

## AP2, LAB 8 - THE URINARY SYSTEM

### I. SYSTEM COMPONENTS (p. 998 / 961)

#### KIDNEYS

- Each kidney contains approx. 1,000,000 tubular **NEPHRONS** which produce **FILTRATE** from the plasma and then ‘add to’ or ‘take from’ this filtrate to produce **URINE**.
- Through this process the kidneys remove water soluble wastes & toxins from the blood.
- Through this process the kidneys control how much water and/or electrolytes is lost or retained

#### URETERS

- tubular passageways for urine to flow from kidneys down to bladder
- flow is active due to peristaltic contractions so flow from kidneys to bladder does not depend on gravity

#### BLADDER

- storage container, walls contain smooth muscle, which receives urine from the ureters
- urine volume and concentration is not altered while stored here.
- distention (stretch) of the bladder creates the “urge” to pee.
- emptying controlled by voluntary relaxation of an external sphincter at base of urethra and simultaneous involuntary contraction of smooth muscles in the bladder wall.

#### URETHRA

- tubular passageway for urine to flow from bladder to exterior of body.

### II. THE KIDNEYS (p. 1000 / 964)

#### RENAL CAPSULE

- a sheet of fibrous connective tissue covering the surface of the kidney.

#### RENAL ARTERY AND VEIN

- provides blood flow to and from the kidneys.
- at rest, approx. 21% of your total cardiac output passes through your kidneys.
- at rest, kidney metabolism accounts for approx. 20% of your oxygen consumption

#### RENAL CORTEX

- the outer layer of kidney tissue deep to the capsule but superficial to the pyramids
- It’s not a specific structure. It’s a “zone” or “region.”

#### RENAL MEDULLA

- The inner layer of kidney tissue consisting of 15-20 renal **PYRAMIDS**. On the models, each pyramid looks somewhat triangular.
- It’s not a specific structure. It’s a “zone” or “region.”
- The tubular nephrons mentioned earlier exist in both the cortex and medulla **filtering, absorbing, and secreting** to produce urine.

#### RENAL (MEDULLARY) PYRAMIDS

- subdivisions of the renal medulla. Each pyramid contains numerous nephron tubules where filtrate is processed with the end product being urine. The Papilla (tip) of each pyramid points inward toward the renal pelvis. Urine flows from each pyramid into the pelvis.

#### RENAL PELVIS

- a cavity toward the medial border of the kidney which receives urine from the 15-20 pyramids.
- Peristaltic waves of contraction begin here and propel urine along the ureters to the bladder.

## A&P LAB - THE URINARY SYSTEM

**THE NEPHRONS** - (text images p. 1002 & 1004 / 965 & 967) The tubular structures that produce FILTRATE from plasma and then as the filtrate flows through the tube... water, electrolytes, drugs, and toxins are either taken from the filtrate and put back into the blood or added from the blood to the filtrate.

What's left over at the end of the tube is URINE. See film clip 29428 → on disc # 13

\* Any time water or an electrolyte is pulled from the filtrate back into the blood this is called **REABSORPTION**.

\* Any time an electrolyte, drug, or toxin is added to the filtrate from the blood this is called **SECRETION**.

\* When you see the word 'reabsorbed' or 'secreted' you *know* whether it is moving into or out of the filtrate.

RENAL CORPUSCLE (frames 1354, 30221, 1368, and p. 1006 & 1008 / 970-971)

GLOMERULUS (Glomerular capillaries)

GLOMERULAR (BOWMAN'S) CAPSULE

PROXIMAL CONVOLUTED TUBULE (PCT) (frame 31382)

LOOP OF HENLE (frame 31454)  
DESCENDING LIMB

ASCENDING LIMB

DISTAL CONVOLUTED TUBULE (DCT) (frame 34126)

COLLECTING TUBULE (frame 34194)

AFFERENT AND EFFERENT ARTERIOLES (frame 30221)

PERITUBULAR CAPILLARIES (frames 31675 & 31000)

## **Hemodialysis (a.k.a. **Dialysis**)**

Define: Dialysis

What diffuses out of the blood into the dialysis fluid and why?

What does not move out of the blood and why not?

Does anything diffuse from the dialysis fluid into the blood? \_\_\_\_\_ Why?

OYO: What is peritoneal dialysis?

## OYO – Kidney Topics

Upon which parts of the nephron does ADH have its effect? \_\_\_\_\_ and \_\_\_\_\_  
What is the effect of ↑ADH and how will this affect the volume and concentration of the blood?

How will ↑ADH affect the volume and concentration of urine?

Both of the following are diuretics. They will both increase the production of urine. Explain how.

**Alcohol**

**furosemide (Lasix)**

Explain how and where KIDNEY STONES form.

Explain the LITHOTRIPSY procedure for treatment of kidney stones.