Respiratory System

Take a deep breath and take some notes!
What are we going to do with that small amount of time?

50% of the population lives on less than 2$ a day.

150 Million orphans are in the world.

3 million people die every year with a disease that could have been prevented easily with simple medications.

1,058,500 babies are aborted each year. (About half of riverside county)

Over 2 Billion people have never even heard about the Gospel.
Basic Functions of the Respiratory System (Besides just breathing...duh...)

• Exchange of gases between the atmosphere and the blood
• Homeostatic regulation of body pH
• Protection from inhaled pathogens and irritating substances
• Vocalization
Nasal Cavity

Two primary functions...

1. Olfaction (sense of smell)
2. Conditions the air you breathe
1. After air passes through the nasal cavity it goes to the **pharynx** (a passageway for both air and food that contains the nasopharynx, oropharynx, and laryngopharynx).

2. It passes from the **pharynx** into the **larynx** which contains something very important to everyone... vocal cords!

3. After leaving the larynx, it enters the **trachea** that consists of 20 pieces of cartilage.

4. The trachea splits into two **bronchi** which carry air to the lungs.

5. The bronchi split into smaller bronchi called secondary bronchi, then go to **bronchioles**, and finally to alveoli.
Diaphragm

- Thin muscular sheet that controls inspiration and expiration.
Type 1 Alveolar Cells: Thin walled, majority of lungs, gas exchange.

Type 2 Alveolar Cells: Make surfactant, thick walled, smaller.
Alveoli

- Make up more than 90% of the lungs
- How we supply our cells with oxygen and also get the co2 out.
- Wrapped with capillaries and the thin cells enable oxygen and co2 to diffuse across them!
Surfactant

- Made by Type 2 alveolar cells
- Keep the lungs from collapsing.
- Babies born premature lack surfactant, need artificial.
Compliance

• Compliance: ability to stretch

• High compliance = Stretches easily

• Low compliance = Requires more force
  – Restrictive lung diseases

• Fibrotic lung diseases (fibrosis)
  “Thickens alveoli”

• Inadequate surfactant production
  (NRDS)
• Tidal volume ($V_T$): volume that moves during a simple inspiration/expiration
• Inspiratory reserve volume (IRV) additional volume above tidal volume
• Expiratory reserve volume (ERV) forcefully exhaled after the end of a normal expiration
• Residual volume (RV) volume of air in the respiratory system after maximal exhalation
• Total Lung Capacity = IRV + ERV + $V_T$

Book just states that IRV is total lung capacity.

Normal Respiratory Rate is about 12 to 20 breaths per minute.
Nervous system control

• Bronchoconstriction increases resistance (Parasympathetic)

• Bronchodilation decreases resistance (Sympathetic)

– $\beta_2$ receptors on smooth muscles relax in response to epinephrine

• Hyperventilation: Increases o2 and decreases co2
• Hypoventilation: Decreases o2 increases co2