Chapter 14: The Respiratory System

Nasal cavity
- filters, warms, and moistens air

Pharynx
- passageway where pathway for air and food cross

Glottis
- space between the vocal chords; opening to larynx

Larynx
- (voice box); produces sound, covered by the epiglottis during swallowing

Trachea
- (windpipe); passage of air to bronchi

Bronchus
- passage of air to lungs

Bronchioles
- passage of air to alveoli

Lung
- contains alveoli (air sacs); carries out gas exchange

Diaphragm
- skeletal muscle; functions in ventilation
The Respiratory System

- Major function is _______________

- Works with the cardiovascular system to accomplish:
  - ________________ - air into and out of the lungs
  - External respiration- ____________________________
  - ____________________________ - exchange between ________ and _______ fluid
  - Transport of gases- ____________________________
The Respiratory Tract

- cleanse inhaled air
  - Lysozyme in the mucus
  - Mucociliary escalator
- Inhaled air is warmed by __________
- Air is moistened by __________
The nose

- **The only** _________
  ____________ of the respiratory system
- Contains __________
  __________________________________________
  - Lined by a __________
    __________________
  - Nasal conchae increase the surface area for ____________
    __________________________________________
  - Odor receptors located in the ___________
pharynx –

• **Connects the**  
  ________________
  __________________
  __________________

  Three parts:
  • Nasopharynx
  • Oropharynx
  • Laryngopharynx

• Tonsils provide  
  __________________
  __________________

• The _______ and the  
  _______________ cross
The Larynx-

- **Passageway for air between**
- **The epiglottis prevents**
The trachea (windpipe)

- Connect the ________
  ____________________
- Ventral to __________
- C-shaped __________
  ____________________
- Mucosal lining has
  ____________________
  ____________________
The Bronchial Tree

- The trachea divides into ______________________
- The primary bronchi branch into
  - _____ for the right lung
  - _____ for the left lung
- The secondary bronchi divide into _______
  ________________________________
- Bronchioles are the smallest ____________________
The lungs- paired, cone-shaped organs

- Each lobe is divided into
  _______________

- Each lobule has a __________ that serves __________________________

- Pleurae
  
  _____________________________
  _____________________________
  
  The ________________adheres to the surface of the lung
  
  The parietal pleura ________
  ____________________________
  
  Produces a ________________
  ____________________________
The alveoli- site

- Alveolar sacs are made up of ________________ ____________ surrounded by ________________
- Alveoli must __________ to receive inhaled air
  - ________________ ________________ preventing them from collapsing completely
  - Respiratory distress syndrome occurs in ____________ who

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The Respiratory membrane

- Facilitates ___________________________
- Composed of juxtaposed alveolar epithelium and the capillary epithelium
- Extremely ________________
- (50-70m²)
Mechanism of Breathing

**Ventilation**

- The manner in which ________________
  ________________

- Conditions to consider:
  - The lungs lie within the ________________
    ________________
  - The lungs adhere to the ________________
    ________________
  - A continuous column of air extends from
    ________________
Inspiration-

- ______________contracts
- External intercostal muscles contract, and ______________
  ______________
- Thoracic cavity volume increases, ______________
  ______________
- ______________within the alveoli (intrapulmonary pressure)
- Air flows from ______________
  ______________
  ______________
Expiration-

- The diaphragm ______
- The intercostal muscles relax and __________
- The _____ of the thoracic cavity __________
- __________ decreases and the ____________
- Since intrapulmonary pressure __________ than atmospheric pressure,
Maximum Inspiratory effort

- Involves the_____________________________
  - Erector spinae
  - Pectoralis minor
  - Scalenae and sternocleidomastoid muscles
  - Help______________________________

- Forced Expiration
  - During______________________________
  - Involves contraction of_________________________
Spirometer & spirogram

0 Spirometer – ________________________________

0 Spirogram – ________________________________

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Respiratory volumes

- **Tidal volume**
  - __________________________
  - About 500 mL

- **Vital capacity**
  - __________________________
  - Depends on:
    - Forced inspiration
    - Increases the volume of air beyond the tidal volume by 2,900 mL
  - Increased volume of expired air
    - 1,400 mL

- **Residual volume**
  - __________________________
  - 1,000 mL
Ventilation- Controlled by

- The phrenic nerve

- The intercostal nerves stimulate the

- Normal breathing rhythm also requires
Breathing is influenced by

- **Nervous input**
  - Can influence ______________
  - Cerebral cortex, limbic system, hypothalamus, and other brain centers

- **Chemical input**
  - The respiratory center is ______________
  - Chemoreceptors in the carotid and aortic bodies are ______________
External respiration -

0 Between the air in the ____________________________

0 Oxygen
  - Higher concentration ____________________________
  - Diffuses from ________________________________

0 Carbon dioxide
  - Higher concentration ____________________________
  - Diffuses from ________________________________

0 Partial pressure
  - Amount of ________________________________
  - Symbolized as P_{O_2} and P_{CO_2}
  - _____________ P_{O_2} is higher than _____________
Internal Respiration

Between the __________________________

• **Oxygen**
  - Higher concentration
  - Diffuses from the __________________________

• **Carbon dioxide**
  - Higher concentration
  - Diffuses from the __________________________
Oxygen Transport

- By ___________________ in the ___________________

- Can combine with ___________________ oxyhemoglobin

- Can release oxygen ___________________

- Small amount transported ___________ ___________________
Carbon Dioxide Transport

- Dissolved gas in __________ and in the __________ of ______________ cells
  - Combined with _______________ – carbaminohemoglobin
  - Most is carried as _______________
    - Carbon dioxide combines _______________
    - _______________ into hydrogen ions and bicarbonate ions
    - _______________ with the globin portion of hemoglobin (reduced hemoglobin)
    - Bicarbonate ions diffuse _______________
Respiratory system regulates

- Bicarbonate/Carbonic acid buffer system is altered.
  - Hypoventilation = __________ = __________ = acidosis (pH less than 7.35)
  - __________ = decreased CO₂ = increased pH = __________
Upper Respiratory Tract Infections

- Spread from the nasal cavities to the _______________________
- _______________________

- Viral infections can lead to _______________________
- _______________________

- Strep throat
  - _______________________
  - Caused by *streptococcus pyogenes*
  - Can lead to a generalized _______________________
  - ________________________
Sinusitis

- Develops when nasal congestion

  - Symptoms include:
    - Postnasal discharge
    - Facial pain

  - Treatment depends on
Otitis Media-

- Often a complication seen in _______
- ______________ is the primary symptom
- Other symptoms include:
  - Sense of fullness
  - Hearing loss
  - Vertigo
  - Fever
- Treatment is ___________________
Tonsillitis

- Tonsils - masses of

- Tonsillectomy –

Laryngitis

- Hoarseness leads to the inability to talk in an audible voice
- Causes:
  - 
  - 
  - 
Lower Respiratory Tract infections

- **Bronchitis**
  - Bacterial infection of the ________________

- **Pneumonia**
  - ________________ of the lungs
  - ________________ fill with thick fluid
  - Risk factors include:
    - Advanced ________________
    - Weakened ________________
    - ________________ and being ________________

- ________________
  - Caused by the tubercle bacillus bacterium
  - Lung tissue develops ________________
  - Tuberculosis skin test can detect ________________
**Pneumonia**
Alveoli fill with pus and fluid, making gas exchange difficult.

**Bronchitis**
Airways are inflamed due to infection (acute) or due to an irritant (chronic). Coughing brings up mucus and pus.

**Pulmonary Fibrosis**
Fibrous connective tissue builds up in lungs, reducing their elasticity.

**Pulmonary Tuberculosis**
Tubercles encapsulate bacteria, and elasticity of lungs is reduced.

**Emphysema**
Alveoli burst and fuse into enlarged air spaces. Surface area for gas exchange is reduced.

**Asthma**
Airways are inflamed due to irritation, and bronchioles constrict due to muscle spasms.
Restrictive Pulmonary Disorders

- ______________ is reduced
- Lungs have lost ________________
- **Pulmonary fibrosis**
  - ________________ in the lungs
    - Can be caused by inhaling:
      - Silica
      - Coal dust
      - Asbestos
      - Clay
      - Cement
      - Flour
      - Fiberglass
Obstructive Pulmonary Disorder Cause

- Air does not flow ____________________________
- __________ or ___________ is greatly increased
  - _______________________________
  - Develop slowly, over a long period of time
  - Recurrent
  - Chronic bronchitis
    - Airways are _______________________________
    - Bronchi have _____________________________
- chronic incurable disorder

- Alveoli are ______________________
- __________have been damaged and the ______________ for gas exchange has been ____________________
- Often preceded by _______________
- Lungs have ______________________
- Exhaling is ___________ and __________ ________________ increases
- ___________________reaches the heart and brain
- acute obstructive disorder

- Disease of the ________________________________
  - Marked by:
    - ________________________________
    - ________________________________
    - ________________________________
    - Sometimes a ______ and ______________
    - ________________________________
  - Airways are ________________________________
  - Is not curable, but ________________________________
Lung cancer-

- and of the cells lining the

Cells with appear in the

Cells other tissues

Pneumonectomy –  

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Effects of Aging

- Respiratory fitness
- Maximum breathing capacities
- __________________________ becomes less efficient
- Respiratory membrane
- __________________________ decline in number
- __________________________ are more common
Homeostasis

- Regulation of ______________
- Control of _________________