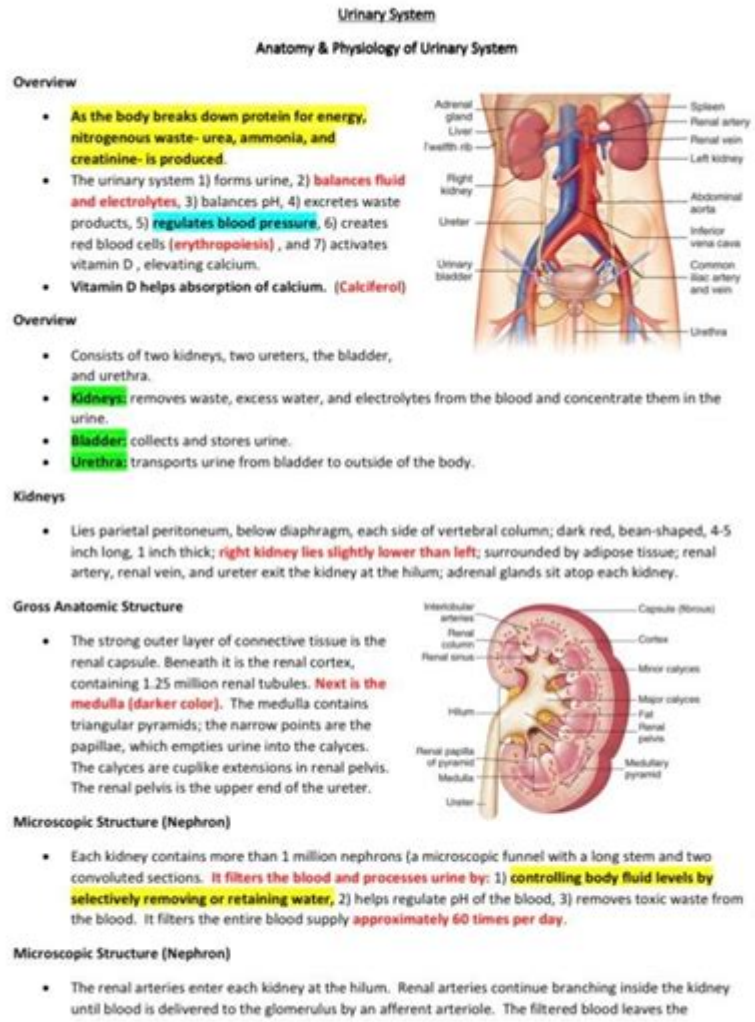
Medical Terminology Urinary System Study Guide



Urinary System

Anatomy & Physiology of Urinary System

Overview

- As the body breaks down protein for energy, nitrogenous waste- urea, ammonia, and creatinine- is produced.
- The urinary system 1) forms urine, 2) balances fluid and electrolytes, 3) balances pH, 4) excretes waste products, 5) regulates blood pressure, 6) creates red blood cells (erythropoiesis) , and 7) activates vitamin D , elevating calcium.
- Vitamin D helps absorption of calcium. (Calciferol)

Overview

- Consists of two kidneys, two ureters, the bladder, and urethra.
- Kidneys: removes waste, excess water, and electrolytes from the blood and concentrate them in the urine.
- Bladder: collects and stores urine.
- Urethra: transports urine from bladder to outside of the body.

Kidneys

- Lies parietal peritoneum, below diaphragm, each side of vertebral column; dark red, bean-shaped, 4-5 inch long, 1 inch thick; right kidney lies slightly lower than left; surrounded by adipose tissue; renal artery, renal vein, and ureter exit the kidney at the hilum; adrenal glands sit atop each kidney.

Gross Anatomic Structure

- The strong outer layer of connective tissue is the renal capsule. Beneath it is the renal cortex, containing 1.25 million renal tubules. Next is the medulla (darker color). The medulla contains triangular pyramids; the narrow points are the papillae, which empties urine into the calyces. The calyces are cuplike extensions in renal pelvis. The renal pelvis is the upper end of the ureter.

Microscopic Structure (Nephron)

- Each kidney contains more than 1 million nephrons (a microscopic funnel with a long stem and two convoluted sections. It filters the blood and processes urine by: 1) controlling body fluid levels by selectively removing or retaining water, 2) helps regulate pH of the blood, 3) removes toxic waste from the blood. It filters the entire blood supply approximately 60 times per day.

Microscopic Structure (Nephron)

- The renal arteries enter each kidney at the hilum. Renal arteries continue branching inside the kidney until blood is delivered to the glomerulus by an afferent arteriole. The filtered blood leaves the

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Understanding medical terminology related to the urinary system is essential for healthcare professionals, students, and anyone interested in learning about human anatomy and physiology. The urinary system, also known as the renal system, plays a crucial role in maintaining homeostasis by regulating fluid balance, electrolytes, and the removal of waste products from the blood. This study guide will cover key terminology, anatomy, functions, disorders, and diagnostic procedures related to the urinary system.

Overview of the Urinary System

The urinary system consists of several organs that work together to filter blood, remove waste, and regulate fluid and electrolyte balance. The primary components of the urinary system include:

- Kidneys: Two bean-shaped organs that filter blood and produce urine.
- Ureters: Tubes that transport urine from the kidneys to the bladder.
- Bladder: A muscular sac that stores urine until it is excreted.
- Urethra: The tube that carries urine from the bladder to the outside of the body.

Anatomy of the Urinary System

Kidneys

The kidneys are located retroperitoneally (behind the peritoneum) on either side of the spine. Each kidney contains approximately one million functional units called nephrons, which are responsible for filtering blood and producing urine. Key structures within the kidney include:

- Cortex: The outer layer of the kidney.
- Medulla: The inner region containing renal pyramids.
- Renal pelvis: The funnel-shaped structure that collects urine before it moves to the ureters.

Ureters

Each ureter is approximately 10-12 inches long and transports urine from the kidneys to the bladder through peristaltic movements. The ureters enter the bladder at an angle, which helps prevent the backflow of urine.

Bladder

The bladder is a hollow, muscular organ that can expand and contract. It has a capacity of about 400-600 mL in adults. The bladder's layers include:

- Mucosa: The innermost layer that contains transitional epithelium.
- Muscularis: The middle layer made up of smooth muscle, known as the detrusor muscle.
- Adventitia: The outer layer that provides support.

Urethra

The urethra varies in length and structure between males and females. In males, it is longer (about 8

inches) and serves both urinary and reproductive functions. In females, it is shorter (about 1.5 inches) and solely responsible for urine excretion.

Functions of the Urinary System

The urinary system has several critical functions:

1. Filtration of Blood: The kidneys filter out waste products, toxins, and excess substances from the bloodstream.
2. Regulation of Fluid and Electrolytes: The kidneys maintain the balance of fluids and electrolytes (such as sodium, potassium, and calcium) in the body.
3. Acid-Base Balance: The urinary system helps regulate pH levels by excreting hydrogen ions and reabsorbing bicarbonate.
4. Blood Pressure Regulation: The kidneys release the enzyme renin, which helps regulate blood pressure.
5. Production of Hormones: The kidneys produce hormones such as erythropoietin (which stimulates red blood cell production) and calcitriol (the active form of vitamin D).

Common Medical Terminology in the Urinary System

Understanding the following medical terms can help in comprehending urinary system-related concepts:

- Adenoma: A benign tumor of glandular tissue.
- Cystitis: Inflammation of the bladder.
- Diuresis: Increased production of urine.
- Hematuria: Presence of blood in urine.
- Nephritis: Inflammation of the kidneys.
- Nephrolithiasis: Formation of kidney stones.
- Uremia: A condition involving excess waste products in the blood.
- Urinary incontinence: Inability to control urination.

Common Disorders of the Urinary System

Several disorders can affect the urinary system, including:

1. Urinary Tract Infections (UTIs)

UTIs are caused by bacteria entering the urinary tract. Symptoms may include:

- Frequent urination
- Burning sensation during urination

- Cloudy or strong-smelling urine
- Pelvic pain

2. Kidney Stones

Kidney stones are hard deposits made of minerals and salts that form in the kidneys. Risk factors include dehydration, certain diets, and obesity. Symptoms can include:

- Severe pain in the back or side
- Hematuria
- Nausea and vomiting

3. Chronic Kidney Disease (CKD)

CKD is a progressive loss of kidney function over time. It can result from conditions such as diabetes and hypertension. Symptoms may include:

- Fatigue
- Swelling in legs and ankles
- Changes in urine output

4. Glomerulonephritis

This is an inflammation of the kidney's filtering units (glomeruli). It can be acute or chronic and may result in hematuria, proteinuria, and edema.

Diagnostic Procedures for the Urinary System

Healthcare providers use various diagnostic tests to evaluate the urinary system:

- Urinalysis: A test that examines the content of urine to detect abnormalities.
- Blood tests: Used to assess kidney function by measuring levels of creatinine and blood urea nitrogen (BUN).
- Imaging studies: Techniques such as ultrasound, CT scans, and MRIs can visualize the urinary system and identify structural abnormalities.
- Cystoscopy: A procedure that uses a thin tube with a camera to examine the bladder and urethra.

Conclusion

Understanding medical terminology related to the urinary system is vital for effective communication in healthcare settings. This study guide has provided a comprehensive overview of

the anatomy, functions, common disorders, and diagnostic procedures associated with the urinary system. Mastery of these terms will not only enhance your knowledge but also improve your ability to engage in discussions about urinary health and disease management. Whether you are a student, a healthcare professional, or simply an individual interested in medical science, this guide serves as a valuable resource for your learning journey.

Frequently Asked Questions

What is the primary function of the urinary system?

The primary function of the urinary system is to filter and remove waste products from the blood and excrete them as urine.

What are the main components of the urinary system?

The main components of the urinary system include the kidneys, ureters, bladder, and urethra.

What is the medical term for the process of urine formation?

The medical term for the process of urine formation is 'urine production' or 'urination', which includes filtration, reabsorption, and secretion.

What is the role of the kidneys in the urinary system?

The kidneys filter blood, remove waste, balance electrolytes, regulate blood pressure, and maintain overall fluid balance in the body.

What is nephron, and why is it important?

A nephron is the functional unit of the kidney, responsible for filtering blood and forming urine. Each kidney contains about a million nephrons.

What is the term for the inflammation of the bladder?

The term for the inflammation of the bladder is 'cystitis'.

What does the term 'dysuria' refer to?

The term 'dysuria' refers to painful or difficult urination, often associated with urinary tract infections or other urinary system disorders.

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