URINARY SYSTEM HISTOLOGY

PROF.DR. ESRA ERDEMLİ

DEPARTMENT OF HİSTOLOGY & EMBRYOLOGY

KIDNEY, large reddish bean-shaped organ, situated retroperitoneally

Convex border situated laterally

Hilum,facing medially-renal artery and vein,lymph vessels and ureter

Renal pelvis, region of ureter expanded in hilus, Its continuos with major renal calyses, each of which in turn has several small tributaries , the minor calyses Its continuos with major renal calyses, each of which in turn has several small tributaries , the minor calyses

Renal sinus, a fat- filled extension of the hilus

Kidney *Outer cortex, dark brown and granullar*

Inner medulla, 6-12 **renal pyramids**

- base of the pyramids toward the cortex,

-apex of the pyramids are calling **renal papilla,** points toward the hilum

NEFRON

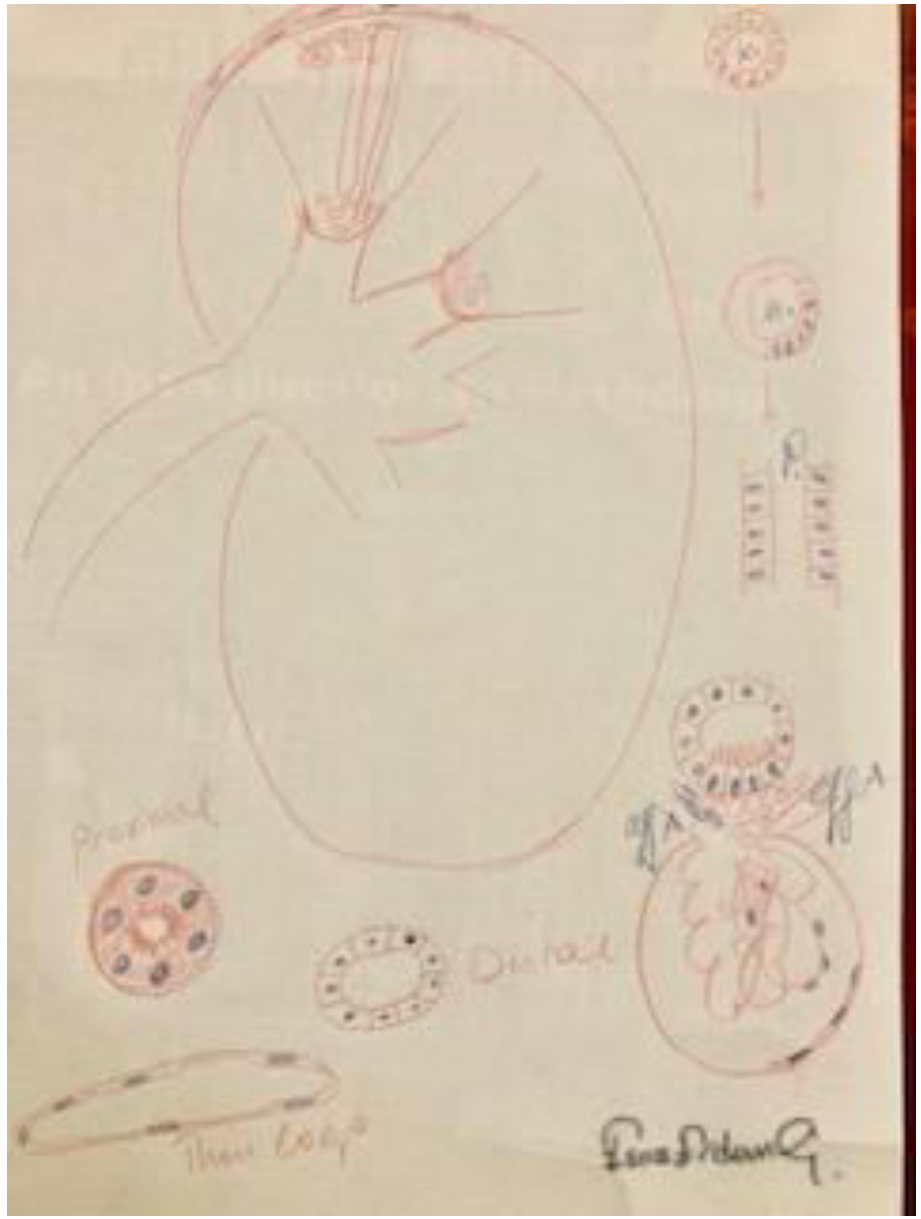
- Renal corpuscle –glomerulus
  -Bowman capsule
- Proximal tubule –pars convoluta
  -pars recta
- Thin limbs of Henle Loop - descending
  -Henle loop
  - ascending
- Distal tubule – pars recta
  - macula densa
  - pars convoluta

MEDULLARY RAYS

- Groups of tubules that extend from the base of each renal pyramid into the cortex
- These tubules:

-straight (recta) tubules of the proximal and distal tubules

-collecting ducts


Proximal
Distal

BASAL LAMINA

- Between the podocytes and the glomerular endothelial cells
- Manufactured by both these cells
- 300nm Thick

-***lamina rara externa***,an electron- lucent zone adjacent to the podocyte epithelium

-***lamina densa***, sharing thicker electron-dense intermediate zone

-***lamina rara interna***, an electron- lucent zone adjacent to the capillary endothelium

PRONEPHROS

At the begining of the 4th week Nephrogenic cord to form **pronephric tubules** and the **pronephric duct**

Represented **7-10 solid cell groups**

in the **sevical position**

The regress completely in 5th week

ıs **not functional** in humans and disappeared

is the kidney of some primitif fishes

MESONEPHROS

- During regression of the pronephric system the firs excretory tubules of the mesenephros appear and lengthen rapidly **an S-shaped loop**
- A tuft of capillaries form **glomerulus**
- Around the glomerulus ,the tubules form **Bowman capsule**
- Laterally , the tubule enters the longitudinal collecting duct,**mesonephric or Wolffian duct**
- **In the middle of the 2nd month** forms large ovoid organ on each side of midline and forms the **urogenital ridge** with on its medial side developing gonad

MOLECULAR REGULATION OF KIDNEY DEVELOPMENT

epithelium of the ureteric bud interacts with mesenchyme of the metanephric blastema

The metanephric mesenchyme expresses WT1, a transcription factor that makes this tissue competent to respond to induction by the ureteric bud.

WT 1 also regulates production (GDNF) and (HGF, or scatter factor) by the mesenchyme

these proteins stimulate branching and growth of the ureteric buds

The tyrosine kinase receptors RET, for GDNF, and MET, for HGF, are synthesized by the epithelium of the ureteric buds, establishing signaling pathways between the two tissues.

MOLECULAR REGULATION OF KIDNEY DEVELOPMENT

the buds induce the mesenchyme via (FGF2) and (BMP7) (Fig. 16.7A).

Both of these growth factors block apoptosis and stimulate proliferation in the metanephric mesenchyme while maintaining production of WT1

Conversion of the mesenchyme to an epithelium for nephron formation is also mediated by the ureteric buds through expression of WNT9B and WNT6, which upregulate PAX2and WNT4 in the metanephric mesenchyme.

PAX2 promotes condensation of the mesenchyme preparatory to tubule formation, whereas WNT4 causes the condensed mesenchyme to epithelialize and form tubules

DEVELOPMENT OF THE URINARY BLADDER

During differentiation of the cloaca, the caudal portions of the mesonephric ducts are absorbed into the wall of the urinary bladder

the ureters, initially outgrowths from the mesonephric ducts, enter the bladder separately

As a result of ascent of the kidneys, the orifices of the ureters move farther cranially; those of the mesonephric ducts move close together to enter the pros- tatic urethra and in the male become the ejaculatory ducts

Because both the mesonephric ducts and ureters originate in the mesoderm, the mucosa of the bladder formed by incorporation of the ducts (the trigone of the bladder) is also mesodermal. With time, the mesodermal lining of the trigone is replaced by endodermal epithelium, so that finally, the inside of the bladder is completely lined with endodermal epithelium.