

Medicine

Edition 8.5

Marrow

Volume - 3

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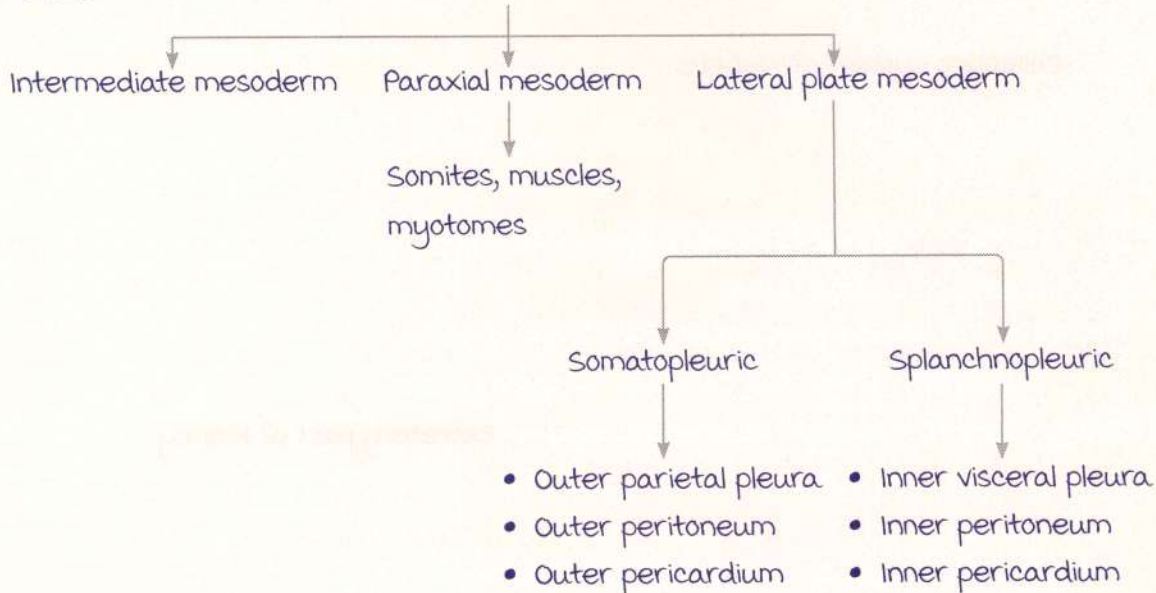
DEVELOPMENT OF KIDNEYS

----- Active space -----

Embryology

00:00:40

mesoderm



Development of urogenital system :

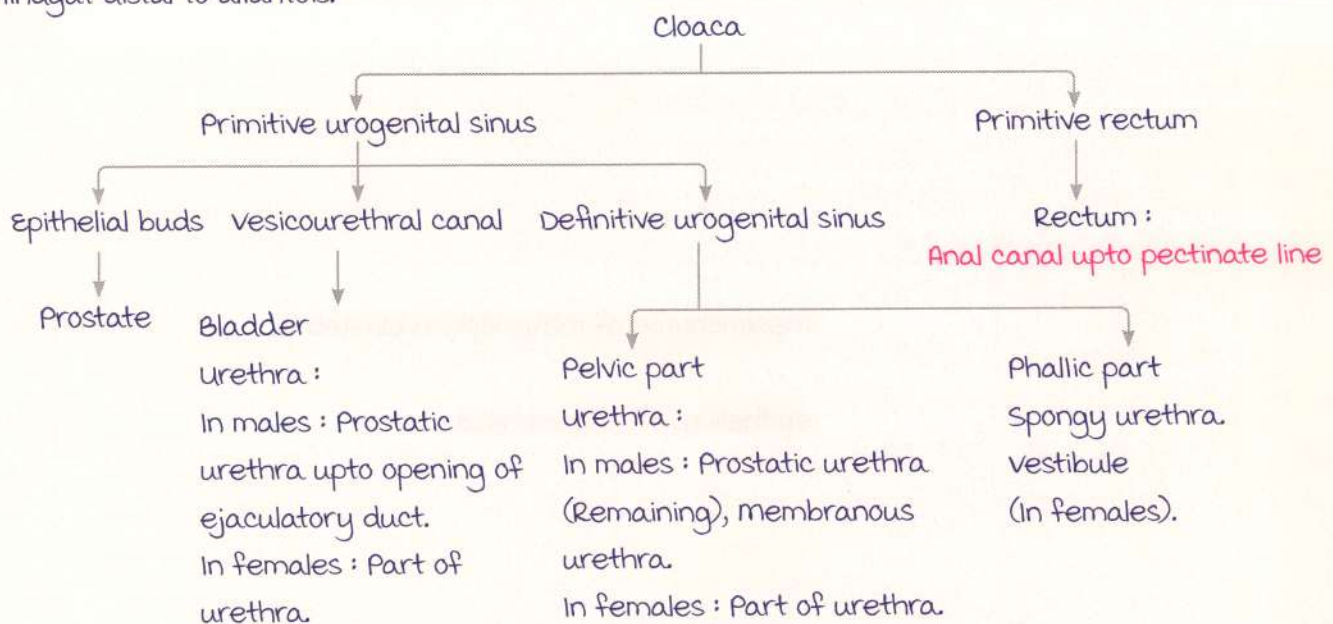
Intermediate mesoderm + Endoderm : Cloaca.

Note :

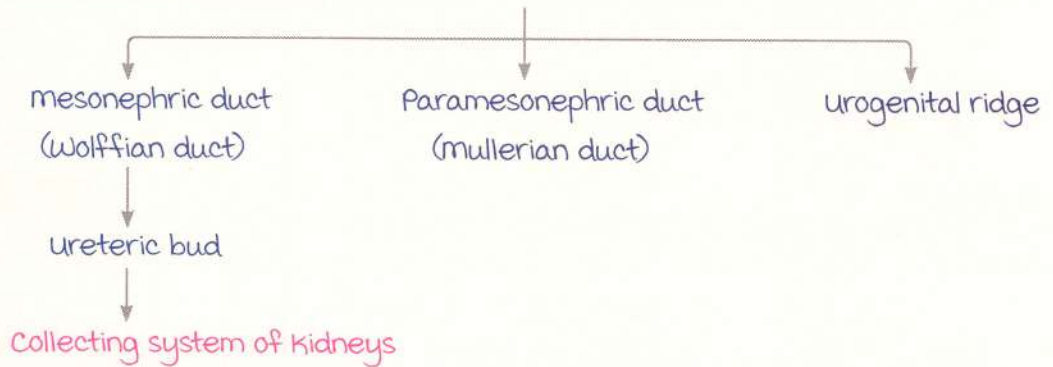
Anal canal below pectinate line is derived from **proctodeum**/ anal pit.

Cloaca :

Hindgut distal to allantois.



----- Active space -----

Intermediate mesoderm :Urogenital ridge :

- Extension : Cervical to sacral region of embryo.
- Adjacent to Wolffian duct.
- 2 pairs of swellings on either side of dorsal aorta.
 - medial swelling : Genital ridge → Ovary, testis.
 - Lateral swelling : Nephrogenic cord → **Excretory part of kidney.**

Note :

- Appendix of epididymis : Remnant of mesonephric duct.
- Appendix of testis.
- Hydatid of Morgagni } Remnant of paramesonephric duct.
- Metanephros : Kidney.

Timeline of Development :

Timeline	Event
Day 22 (4th week)	• Formation of pronephros. • Regresses in a few days.
End of 4th week	• Formation of mesonephros. • Regresses by 4 months. • Transient excretory organ until metanephros appears.
5th week	• Formation of mesenchyme of metanephric blastema from nephrogenic cord. • Formation of epithelium of ureteric bud from mesonephric duct.

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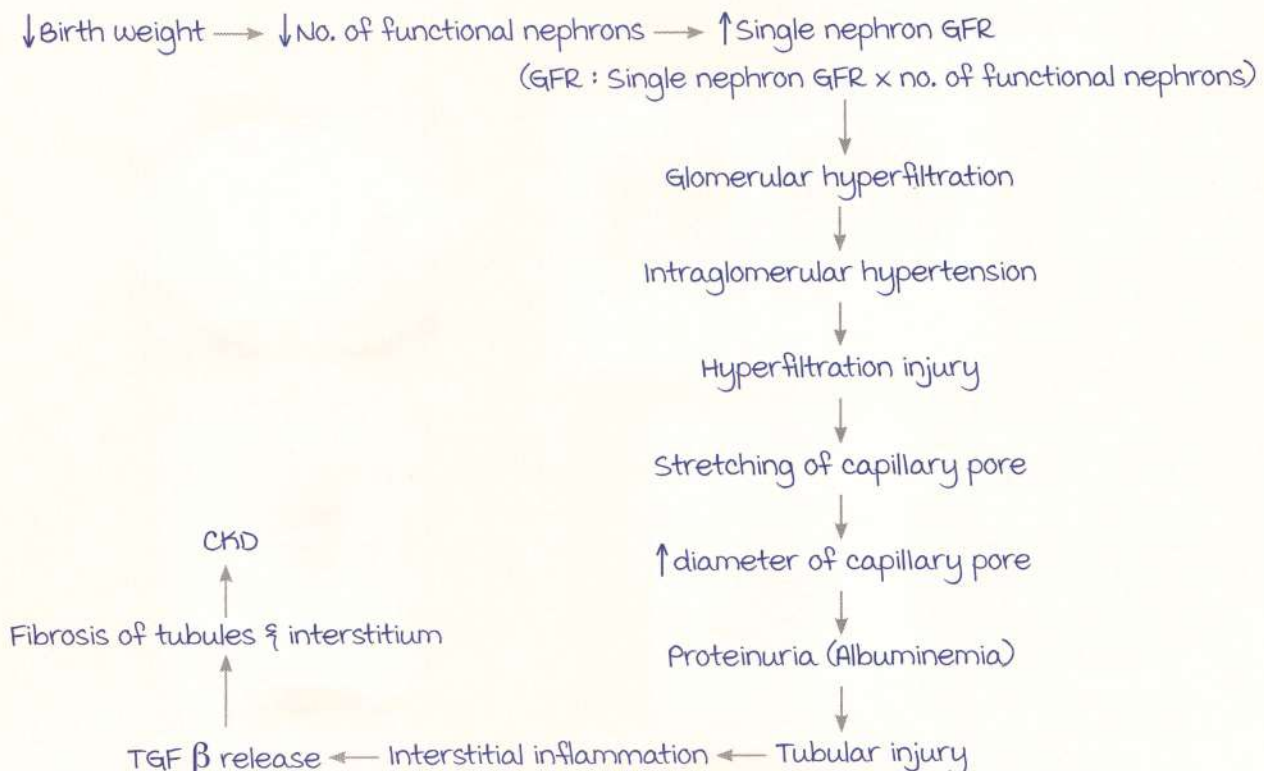
Timeline	Event
6 - 8th week	• Epithelial-mesenchymal interaction/transition (epithelium of ureteric bud & mesenchyme of metanephric bud). • WT1 : • Transcription factor. • Chromosome 11.
End of 8th week	First fully formed nephron
9 - 10 weeks	• Formation of urine (filtration). • Ascend of kidney with rotation.
32 - 36 weeks	• Completion of nephrogenesis. • 60-70 % of nephrons : Formed in 3rd trimester.
At birth	Fixed no. of nephrons
After birth	• No new nephron formed/replaced after birth. • $\uparrow$ urine concentration capacity $\rightarrow$ Reaches adult level by 1.5 yrs.

Pathogenesis of CKD

00:15:55

Nephron number defining parameter : **Birth weight**.

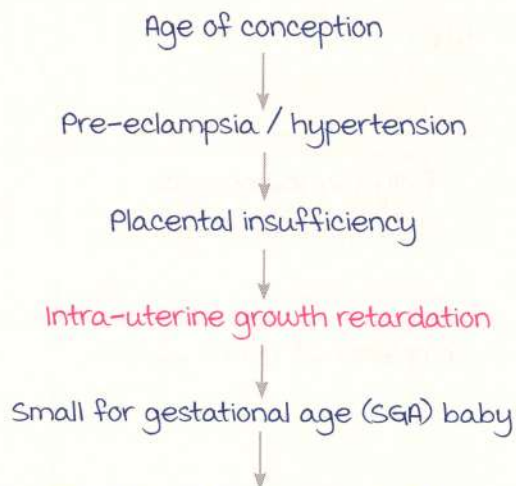
Pathogenesis :



----- Active space -----

CKD features :

- ↓ in no. of functional nephron.
- % of interstitial fibrosis, tubular atrophy glomerulo-sclerosis.

maternal Factor :

↑ Risk of CKD, hypertension, hyperuricemia, diabetes, metabolic syndrome

Note :

- **PAX-2** : Important for formation of epithelium of ureteric bud.
- Location of Kidney :
 - Adult : T12 - L3.
 - Fetal : S1 - S2.

WT₁ Gene Mutation

00:25:05

WAGR Syndrome :

1. Wilms tumour



2. Aniridia



3. Genito urinary abnormalities



4. mental retardation