Pulmonary/Respiratory Systems

PREPARED BY Dr. Mervat Kadhem

INTRODUCTION

- Respiration is an act of breathing.
- Respiration is exchange of gases in biological process.
- In the human body, the respiratory system is the pneumatic system.
- A physiological air pump (called diaphragm), creates alternatively negative and positive pressures in a sealed chamber (called thoracic cavity) and causes air to be sucked into and out of a pair of lungs (elastic like bags) within the chamber.
- The lungs are connected to the surrounding air medium through nasal cavities.
- The tubing between lungs and nasal cavities has a common path way for carrying air to the lungs and food to the stomach.

- A special valve blocks the airway whenever food passes through the common region.
- Inhaling (inspiration) is a process of flowing of air into the lungs.
  In the inhaling process, the muscle will contract so that the ribs will lift and pull outward to increase lung volume.
- The increase in lung volume will allow air to rush into the lungs.
- The inspired air contains about 21% oxygen and may not contain carbon dioxide.
- Exhaling (expiration) is a reverse process of flowing of air out of lungs.
- In the exhaling process, the muscle will relax and decreases lung volume.

- The decrease in lung volume will exhaust the air out of lungs.
- The oxygen content in the expired air is about 16% and the content of carbon dioxide is about 5%.
- The respiratory system works on Hering-Breuner inspiratory reflex.
- That the expansion of the lungs stimulates nerve receptors (vagus nerve X) to signal the brain stem to turn off inspiration.
- Similarly, whenever the lungs collapse, the receptors give the turn on signal.
- Holding one's breath will affect respiration, but for short duration only.
- Holding one's breath will build-up carbon dioxide in the blood and forces a turn on signal.

- The blood acts as a transport system to supply oxygen to the various parts of the body.
- It also transports the metabolic waste and carbon dioxide from the various parts of the body to the lungs and kidney.
- The function of respiratory system is to remove the carbon dioxide from the blood when it reaches lungs and in turn to enrich the blood with oxygen.
- The parameter of the respiration are rhythm, rate and depth.
- These parameters are controlled by the brain stem (pons and medulla).

- The respiratory parameters are adjusted depending upon the following situations:
- (i) Whenever the concentration of carbon dioxide in the blood increases which increase the depth and rate of respiration.
- (ii) Whenever lung tissue air pressure deviates from normal value.
- (iii) Whenever increase in blood pressure, which slows down respiration.
- (iv) Decrease in blood pressure, which increases respiration rate and depth and
- (v) Drop in blood pH, which speeds up respiratory.