



PHARMACOLEARN

It's Important to Know!

BP201T — Human Anatomy and Physiology II

B.Pharm Semester 2 · Unit 3 — Respiratory System and Urinary System

Unit III: Respiratory System and Urinary System

The respiratory system exchanges oxygen and carbon dioxide. The urinary system forms urine, regulates fluid composition and contributes to acid-base balance.

Respiratory anatomy and breathing

The respiratory tract includes the nose, pharynx, larynx, trachea, bronchi, bronchioles and lungs. Gas exchange occurs across the thin respiratory membrane of alveoli. The diaphragm is the main muscle of quiet inspiration. Changes in thoracic volume create pressure changes that move air.

Respiratory centres in the brain stem regulate breathing. Chemoreceptors respond mainly to changes in carbon dioxide, hydrogen ion concentration and oxygen.

Lung volumes and gas transport

Tidal volume is the air moved during a normal quiet breath. Inspiratory reserve volume and expiratory reserve volume are additional volumes that can be moved after a normal breath. Residual volume remains after maximal expiration. Vital capacity is the maximum volume exhaled after maximal inspiration.

Oxygen is transported mainly bound to haemoglobin. Carbon dioxide is transported dissolved in plasma, bound to proteins and mainly as bicarbonate. Gas exchange is driven by partial-pressure gradients.

Artificial respiration and resuscitation

Artificial respiration supports ventilation when spontaneous breathing is inadequate. Resuscitation combines recognition of emergency, airway support, breathing support and circulation support according to current training guidance.

Urinary tract and nephron

The urinary tract consists of kidneys, ureters, urinary bladder and urethra. The nephron is the functional unit of the kidney. It includes a renal corpuscle, proximal tubule, loop of Henle, distal tubule and collecting duct.

Urine formation involves glomerular filtration, tubular reabsorption and tubular secretion. The kidneys regulate water, electrolytes and acid-base status. The micturition reflex coordinates bladder contraction with relaxation of the outlet. The renin-angiotensin system influences blood pressure, sodium balance and fluid volume.

Unit III: Frequently asked questions

Q: What is the main function of alveoli?

A: Alveoli provide a thin, large surface for diffusion of oxygen into blood and carbon dioxide out of blood.

Q: What are the three processes of urine formation?

A: They are glomerular filtration, tubular reabsorption and tubular secretion.

Q: How do kidneys help acid-base balance?

A: They excrete hydrogen ions, reabsorb filtered bicarbonate and generate new bicarbonate through renal processes.

Unit III: Key takeaways

- Ventilation moves air and alveoli exchange gases with blood.
- Haemoglobin carries most oxygen in blood.
- The nephron filters plasma and modifies the filtrate into urine.
- Kidneys regulate water, electrolytes, blood pressure and acid-base balance.
- The renin-angiotensin system links kidney function with circulatory regulation.

Unit III: Clinical correlation

Clinical correlation: renal failure. Reduced nephron function can impair waste excretion, fluid balance, electrolyte regulation and acid-base control.