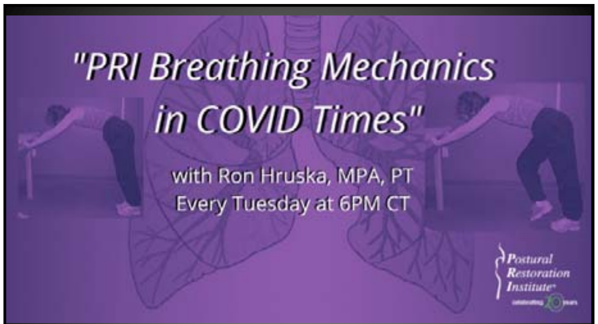

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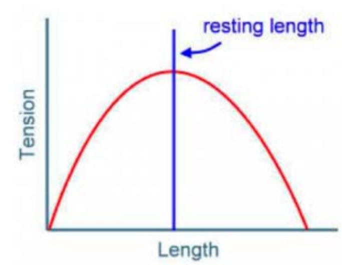
WEEK 6: INTERNAL OBLIQUE ABDOMINAL INFLUENCE ON EXTERNAL ROTATED RIB AIRFLOW OBSTRUCTION

Abdominal muscles compress the abdominal contents.

How they compress the abdominal contents determines the passive length-tension curve of the diaphragm, lung volume that corresponds with abdominal pressure, and passive length-tension of the abdominals (specifically the internal oblique and transverse abdominis).

Our pattern of chest wall compliance, alveolar airway function, lung arterialization, pulmonary drainage of fluid, amount of lung dead space, pleura cavity negative pressure, levels of CO_2 and chronicity of obstructive lung dysfunction (all subjects we have covered over the last 5 weeks), are influenced by our ability or inability to integrate the left internal obliques/transverse abdominis (IOs & TAs) with the right external oblique (EOs) during inhalation.



Length-Tension Curve
of a Single Muscle Fiber

Image from: https://conanfitness.com/articles/stretching-the-dos-and-donts/attachment/length-tension-relationship-muscle/

This week, we are focusing on the need to keep the abdominal/diaphragm muscle <u>length</u>-tension ratios balanced for good lung perfusion and ventilation, by reinforcing simultaneous directed and desirable expansion of the chest wall, and associated lung volume, through integration of left internal oblique abdominal shortening during inspiration.

The isometric, length-tension curve represents the force a muscle is capable of generating while held at a series of discrete lengths.

When tension at each length is plotted against length, a relationship of tension to force capability can be predicted.

Force generated by a muscle is also a function of its velocity.

The velocity of contraction of the human right hemi-diaphragm therefore, is higher on the right than the left because of this predictable, normal imbalance of tension between the two zones of apposition.

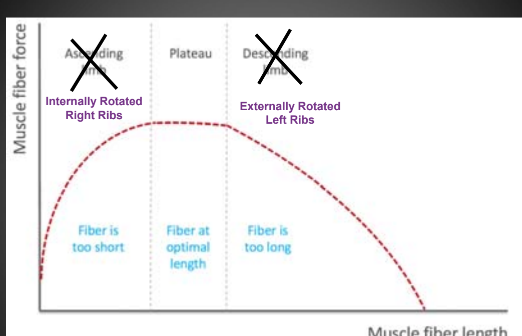


Image has been modified from: https://www.strengthandconditioningresearch.com/perspectives/stronger-joint-angles/active-length-tension-3/

The co-contraction of the left internal oblique abdominals with the left anterior costal diaphragm, will decrease the external rotation of the left anterior chest wall and correlated functional residual capacity (FRC).

It also enhances left diaphragm leaflet force for inspiratory pull to create desirable negative pleural pressure and to reduce airflow obstruction from left ribs that are too externally rotated when gravitational pull on the body is over-lateralized to the right.

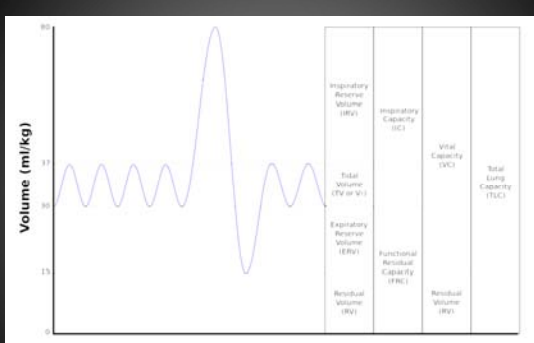


Image from: https://en.wikipedia.org/wiki/Tidal_volume

Sequential operation of these individual abdominal muscles needs to be modified, during inhalation, to reduce the compensatory lower chest wall rotation to the left facilitated by left external rib rotation, and associated airflow obstruction at the right upper lateral chest wall and left lower posterior chest wall.

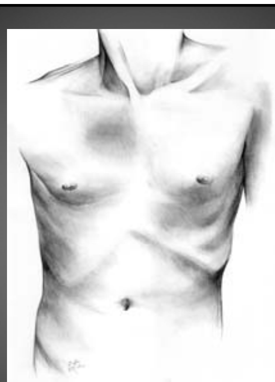
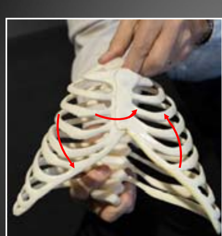


Illustration by Elizabeth Noble for the Postural Restoration Institute®



The PRI techniques outlined in this presentation, along with the others that were discussed in preceding webinar presentations, will foster balanced length-tension of biased positionally placed muscle attachments corresponding with airways and arterialization association with right ground placement and positional security.

Our respiratory muscle length-tension ratios are developed and maintained by our 'memory' of mass support and postural pleural passivity.

The last three presentations in this webinar series will focus on how to maintain a new paradigm of pleural position, spinal and rib cage rotational balance and sense of balanced body weight on the ground or the surface one sits on.

Unilateral External Oblique Function

- ✓ Ipsilateral side flexion and contralateral trunk rotation
- ✓ Increases intraabdominal pressure more so on the ipsilateral side

The right external oblique assists in maintaining intrabdominal pressure and opposition to the contralateral internal obliques during left diaphragmatic contraction upon inhalation.

Contraction of the external oblique on the right, without trunk rotation to the left will stabilize the left internal oblique to become a better internal rotator of the lower left ribs during inhalation.

This allows better expansion of the lung and ribcage at the left mid-posterior and lateral regions, which is needed more than on the right side because of the asymmetrical function and form of each external oblique attachment and each corresponding diaphragm leaflet attachment to each side of the lower ribs.

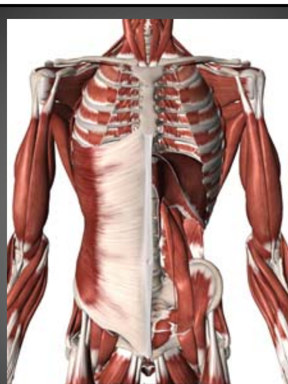


Image is from 3D4 Medicals Essential Anatomy 5 application.

Unilateral Internal Oblique Function

- ✓ Ipsilateral side or lateral flexion of the trunk, with ipsilateral trunk rotation
- ✓ Increases intraabdominal pressure more so on the ipsilateral side

The left internal oblique is a major mover of the left lower ribs, which is so necessary to preserve opposition and apposition to the costal fibers of the left hemi-diaphragm.

This internal rotation of the left lower ribs secondary to both eccentric (lengthening contraction) and concentric (shortening) contraction empowers simultaneous external rotational function on the right.

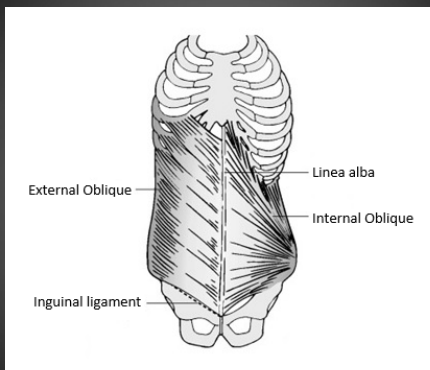
External rotation of the ribs on the right allows for better overall lateral lung perfusion and lateral chest wall ventilation on the right.

Image is from 3D4 Medicals Essential Anatomy 5 application.

The left internal oblique and the right external oblique contract as the torso flexes and rotates to bring the right shoulder towards the left hip.

If the right external oblique operates without simultaneous contraction from the left internal oblique, trunk flexion is lost and the right shoulder will move forward to the left on a straight or extended spine.

This greatly reduces lung function and contributes to positive pleural pressure, increased FRC, hyperinflation, respiratory alkalinity, and airflow obstruction.



The balance between the insertion force of the IOs and EOs on the anterior lower diaphragm is so imperative to effectively deflate the rib cage, increase abdominal pressure for postural regulation and inflate the lower rib cage without assistance from cervical inhalers.

Insertional force provided by the abdominal muscles will depend on three variables related to respiration:

1. Tension developed in the diaphragm muscle fibers during lateral torso flexion.
2. Orientation of the diaphragm muscle fibers.
3. Distance between the site of diaphragm muscle insertion on the ribs and the center of rotation of the ribs (spine).

Our internal oblique abdominal muscle, especially on the left side of our body, provides the necessary tension and the necessary vector on the lower ribs to lower them so that the ipsilateral diaphragm can maintain the necessary distance from the center of rotation of the ribs on the spine for efficient and effective diaphragmatic pull upon inhalation.

Two PRI techniques that will promote left internal oblique integration with right external oblique function for unobstructed and reciprocal airflow in the human respiratory asymmetrical designed system are:

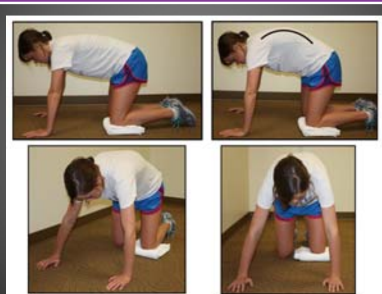
All Four Left Posterior Mediastinum Expansion in Left Trunk Rotation

The one inch block or raised surface under the left hand facilitates engagement of the left IOs through passive orientation of the upper torso to the left and active stabilization in this position from the right EOs.

By placing the hand, arms and shoulders in this position, and by arching the back upward, the left diaphragm becomes dependent on the left IOs and right EOs for the pull that is required by the left IOs and left diaphragm to expand the back and lateral side of the left chest wall; thereby reducing both lung and chest wall obstruction.

By positioning the left IOs in this position, the left lower ribs will not move out of internal rotation.

All Four Left Posterior Mediastinum Expansion in Left AF IR



The one inch towel or raised surface under the left knee facilitates engagement of the left IOs through passive orientation of left lower torso to the left and active stabilization in this position from the right EOs.

By “tucking” your bottom under you, your center of mass will move to the left and your right mid to low back will laterally flex.

The effects of breathing in or pulling in through your nose in this position will be the same as the former technique. However, this position gives a better sense of the left IOs and abs in general because of the slight lengthening of the left IOs and because of the left IO's passive pull on the left lower ribs prior to the inhalation.

Upon inhalation the right lower ribs will move more into right external rotation with respect to the left, because of the slight anterior positioned lower right rib cage, pelvis and hip.

THANK YOU!

We hope you will join us again next week!

WEEK 7:
Maximizing Mechanical Reciprocal Respiration Force Through The Integration of Intercostals, Wrist Extensors and Ankle Dorsiflexors