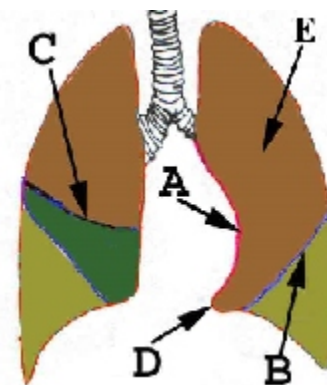


RESPIRATORY ANATOMY & PHYSIOLOGY

4/1/82, rvsd 4/21/98, 17 April 02, 23Apr08, 22Apr09, 21Apr10, 20Apr11
S&M 590, KE: 72-77, Martini's 5th: 798-842, 7th: 822-850, 8th 835-871

TRACHEA: lies anterior to esophagus, reinforced with hyaline cart. rings cilia beat upwards to remove debris (p 816)
p. 835 As it passes behind arch of aorta, branches to bronchi.

Repeated branching leads ultimately to **terminal** then **respiratory bronchioles**
Entire tract lined with **pseudostratified ciliated columnar epith.** (Except alveoli)
Bronchioles lined with smooth muscle, constrict under asthma



LUNGS: (p. 836)

left: two lobes, superior(E) and inferior, cardiac notch (A), oblique fissure (B) (up to L)
right: three lobes, also has horizontal fissure (C) as well as oblique (up to R)

PLEURA: as before: visceral, parietal, cavity containing serous fluid adhere tightly due to negative pressure

ALVEOLI (P 838, 827,)

Respiratory membrane: double layer, endo and epithelium, 2 basal laminae fused (p 840)

surfactant (reduces surface tension) is produced which causes alveoli to open up at birth.

Premature infants may have inadequate surfactant, resulting high surface tension leads to **hyaline membrane disease**

MECH OF BREATHING: ~500 mL enters and leaves per breath, 8000 mL/min
only 5% actually exchanged in alveoli per each breath

diaphragm contraction is the greatest contributor to inspiration (p 845)

Intercostal muscles also cause breathing. p. 848:

exhale: internal intercostal muscles, pulls ribs down

inhale: external intercostal muscles, pulls ribs up

inspiration: **Phrenic** nerve to diaphragm and external intercostal muscles (via intercostal nerves) to:.

exhalation: passive: elastic recoil
forceful: 1) internal intercostals 2) serratus posterior
3) external and internal obliques 4) rectus abdominis

LUNG VOLUMES: p. 850

residual	1000-1200 mL
expiratory reserve	800-1200 (beyond resting expiration)
tidal volume	500
inspiratory reserve	2100-3000 (beyond resting inspiration)
vital capacity	4800 (maximum air which can be expelled after deep breath)

Deep breathing: more efficient than shallow due to dead space in resp system.

REGULATION OF BREATHING:

respiratory center (P 863):

Medulla	dorsal respiratory group	controls quiet breathing
Pons	apneustic	triggers inspiration,
	pneumotaxic	stimulates exhalation

Trigger for breathing: high CO₂ forms carbonic acid, lowers pH, stimulates breathing. (Acidosis)
Hemoglobin can transport CO₂, carbaminohemoglobin.

RESPIRATORY PROBLEMS:

Cyanosis	due to reduced hemoglobin, darker, cyan: blue (hypoxia)
Emphysema	("an inflation") breakdown of alveolar partitions
Asthma	("panting") hyper reactive constricted airways
Pneumothorax	("air chest") air in the pleural space, causes collapsed lung.
cystic fibrosis	thick mucus accumulates in lungs (inherited error in chloride transport)
CO poisoning	forms carboxyhemoglobin, cherry red, CO binds 200x more strongly than O ₂ .

