

Urinalysis and Body Fluids CP9

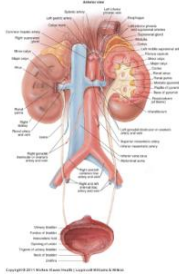
Unit 1 D

Anatomy of the Urinary System

Macroscopic Anatomy

• Urinary System Anatomical Overview

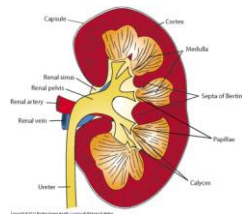
- **2 Kidneys**
 - Where urine is formed from filtration of blood
- **2 Ureters**
 - Tubes carrying urine to bladder
- **1 Bladder**
 - Elastic sac, holds urine until expulsion
- **1 Urethra**
 - Tube to transport urine outside of body



Macroscopic Anatomy

• Urinary System Anatomical Overview

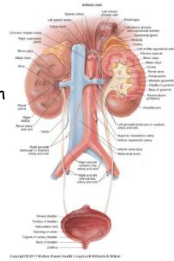
- **2 Kidneys**
 - Where urine is formed from filtration of blood



Macroscopic Anatomy

• 2 Ureters

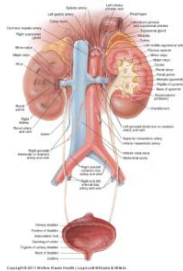
- Tubules between kidneys and bladder.
- Urine that collects in renal pelvis is periodically propelled by smooth muscle action (peristaltic). Transport takes @ 30 seconds.



Macroscopic Anatomy

• 1 Bladder

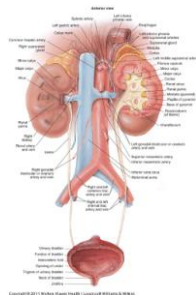
- Elastic muscular sac, stores urine.
- When volume @ 200-400 mL, intra-bladder stretch receptors become excited.
- Cystitis - inflammation of bladder wall, often associated with urinary tract infection (UTI)



Macroscopic Anatomy

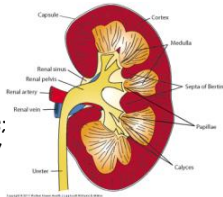
• 1 Urethra

- canal or portal that conducts urine from the body.
- Micturition - process of removing urine from body
- Urethritis - inflammation of the urethra, more often a problem with females



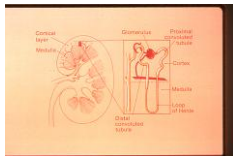
Kidney Internal Structure

- Capsule covering
- Internal structures
 - Cortex - outer layer, just below capsule.
 - Medulla - central area of kidney, contains renal pyramids/ renal columns
 - Renal pelvis - collects urine from renal pyramids; extends outside of kidney to merge with ureters.



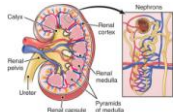
Micro-Anatomy of the Urinary System

- Nephron
 - Functional unit of the kidney
 - @ 1 million / kidney
 - Where urine is formed during the process of clearing wastes from the blood
 - Nephrons are in both the renal cortex and the renal medulla



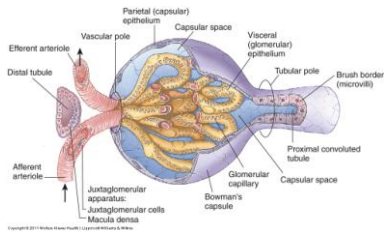
Micro-Anatomy of the Urinary System

- Nephron
 - 2 major parts
 - Glomerulus - the specialized region where filtration takes place.
 - Renal Tubules - uniquely designed to allow the body to keep those things it wants and eliminate the rest.



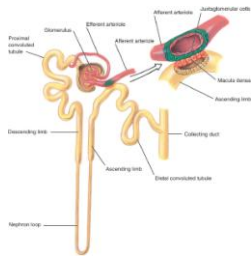
Micro-Anatomy of the Urinary System

- The Glomerulus - the specialized region where filtration takes place.
 - Bowman's capsule surrounds glomerular capillaries
 - collects the ultrafiltrate squeezed out



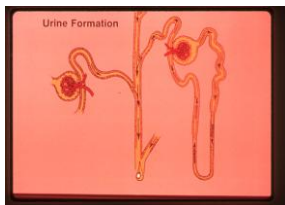
Micro-Anatomy of the Urinary System

- Renal Tubules
 - Proximal convoluted tubule
 - Loop of Henle
 - Distal convoluted tubule



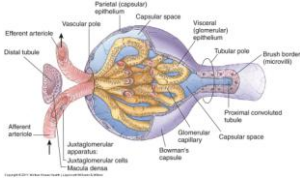
Micro-Anatomy of the Urinary System

- Collecting Tubules

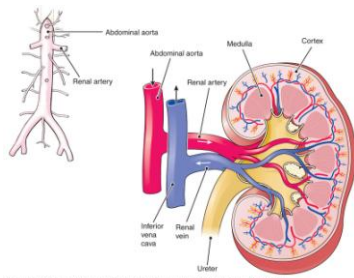


Micro - Anatomy

- Juxtaglomerular apparatus / JGA
 - Area of nephron where macula densa cells of the distal convoluted tubule are in close contact with the cells of the afferent arteriole.



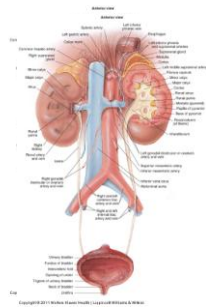
Renal Blood Flow



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Renal Blood Flow

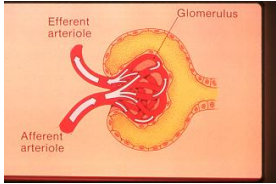
- Renal artery - brings blood from aorta at rate of 1200 ml/min
- Renal vein - takes blood from the kidney to the vena cava



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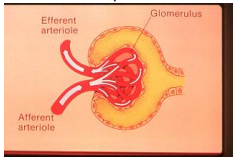
Renal Blood Flow

- Nephron Anatomy - incoming blood supply
 - Afferent arteriole - carries blood from renal artery into the nephron



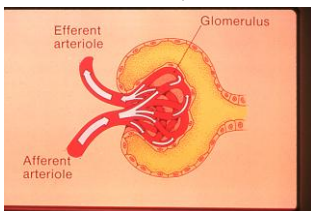
Renal Blood Flow

- Nephron Anatomy
 - Glomerular capillaries - the specialized 'tuft' of capillaries where the non-selective filtration takes place.
 - Water, glucose, electrolytes and other molecules < 70,000 daltons are allowed to pass out of the capillaries.



Renal Blood Flow

- Nephron Anatomy
 - Efferent arteriole - carries the 'modified' blood out of the glomerulus. (It eventually enters renal vein.)



Renal Blood Flow

- Peritubular Capillaries

- ☒ As blood leaves glomerulus, it passes through a web of capillaries surrounding the renal tubules where re-absorption takes place

