Asthma Management

Introduction, Anatomy and Physiology

University of Utah

Center for Emergency Programs

and

The Utah Asthma Program

Incidence, Impact and Goals of Asthma Management

Prevalence, Morbidity & Mortality

- In 2003
  - 20 Million Americans Diagnosed
  - 72% men and 86% women
- 8% of Utahn's have Asthma
- In 2002…
  - 4,200 Deaths
  - 480,000 Hospital Discharges
  - 1.9 million Emergency Department Visits

Childhood Statistics

- In 2003, asthma was diagnosed in…
  - 6.2 million children under 18 years old
  - 1.2 million under 5 years old
- 3rd leading cause of hospitalization in kids
- 1st leading cause of school absences (for chronic conditions)

Human Impact of Asthma

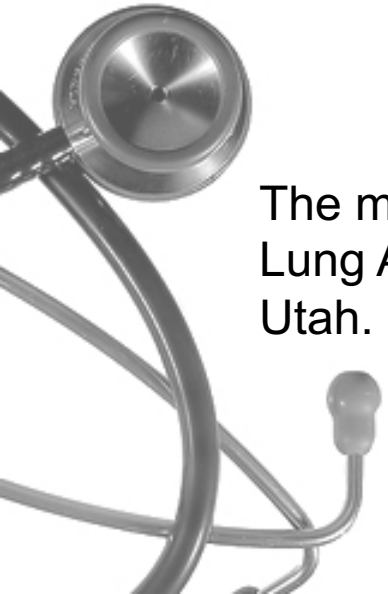
- 1 in 5 adults are seen by MD regularly
- 1 in 3 use medication for symptoms
- 1 in 2 say asthma limits their activity
- In 2003…
  - 24.5 million lost work days
  - $11.5 billion in direct costs
  - $4.6 billion in indirect costs

American Lung Association

The mission of the American Lung Association® is to prevent lung disease and promote lung health. The American Lung Association® is the oldest voluntary health organization in the United States, with a National Office and constituent and affiliate associations around the country. Founded in 1904 to fight tuberculosis, the American Lung Association® today fights lung disease in all its forms, with special emphasis on asthma, tobacco control and environmental health.

http://www.lungusa.org

AMERICAN LUNG ASSOCIATION.
CURES | CLEAN AIR | SMOKEFREE KIDS



The mission of the Utah Lung Association is similar to the American Lung Association® except it's efforts are directed to the people of Utah.

http://www.utahlung.org

AMERICAN LUNG ASSOCIATION® of Utah

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National Asthma Education and Prevention Program

National Goals in Asthma Management:

1. Assessment and Monitoring
2. Pharmacologic Therapy
3. Control Factors Contributing to Severity
4. Patient Education

Department of Health and Human Services • National Institutes of Health
National Heart Lung and Blood Institute
People Science Health

http://www.nhlbi.nih.gov/about/naepp/naep_pd.htm

Utah Department of Health Asthma Program

Utah Goals in Asthma Management:

1. Create an infrastructure from a public health perspective
2. Create an assessment & monitoring system
3. Build partnerships
4. Develop population-based strategies

UTAH DEPARTMENT OF HEALTH
Asthma Program

http://www.health.utah.gov/asthma/index.html

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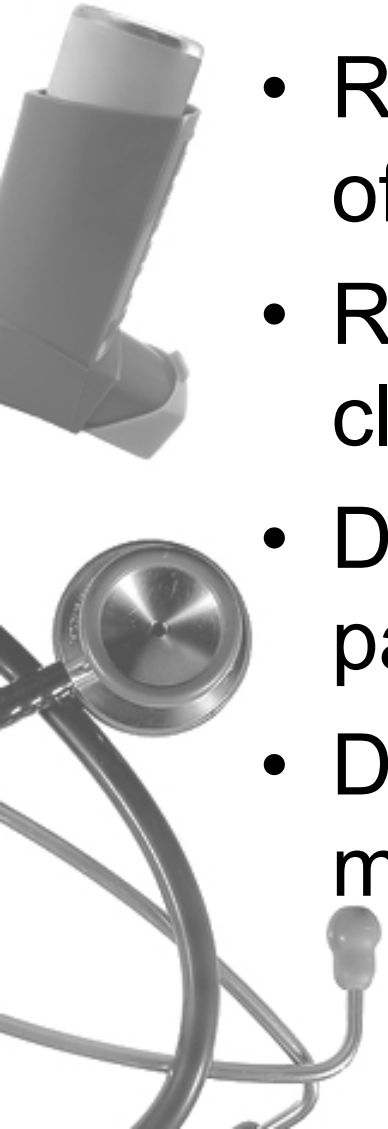
Goals for this CME Activity



- Review basic anatomy and physiology of the respiratory system
- Review the pathophysiology and classification of asthma
- Discuss the medical assessment of patients experiencing asthma
- Discuss both acute and chronic management of asthma

Respiratory Anatomy

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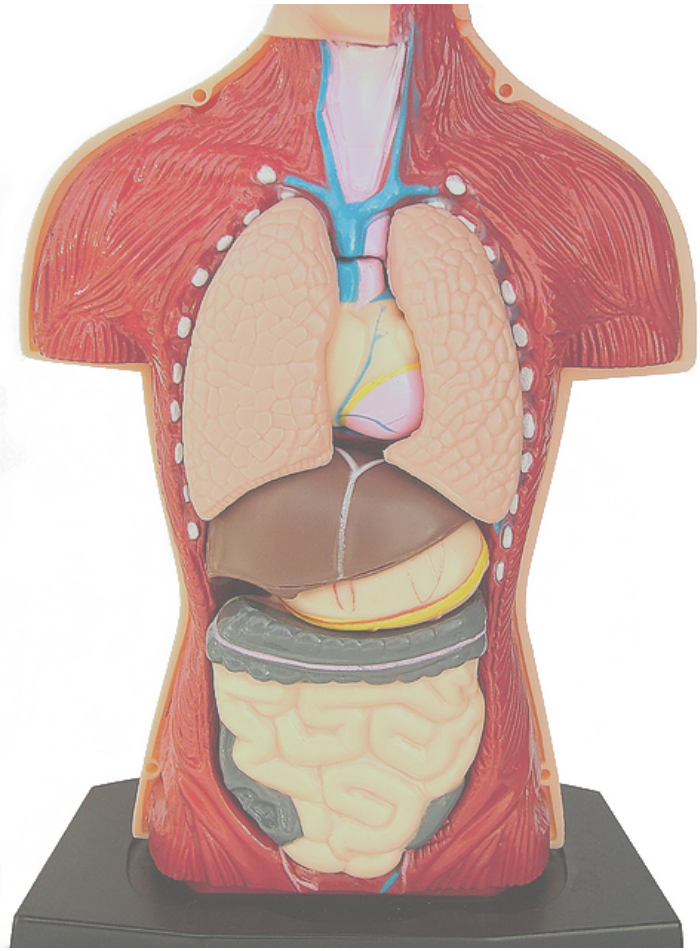
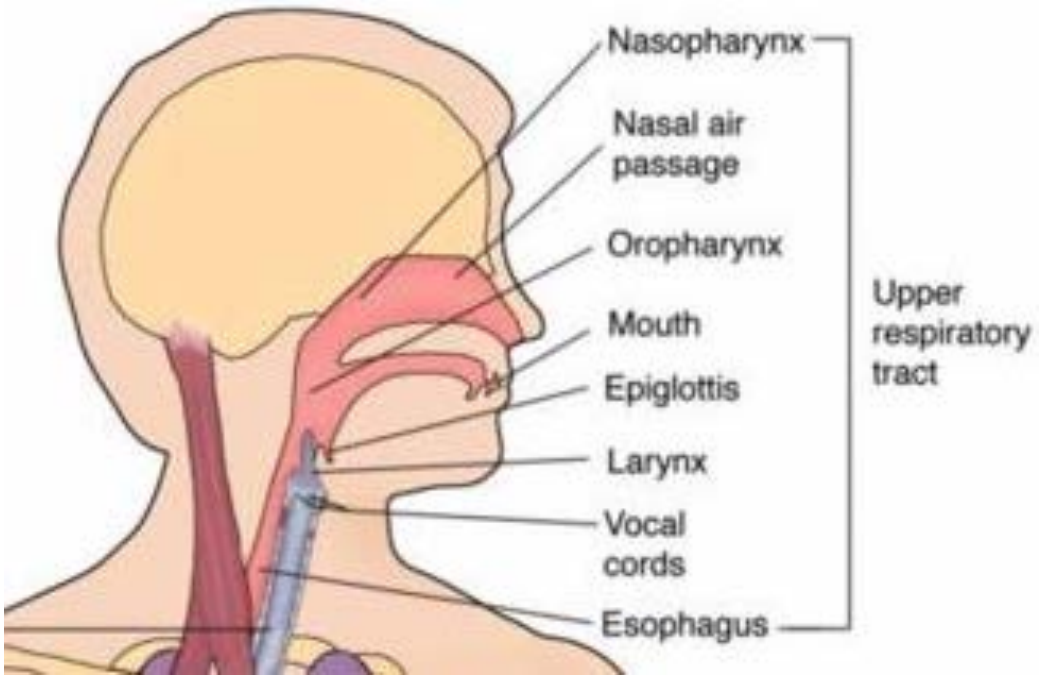
Thoracic Cavity

- Lungs
- Heart
- Other Structures



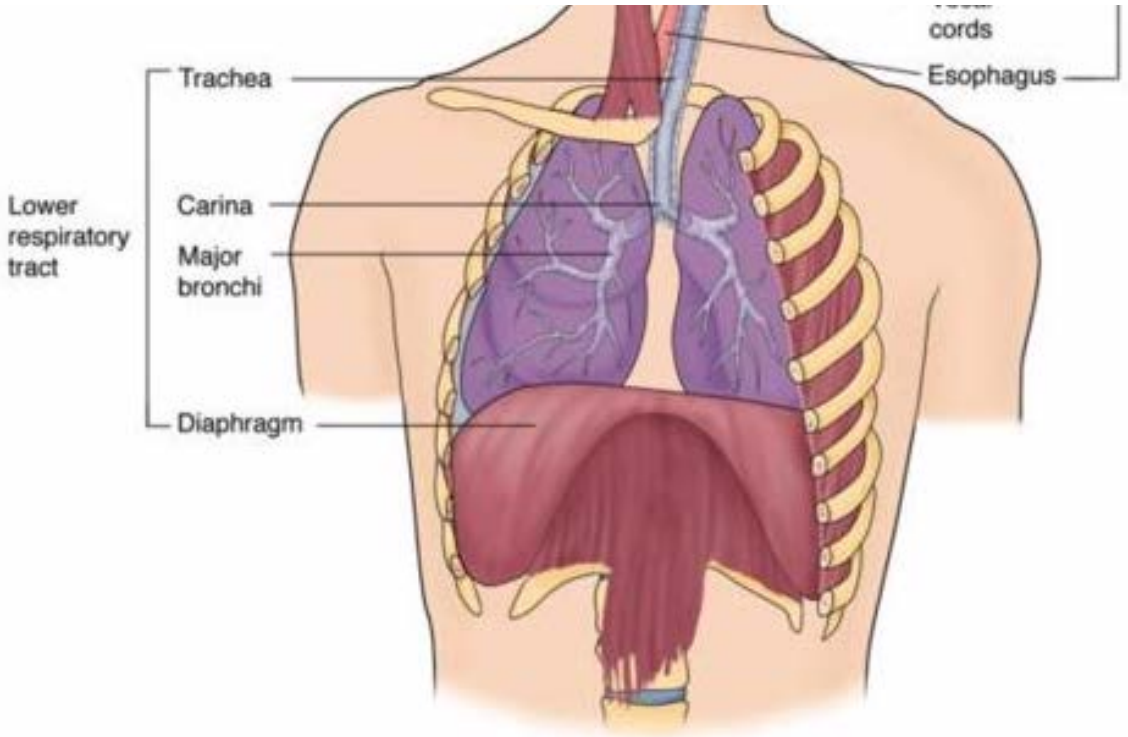
Upper Respiratory Anatomy

- Nose and Mouth
- Pharynx
- Epiglottis



Lower Respiratory Anatomy

- Larynx
- Trachea
- Bronchi
- Alveoli



Muscles of Respiration

- Primary Muscles of Respiration
  - Diaphragm
  - External intercostal
  - Scalene
- Accessory Muscles of Respiration
  - Sternocleidomastoid
  - Internal intercostal
  - Rectus abdominal

Respiratory Physiology

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Respiration

Respiration is a complex process of oxygen and carbon dioxide exchange.

In humans, it includes:

1. Ventilation from ambient air into alveoli.
2. Pulmonary gas exchange from alveoli to blood.
3. Gas transport through circulation to organs.
4. Peripheral gas exchange from tissue capillaries into cells and mitochondria.

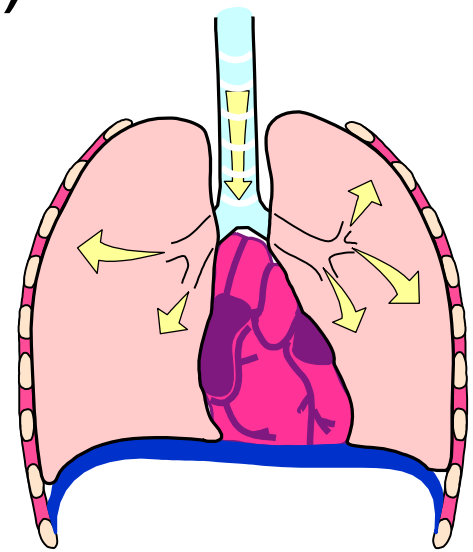
Ventilation

Ventilation from the ambient air into the alveoli of the lung is a two step process.

- Inhalation – an active process
- Exhalation – a passive process

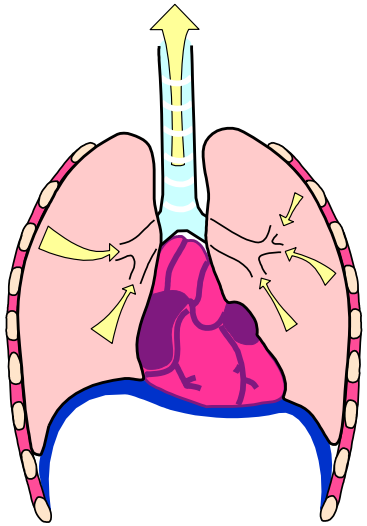
Inhalation

- The primary muscles of respiration contract.
- The size and shape of the thoracic cavity change (increases).



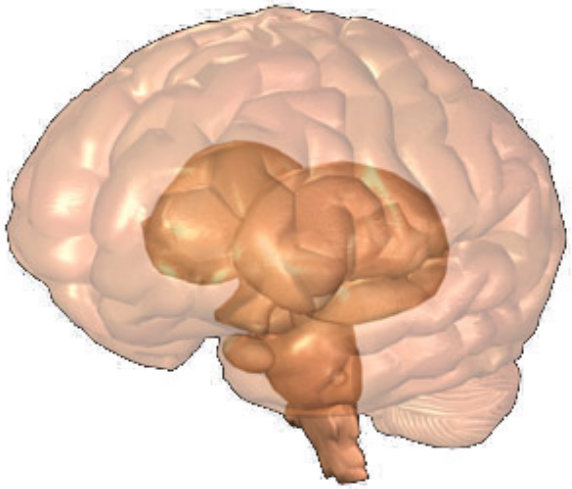
Exhalation

- The primary muscles of respiration relax.
- The size and shape of the thoracic cavity change again (decreases).



Neuroregulation of Ventilation

- Central Pattern Generator
  - Dorsal Respiratory Group (DRG)
  - Ventral Respiratory Group (VRG)



Chemoregulation of Ventilations

- Ventilations are regulated by:
  - pH of the blood (acidic or alkaline)
  - Oxygen levels in the blood
  - Carbon Dioxide levels in the blood

Air Flow Measurements

- Respiratory Rate (RR)
- Tidal Volume (TV)
- Forced Vital Capacity (FVC)
- Forced Expiratory Volume in 1 sec (FEV1)
- Peak Expiratory Flow (PEF)

Pulmonary Gas Exchange

- Pulmonary Gasses Include:
  - Oxygen, Carbon Dioxide, Nitrogen
- The alveoli and capillary membranes provide a barrier between the air and the blood
- Gasses move across this barrier, from one direction to the other, based on concentration gradients

Hemoglobin

- Red Blood Cells contain hemoglobin

Transport of Gasses

- Arteries and arterioles carry blood away from the heart
- Veins and venuoles carry blood towards the heart

Peripheral Gas Exchange

- Blood Gasses Include:
  - Oxygen and Carbon Dioxide
- The capillary and cell membranes provide a barrier between the blood and the cell
- Gasses move across this barrier, from one direction to the other, based on concentration gradients

Assessment Tools of Ventilation, Perfusion and Oxygenation

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Respirations

- Respiratory Rate
- Respiratory Effort

Skin Color

Pulse Oximetry

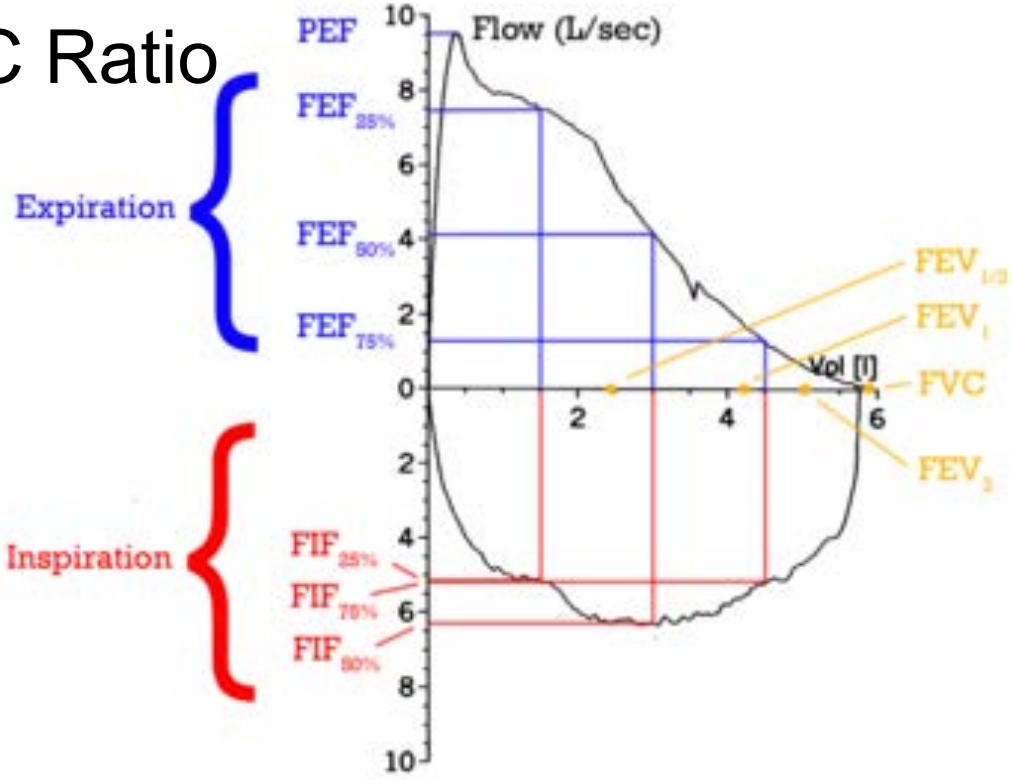
- Measure the diffusion of light through the capillary bed
- Indicates the amount of hemoglobin that is bound as a percentage

Pulse Oximetry

- At this altitude…
  - 93% and above are considered normal
  - 90-93% may be normal based on history
  - <90% is considered abnormal

Pulmonary Function Tests

- Spirometry
  - TV, FVC and FEV1
  - FEV1 to FVC Ratio



Peak Expiratory Flow Meter