

Histology of juxtaglomerular complex and excretory passages of urine

JUXTAGLOMERULAR COMPLEX

Located at the vascular pole of the glomerular corpuscle

- **Macula densa** of the distal convoluted tubule
- **Juxtaglomerular cells (JG)** of the afferent glomerular arteriole
- **Extraglomerular mesangial cells-** *Lacis cells, polkissen cells,*

MACULA DENSATA

- are tall, narrow, closely packed epithelial cells of the distal convoluted tubule
- have elongated closely packed nuclei
- may monitor the osmolarity & volume of the fluid in the distal tubule and transmit this information to JG cells

*When the sodium concentration or volume of the ultrafiltrate is reduced, the macula densa cells direct the JG cells to release their **renin***

JUXTAGOMERULAR CELLS (JG)

- are **modified smooth cells** the wall of afferent arteriolar tunica media
- A few may also be present in the wall of the efferent arteriole
- Exhibit the characteristics of protein secreting cells
- Synthesize **renin** (a proteolytic enzyme) and store it in secretory granules

EXTRAGLOMERULAR MESAENGIAL CELLS

- are also known **pole cushion, polkissen or Lacis cells**
- Lie between the afferent and efferent glomerular arterioles ,
- Their functions are still not understood

RENAL INTERSTITIUM

Loose connective tissue compartment of the kidney

Scanty in cortex - less than 10% of the cortical volume

Constitute of basement membranes and vascular supply

Two cellular components of the cortical tissue

- Fibroblast
- Interstitial dendritic cells- members of the MPS

Greater in medulla – 20% of the medullary volume

Constitute of connective tissue between the urinifer tubules and extensive vascular network

Cell population of medullary interstitium

- Fibroblas
- Macrophages
- Pericytes
- Intertstitial cells

RENAL INTERSTITIUM

Intertstitial cells, have long process which encircle capillaries and tubules in medulla

Situated like the rungs of a ladder

Numerous between the collecting ducts and between Bellini ducts

Have elongated nuclei and numerous lipid droplets

Synthesize **medullipin I**

Converted in the liver



medullipin II

A potent vasodilator that lowers blood pressure

RENAL BLOOD CIRCULATION

- The two kidneys receive an extremely extensive blood supply
- Blood through both kidneys of about 1200mL/min
- All the circulating blood in the body passes through the kidneys every 4 to 5 minutes

Renal arter → segment arteries → interlobar arter → arcuate arters → interlobular arteries → afferent glomerular arterioles → glomerular capillaries → efferent arteriols

VASA RECTA

- arise from the efferent arterioles supplying **juxtamedullary nephrons**
- Thin vessels (**arteriolae recta**) follow straight path into the medulla & papilla where they form capillaries and then loop back **venule rectae**
- Closely associated with the descending & ascending limbs of Henle Loops & collecting ducts
- Critical role in **countercurrent exchanges** with the interstitium
- **Cortical and midcortical nephrons** give rise to extensive peritubular capillary network

FILTRATION IN THE RENAL CORPUSCLE

FILTRATION BARRIER

EXCRETORY PASSAGES

- Minor and major calyces
- Pelvis of the kidney
- Ureter
- Urinary bladder
- urethra

URETER

- Transitional epithelium is thicker than calyces
- Possess a two-layer smooth muscularis layers (inner longitudinal and outer circular)
- The lowest third possesses an additional outer longitudinal layer of smooth muscle
- Adventitia

URINARY BLADDER

- Transitional epithelium

*Epithelium of the **relaxed bladder** 5-6 cells layers thick and has domed shaped cells*

*Epithelium of the **distended bladder** only 3-4 cell layers thick and has squamous superficial cells*

- Lamina propria of fibroelastic connective tissue
- Three layer muscularis