Respiratory Topics

1) respiratory system
2) respiratory phases
3) diseases

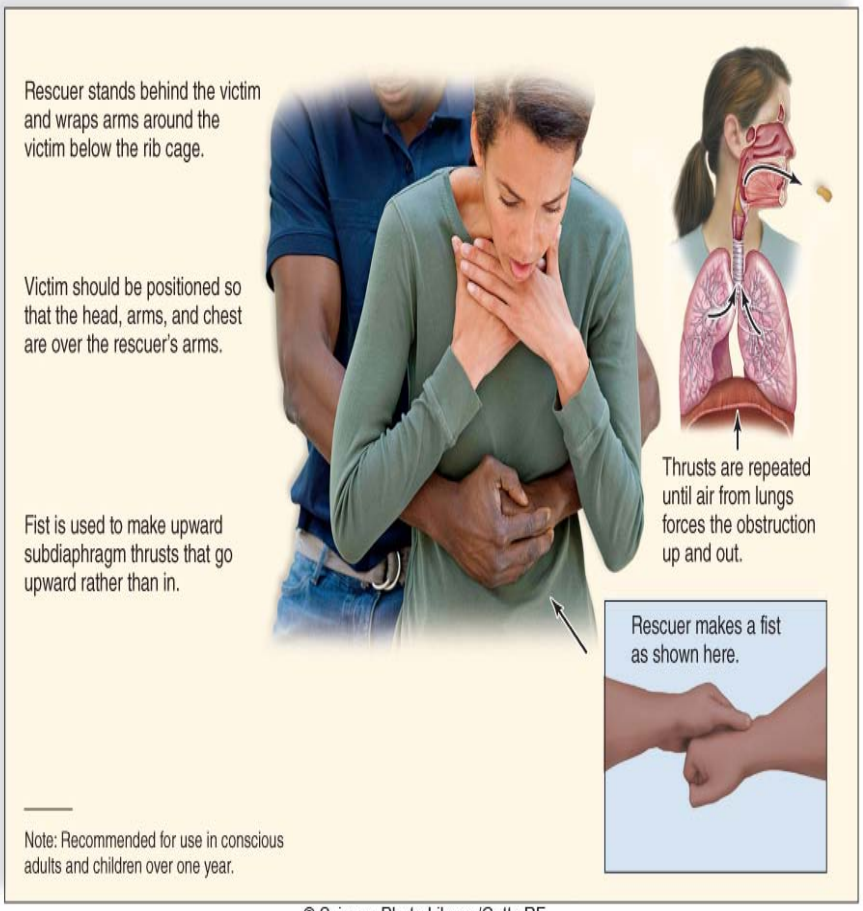
Upper Respiratory Tract (2)

nose: opening + nasal cavities
- **conn. to auditory tubes (hearing) -> vertigo**
- **conn. to sinuses -> sinus headache**
- **drain for tear ducts**

pharynx: throat
- **conn. mouth & nose to trachae**
- **tonsils for defence of airborne microbes**
- **epiglottis to open trachae or esophagus**

larynx: voice box
- **conn. pharynx & trachae**
- **vocal cords for speech**

Heimlich Maneuver



4 steps to force food out

Don't eat & talk!

note:

1) **fist pushes up, not in**
2) **not for young kids**
3) **may break ribs**

Lower Respiratory Tract (2)

trachea: windpipe
- traps air debris with mucous & cilia -> cough
- tracheotomy: breathing tube

bronchial tree: respiratory tree
- branches = bronchi, bronchioles
- "leaves" = alveoli, air pockets at end of branches

lungs: large, paired organs inside chest cavity
- right lung: 3 lobes
- left lung: 2 lobes, due to heart

alveoli: air sacs or pockets, gas exchange
- 300 million, "tennis court" surface area

Air Flow

upper tract (5, 2 routes)

a) nares ->nasal cavity

or b) mouth ->oral cavity

->pharynx ->larynx ->trachea

lower tract (4, 1 route)

trachea->bronchus->bronchioles

->alveolus

Respiration Phases

function: bring fresh air in, take stale air out

4 parts:

1) ventilation

= breathing (inhale; exhale)

2) external respiration

= gas transport (deliver air thru body)

3) internal respiration

= gas exchange (exchange air thru cells)

4) cell respiration

= gas use (use air to make cell energy)

Ventilation #1

3 phases of "breathing":

1) **pause**
2) **inhale (fresh air in)**
3) **exhale (stale air out)**

airflow:

- inhale: upper resp. tract → lower resp.

- exhale: " ← "

note:

1) **one way air flow - inhale or exhale, not both**
2) **air mixing - inhaled & exhaled air**
3) **same passages - reverse direction**

Inhaled Air Processing

outside air -> processed inside air

1) warm up
- **nasal & oral cavity**

2) moisten
- **nose -> trachae**

3) cleanup
- **nostril hair* (filter)**
- **reflexes (clear out passages)**
  - **cough: bronchi -> nose**
  - **sneeze: nasal cavity**

***cig. smoke too small to filter out**

Breath Muscles (2)

3 phases:

1) relaxed (pause)

- resp. muscles remain relaxed

- no air movement

2) inhale (inspire)

- diaphragm & rib muscles contract

- air flows in

3) exhale (expire)

- diaphragm & rib muscles relax

- air flows out

Neural Controls

Automatic breathing:

- respiratory centers in brain

- regulate breathing rate

- regulate inhale & exhale patterns

- based on activity, acid, O_2, CO_2 levels

Voluntary breathing:

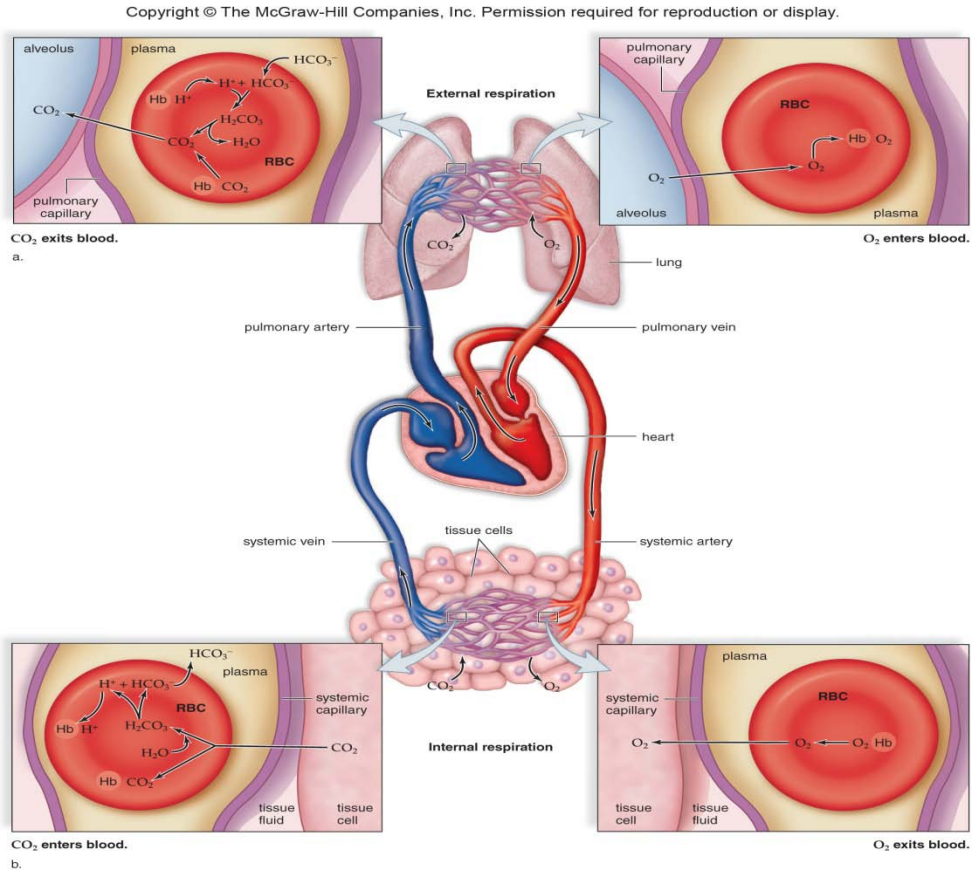
- cortex in brain

- limited in scope

- unconcious -> automatic breathing

External & Internal Resp. #2 &#3

= gas transport & exchange



← pulmonary circuit

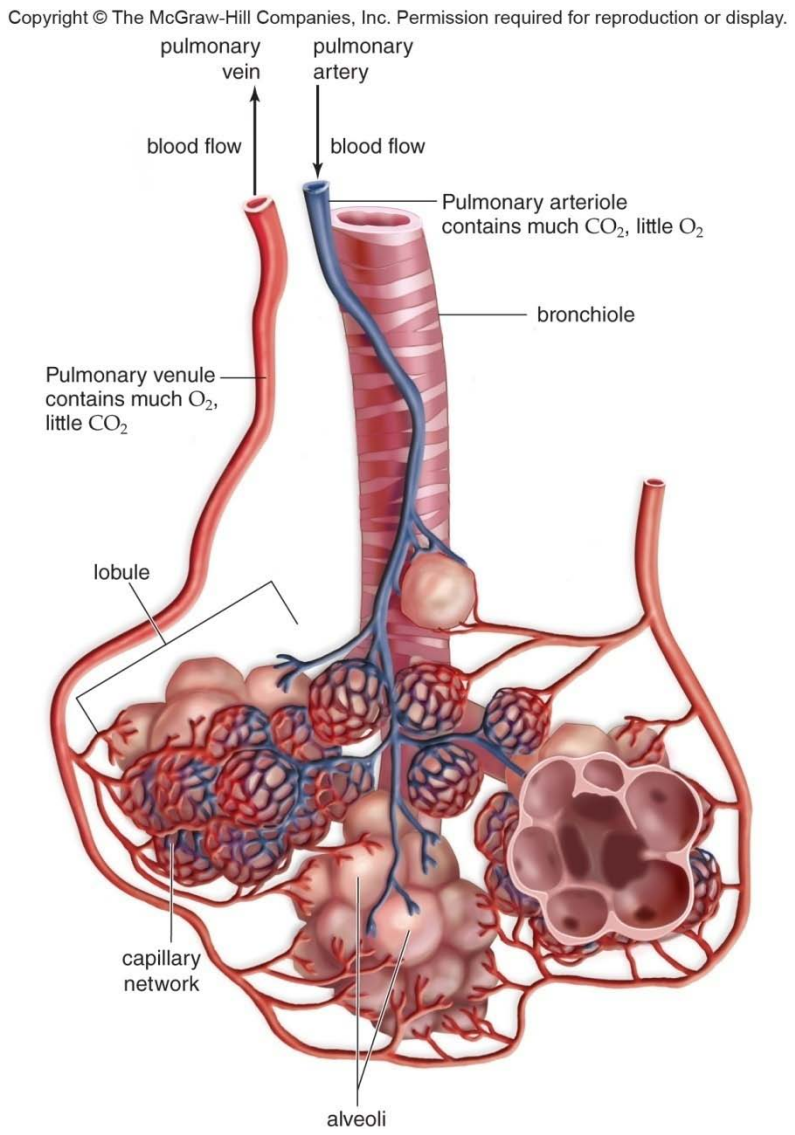
← systemic circuit

Gas Transport

circulatory system: transport gases (O_2 & CO_2)

	receives	transports to .
1) right heart:	O_2 poor blood	pulmonary circuit
2) pul. circuit:	O_2 poor blood	O_2 rich blood to left heart
3) left heart:	O_2 rich blood	systemic circuit
4) sys. circuit:	O_2 rich blood	O_2 poor blood to right heart

Pulmonary Circuit



1) **right heart**
   - **receives O_2 poor blood**

2) **pul. artery**
   - **send to pul. circuit**

3) **pul. circuit**
   - **exchange O_2 poor for O_2 rich blood**

4) **pul. vein**
   - **send from pul. circuit**

5) **left heart**
   - **receives O_2 rich blood**

Gases & Blood

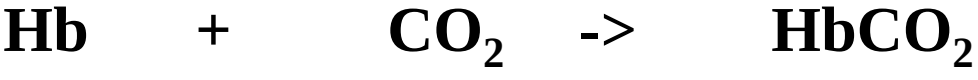
O_2 transport

1) **hemoglobin (Hb) in RBC**

2) **dissolved in blood plasma**

CO_2 transport

1) **hemoglobin (Hb) in RBC**



2) **dissolved in blood plasma**
3) **as bicarbonate**

Cell Respiration #4

= gas use (use air to make cell energy)

mitochondria inside each cell:

$C_6H_{12}O_6$ + O_2 -> CO_2 + H_2O + ATP
glucose oxygen waste water energy

note: O_2 needed; CO_2 produced

Infections (1)

infections = bacterial or viral spread,
may be infectious (contagious)

upper tract:

1) **strep throat : bacterial, throat**
2) **sinusitis: sinuses not drain, pain**
3) **otitis media: ear, vertigo, hearing loss**
4) **laryngitis: sore throat, larynx**

lower tract:

1) **bronchitis: bacterial, bronchioles**
2) **pneumonia: viral or bacterial, lungs**
3) **TB: bacterial, alveoli**

Pneumonia & TB

cause: virus or bacteria

result:

1) **lungs inflamed & damaged**
2) **excess fluid in alveoli**
3) **reduced gas exchange**
4) **fever, chills, green phlegm**
5) **contagious - airborne**

treatment:

antibiotics -if avail. & effective

- excess use -> less effect

oxygen & breathing aids

Respiratory Diseases

Describe the cause & effects of:

1) **asthma**
2) **emphysema**
3) **bronchitis**
4) **pneumonia**
5) **tuberculosis (TB)**
6) **botulism**
7) **lung cancer**
8) **pulmonary fibrosis**