



**"PRI Breathing Mechanics
in COVID Times"**

with Ron Hruska, MPA, PT
Every Tuesday at 6PM CT



THIS WEBINAR SERIES AND ACCOMPANYING DOCUMENTS ARE NOT INTENDED FOR THE PURPOSE OF PROVIDING MEDICAL ADVICE. All information, content, and material provided during this webinar series is for informational purposes only and is not intended to serve as a substitute for the consultation, diagnosis, and/or medical treatment of a qualified physician or healthcare provider. If you think you are experiencing symptoms consistent with COVID-19 or any other medical emergency, please contact your doctor or hospital.


Purpose of this Webinar Series is to:



1. Outline common postural patterns of the chest wall and the influences they have on the underlying lung arterialization, perfusion and ventilation.
2. Describe how to improve chest compliance for lung compliance, through activities that compliment good diaphragm position, so that overall pressure (neuro and mechanical) from our chest wall can be reduced.


Copyright © 2020 Postural Restoration Institute®

3. Focus on repatterning chest wall mechanics during rest and upright activities that can empower our smallest aveolar airways and maintain opening of our largest bronchi, both for arterialization and fluid drainage.
4. Provide you, the listener, the breather, the chest wall owner ... ways to maintain normal breathing mechanics by focusing on both of your two chest walls and accompanying underlying cavities that mechanically massage, move, transport, lift, slide, squish, squirm, drain, fill, pull apart and push lungs.




Copyright © 2020 Postural Restoration Institute®

PLEURA PURPOSE




Copyright © 2020 Postural Restoration Institute®

Pleura is one of the two membranes around the lungs. These two membranes are called the visceral and parietal pleurae. The visceral pleura envelops the lung, and the parietal pleura lines the inner chest wall. These membranes follow the action of what they cover and are there because both the lungs and the chest wall MOVE with or without each other. If they move without each other, the pleural sacs, which are filled with fluid for membrane movement lubrication, become inflamed. This inflammation is condition is called pleurisy.



Copyright © 2020 Postural Restoration Institute®

The space between the two pleurae contains negative pressure that keeps the lungs inflated, but also keeps us capable of moving our chest walls for walking, talking, reaching, etc.




Copyright © 2020 Postural Restoration Institute®

**LUNG OVERVIEW AS
RELATED TO PHYSIOLOGIC
MECHANICS**

Copyright © 2020 Postural Restoration Institute®

We have two lungs, one larger (right with 3 lobes) and one smaller (left with 2 lobes)



They provide the pressure our chest walls need for postural support, shock absorption and valsalva maneuvers.

Copyright © 2020 Postural Restoration Institute®

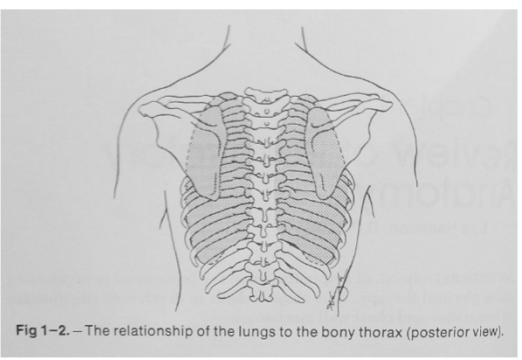


Fig 1-2. – The relationship of the lungs to the bony thorax (posterior view).

Figure from: Frownfelter DL. Chest physical therapy and pulmonary rehabilitation: An interdisciplinary approach (1978). Year Book Medical Publishers, Inc. Chicago.

Our lung function depends on our "incentive" to breathe in for:

- > Chest wall positioning and re-positioning
- > Anti-gravitational assistance
- > Extremity integration

Copyright © 2020 Postural Restoration Institute®

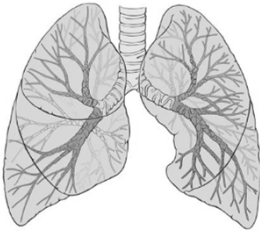
Our lungs have 5 surfaces: Apex, base, costal, medial and diaphragmatic.

All 5 surfaces were designed to move toward one or more of each other, or away from one or more of each other in a spiral, coil-recoil like manner.

This twisting is provided by the patterned or un-patterned chest wall movement.

Copyright © 2020 Postural Restoration Institute®

Our right lung is heavier, wider and shorter; while our left lung is longer, thinner and lighter.



Copyright © 2020 Postural Restoration Institute®

The chief physiologic purpose of our lungs is to arterialize blood.



Arterialization is the conversion of venous blood into arterial blood by and through absorption of oxygen into the lungs.

Copyright © 2020 Postural Restoration Institute®

It is important that ventilation areas of the lung be in contact with perfused areas of the lung.



Conditions that alter the ventilation or perfusion of part of the lung will also affect the gas exchange in that portion of the lung.

Copyright © 2020 Postural Restoration Institute®

Uneven ventilation occurs when there is uneven airway resistance or uneven compliance in different parts of the lung.



Uneven airway resistance may be due to airway narrowing (bronchoconstriction in asthma, mucous plugs, edema) or collapse (emphysema).

The lungs may also expand unevenly as a result of effects of gravitational position patterning, fibrosis, emphysema, pleura thickening secondary to limited pleura movement, effusions, or pulmonary edema.

Copyright © 2020 Postural Restoration Institute®

Ventilation is the exchange of air between the lungs and the atmosphere so that oxygen can be exchanged for carbon dioxide in the alveoli or the tiny air sacs in the lungs.

Perfusion is the passage of fluid through the circulatory system through a capillary bed in tissue of the lung.

Copyright © 2020 Postural Restoration Institute®



The areas of the best gas exchange will occur where there is the greatest amount of perfusion and ventilation.

This occurs toward the base of the lungs in erect humans.

Copyright © 2020 Postural Restoration Institute®



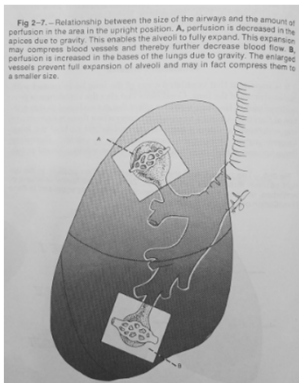


Figure from: Frownfelter DL. Chest physical therapy and pulmonary rehabilitation: An interdisciplinary approach (1978). Year Book Medical Publishers, Inc. Chicago.



Changes in posture secondary to positions of ease and comfort or habitual patterning changes perfusion and ventilation positions and patterns of arterialization.

Copyright © 2020 Postural Restoration Institute®



Fig 2-6.—The perfusion of the lung is dependent on posture. In the upright position three areas can be seen. Zone I has perfusion in excess of ventilation, in Zone II perfusion and ventilation are fairly equal and in Zone III ventilation occurs in excess of perfusion.

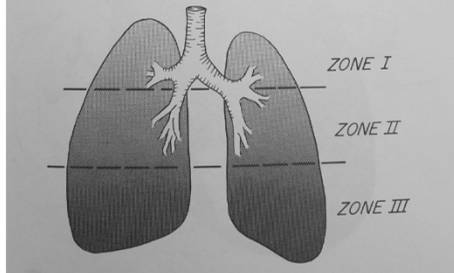


Figure from: Frownfeller DL. Chest physical therapy and pulmonary rehabilitation: An interdisciplinary approach (1978). Year Book Medical Publishers, Inc. Chicago.



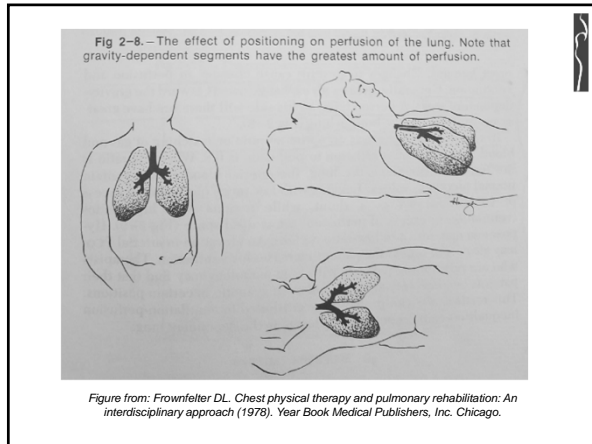
Activities that change gravitational position will have an influence on greater gas exchange occurring toward the gravity dependent areas.

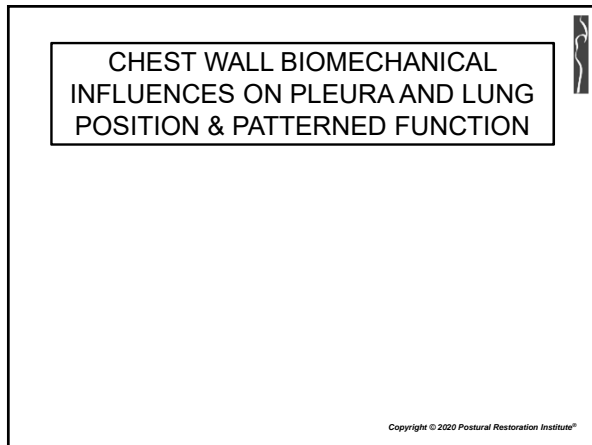
For example, activities that are used to enhance integration of senses and extremities can be influenced by the position one places the lobes of the lung in for gravitational assistance.

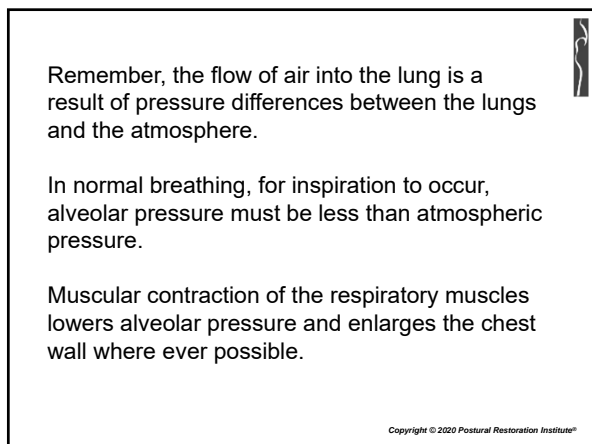
A person lying on his or her side will therefore have greater gas exchange in the bottom lung.

Copyright © 2020 Postural Restoration Institute®









Exhalation occurs when alveolar pressure is greater than atmospheric pressure, as the chest wall recoils, relaxes, or intercostals contract.

Exhalation can also be limited because of the chest wall's inability to compress the lungs.

Leaning, listing or laying to one side limits both exhalation and inhalation mechanics of some part of the chest wall.

The most common site of limitation is the right anterior apical lobe and the left posterior base lobe.

Copyright © 2020 Postural Restoration Institute®



Those airways are influenced by first and foremost, the position your chest is in and likes to stay in, the muscular patterned activity around the chest wall, your sight, your hearing, your occlusion, your feet and your passions.

Copyright © 2020 Postural Restoration Institute®



The bronchi of the airways continue to divide until there are 23 generations or divisions.


The diameter of these airways become progressively smaller with each generation.

Copyright © 2020 Postural Restoration Institute®



The positions of the diaphragm and its range of movement and the airflow to these respiratory alveolar sacs vary with chest wall posture and position.


PRI non-manual techniques are designed around diaphragm and chest wall positions.



Copyright © 2020 Postural Restoration Institute®

The average movement of the diaphragm during quiet respiration or with increased ventilation is higher on the right side than on the left.


Therefore, activities that empower the left diaphragm movement and ventilatory ability balances this human breathing and body imbalance and promotes less overall breathing discord following a respiratory or pulmonary event or episode.



Copyright © 2020 Postural Restoration Institute®

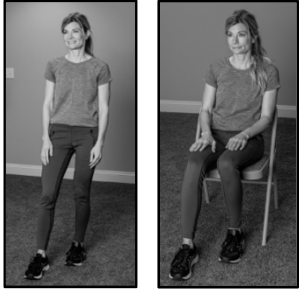
The greatest respiratory excursions during normal breathing occurs in supine.

However, one must remember that the lung volume decreases secondary to elevation of the position of the internal organs under the diaphragm.



Copyright © 2020 Postural Restoration Institute®

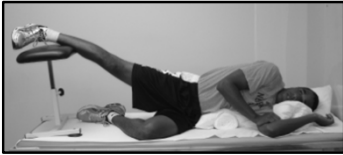
Your lung volume increases when you stand or sit.



Copyright © 2020 Postural Restoration Institute®

In sidelying, the lower chest has a higher excursion. The diaphragm on the lower side rises further in the thorax than the dome of the diaphragm on the upper side.

This is one of the reasons why, when possible, PRI practitioners should consider left sidelying non-manual techniques.



Left Sidelying Right Apical Expansion with Passive Right FA Abduction (Sidelying Right Intercostal Inhibition #7)

Copyright © 2020 Postural Restoration Institute®

In this PRI Webinar Chest Wall series, I will be focusing on positional patterning of biomechanical chest wall activity for:

- Breathing retraining
- Chest mobilization
- Postural and thoracic duct drainage
- Positional rotation for prophylactic treatment of bacterial pneumonia using PRI guidelines
- Sensory awareness processing of regional chest wall and thorax inhalation and exhalation

Copyright © 2020 Postural Restoration Institute®

Thank you for joining us!

**We look forward to spending
Tuesday evenings with you for this
webinar series!**



*Postural
Restoration
Institute®*
celebrating 20 years