



Assisted Lateral Side Bending 2

Supine Lateral Bending

Mermaid

Upper Thoracic Extension

Upward and Downward Dog

Back Bend 1

Back Bend 2

Back Bend 3

Back Bend 4

Thoracic Flexion

- You will see a “flat spot” in the t-spine, where you no longer see or see less prominent thoracic spinous processes
- Restore with:
  - Pec Minor Release
  - Diaphragm Release
  - Abdominal Release

Summary

- Remember Specific Breathing Patterns
  - 3D breath
- Restore Thoracic Mobility
  - Esp. extension and rotation
- Lumbar stability and hip mobility for comprehensive program

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