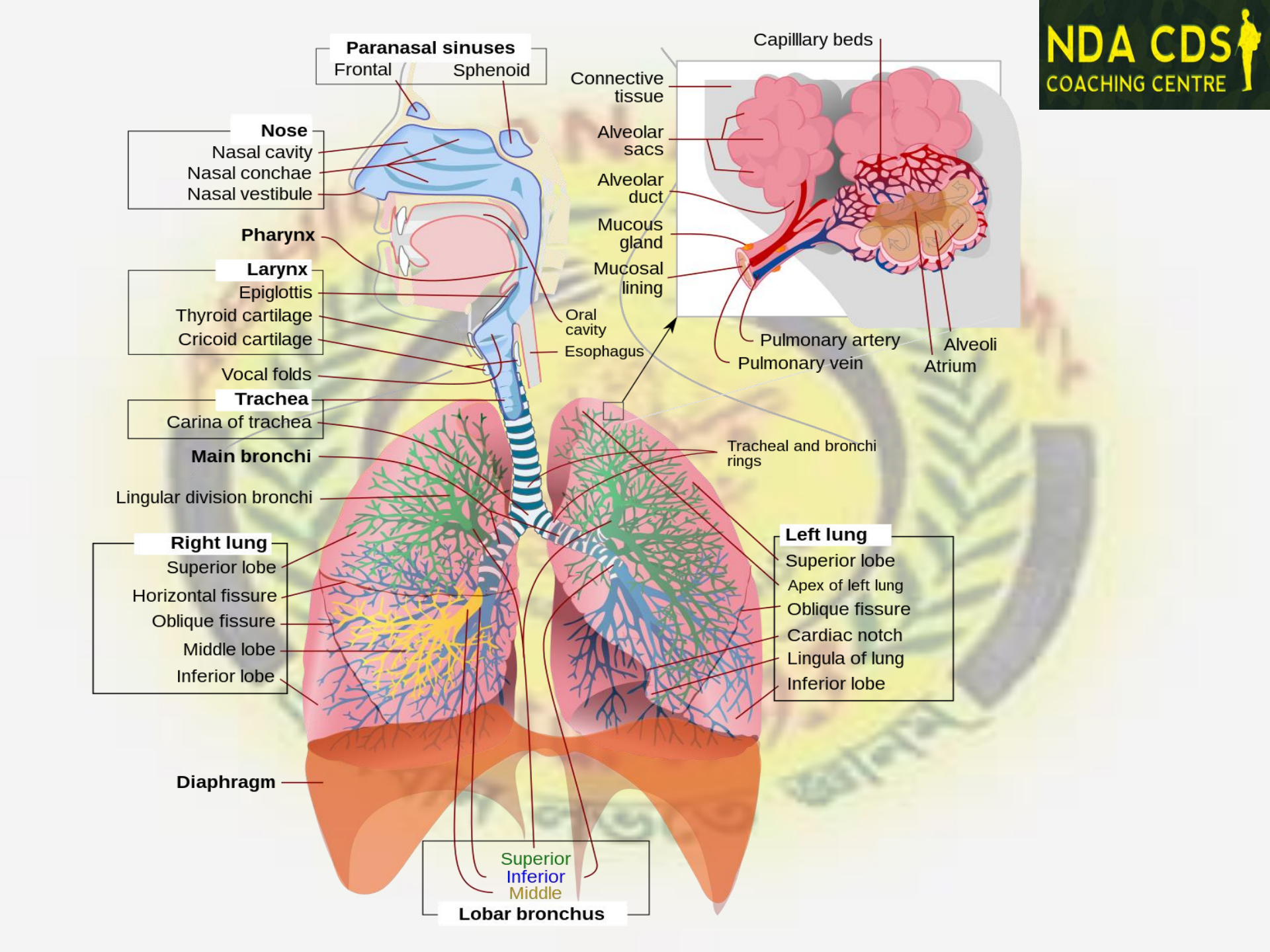
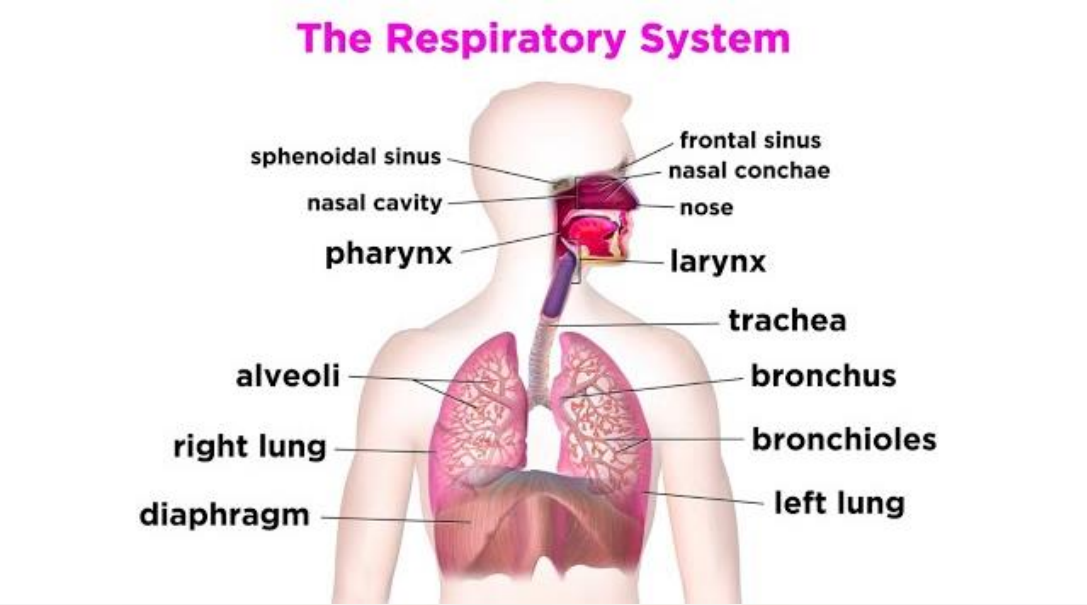

Paranasal sinuses
Frontal
Sphenoid
Nose
Nasal cavity
Nasal conchae
Nasal vestibule
Pharynx
Larynx
Epiglottis
Thyroid cartilage
Cricoid cartilage
Vocal folds
Trachea
Carina of trachea
Main bronchi
Lingular division bronchi
Right lung
Superior lobe
Horizontal fissure
Oblique fissure
Middle lobe
Inferior lobe
Diaphragm
Oral cavity
Esophagus
Capilllary beds
Connective tissue
Alveolar sacs
Alveolar duct
Mucous gland
Mucosal lining
Pulmonary artery
Pulmonary vein
Alveoli
Atrium
Tracheal and bronchi rings
Left lung
Superior lobe
Apex of left lung
Oblique fissure
Cardiac notch
Lingula of lung
Inferior lobe
Superior
Inferior
Middle
Lobar bronchus

Types of Respiration

- External Respiration
- Inhalation and exhalation of air
- Internal Respiration
- Happens at cellular level
- Breakdown of glucose to produce energy

Human Respiratory system

- Nose- It is an opening to inhale air from surrounding(breathe in breathe out)
- Nasal Cavity- It has air and mucus. To trap dust particles
- To make air moist and warm
- Pharynx- Food pipe and wind pipe get separated
- Wind pipe is covered by a membrane called epiglottis



- Larynx- voice box or vocal cords
- Trachea- carries air to lungs
- **Trachea (Windpipe):**
  - A rigid tube composed of cartilage rings that connects the larynx to the bronchi.
  - Lined with ciliated cells and mucus-producing cells to trap and remove debris.
- **Bronchi:**
  - The trachea branches into two bronchi, each leading to one lung.
  - Further subdivided into smaller bronchioles.
- **Bronchioles:**
  - Smaller airways that branch off from the bronchi.
  - End in clusters of tiny air sacs called alveoli.
- **Alveoli:**
  - Microscopic air sacs where gas exchange occurs.
  - Oxygen from the air diffuses into the bloodstream, while carbon dioxide from the bloodstream diffuses into the air in the alveoli.

- The diaphragm, a dome-shaped muscle below the lungs, plays a crucial role in breathing.
- During inhalation, the diaphragm contracts, moving downward and increasing the volume of the thoracic cavity.
- This creates a pressure difference, causing air to flow into the lungs.
- During exhalation, the diaphragm relaxes, and the thoracic cavity decreases in volume, expelling air.

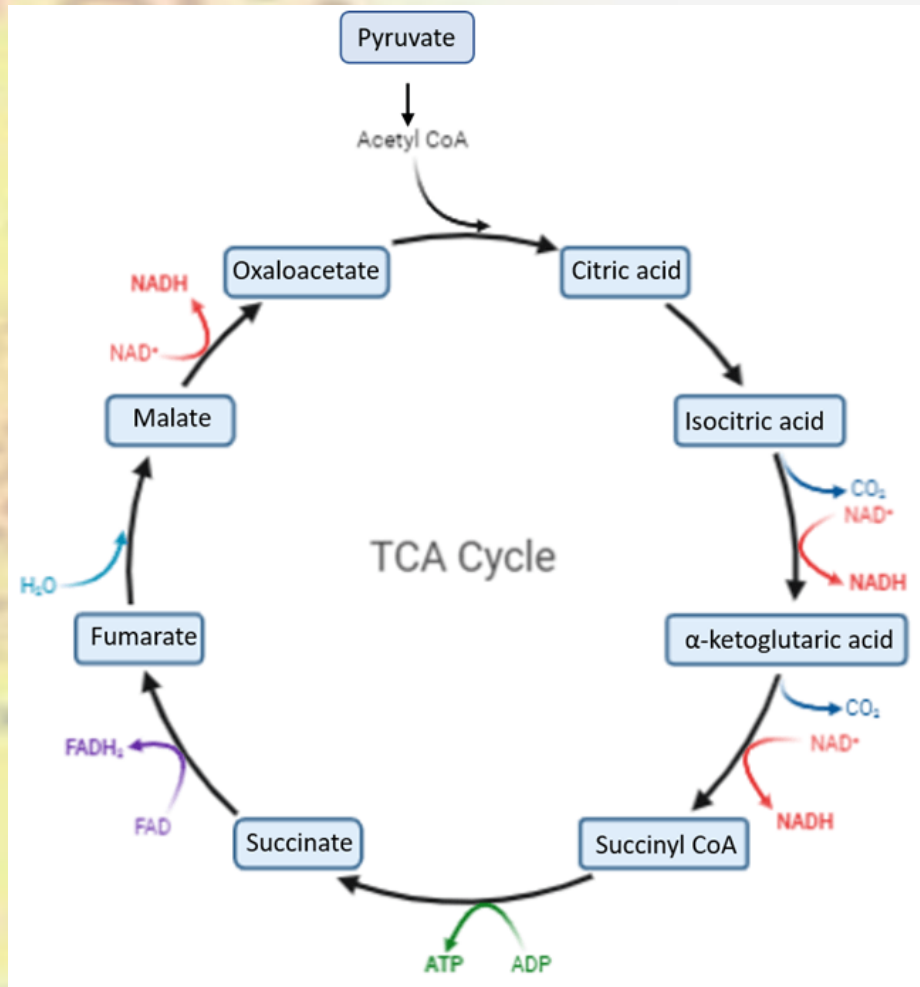
Cellular respiration

- The complete oxidation of one molecule of glucose in cellular respiration can be summarized as: $\text{C}_6\text{H}_{12}\text{O}_6+6\text{O}_2 \rightarrow 6\text{CO}_2+6\text{H}_2\text{O}+\text{energy (as ATP)}$
- **Aerobic vs. Anaerobic Respiration:**
- **Aerobic Respiration:** Occurs in the presence of oxygen and is the most efficient way to generate ATP.
- **Anaerobic Respiration:** Takes place in the absence of oxygen and is less efficient. In the absence of oxygen, pyruvate may be converted to lactic acid (in animals) or ethanol (in microorganisms) in a process known as fermentation.

- **Glycolysis**
- **Location:** Cytoplasm of the cell
- **Process:**
  - Glucose, a six-carbon sugar, is broken down into two molecules of pyruvate (a three-carbon compound).
  - This process produces a small amount of ATP and NADH (nicotinamide adenine dinucleotide, a coenzyme).
  - Glycolysis does not require oxygen and is considered anaerobic.

Citric Acid Cycle (Krebs Cycle):

- **Location:** Mitochondrial matrix
- **Process:**
  - Each pyruvate molecule produced in glycolysis enters the mitochondria and is further broken down.
  - This cycle generates NADH and flavin adenine dinucleotide (FADH2), along with a small amount of ATP.
  - Carbon dioxide is released as a byproduct.



- **Oxidative Phosphorylation (Electron Transport Chain and Chemiosmosis):**
- **Location:** Inner mitochondrial membrane (Electron Transport Chain) and mitochondrial inner membrane space (Chemiosmosis).
- **Process:**
  - NADH and FADH2 from glycolysis and the citric acid cycle donate electrons to the electron transport chain.
  - As electrons move along the chain, energy is released and used to pump protons (H+) across the inner mitochondrial membrane.
  - The accumulation of protons creates a concentration gradient.
  - Protons flow back into the mitochondrial matrix through ATP synthase, driving the synthesis of ATP from adenosine diphosphate (ADP) and inorganic phosphate (Pi).