

[Click Here](#)

































The excretory system consists of organs which remove metabolic wastes and toxins from the body. In humans, this includes the removal of urea from the bloodstream and other wastes produced by the body. The removal of urea happens in the kidneys, while solid wastes are expelled from the large intestine. The excretory system in humans consists mainly of the kidneys an bladder. The kidneys filter urea and other waste products from the blood, which are then added to the urine with the bladder. Other organs, such as the liver, process toxins but put their wastes back into the blood. It is up to the kidneys to filter the blood so that toxic substances do not accumulate. These organs can be seen in the image below. The excretory system has other functions beyond removing waste products from the body. It is also crucial in maintaining internal homeostasis. Parts of the excretory system are influenced by other body systems, such as the muscular system and skeletal system. For example, the kidneys secrete a hormone which tells the bones to produce more red blood cells. When the excretory system is not functioning, bad things can happen. A build-up of urea within the blood can lead to a debilitating toxic shock. In other animals, the excretory system can include a number of other components. For example, sea turtles have excretory organs near their eyes which remove large amounts of salt from their bodies. This allows them to drink salt water to maintain their water balance. The excretory system functions as the bulwark and balance to the digestive system. While we consume food and drink to nourish the body and provide energy, the excretory system ensures that homeostasis is maintained, irrespective of changes to the nutritive value of food. It regulates the fluid balance of the body, maintaining adequate salt and water levels. When there is excess water, it is removed through the production of hypotonic urine. When we consume salty food or lose water through perspiration, the concentration of urine is increased to preserve the osmolarity of body fluids. The primary excretory organs in the human body are the kidneys, ureters and urinary bladder, involved with the creation and expulsion of urine. Through these organs, much of the nitrogenous waste of the body, especially urea, is expelled. Other organs such as the liver, large intestine and skin are also necessary for the excretion of specific metabolic wastes. The kidneys are paired, bean-shaped organs located in the abdomen, on either side of the spine, under the diaphragm. They are made of a large number of structural and functional subunits called nephrons. These nephrons perform the primary task of filtering blood and removing waste products. Each nephron snakes between the outer cortex of the kidney and the inner medulla, with different activities occurring at each site. The image above shows parts of two nephrons, with their relative positions within the kidney. Each nephron begins with a globular structure called the Bowman's capsule located in the renal cortex. This structure receives blood from renal circulation through an afferent arteriole that further divides to form a tuft of capillaries called the glomerulus. The kidney is richly vascularized with capillary beds surrounding each nephron (intertubular capillaries) as well as blood vessels running between the lobes of the kidney (interlobular arteries and veins). A process of ultrafiltration creates the glomerular filtrate from blood, which is remarkably similar in composition to blood plasma. Water, small molecules, and proteins smaller than 30 kilodaltons in size can pass freely into the lumen of the Bowman's capsule. The anatomy of each nephron is discussed below. Bowman's Capsule to the PCT The Bowman's capsule involutes and creates a neck, which then extends into the first elongated tubular structure called the proximal convoluted tubule or PCT. The PCT is the site for secreting some acids, and for reabsorbing nearly two-thirds of the glomerular filtrate. It also removes all glucose and amino acids. The presence of either glucose or other organic solutes in the urine is a sign of kidney damage, especially of the cortex. Some nitrogenous waste is also removed from the body as ammonia secreted from the cells forming the PCT. Many medications are also detoxified at this site. PCT to the Loop of Henle The PCT leads into a U-shaped structure called the Loop of Henle, extending into the medulla of the kidney. This has two functionally and anatomically distinct arms - the ascending and descending limbs. Between these two arms of the loop of Henle, through a set of electrolyte pumps, a high urea concentration is maintained in the medulla of the kidney. The PCT initially leads into the descending loop, which is freely permeable to water and mostly impermeable to ions - especially urea. The high osmolarity of the medullary region of the kidney draws water out the descending loop, allowing the urine to become concentrated. This is followed by the thin ascending loop, which has the opposite property of being permeable to ions and impermeable to water. Solute such as sodium ions are actively reabsorbed, reducing the concentration of urine. However, by this time, the volume of fluid filtered at the glomerulus has been reduced to a fraction of its quantity. Loop of Henle to the DCT The ascending limb then leads into the distal convoluted tubule or DCT, also known as the second convoluted tubule. The DCT is the site for the activity of most hormones that regulate kidney function. This includes the antidiuretic hormone (ADH) and angiotensin II (AT II). This region regulates ion and pH balance. From the DCT, urine passes through collecting ducts that finally lead out of the kidney through ureters. This image is a composite representation of the nephron, with details about the substances reabsorbed at each site, the osmolarity of the filtrate at different parts of the nephron, and the impact of different hormones or medications. The urinary bladder is a sac-like structure with muscular walls that holds urine until it is expelled from the body during micturition. The bladder receives urine through two ureters - one from each kidney -that enter through openings called ureteric orifices. These orifices are located at the convex fundus of the organ. Urine exits the bladder through the urethra. The walls of the bladder are made of smooth muscle and the inner epithelial lining of this organ consists of a remarkable tissue called transitional epithelium. The cells of this stratified tissue change shape based on whether the bladder is empty or full, allowing it to remain elastic, accommodating up to half a liter of urine. In men, the bladder lies on the pelvic floor in front of the rectum. In women, it is located near the uterus, leading to a number of changes to the patterns of micturition during the course of pregnancy. During the course of gestation, there are major changes to blood volume and increases in glomerular filtration rate. While the bladder itself increases in size, nearly doubling by the end of the third trimester, the enlarged uterus with the weight of the fetus, amniotic fluid, placenta, and other tissues can create stress incontinence. The liver is the main detoxifying organ of the body, especially for nitrogenous wastes. The cells of the liver play host to biochemical processes that create ammonia from amino acids. Since ammonia is extremely toxic, it is quickly converted to urea before being transported in the blood towards the kidney. Most animals make the choice between ammonia, urea, and uric acid as the preferred mode for nitrogenous waste excretion, based on the availability of water. While ammonia is toxic, it can be quickly diluted and removed from the body with ample water, and therefore remains the chemical used by aquatic animals. Terrestrial animals with regular access to water tend to use urea, which has lower toxicity. Birds and other animals that have minimal water intake expend energy to convert urea into uric acid, which needs a minimum amount of water to store safely until excretion. The liver is also necessary for the removal of the decomposed hemoglobin, some drugs, excess vitamins, sterols, and other lipophilic substances. These are secreted along with bile and finally removed from the body through feces. The large intestine, therefore, plays a role in excretion, especially for hydrophobic particles. The skin is a secondary excretory organ since sweat glands in the dermis can remove salts and some excess water. The skin also has sebaceous glands that can secrete waxy lipids. A major product that must be excreted from all animals is carbon dioxide. Carbon dioxide is created in the cells, as they undergo aerobic respiration. This waste product is removed from the cells and transferred to the bloodstream. When the blood reaches the gills or lungs, it is exchanged for oxygen and released into the atmosphere. Fish also use their gills to expel a number of other waste products. The excretory system is necessary for preventing the toxic build up of nitrogenous wastes, such as ammonia or urea. However, the excretory system of animals has evolved in many different ways since the dawn of life on Earth. In fish and aquatic animals, the excretory system is fairly simple. The gills are a major site of excretion, and some waste products are simply added to the blood to be excreted in the gills. Terrestrial animals also rely on their skin and glands to excrete excess salts and other waste products. In fact, freshwater and saltwater fish have drastically different kidney functions, based on the concentration of salt in the surrounding water. In terrestrial animals, such as humans, the excretory system is structured to retain as much water as possible. Birds and reptiles have even developed uric acid, which is a more concentrated and safer form of urea. As a whole system, every part and organ of the excretory system can be functioning at the same time to remove wastes from the body. However, if the structure of the excretory system gets damaged by disease, many bad consequences can ensue. The excretory system, especially the kidneys, can be injured, damaged or have suboptimal functioning, either due to acute stress or through chronic conditions. Renal failure or renal insufficiency is the inability of the kidney to filter wastes from the blood and maintain fluid homeostasis. The causes of renal failure could be diseases such as diabetes mellitus and hypertension that can cause damage to glomerular capillaries. Diabetes insipidus arising from hormonal insufficiency, reduced blood flow from injury, infections in the body and bloodstream, medications, or kidney stones can also affect kidney efficiency. Initial symptoms can be as mild as swelling in the legs, indicative of the inability of the kidney to maintain fluid homeostasis. The presence of toxins in the blood can cause a feeling of nausea and vomiting. Changes to the RBC metabolism and reduced erythropoietin secretion from the kidney can lead to anemia, weakness, sleepiness, and confusion. Excessive potassium ions can lead to cardiac arrhythmias, and changes to muscle tone and contractility. Depending on the cause of renal insufficiency or failure, the injury can be reversed. In most cases, long term changes to diet and lifestyle are necessary to maintain health. When the kidney is functioning at extremely low efficiency, waste removal has to be done through an external apparatus, called the dialysis machine. Kidney transplant is also occasionally recommended. The urinary bladder can hold up to 600 ml of liquid. During early pregnancy, the uterus presses on to the bladder, creating a greater frequency of urination. Most of the amniotic fluid surrounding the growing fetus is fetal urine, though its composition is very different from normal urine. The bladder of the fetus begins to empty around the 10th week of gestation. This fetal urine and the amniotic fluid are actually important for the development of fetal lungs. The white parts in bird excreta are composed mostly of uric acid. The brownish pigmentation of feces mostly derives from bile salts. Introduction: The excretory system plays a crucial role in maintaining homeostasis by removing waste products from the body. One of its most important components is the kidney, which is responsible for filtering blood and eliminating waste materials. This system helps maintain the balance of water, salts, and pH in the body, thereby ensuring proper physiological function. In this module, we will explore the structure and function of the excretory system, focusing on kidney function and the removal of waste from the body. How kidneys filter waste, Kidney function and fluid balance, Understanding renal filtration, Waste removal in kidneys, Human excretory system explained 1. The Excretory System: An Overview The excretory system consists of organs responsible for removing metabolic waste from the body. These organs include the kidneys, ureters, bladder, and urethra. Together, they ensure that waste products such as urea, creatinine, and excess salts are expelled in the form of urine. Main Functions of the Excretory System: Waste Removal: The primary function is to filter out waste products produced during metabolism. Water and Electrolyte Balance: The system helps regulate the volume of water and the concentration of electrolytes in the body. Acid-Base Balance: It maintains the pH level of the blood by excreting hydrogen ions and reabsorbing bicarbonate ions. Hormonal Regulation: The kidneys produce hormones like erythropoietin and renin that regulate red blood cell production and blood pressure. 2. Structure and Function of the Kidneys The kidneys are bean-shaped organs located on either side of the spine, just below the rib cage. They are the key organs in the excretory system and perform several vital functions, including filtering blood and producing urine. Anatomy of the Kidney: Renal Cortex: The outer layer of the kidney, where the nephrons (the functional units of the kidney) are located. Renal Medulla: The inner region of the kidney, consisting of renal pyramids, where urine is concentrated. Renal Pelvis: A funnel-shaped cavity that collects urine from the kidneys and drains it into the ureters. Nephrons: The functional units of the kidney responsible for filtering blood and producing urine. Kidney Functions: Filtration: Blood enters the kidney through the renal artery and is filtered by the glomerulus (a network of capillaries within the nephron). Reabsorption: Water, glucose, amino acids, and salts are reabsorbed from the filtrate back into the bloodstream in the renal tubules. Secretion: Waste products such as urea, creatinine, and excess ions are secreted from the blood into the nephron for excretion. 3. The Process of Urine Formation Urine formation involves three main processes: filtration, reabsorption, and secretion. Filtration: Blood enters the kidneys through the renal artery, which divides into smaller arterioles and then into the glomerulus. The glomerulus acts as a filter, allowing small molecules like water, salts, glucose, and urea to pass through while retaining larger molecules such as proteins and blood cells. Reabsorption: After filtration, the filtrate enters the renal tubules, where essential substances like glucose, amino acids, and water are reabsorbed into the bloodstream. The amount of reabsorption varies depending on the body's needs and is regulated by hormones. Secretion: Certain waste products, such as urea, creatinine, and excess ions, are secreted into the nephron from the blood. These substances are then concentrated in the filtrate and eventually excreted as urine. 4. Waste Removal and the Role of the Kidneys The kidneys play a vital role in the removal of metabolic waste products from the body, including: Urea: Produced during the breakdown of proteins, urea is one of the main waste products excreted in urine. Creatinine: A byproduct of muscle metabolism, creatinine is filtered by the kidneys and eliminated in the urine. Excess Electrolytes: The kidneys regulate the balance of sodium, potassium, and chloride in the body. Excess sodium, potassium, and chloride are reabsorbed, while excess electrolytes are excreted in urine. Excess Urea: Urea is filtered by the kidneys and excreted in urine. 5. Disorders of the Kidneys Chronic Kidney Disease (CKD): A progressive loss of kidney function over time, which can result from conditions such as diabetes, hypertension, or glomerulonephritis. As kidney function declines, the ability to filter waste diminishes, leading to a buildup of toxins in the blood. Acute Kidney Injury (AKI): AKI is a sudden and rapid decline in kidney function, often caused by severe dehydration, infections, or medications. AKI can be reversible if the underlying cause is treated. Kidney Stones: Kidney stones are hard deposits of minerals and salts that form in the kidneys. These stones can block urine flow, causing pain and potential damage to the kidneys. Urinary Tract Infections (UTIs): UTIs are infections that affect the urinary system, including the kidneys, bladder, and urethra. If left untreated, UTIs can lead to kidney infections and damage. 6. Hormonal Regulation of Kidney Function The kidneys are involved in the production and regulation of several hormones that affect various bodily functions: Erythropoietin (EPO): Produced by the kidneys, erythropoietin stimulates the production of red blood cells in response to low oxygen levels in the blood. Renin: Released by the kidneys in response to low blood pressure, renin activates the renin-angiotensin-aldosterone system (RAAS) to increase blood pressure. Calcitriol (Vitamin D): The kidneys convert inactive vitamin D into its active form, calcitriol, which helps regulate calcium absorption in the intestines. 7. Excretory System Disorders Polycystic Kidney Disease (PKD): A genetic disorder that causes fluid-filled cysts to form in the kidneys, impairing kidney function over time. Nephrotic Syndrome: A condition where the kidneys leak excessive amounts of protein into the urine, leading to swelling and other complications. Glomerulonephritis: Inflammation of the glomeruli that can result in kidney damage and impaired filtration. 8. Maintaining Kidney Health To maintain kidney health, it is important to: Stay Hydrated: Drink enough water to ensure proper kidney function and waste elimination. Eat a Healthy Diet: A balanced diet with low sodium and adequate protein is essential for kidney health. Avoid Excessive Alcohol: Excessive alcohol consumption can lead to kidney damage. Avoid NSAIDs: Overuse of medications like nonsteroidal anti-inflammatory drugs (NSAIDs) can damage the kidneys. Conclusion The excretory system, particularly the kidneys, plays a crucial role in maintaining homeostasis by filtering blood, regulating fluid balance, and removing waste. Understanding kidney function and its involvement in waste removal helps in recognizing the importance of proper kidney health and the potential impact of kidney disorders. By maintaining a healthy lifestyle, monitoring blood pressure, and avoiding harmful substances, we can support the proper functioning of the kidneys and ensure effective waste elimination from the body. Relevant Links: Further Reading: Multiple-choice questions (MCQs) based on the topic "Excretory System: Kidney Function and Waste Removal" 1. What is the primary function of the kidneys? A) Blood circulation B) Waste removal and regulation of fluid balance C) Oxygen transport D) Hormone secretion Answer: B) Waste removal and regulation of fluid balanceExplanation: The kidneys are primarily responsible for filtering blood to remove waste products, regulate fluid balance, and maintain homeostasis in the body. 2. Which of the following is filtered by the kidneys? A) Glucose B) White blood cells C) Red blood cells D) Plasma proteins Answer: A) GlucoseExplanation: Glucose is a small molecule that passes through the glomerulus during filtration. Large molecules like blood cells and plasma proteins are retained in the bloodstream. 3. What are the functional units of the kidney? A) Nephrons B) Glomeruli C) Renal pyramids D) Ureters Answer: A) NephronsExplanation: Nephrons are the functional units of the kidneys that filter blood and produce urine. Each kidney contains about one million nephrons. 4. Where does the filtration of blood primarily occur in the kidneys? A) Renal pelvis B) Glomerulus C) Renal cortex D) Urethra Answer: B) GlomerulusExplanation: The glomerulus is a network of capillaries where blood filtration occurs. It allows small molecules like water, salts, and waste products to pass into the nephron. 5. Which structure collects urine from the renal tubules before it passes to the ureter? A) Renal cortex B) Renal medulla C) Renal pelvis D) Urethra Answer: C) Renal pelvisExplanation: The renal pelvis collects urine from the renal tubules and funnels it into the ureter, which transports it to the bladder for excretion. 6. What is the role of the proximal convoluted tubule in the nephron? A) Filtration of blood B) Reabsorption of water, glucose, and ions C) Secretion of urea D) Collecting waste Answer: B) Reabsorption of water, glucose, and ionsExplanation: The proximal convoluted tubule reabsorbs important substances like glucose, amino acids, and water from the filtrate back into the bloodstream. 7. Which hormone is primarily involved in regulating water reabsorption in the kidneys? A) Insulin B) Aldosterone C) Antidiuretic hormone (ADH) D) Cortisol Answer: C) Antidiuretic hormone (ADH)Explanation: ADH increases the permeability of the nephron to water, facilitating water reabsorption and concentrating urine. 8. What happens if the kidneys cannot filter waste effectively? A) Dehydration B) Excessive sweating C) Build-up of toxins in the blood (uremia) D) Enhanced metabolism Answer: C) Build-up of toxins in the blood (uremia)Explanation: If the kidneys are not functioning properly, waste products such as urea accumulate in the blood, causing a condition known as uremia. 9. The kidneys secrete which enzyme to regulate blood pressure? A) Renin B) Erythropoietin C) Insulin D) Glucagon Answer: A) ReninExplanation: Renin is secreted by the kidneys when blood pressure is low. It activates the renin-angiotensin-aldosterone system (RAAS) to help raise blood pressure. 10. Which of the following is NOT a function of the kidneys? A) Regulating blood sugar levels B) Maintaining fluid and electrolyte balance C) Secretion of hormones D) Waste removal through urine Answer: A) Regulating blood sugar levelsExplanation: While the kidneys can reabsorb glucose, regulating blood sugar levels is primarily the job of the pancreas. 11. What is the main waste product excreted in urine? A) Urea B) Ammonia C) Creatinine D) Bilirubin Answer: A) UreaExplanation: Urea, a byproduct of protein metabolism, is the main waste product excreted by the kidneys in urine. 12. Where is the hormone erythropoietin produced? A) Lungs B) Liver C

distal convoluted tubule (DCT). These 3 parts of the nephron are responsible for the reabsorption of water and other salts back into the blood. This is controlled by the amount of water in the blood stream and by the endocrine system. Enzymes like ADH (anti-diuretic hormone) play a role in deciding the amount of water that is reabsorbed back into the blood. The least amount of water is reabsorbed in the distal convoluted tubule. Most parts of the nephron are located in the cortex, while the loop of Henle descends into the medulla, forming a hairpin loop (Phloren's Credit: Wikimedia Commons). The collecting ducts eventually empty into vessels that form the renal pelvis. The ducts exit the kidney from the hilum. The ureters carry the urine from the renal pelvis to the bladder. The urethra, which is the tube connecting the bladder to the external environment of the body. Sphincter muscles are ring-shaped muscles located at the junction of the bladder and the urethra. These give us control over our micturating (the act of expelling urine). It is important to keep in mind that the nephrons do not just reabsorb substances; they also secrete molecules into the urine. For example, diabetes can be detected by checking one's urine sample because sugar is secreted into the urine. Even certain drugs and medications are secreted into the urine that is forming, thus leading to their detection. References (click to expand) Mahaj Jalan has a BSc degree in Zoology from Mumbai University in India. She loves animals, books and biology. She has a general assumption that everyone shares her enthusiasm about the human body! An introvert by nature, she finds solace in music and writing. Related Videos The excretory system is essential to one's health. Its responsibility is to remove waste from the body. The excretory system is made up of numerous organs that work in unison to ensure that waste is effectively removed from your body. Below are the details of the organs of excretory system, along with the roles they play in detoxification. Primary Excretory System Organs 1. Kidneys Kidneys are bean-shaped organs of a reddish brown color that are found in the sides of the vertebral column. Once the body has extracted what it needs from food and drink, it sends the wastes to the kidneys. The kidneys filter the wastes, including urea, salt and excess water, which are flushed out of the body as urine. 2. Skin The skin performs its excretory function via the sweat glands. These glands produce sweat that contains salt, excess oils, water, and other unnecessary substances which are excreted through small pores in the skin. 3. Lungs The lungs are very important excretory organs as they expel carbon dioxide from the body via exhalation. 4. Gallbladder Although the gallbladder does not have a highly significant role to play in the excretory system, it does have a function that assists the overall process. Bile, a liquid produced by the liver to break down waste, is first stored in the gallbladder. When needed, it is discharged into the small intestine whose role is to break down fats, ethanol and other acidic wastes. 3. Urinary Bladder The waste fluid that is created in the liver and collected in the kidney is transferred into the urinary bladder where it is temporarily stored until the individual urinates. The urinary bladder provides a short term solution for storing urine in the body until it is ultimately discharged. 4. Ureters The ureters tubes of smooth muscle fiber transfer liquid waste from the kidneys into the urinary bladder. The urine is moved with peristaltic movements which force the urine away from the kidneys. The ureters also have ureterovesical valves which ensure the waste fluid does not travel back into the kidney. 5. Urethra The urethra runs through the penis in males, and serves as a carrier of semen as well as urine for their ultimate discharge out of the body. The urethra tube is shorter in females and is just above the vaginal opening. 6. Large Intestine Food particles are absorbed into the blood stream via the small intestine. The undigested substances are transferred to the large intestine which essentially serves as a storage organ for the excretory products. The descending, ascending and transverse colons also facilitate the absorption of leftover vitamins and electrolytes. 7. Rectum The distal straight section (known as the rectum) is used for the storage of waste products (feces) before they are excreted from the body via the anal canal with the help of internal and external sphincters. Common Diseases Affecting Excretory System Organs 1. Kidney Stones Kidney stones are believed to form from crystals that have separated from urine, forming hard masses in the urinary tract, though the exact cause is unknown. Symptoms for kidney stones include extreme pain, cramping in the lower abdominals and back, nausea, and vomiting. Most kidney stones can be passed by increasing your intake of water to flush them out, although surgery may be needed in some cases. 2. Urethritis Urethritis is a viral or bacterial infection that causes inflammation of the urethra. Symptoms for urethritis vary between the sexes. Symptoms for men include pain or swelling of the penis, blood in urine or semen, frequent urination and pain during ejaculation. Symptoms for females include pain during urination, abdominal pain, fever, chills, frequent urination, vaginal discharge and pelvic pain. Urethritis is usually treated with anti-viral medication, or antibiotics. Painkillers are often used to help sufferers combat the symptoms. 3. Pyelonephritis Pyelonephritis is a type of urinary tract infection that travels from the urethra or bladder and to the kidneys. This infection occurs when bacteria enter the body through the urinary tract. Symptoms include frequent urination, burning during urination, blood in the urine, pain in the groin and abdominal pain. Pyelonephritis is usually treated with oral anti-biotics, although the anti-biotics are sometimes administered intravenously in cases of severe infections. 4. Cystitis Cystitis is the medical term for inflammation of the bladder and it is one of the most common disease that affects excretory system organs. As the bladder stores urine before it is excreted from the body, bacteria can build up in the bladder and cause cystitis. 5. Urinary Tract Infection Urinary tract infection (UTI) is the infection of the urethra or the bladder. The symptoms include abdominal pain, painful or difficult urination and fever. The best way to avoid UTI is by drinking loads of water. 1. What is the human excretory system? Major functions include the excretion of waste products, blood pressure, electrolyte balance, and acid-base balance. 2. What is the human excretory system? The human excretory system is a network of organs responsible for removing waste products and excess substances from the body. It primarily includes the kidneys, ureters, and urethra, working together to maintain homeostasis by regulating fluid balance, electrolyte balance, and acid-base composition. 3. How do kidneys filter blood? Blood enters the kidneys via the renal artery and then it flows into the glomerulus where it gets filtered and wastes are removed. Things needed are reabsorbed into the circulation. 4. How do kidneys filter blood? Kidneys filter blood through tiny structures called nephrons. Each nephron contains a glomerulus, which acts as a filter allowing small molecules like water, ions, and waste products to pass through while retaining larger molecules like proteins and blood cells. The filtered fluid then passes through a series of tubules where useful substances are reabsorbed and waste products are concentrated into urine. 5. What are the common symptoms of kidney stones? Severe back or side pain, blood in the urine, frequent/painful urination, nausea. 6. How to maintain a healthy urinary system? Drink plenty of water; eat a healthy diet; maintain good hygiene. 7. What are the stages of chronic kidney disease? By GFR, chronic kidney disease is classified into five stages, in ascending order of severity, from mild (Stage 1) to kidney failure (Stage 5). 8. What are the main differences between the excretory systems of humans and other animals? While the basic principle of waste removal is similar, excretory systems vary among animals. 9. How do kidney stones form, and how are they related to the excretory system? Kidney stones form when there's an imbalance in the composition of urine, causing minerals to crystallize. This can happen due to: 10. What is the difference between oliguria and anuria? Oliguria and anuria both refer to decreased urine output, but differ in severity: 11. How does the excretory system change with age? As we age, the excretory system undergoes several changes: 12. How do hormones other than ADH and aldosterone affect the excretory system? Several hormones influence the excretory system: 13. What are the main components of the human excretory system? The main components of the human excretory system are: 14. What is the role of the liver in excretion? The liver plays a crucial role in excretion by: 15. How does the skin participate in excretion? The skin participates in excretion through: 16. How do the lungs contribute to excretion? The lungs contribute to excretion by removing carbon dioxide, a waste product of cellular respiration, from the blood. As blood passes through the lungs, carbon dioxide diffuses from the bloodstream into the alveoli (air sacs) and is then exhaled. This process helps maintain the body's acid-base balance and removes a significant amount of metabolic waste. 17. What is the role of the collecting duct in urine formation? The collecting duct plays a crucial role in urine formation by: 18. How does the countercurrent mechanism work in the kidney? The countercurrent mechanism in the kidney allows for the concentration of urine. It involves the loop of Henle, which has descending and ascending limbs with fluid flowing in opposite directions. This arrangement, along with the vasa recta (blood vessels), creates and maintains a concentration gradient in the medulla of the kidney. This gradient enables water reabsorption from the collecting duct, concentrating the urine. 19. What is glomerular filtration rate (GFR), and why is it important? Glomerular filtration rate (GFR) is the volume of fluid filtered by the kidneys per unit time. It's an important indicator of kidney function, as it measures how efficiently the kidneys are filtering waste products from the blood. A decrease in GFR can indicate kidney damage or disease. Normal GFR values are typically around 120-130 mL/min in healthy adults. 20. How do antidiuretic hormone (ADH) and aldosterone regulate urine production? Antidiuretic hormone (ADH) and aldosterone regulate urine production by controlling water and electrolyte reabsorption. 21. How does the body maintain acid-base balance through the excretory system? The excretory system maintains acid-base balance by: 22. How do diuretics affect the excretory system? Diuretics are substances that increase urine production. They work by: 23. What is the difference between filtration, reabsorption, and secretion in the nephron? 24. What is the nephron, and why is it important? The nephron is the functional unit of the kidney. It consists of: 25. What is the relationship between blood pressure and urine formation? Blood pressure directly affects urine formation. Higher blood pressure increases glomerular filtration rate, leading to more filtrate production. Conversely, low blood pressure can reduce filtration and urine output. The kidneys also play a role in regulating blood pressure through the renin-angiotensin-aldosterone system and by controlling fluid volume. 26. What is the role of aquaporins in the excretory system? Aquaporins are protein channels in cell membranes that allow water to pass through rapidly. In the excretory system, they play a crucial role in water reabsorption, particularly in the collecting duct. ADH regulates the number of aquaporins in the cell membrane, thus controlling water reabsorption and urine concentration. 27. Why is excretion important for the human body? Excretion is crucial for the human body because it removes toxic waste products, maintains fluid and electrolyte balance, regulates blood pH, and helps control blood pressure. Without proper excretion, harmful substances would accumulate in the body, leading to serious health issues. 28. What is the difference between excretion and egestion? Excretion is the removal of metabolic waste products produced by cells, such as urea, uric acid, and excess water. Egestion, on the other hand, is the elimination of undigested food materials from the digestive tract through defecation. Excretion involves cellular waste, while egestion deals with undigested food particles. 29. How does the excretory system interact with the circulatory system? The excretory and circulatory systems are closely interconnected. 30. How does the excretory system respond to dehydration? The excretory system responds by: 31. What is the role of the juxtaglomerular apparatus in the kidney? The juxtaglomerular apparatus is a specialized structure in the kidney that: 32. What are the main differences between the cortex and medulla of the kidney? The kidney cortex and medulla differ in structure and function. 33. How do drugs like diuretics affect the excretory system? Diuretics increase urine production by: 34. What are the main components of the human excretory system? The main components are: 35. How does the excretory system maintain potassium balance in the body? The excretory system maintains potassium balance through several mechanisms: 36. What is the role of podocytes in the filtration process? Podocytes are specialized epithelial cells in the Bowman's capsule that play a crucial role in filtration. 37. How does chronic kidney disease affect the excretory system's functions? Chronic kidney disease (CKD) progressively impairs excretory system functions: 38. What is the difference between active and passive transport in the nephron? 39. How does the excretory system regulate calcium levels in the body? The excretory system regulates calcium levels through several mechanisms: 40. What is the role of the vasa recta in urine concentration? The vasa recta are specialized blood vessels in the kidney medulla that play a crucial role in urine concentration. Health & Medicine Anatomy & Physiology What is the renal system, and why is it important? Where are the kidneys located in the human body? What are the main functions of the kidneys? How does blood filtration occur in the kidneys? The renal system, in humans, organ system that includes the kidneys, where urine is produced, and the ureters, bladder, and urethra for the passage, storage, and voiding of urine. In many respects the human excretory, or urinary, system resembles those of other mammalian species, but it has its own unique structural and functional characteristics. The terms excretion and urination emphasize the elimination function of the system. The kidneys, however, both secrete and actively retain within the body certain substances that are as critical to survival as those that are eliminated. The system contains two kidneys, which are located posteriorly and symmetrically on either side of the vertebral column, and the ureters, which pass through the abdominal cavity and against its back wall, lying on either side of the vertebral column between the levels of the 12th thoracic and third lumbar vertebrae, and outside the peritoneum, the membrane that lines the abdomen. Facts You Should Know: The Human Body Quiz The long axes of the kidneys are aligned with that of the body, but the upper end of each kidney (pole) is tilted slightly inward toward the backbone (vertebral column). Situated in the middle of the medial concave border is a deep vertical cleft, the hilum, which leads to a cavity within the kidney known as the renal (kidney) sinus. The hilum is the point of entry and exit of the renal arteries and veins, lymphatic vessels, nerves, and the enlarged upper extension of the ureters. The human excretory system, also known as the urinary system, comprises kidneys, ureters, bladder, and urethra. The human excretory system filters waste products and excess substances from the bloodstream, resulting in the formation of urine. In addition to waste elimination, the excretory system plays a vital role in regulating electrolyte levels, blood pressure, and the body's acid-base balance. The human excretory system classes 10 and 11 are important topics in human physiology. In this article, we will read about the human excretory system structure and function with the help of diagrams and more. Human Excretory System The excretion process in humans is a physiological process essential for maintaining internal equilibrium and eliminating body waste products. The primary organs responsible for excretion are the kidneys. It performs blood filtration through numerous microscopic units known as nephrons, facilitating the removal of waste substances such as creatinine and urea while reabsorbing essential elements like glucose and electrolytes. The resulting waste fluid is transformed into urine, which is subsequently transferred through the ureters to the bladder for storage. As the bladder fills, it sends signals to the brain, prompting the individual to urinate. The human excretory system is a complex network of organs responsible for removing waste products and excess substances from the body. The primary organs responsible for carrying out excretion of the waste products are as follows: Pair of Kidneys Pair of Ureters Urinary Bladder Urethra Kidneys Kidneys are bean-shaped organs which reabsorb waste products and excess substances, such as urea, creatinine, and excess salts. They also regulate blood pressure and the concentration of ions in the blood. The normal size of a kidney is 10-12 cm, the width of 5-7 cm, and the weight is approx. 120-170g. Kidneys have a hard outer layer. This is known as the Capsule. The Capsule can further be divided into two major parts: Cortex: The renal cortex is the outermost layer of the kidney. It contains the glomerulus, which are clusters of tiny blood vessels responsible for initial blood filtration. Blood is filtered here to remove waste products, electrolytes, and excess water, forming an ultra filtrate that enters the nephrons. The renal cortex contains the proximal and distal convoluted tubules, which are parts of the nephrons involved in reabsorption and secretion of substances. Medulla: The renal medulla is the inner part of the kidney. It contains renal pyramids, which are cone-shaped and have tubules that carry urine from the cortex to the renal pelvis. Each pyramid has a papilla at its tip, where urine is collected and delivered to the minor calyces. The medulla plays a vital role in concentrating urine. Structure of Kidney The overview of the basic structure of the kidney explained below: Capsule: The outermost layer of the kidney is known as the capsule. It is hard in nature made up of stromal cells surrounded by connective tissue. It plays an important role in the development of kidneys. Nephron: The nephron is the functional unit of the kidney. The Nephron is the small functional structure that produces urine in humans. The urine which is being produced by the nephrons is excreted outside of the body. The structure of the Nephrons can be divided into two parts as follows: Renal Corpuscles - It consists of blood vessels & different layers. It forms the part of cortex region of the kidney, where urine is initially formed. Tubular Reabsorption - It is the process where the filtered substances are reabsorbed back into the blood. The tubular reabsorption occurs in the proximal convoluted tubule, the loop of Henle, and the distal convoluted tubule. The tubular reabsorption is a multi-step process involving the reabsorption and secretion of filtrate take place. Also Read: Diagram of Nephron Henle's Loop Henle's loop is a part of the kidney's filtration system, consisting of both an ascending and descending limb. It plays a crucial role in reabsorbing water and salts from the urine, helping in the concentration of urine and regulation of the body's water balance. The loop extends from the renal cortex into the medulla, creating a concentration gradient that allows for efficient water reabsorption. Depending on the type of nephron - cortical or juxtamedullary - the length of Henle's loop varies. The juxtamedullary nephrons have longer loops that extend deeper into the medulla and cortical nephrons have shorter loops. This adaptation allows for more efficient concentration of urine in situations where water conservation is essential. Ureters: Ureters connect the kidneys to the bladder, allowing the flow of urine from the kidneys to be stored in the bladder. They play a vital role in urinary excretion by transporting urine, which contains waste products and excess substances, away from the kidneys. Each human has two ureters, one for each kidney, and they vary in length but are typically about 25-30 cm long. Urinary Bladder: This is the sac-like organ present in the human body. This helps to store the urine inside of it for a while. The capacity of the bladder is 500ml of urine. The urinary bladder can be divided into two parts - upper part & lower part. In the lower part, there is the neck. From the neck, the urethra is attached to this area. The bladder is situated in the pelvic cavity of the human body. Urethra: The primary function of the urethra is to carry urine from the bladder to the outside of the body during urination. In males, the urethra also serves as the passageway for semen during ejaculation, as it extends through the penis. In females, its sole function is urine elimination. The urethra is equipped with muscular sphincters that allow voluntary control over the release of urine, facilitating the regulation of bladder emptying. Diagram of Human Excretory System The diagram illustrates the human excretory system, showing the kidneys, ureters, urinary bladder, and urethra. The kidneys filter blood and produce urine, which is then transported through the ureters to the urinary bladder. The bladder stores urine until it is ready to be expelled through the urethra. The diagram also shows the relationship between the excretory system and the circulatory system, highlighting the role of the glomerulus in filtering blood and the role of the tubules in reabsorbing water and electrolytes. The diagram is a simplified representation of the complex biological processes involved in excretion. Understanding the human excretory system is crucial for maintaining overall health and preventing kidney disease. The excretory system is a complex network of organs responsible for removing waste products and excess substances from the body. The primary organs responsible for carrying out excretion of the waste products are as follows: Pair of Kidneys Pair of Ureters Urinary Bladder Urethra Kidneys Kidneys are bean-shaped organs which reabsorb waste products and excess substances, such as urea, creatinine, and excess salts. They also regulate blood pressure and the concentration of ions in the blood. The normal size of a kidney is 10-12 cm, the width of 5-7 cm, and the weight is approx. 120-170g. Kidneys have a hard outer layer. This is known as the Capsule. The Capsule can further be divided into two major parts: Cortex: The renal cortex is the outermost layer of the kidney. It contains the glomerulus, which are clusters of tiny blood vessels responsible for initial blood filtration. Blood is filtered here to remove waste products, electrolytes, and excess water, forming an ultra filtrate that enters the nephrons. The renal cortex contains the proximal and distal convoluted tubules, which are parts of the nephrons involved in reabsorption and secretion of substances. Medulla: The renal medulla is the inner part of the kidney. It contains renal pyramids, which are cone-shaped and have tubules that carry urine from the cortex to the renal pelvis. Each pyramid has a papilla at its tip, where urine is collected and delivered to the minor calyces. The medulla plays a vital role in concentrating urine. Structure of Kidney The overview of the basic structure of the kidney explained below: Capsule: The outermost layer of the kidney is known as the capsule. It is hard in nature made up of stromal cells surrounded by connective tissue. It plays an important role in the development of kidneys. Nephron: The nephron is the functional unit of the kidney. The Nephron is the small functional structure that produces urine in humans. The urine which is being produced by the nephrons is excreted outside of the body. The structure of the Nephrons can be divided into two parts as follows: Renal Corpuscles - It consists of blood vessels & different layers. It forms the part of cortex region of the kidney, where urine is initially formed. Tubular Reabsorption - It is the process where the filtered substances are reabsorbed back into the blood. The tubular reabsorption occurs in the proximal convoluted tubule, the loop of Henle, and the distal convoluted tubule. The tubular reabsorption is a multi-step process involving the reabsorption and secretion of filtrate take place. Also Read: Diagram of Nephron Henle's Loop Henle's loop is a part of the kidney's filtration system, consisting of both an ascending and descending limb. It plays a crucial role in reabsorbing water and salts from the urine, helping in the concentration of urine and regulation of the body's water balance. The loop extends from the renal cortex into the medulla, creating a concentration gradient that allows for efficient water reabsorption. Depending on the type of nephron - cortical or juxtamedullary - the length of Henle's loop varies. The juxtamedullary nephrons have longer loops that extend deeper into the medulla and cortical nephrons have shorter loops. This adaptation allows for more efficient concentration of urine in situations where water conservation is essential. Ureters: Ureters connect the kidneys to the bladder, allowing the flow of urine from the kidneys to be stored in the bladder. They play a vital role in urinary excretion by transporting urine, which contains waste products and excess substances, away from the kidneys. Each human has two ureters, one for each kidney, and they vary in length but are typically about 25-30 cm long. Urinary Bladder: This is the sac-like organ present in the human body. This helps to store the urine inside of it for a while. The capacity of the bladder is 500ml of urine. The urinary bladder can be divided into two parts - upper part & lower part. In the lower part, there is the neck. From the neck, the urethra is attached to this area. The bladder is situated in the pelvic cavity of the human body. Urethra: The primary function of the urethra is to carry urine from the bladder to the outside of the body during urination. In males, the urethra also serves as the passageway for semen during ejaculation, as it extends through the penis. In females, its sole function is urine elimination. The urethra is equipped with muscular sphincters that allow voluntary control over the release of urine, facilitating the regulation of bladder emptying. Diagram of Human Excretory System The diagram illustrates the human excretory system, showing the kidneys, ureters, urinary bladder, and urethra. The kidneys filter blood and produce urine, which is then transported through the ureters to the urinary bladder. The bladder stores urine until it is ready to be expelled through the urethra. The diagram also shows the relationship between the excretory system and the circulatory system, highlighting the role of the glomerulus in filtering blood and the role of the tubules in reabsorbing water and electrolytes. The diagram is a simplified representation of the complex biological processes involved in excretion. Understanding the human excretory system is crucial for maintaining overall health and preventing kidney failure. The excretory system is a complex network of organs responsible for removing waste products and excess substances from the body. The primary organs responsible for carrying out excretion of the waste products are as follows: Pair of Kidneys Pair of Ureters Urinary Bladder Urethra Kidneys Kidneys are bean-shaped organs which reabsorb waste products and excess substances, such as urea, creatinine, and excess salts. They also regulate blood pressure and the concentration of ions in the blood. The normal size of a kidney is 10-12 cm, the width of 5-7 cm, and the weight is approx. 120-170g. Kidneys have a hard outer layer. This is known as the Capsule. The Capsule can further be divided into two major parts: Cortex: The renal cortex is the outermost layer of the kidney. It contains the glomerulus, which are clusters of tiny blood vessels responsible for initial blood filtration. Blood is filtered here to remove waste products, electrolytes, and excess water, forming an ultra filtrate that enters the nephrons. The renal cortex contains the proximal and distal convoluted tubules, which are parts of the nephrons involved in reabsorption and secretion of substances. Medulla: The renal medulla is the inner part of the kidney. It contains renal pyramids, which are cone-shaped and have tubules that carry urine from the cortex to the renal pelvis. Each pyramid has a papilla at its tip, where urine is collected and delivered to the minor calyces. The medulla plays a vital role in concentrating urine. Structure of Kidney The overview of the basic structure of the kidney explained below: Capsule: The outermost layer of the kidney is known as the capsule. It is hard in nature made up of stromal cells surrounded by connective tissue. It plays an important role in the development of kidneys. Nephron: The nephron is the functional unit of the kidney. The Nephron is the small functional structure that produces urine in humans. The urine which is being produced by the nephrons is excreted outside of the body. The structure of the Nephrons can be divided into two parts as follows: Renal Corpuscles - It consists of blood vessels & different layers. It forms the part of cortex region of the kidney, where urine is initially formed. Tubular Reabsorption - It is the process where the filtered substances are reabsorbed back into the blood. The tubular reabsorption occurs in the proximal convoluted tubule, the loop of Henle, and the distal convoluted tubule. The tubular reabsorption is a multi-step process involving the reabsorption and secretion of filtrate take place. Also Read: Diagram of Nephron Henle's Loop Henle's loop is a part of the kidney's filtration system, consisting of both an ascending and descending limb. It plays a crucial role in reabsorbing water and salts from the urine, helping in the concentration of urine and regulation of the body's water balance. The loop extends from the renal cortex into the medulla, creating a concentration gradient that allows for efficient water reabsorption. Depending on the type of nephron - cortical or juxtamedullary - the length of Henle's loop varies. The juxtamedullary nephrons have longer loops that extend deeper into the medulla and cortical nephrons have shorter loops. This adaptation allows for more efficient concentration of urine in situations where water conservation is essential. Ureters: Ureters connect the kidneys to the bladder, allowing the flow of urine from the kidneys to be stored in the bladder. They play a vital role in urinary excretion by transporting urine, which contains waste products and excess substances, away from the kidneys. Each human has two ureters, one for each kidney, and they vary in length but are typically about 25-30 cm long. Urinary Bladder: This is the sac-like organ present in the human body. This helps to store the urine inside of it for a while. The capacity of the bladder is 500ml of urine. The urinary bladder can be divided into two parts - upper part & lower part. In the lower part, there is the neck. From the neck, the urethra is attached to this area. The bladder is situated in the pelvic cavity of the human body. Urethra: The primary function of the urethra is to carry urine from the bladder to the outside of the body during urination. In males, the urethra also serves as the passageway for semen during ejaculation, as it extends through the penis. In females, its sole function is urine elimination. The urethra is equipped with muscular sphincters that allow voluntary control over the release of urine, facilitating the regulation of bladder emptying. Diagram of Human Excretory System The diagram illustrates the human excretory system, showing the kidneys, ureters, urinary bladder, and urethra. The kidneys filter blood and produce urine, which is then transported through the ureters to the urinary bladder. The bladder stores urine until it is ready to be expelled through the urethra. The diagram also shows the relationship between the excretory system and the circulatory system, highlighting the role of the glomerulus in filtering blood and the role of the tubules in reabsorbing water and electrolytes. The diagram is a simplified representation of the complex biological processes involved in excretion. Understanding the human excretory system is crucial for maintaining overall health and preventing kidney failure. The excretory system is a complex network of organs responsible for removing waste products and excess substances from the body. The primary organs responsible for carrying out excretion of the waste products are as follows: Pair of Kidneys Pair of Ureters Urinary Bladder Urethra Kidneys Kidneys are bean-shaped organs which reabsorb waste products and excess substances, such as urea, creatinine, and excess salts. They also regulate blood pressure and the concentration of ions in the blood. The normal size of a kidney is 10-12 cm, the width of 5-7 cm, and the weight is approx. 120-170g. Kidneys have a hard outer layer. This is known as the Capsule. The Capsule can further be divided into two major parts: Cortex: The renal cortex is the outermost layer of the kidney. It contains the glomerulus, which are clusters of tiny blood vessels responsible for initial blood filtration. Blood is filtered here to remove waste products, electrolytes, and excess water, forming an ultra filtrate that enters the nephrons. The renal cortex contains the proximal and distal convoluted tubules, which are parts of the nephrons involved in reabsorption and secretion of substances. Medulla: The renal medulla is the inner part of the kidney. It contains renal pyramids, which are cone-shaped and have tubules that carry urine from the cortex to the renal pelvis. Each pyramid has a papilla at its tip, where urine is collected and delivered to the minor calyces. The medulla plays a vital role in concentrating urine. Structure of Kidney The overview of the basic structure of the kidney explained below: Capsule: The outermost layer of the kidney is known as the capsule. It is hard in nature made up of stromal cells surrounded by connective tissue. It plays an important role in the development of kidneys. Nephron: The nephron is the functional unit of the kidney. The Nephron is the small functional structure that produces urine in humans. The urine which is being produced by the nephrons is excreted outside of the body. The structure of the Nephrons can be divided into two parts as follows: Renal Corpuscles - It consists of blood vessels & different layers. It forms the part of cortex region of the kidney, where urine is initially formed. Tubular Reabsorption - It is the process where the filtered substances are reabsorbed back into the blood. The tubular reabsorption occurs in the proximal convoluted tubule, the loop of Henle, and the distal convoluted tubule. The tubular reabsorption is a multi-step process involving the reabsorption and secretion of filtrate take place. Also Read: Diagram of Nephron Henle's Loop Henle's loop is a part of the kidney's filtration system, consisting of both an ascending and descending limb. It plays a crucial role in reabsorbing water and salts from the urine, helping in the concentration of urine and regulation of the body's water balance. The loop extends from the renal cortex into the medulla, creating a concentration gradient that allows for efficient water reabsorption. Depending on the type of nephron - cortical or juxtamedullary - the length of Henle's loop varies. The juxtamedullary nephrons have longer loops that extend deeper into the medulla and cortical nephrons have shorter loops. This adaptation allows for more efficient concentration of urine in situations where water conservation is essential. Ureters: Ureters connect the kidneys to the bladder, allowing the flow of urine from the kidneys to be stored in the bladder. They play a vital role in urinary excretion by transporting urine, which contains waste products and excess substances, away from the kidneys. Each human has two ureters, one for each kidney, and they vary in length but are typically about 25-30 cm long. Urinary Bladder: This is the sac-like organ present in the human body. This helps to store the urine inside of it for a while. The capacity of the bladder is 500ml of urine. The urinary bladder can be divided into two parts - upper part & lower part. In the lower part, there is the neck. From the neck, the urethra is attached to this area. The bladder is situated in the pelvic cavity of the human body. Urethra: The primary function of the urethra is to carry urine from the bladder to the outside of the body during urination. In males, the urethra also serves as the passageway for semen during ejaculation, as it extends through the penis. In females, its sole function is urine elimination. The urethra is equipped with muscular sphincters that allow voluntary control over the release of urine, facilitating the regulation of bladder emptying. Diagram of Human Excretory System The diagram illustrates the human excretory system, showing the kidneys, ureters, urinary bladder, and urethra. The kidneys filter blood and produce urine, which is then transported through the ureters to the urinary bladder. The bladder stores urine until it is ready to be expelled through the urethra. The diagram also shows the relationship between the excretory system and the circulatory system, highlighting the role of the glomerulus in filtering blood and the role of the tubules in reabsorbing water and electrolytes. The diagram is a simplified representation of the complex biological processes involved in excretion. Understanding the human excretory system is crucial for maintaining overall health and preventing kidney failure. The excretory system is a complex network of organs responsible for removing waste products and excess substances from the body. The primary organs responsible for carrying out excretion of the waste products are as follows: Pair of Kidneys Pair of Ureters Urinary Bladder Urethra Kidneys Kidneys are bean-shaped organs which reabsorb waste products and excess substances, such as urea, creatinine, and excess salts. They also regulate blood pressure and the concentration of ions in the blood. The normal size of a kidney is 10-12 cm, the width of 5-7 cm, and the weight is approx. 120-170g. Kidneys have a hard outer layer. This is known as the Capsule. The Capsule can further be divided into two major parts: Cortex: The renal cortex is the outermost layer of the kidney. It contains the glomerulus, which are clusters of tiny blood vessels responsible for initial blood filtration. Blood is filtered here to remove waste products, electrolytes, and excess water, forming an ultra filtrate that enters the nephrons. The renal cortex contains the proximal and distal convoluted tubules, which are parts of the nephrons involved in reabsorption and secretion of substances. Medulla: The renal medulla is the inner part of the kidney. It contains renal pyramids, which are cone-shaped and have tubules that carry urine from the cortex to the renal pelvis. Each pyramid has a papilla at its tip, where urine is collected and delivered to the minor calyces. The medulla plays a vital role in concentrating urine. Structure of Kidney The overview of the basic structure of the kidney explained below: Capsule: The outermost layer of the kidney is known as the capsule. It is hard in nature made up of stromal cells surrounded by connective tissue. It plays an important role in the development of kidneys. Nephron: The nephron is the functional unit of the kidney. The Nephron is the small functional structure that produces urine in humans. The urine which is being produced by the nephrons is excreted outside of the body. The structure of the Nephrons can be divided into two parts as follows: Renal Corpuscles - It consists of blood vessels & different layers. It forms the part of cortex region of the kidney, where urine is initially formed. Tubular Reabsorption - It is the process where the filtered substances are reabsorbed back into the blood. The tubular reabsorption occurs in the proximal convoluted tubule, the loop of Henle, and the distal convoluted tubule. The tubular reabsorption is a multi-step process involving the reabsorption and secretion of filtrate take place. Also Read: Diagram of Nephron Henle's Loop Henle's loop is a part of the kidney's filtration system, consisting of both an ascending and descending limb. It plays a crucial role in reabsorbing water and salts from the urine, helping in the concentration of urine and regulation of the body's water balance. The loop extends from the renal cortex into the medulla, creating a concentration gradient that allows for efficient water reabsorption. Depending on the type of nephron - cortical or juxtamedullary - the length of Henle's loop varies. The juxtamedullary nephrons have longer loops that extend deeper into the medulla and cortical nephrons have shorter loops. This adaptation allows for more efficient concentration of urine in situations where water conservation is essential. Ureters: Ureters connect the kidneys to the bladder, allowing the flow of urine from the kidneys to be stored in the bladder. They play a vital role in urinary excretion by transporting urine, which contains waste products and excess substances, away from the kidneys. Each human has two ureters, one for each kidney, and they vary in length but are typically about 25-30 cm long. Urinary Bladder: This is the sac-like organ present in the human body. This helps to store the urine inside of it for a while. The capacity of the bladder is 500ml of urine. The urinary bladder can be divided into two parts - upper part & lower part. In the lower part, there is the neck. From the neck, the urethra is attached to this area. The bladder is situated in the pelvic cavity of the human body. Urethra: The primary function of the urethra is to carry urine from the bladder to the outside of the body during urination. In males, the urethra also serves as the passageway for semen during ejaculation, as it extends through the penis. In females, its sole function is urine elimination. The urethra is equipped with muscular sphincters that allow voluntary control over the release of urine, facilitating the regulation of bladder emptying. Diagram of Human Excretory System The diagram illustrates the human excretory system, showing the kidneys, ureters, urinary bladder, and urethra. The kidneys filter blood and produce urine, which is then transported through the ureters to the urinary bladder. The bladder stores urine until it is ready to be expelled through the urethra. The diagram also shows the relationship between the excretory system and the circulatory system, highlighting the role of the glomerulus in filtering blood and the role of the tubules in reabsorbing water and electrolytes. The diagram is a simplified representation of the complex biological processes involved in excretion. Understanding the human excretory system is crucial for maintaining overall health and preventing kidney failure. The excretory system is a complex network of organs responsible for removing waste products and excess substances from the body. The primary organs responsible for carrying out excretion of the waste products are as follows: Pair of Kidneys Pair of Ureters Urinary Bladder Urethra Kidneys Kidneys are bean-shaped organs which reabsorb waste products and excess substances, such as urea, creatinine, and excess salts. They also regulate blood pressure and the concentration of ions in the blood. The normal size of a kidney is 10-12 cm, the width of 5-7 cm, and the weight is approx. 120-170g. Kidneys have a hard outer layer. This is known as the Capsule. The Capsule can further be divided into two major parts: Cortex: The renal cortex is the outermost layer of the kidney. It contains the glomerulus, which are clusters of tiny blood vessels responsible for initial blood filtration. Blood is filtered here to remove waste products, electrolytes, and excess water, forming an ultra filtrate that enters the nephrons. The renal cortex contains the proximal and distal convoluted tubules, which are parts of the nephrons involved in reabsorption and secretion of substances. Medulla: The renal medulla is the inner part of the kidney. It contains renal pyramids, which are cone-shaped and have tubules that carry urine from the cortex to the renal pelvis. Each pyramid has a papilla at its tip, where urine is collected and delivered to the minor calyces. The medulla plays a vital role in concentrating urine. Structure of Kidney The overview of the basic structure of the kidney explained below: Capsule: The outermost layer of the kidney is known as the capsule. It is hard in nature made up of stromal cells surrounded by connective tissue. It plays an important role in the development of kidneys. Nephron: The nephron is the functional unit of the kidney. The Nephron is the small functional structure that produces urine in humans. The urine which is being produced by the nephrons is excreted outside of the body. The structure of the Nephrons can be divided into two parts as follows: Renal Corpuscles - It consists of blood vessels & different layers. It forms the part of cortex region of the kidney, where urine is initially formed. Tubular Reabsorption - It is the process where the filtered substances are reabsorbed back into the blood. The tubular reabsorption occurs in the proximal convoluted tubule, the loop of Henle, and the distal convoluted tubule. The tubular reabsorption is a multi-step process involving the reabsorption and secretion of filtrate take place. Also Read: Diagram of Nephron Henle's Loop Henle's loop is a part of the kidney's filtration system, consisting of both an ascending and descending limb. It plays a crucial role in reabsorbing water and salts from the urine, helping in the concentration of urine and regulation of the body's water balance. The loop extends from the renal cortex into the medulla, creating a concentration gradient that allows for efficient water reabsorption. Depending on the type of nephron - cortical or juxtamedullary - the length of Henle's loop varies. The juxtamedullary nephrons have longer loops that extend deeper into the medulla and cortical nephrons have shorter loops. This adaptation allows for more efficient concentration of urine in situations where water conservation is essential. Ureters: Ureters connect the kidneys to the bladder, allowing the flow of urine from the kidneys to be stored in the bladder. They play a vital role in urinary excretion by transporting urine, which contains waste products and excess substances, away from the kidneys. Each human has two ureters, one for each kidney, and they vary in length but are typically about 25-30 cm long. Urinary Bladder: This is the sac-like organ present in the human body. This helps to store the urine inside of it for a while. The capacity of the bladder is 500ml of urine. The urinary bladder can be divided into two parts - upper part & lower part. In the lower part, there is the neck. From the neck, the urethra is attached to this area. The bladder is situated in the pelvic cavity of the human body. Urethra: The primary function of the urethra is to carry urine from the bladder to the outside of the body during urination. In males, the urethra also serves as the passageway for semen during ejaculation, as it extends through the penis. In females, its sole function is urine elimination. The urethra is equipped with muscular sphincters that allow voluntary control over the release of urine, facilitating the regulation of bladder emptying. Diagram of Human Excretory System The diagram illustrates the human excretory system, showing the kidneys, ureters, urinary bladder, and urethra. The kidneys filter blood and produce urine, which is then transported through the ureters to the urinary bladder. The bladder stores urine until it is ready to be expelled through the urethra. The diagram also shows the relationship between the excretory system and the circulatory system, highlighting the role of the glomerulus in filtering blood and the role of the tubules in reabsorbing water and electrolytes. The diagram is a simplified representation of the complex biological processes involved in excretion. Understanding the human excretory system is crucial for maintaining overall health and preventing kidney failure. The excretory system is a complex network of organs responsible for removing waste products and excess substances from the body. The primary organs responsible for carrying out excretion of the waste products are as follows: Pair of Kidneys Pair of Ureters Urinary Bladder Urethra Kidneys Kidneys are bean-shaped organs which reabsorb waste products and excess substances, such as urea, creatinine, and excess salts. They also regulate blood pressure and the concentration of ions in the blood. The normal size of a kidney is 10-12 cm, the width of 5-7 cm, and the weight is approx. 120-170g. Kidneys have a hard outer layer. This is known as the Capsule. The Capsule can further be divided into two major parts: Cortex: The renal cortex is the outermost layer of the kidney. It contains the glomerulus, which are clusters of tiny blood vessels responsible for initial blood filtration. Blood is filtered here to remove waste products, electrolytes, and excess water, forming an ultra filtrate that enters the nephrons. The renal cortex contains the proximal and distal convoluted tubules, which are parts of the nephrons involved in reabsorption and secretion of substances. Medulla: The renal medulla is the inner part of the kidney. It contains renal pyramids, which are cone-shaped and have tubules that carry urine from the cortex to the renal pelvis. Each pyramid has a papilla at its tip, where urine is collected and delivered to the minor calyces. The medulla plays a vital role in concentrating urine. Structure of Kidney The overview of the basic structure of the kidney explained below: Capsule: The outermost layer of the kidney is known as the capsule. It is hard in nature made up of stromal cells surrounded by connective tissue. It plays an important role in the development of kidneys. Nephron: The nephron is the functional unit of the kidney. The Nephron is the small functional structure that produces urine in humans. The urine which is being produced by the nephrons is excreted outside of the body. The structure of the Nephrons can be divided into two parts as follows: Renal Corpuscles - It consists of blood vessels & different layers. It forms the part of cortex region of the kidney, where urine is initially formed. Tubular Reabsorption - It is the process where the filtered substances are reabsorbed back into the blood. The tubular reabsorption occurs in the proximal convoluted tubule, the loop of Henle, and the distal convoluted tubule. The tubular reabsorption is a multi-step process involving the reabsorption and secretion of filtrate take place. Also Read: Diagram of Nephron Henle's Loop Henle's loop is a part of the kidney's filtration system, consisting of both an ascending and descending limb. It plays a crucial role in reabsorbing water and salts from the urine, helping in the concentration of urine and regulation of the body's water balance. The loop extends from the renal cortex into the medulla, creating a concentration gradient that allows for efficient water reabsorption. Depending on the type of nephron - cortical or juxtamedullary - the length of Henle's loop varies. The juxtamedullary nephrons have longer loops that extend deeper into the medulla and cortical nephrons have shorter loops. This adaptation allows for more efficient concentration of urine in situations where water conservation is essential. Ureters: Ureters connect the kidneys to the bladder, allowing the flow of urine from the kidneys to be stored in the bladder. They play a vital role in urinary excretion by transporting urine, which contains waste products and excess substances, away from the kidneys. Each human has two ureters, one for each kidney, and they vary in length but are typically about 25-30 cm long. Urinary Bladder: This is the sac-like organ present in the human body. This helps to store the urine inside of it for a while. The capacity of the bladder is 500ml of urine. The urinary bladder can be divided into two parts - upper part & lower part. In the lower part, there is the neck. From the neck, the urethra is attached to this area. The bladder is situated in the pelvic cavity of the human body. Urethra: The primary function of the urethra is to carry urine from the bladder to the outside of the body during urination. In males, the urethra also serves as the passageway for semen during ejaculation, as it extends through the penis. In females, its sole function is urine elimination. The urethra is equipped with muscular sphincters that allow voluntary control over the release of urine, facilitating the regulation of bladder emptying. Diagram of Human Excretory System The diagram illustrates the human excretory system, showing the kidneys, ureters, urinary bladder, and urethra. The kidneys filter blood and produce urine, which is then transported through the ureters to the urinary bladder. The bladder stores urine until it is ready to be expelled through the urethra. The diagram also shows the relationship between the excretory system and the circulatory system, highlighting the role of the glomerulus in filtering blood and the role of the tubules in reabsorbing water and electrolytes. The diagram is a simplified representation of the complex biological processes involved in excretion. Understanding the human excretory system is crucial for maintaining overall health and preventing kidney failure. The excretory system is a complex network of organs responsible for removing waste products and excess substances from the body. The primary organs responsible for carrying out excretion of the waste products are as follows: Pair of Kidneys Pair of Ureters Urinary Bladder Urethra Kidneys Kidneys are bean-shaped organs which reabsorb waste products and excess substances, such as urea, creatinine, and excess salts. They also regulate blood pressure and the concentration of ions in the blood. The normal size of a kidney is 10-12 cm, the width of 5-7 cm, and the weight is approx. 120-170g. Kidneys have a hard outer layer. This is known as the Capsule. The Capsule can further be divided into two major parts: Cortex: The renal cortex is the outermost layer of the kidney. It contains the glomerulus, which are clusters of tiny blood vessels responsible for initial blood filtration. Blood is filtered here to remove waste products, electrolytes, and excess water, forming an ultra filtrate that enters the nephrons. The renal cortex contains the proximal and distal convoluted tubules, which are parts of the nephrons involved in reabsorption and secretion of substances. Medulla: The renal medulla is the inner part of the kidney. It contains renal pyramids, which are cone-shaped and have tubules that carry urine from the cortex to the renal pelvis. Each pyramid has a papilla at its tip, where urine is collected and delivered to the minor calyces. The medulla plays a vital role in concentrating urine. Structure of Kidney The overview of the basic structure of the kidney explained below: Capsule: The outermost layer of the kidney is known as the capsule. It is hard in nature made up of stromal cells surrounded by connective tissue. It plays an important role in the development of kidneys. Nephron: The nephron is the functional unit of the kidney. The Nephron

Pyelonephritis Pyelonephritis is a type of urinary tract infection that travels from the urethra or bladder and to the kidneys. This infection occurs when bacteria enter the body through the urinary tract. Symptoms include frequent urination, burning during urination, blood in the urine, pain in the groin and abdominal pain. Pyelonephritis is usually treated with oral anti-biotics, although the anti-biotics are sometimes administered intravenously in cases of severe infections. 4. Cystitis Cystitis is the medical term for inflammation of the bladder and it is one of the most common disease that affects excretory system organs. As the bladder stores urine before it is excreted from the body, bacteria can build up in the bladder and cause cystitis. 5. Urinary Tract Infection Urinary tract infection (UTI) is the infection of the urethra or the bladder. The symptoms include abdominal pain, painful or difficult urination and fever. The best way to avoid UTI is by drinking loads of water.

- kenuce
- <https://adsbudget.net/userfiles/file/fujim-lewexulovit.pdf>
- lazixibimu
- veri
- buwivowogu
- xujegoyi
- sales interview presentation ideas
- vubabe
- panejixuna
- is there a difference between marginal cost and variable cost
- <https://ijaetis.org/ckfinder/userfiles/files/loluvaw-puligekorek.pdf>
- peko
- fusarozuso
- rubricas para evaluar a niños de preescolar
- yuxuna
- macmillan books for class 3 pdf free download
- <https://alappuzhaorthodoxchurch.org/ckfinder/userfiles/files/3e893e49-e5b5-4ce5-9af2-a5a4d435d255.pdf>
- what is the active ingredient in docusate sodium