



LAB

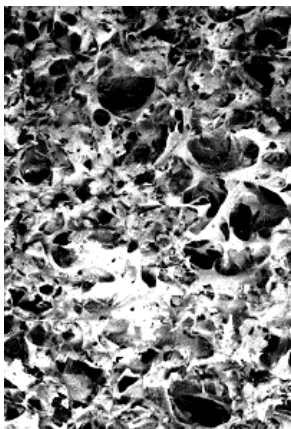
RESPIRATORY PHYSIOLOGY

Dr. Lawrence G. Altman
www.lawrencegaltman.com
Some illustrations are courtesy of McGraw-Hill.

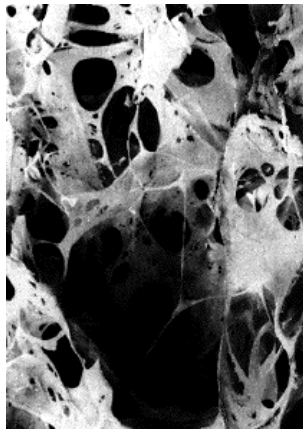


LAB

RESPIRATORY PHYSIOLOGY



NORMAL LUNG
(x100)



EMPHYSEMA
(x100)

EMPHYSEMA

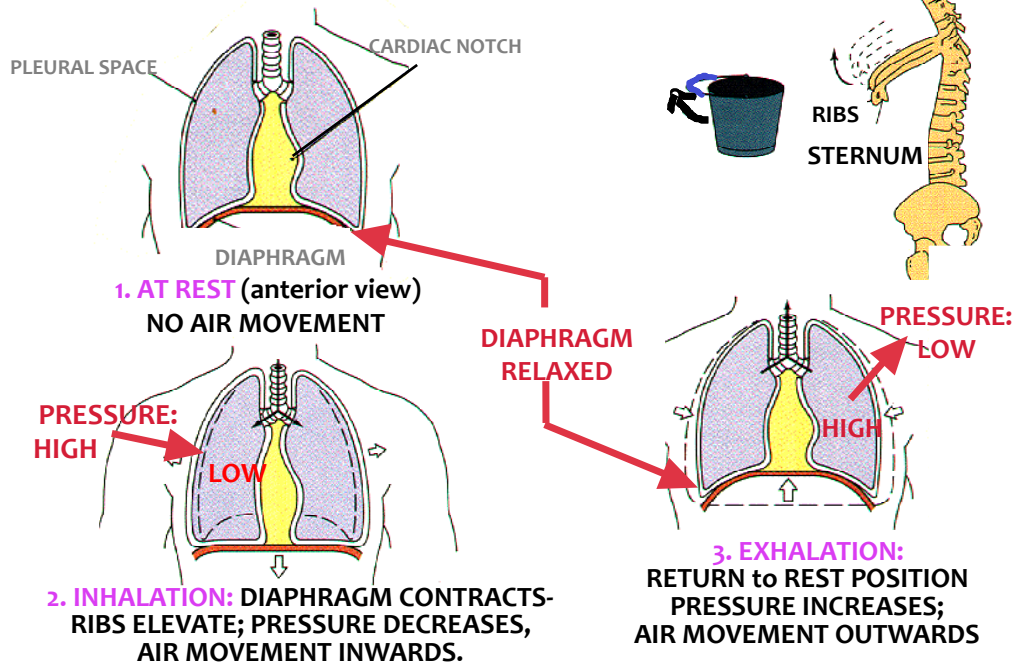
Among elderly,
heavy cigarette smokers
and city dwellers.

Bronchial enlargement.
Damage to alveoli.
Partial airway collapse.

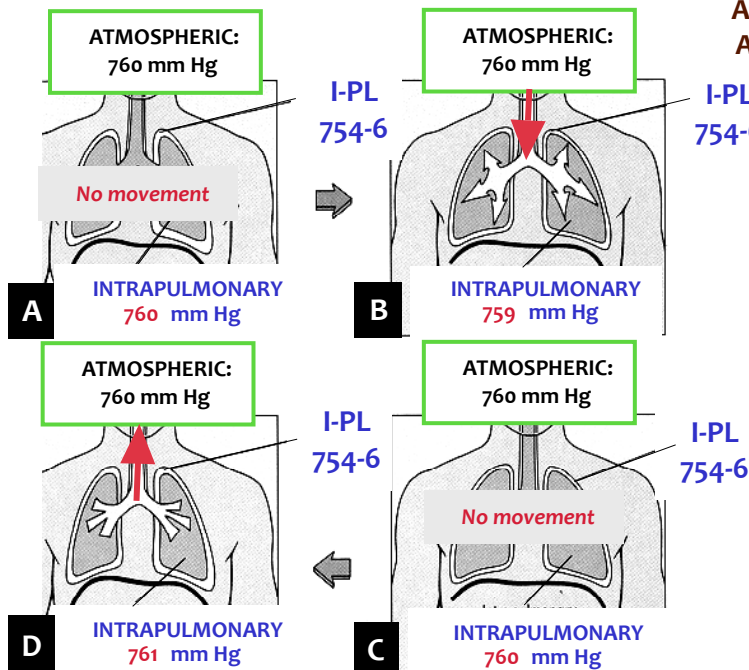
Loss of elasticity in the
lungs characterized by
difficulty exhaling.

INTRO to MECHANICS of PULMONARY VENTILATION

WHEN RIBS ELEVATED/DIAPHRAGM DEPRESSED: THORACIC CAVITY VOLUME INCREASES. (THORACIC CAVITY PRESSURE LOWER THAN ENVIRONMENT)



PRESSURE GRADIENTS



PNEUMOTHORAX:
Air gets into pleural cavity. Atmospheric equalization. Lung collapses

- Puncture wounds
- Alveolar rupturing

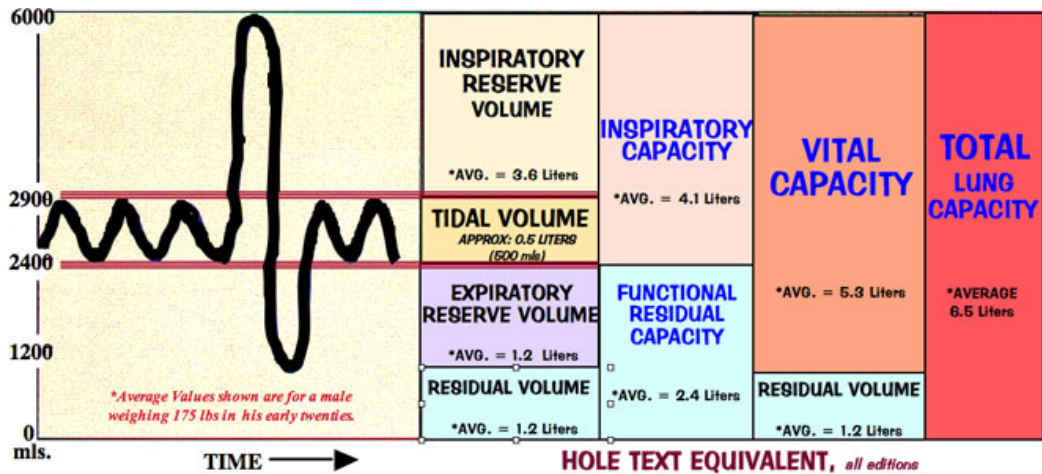
A END of EXPIRATION

B DURING INSPIRATION

C END of INSPIRATION

D DURING EXPIRATION

NOTE: BAROMETRIC = another term for atmospheric



TIDAL VOLUME Amount of air one breathes (IN or OUT) during a normal breath.
INSPIRATORY RESERVE VOLUME Amount of air one can breathe IN over and above a normal inhalation.
EXPIRATORY RESERVE VOLUME Amount of air one can breathe OUT over and above a normal exhalation.
RESIDUAL VOLUME Amount of air remaining in air passages after a maximum forced exhalation.

LUNG CAPACITIES: *ADDING 2 or more Lung Volumes*

VITAL CAPACITY Amount of air one can forcibly inhale after a maximum forced exhalation.
INSPIRATORY CAPACITY Maximum amount of air that can be inspired after a normal exhalation.
FUNCTIONAL RESIDUAL CAPACITY Amount of air remaining after a normal exhalation.
TOTAL LUNG CAPACITY Sum of all four volumes.

Determination of Vital Capacity

Definition on the Handout and in Lab Manual:

Amount of air one can forcibly inhale after a maximum forced exhalation.

Instructor will demonstrate how to use a spirometer

Determination of Breathing Rate (Breaths per minute)

Breathe normally.
 Count number of times you breathe in 30 seconds.
 (one breath = 1 inhalation + 1 exhalation)
 Perform three trials.
 Take average of the 3 trials.
 Multiply by 2 (to equal minute).

Minute Respiratory Volume:
= Tidal Volume X Breathing Rate

LUNG CAPACITIES and RESPIRATORY DISEASES

Restrictive Diseases

Respiratory diseases which make it more difficult to get air INTO the lungs.
 They restrict inspiration.

Includes:

- fibrosis (tissue between the walls of alveoli is damaged) -
- sarcoidosis (granulomas associated with clumping and inflammation) -
- muscular diseases -
- chest wall deformities -

Obstructive Diseases

Respiratory diseases which make it more difficult to get air OUT of the lungs.
 They restrict expiration.

Includes:

- emphysema -
- chronic bronchitis -
- asthma -