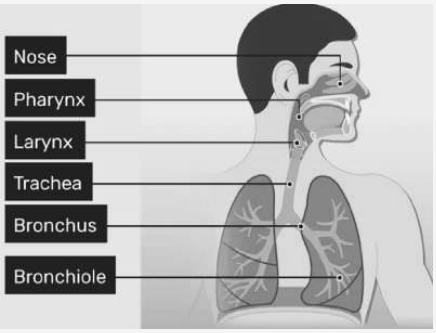
Major Functions

- Gas exchange
- Blood pH regulation
- Voice production
- Olfaction
- Protection against airborne diseases

Basic Respiratory Parts



Associated Cells/Structures

Cilia

- Hair-like
- Traps and wafts out dirt, pathogens etc.

Goblet Cells: Makes mucous

Mucous Properties

- Sticky for trapping
- Has lots of H_2O for air humidifying

Age-Related Changes

- Decreased respiratory function, O_2 amount in blood & cilia/macrophage activity
- Stiffened lung tissue & rib cage
- Increased COPD/emphysema risk

Key Respiration Terms

Ventilation	Respiration
Breathing	Gas exchange

Inspiration	Expiration
Inhaling	Exhaling

Key Respiration Terms (cont)

Gas exchange between blood & lungs	Gas exchange between blood & cells

Gas Exchange (Diffusion)

- Gas exchange balances gas pressures on 'both sides'

Partial Pressure (P)

- Air-caused pressure inside alveoli & blood vessels

Internal Respiration	External Respiration
Between blood & cells	Between blood & alveoli
O_2 from blood to cells	O_2 from alveoli to blood
CO_2 from cells to blood	CO_2 from blood to alveoli

Upper Respiratory Tract (URT)

Organs Of URT

- Nasal cavity
- Pharynx
- Trachea
- Mouth
- Larynx

Roles

- Prevents infection
- Warms/cools air (via nasal cavity & pharynx)
- Cleans air (via mucous, nose hairs, cilia, tonsils and epiglottis)
- Humidifies air (via mucous)

Nose & Nasal Cavity (URT)

- Lined by epithelial tissues and goblet cells
- Highly vascular

Nose Hairs: Traps pathogens, dirt & dust

Pharynx (URT)

Sections

- **Nasopharynx:** Back of nasocavity
- **Oropharynx:** Back of oral cavity
- **Laryngopharynx:** Joins the larynx

Functions/Properties

- Passage for air and food
- Highly vascular
- Has goblet cells
- Fights infections via tonsils

Larynx (URT)

- Produces speech
- Contains voice box & vocal cords
- Epiglottis seals off trachea when swallowing
- Has goblet cells

Neural Control Of Breathing

Main Brain Structures Involved

Medulla Oblongata

- For normal, passive breathing
- Automatic signal spot
- Signals from inspiration centre contract diaphragm & intercostal muscles

Pons

- Increases breathing rate by overriding medulla oblongata's automatic signals
- Accommodates for exercise, fear etc.

Trachea (LRT)

- Main passage for air
- Has cilia (stimulates cough reflex)

C-Shaped Cartilage Rings

- Surrounds trachea
- Allows food accomodation
- Holds trachea open

Bronchi (LRT)

- Both have cartilage rings

Right Bronchus	Left Bronchus
Shorter, wider & more vertical	2x longer than right
Common site for foreign objects	Narrower

Bronchioles (LRT)

- Branches off bronchi
- Air passage
- Has goblet cells
- Surrounded & lined by smooth muscle

Pleura (LRT)

- Double-layered lining
- Fluid-filled

Alveoli (LRT)

- Grape-like air sacs at end of bronchioles
- 1 cell thick
- Surrounded by capillaries

O_2 Saturations

- Oxygen % in area of measurement

O_2 Saturation Unit: SpO_2

O_2 Saturation Ranges

- **Normal:** 97-100%
- **Low:** 90-96%
- **Critical:** 89% and below

Respirations (R or RR)

Normal Rate (No. Breaths/Min)

- **Adults:** 12-20 (16 average)
- **Children:** 20-28 (22 average)

Rhythm (Regularity)

- Normal or irregular

Depth (Breath Deepness)

- Shallow, normal or deep

Sounds

- Normal: None
- Abnormal: Wheezing, bubbling, crackling and/or stridor

Temperature

Peripheral Temperature	Core Temperature
Recorded from surface	Recorded from body's center

Temperature Ranges

- **Normal:** 36℃ - 37.4℃
- **Low:** Below 35℃
- **High:** 38℃ and above

Low Temperature	High Temperature
Name: Hypothermia	**Name:** Hyperthermia, pyrexia or febrile
Causes: Shock, liver/kidney disease, extreme cold, hyperthyroidism	**Causes:** Infection, heat stroke, virus