# Excretory Products & their Elimination Miscellaneous & Doubt Clearing Session

Course on Human Physiology: Excretory Products & their Elimination

**Dr Amit Gupta** • Lesson 10 • Aug 31, 2021

**Functions of kidney :**

Homeostasis

- Regulation of water and electrolyte balance.
- Regulation of body fluid osmolarity and electrolyte concentration.
- Regulation of acid base balance.
- Regulation of arterial pressure.
- Excretion of metabolic waste and foreign chemicals.
- Maintenance of blood calcium balance and $Ca^{++}$ Absorption from intestine
- Secretion of hormones like erythropoeitin and renin.

A person who is under starvation will have more urea & ketone bodies in blood and less urea in urine

## DISEASES RELATED WITH KIDNEY

**Renal failure :** It is a syndrome characterised by renal dysfunction, oliguria, anuria, sudden rise in metabolic waste products like urea & creatinine in blood (Uremia) . It is either of acute (sudden onset) or chronic (slow onset) nature.

**Glomerulonephritis :** It is a disease where due to infection or injury in the basement membrane, the inflammation of glomerulus progressively leads to renal failure and death.

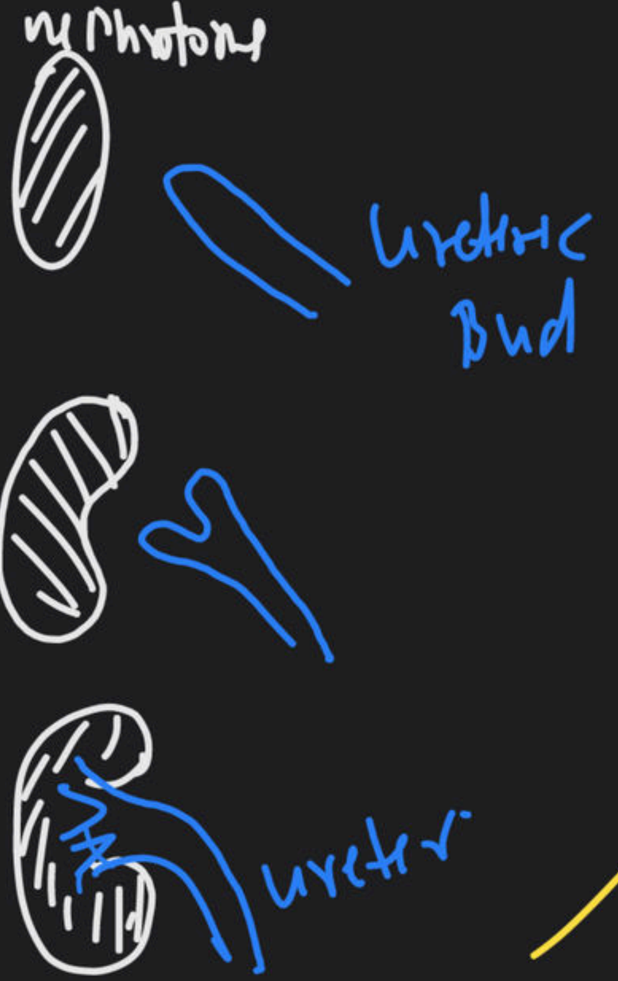
**Diabetic nephropathy :** It is a complication due to diabetes mellitus where the kidney progressively gets damaged leading to death ultimately due to renal failure.

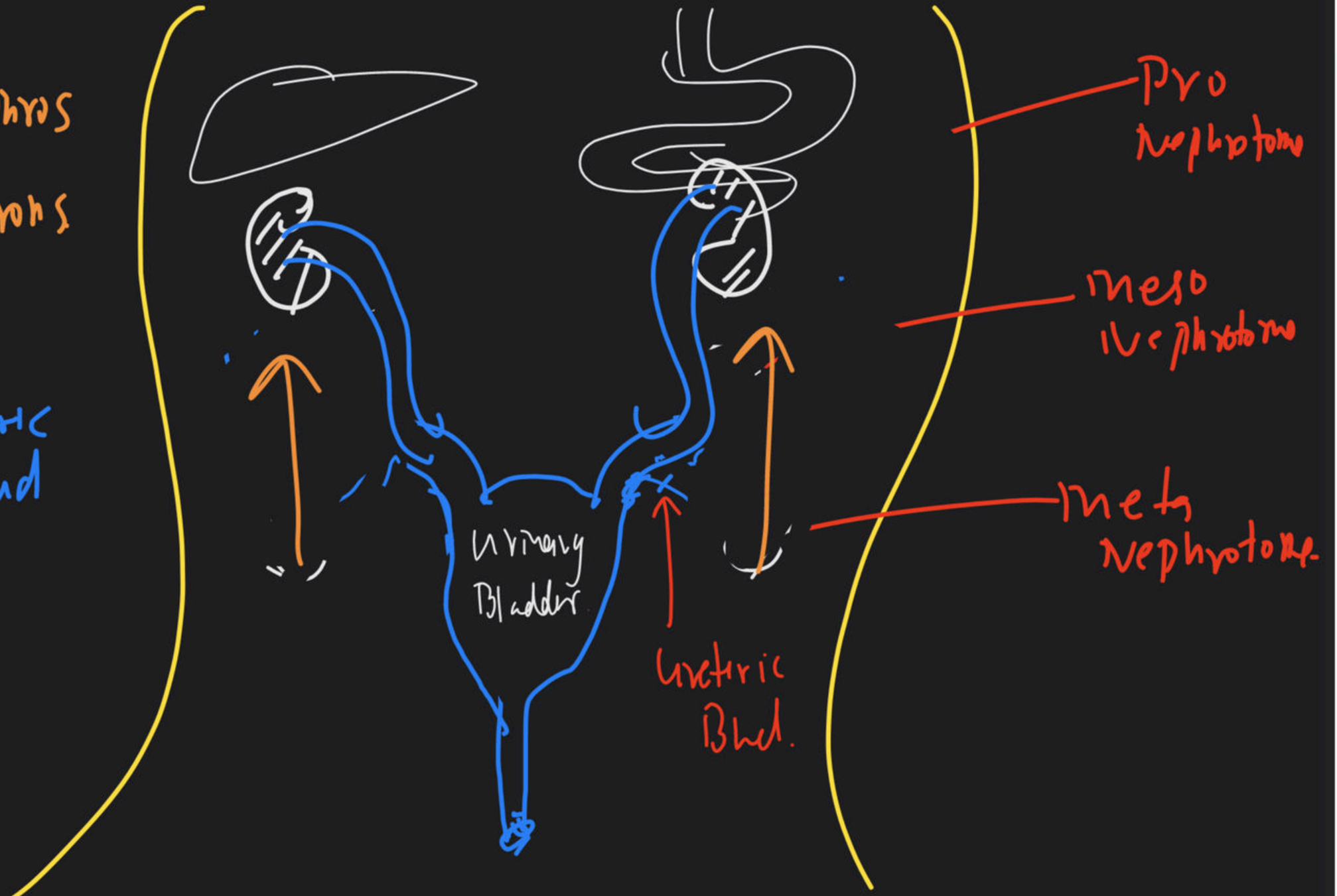
**Urolithiasis :** Formation of calculi (stone) in the urogenital tract at any point. These calculi are made of calcium phosphate, uric acid., cystine or calcium oxalate.

Mesoderm

Nephrotome → Nephros

(Kidney) → Nephrons



# On Basis of origin

1) **Pronephric**

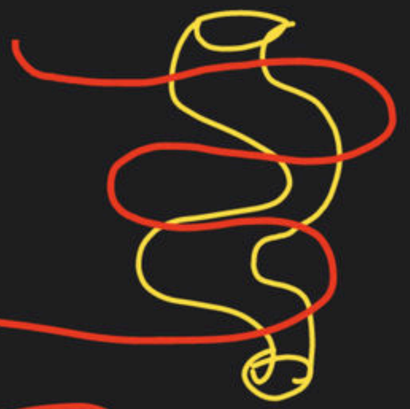
Cyclostomata, Tadpole

Pronephron

only Tubular Secretion

BC Absent

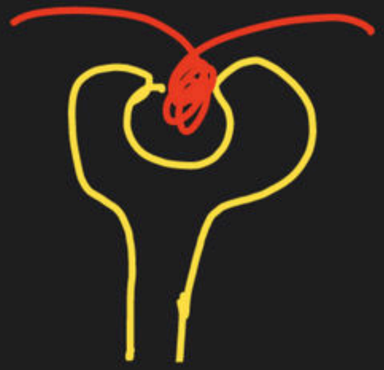
∴ NO Glomerulus



2) **Mesonephric**

Adult Amphibia

Mesonephron

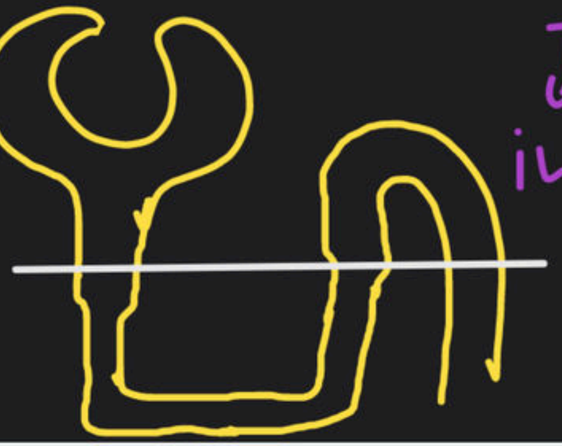


3) **Metanephric**

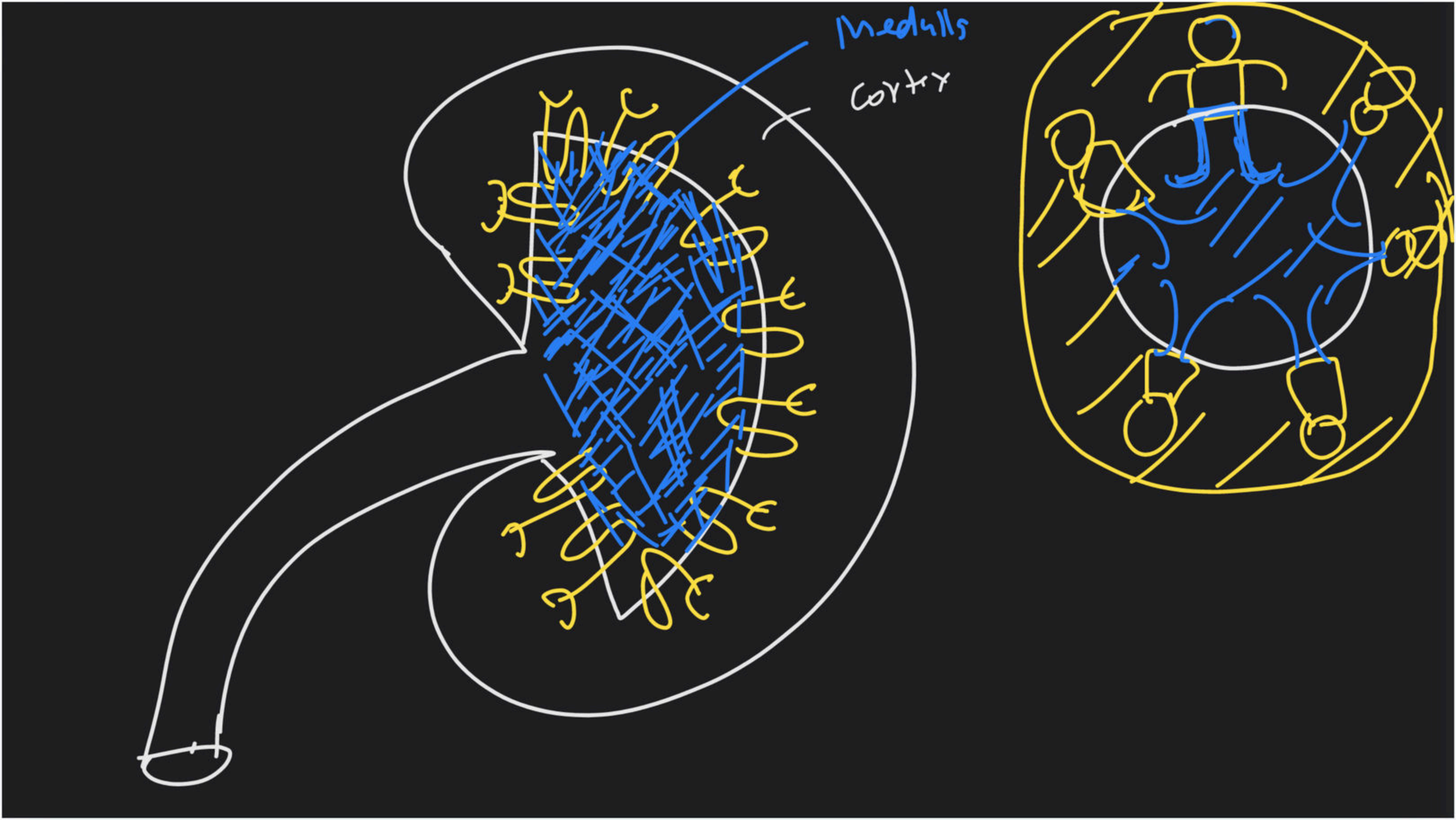
Reptile < Aves < Mammals.

Metanephron

Dupt. of Henle's Loop



Differentiated into Cortex & Medulla


Medulla
Cortex

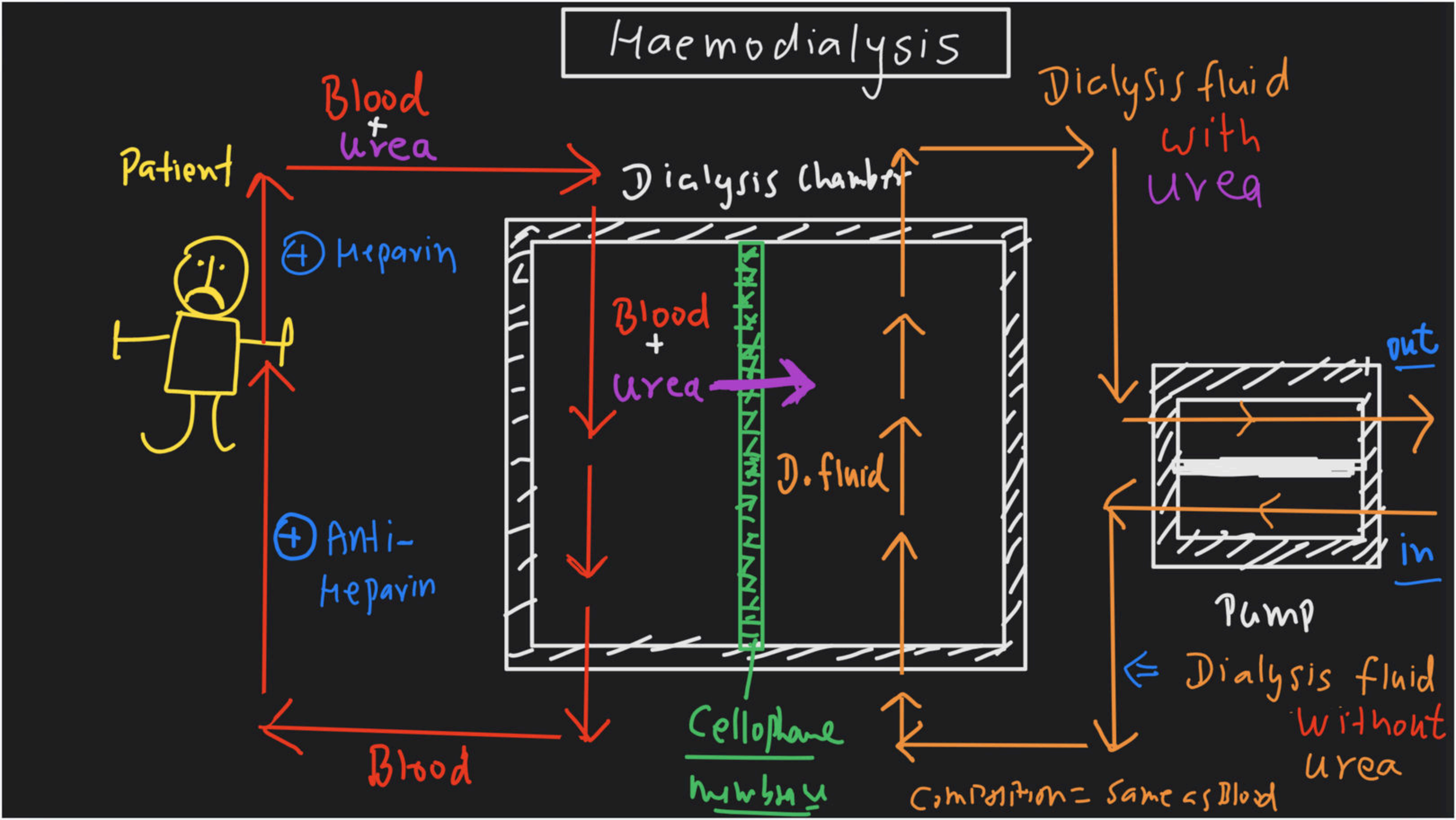
In which of the following Animal will you Expect a More Developed Henle's Loop

(A) Aquatic Mammal II

(B) Aquatic Reptile IV

(C) Desert Mammals I

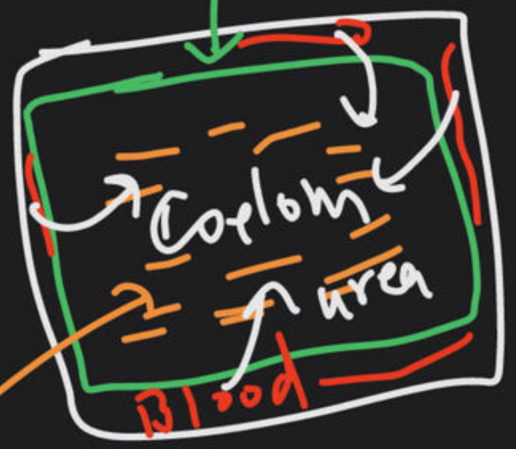
(D) Desert Birds III


Haemodialysis
Blood + Urea
Patient
Dialysis Chamber
Dialysis fluid with Urea
⊕ Heparin
Blood + Urea
D. fluid
out
in
⊕ Anti-Heparin
Pump
Dialysis fluid without Urea
Blood
Cellophane membrane
Composition = same as Blood

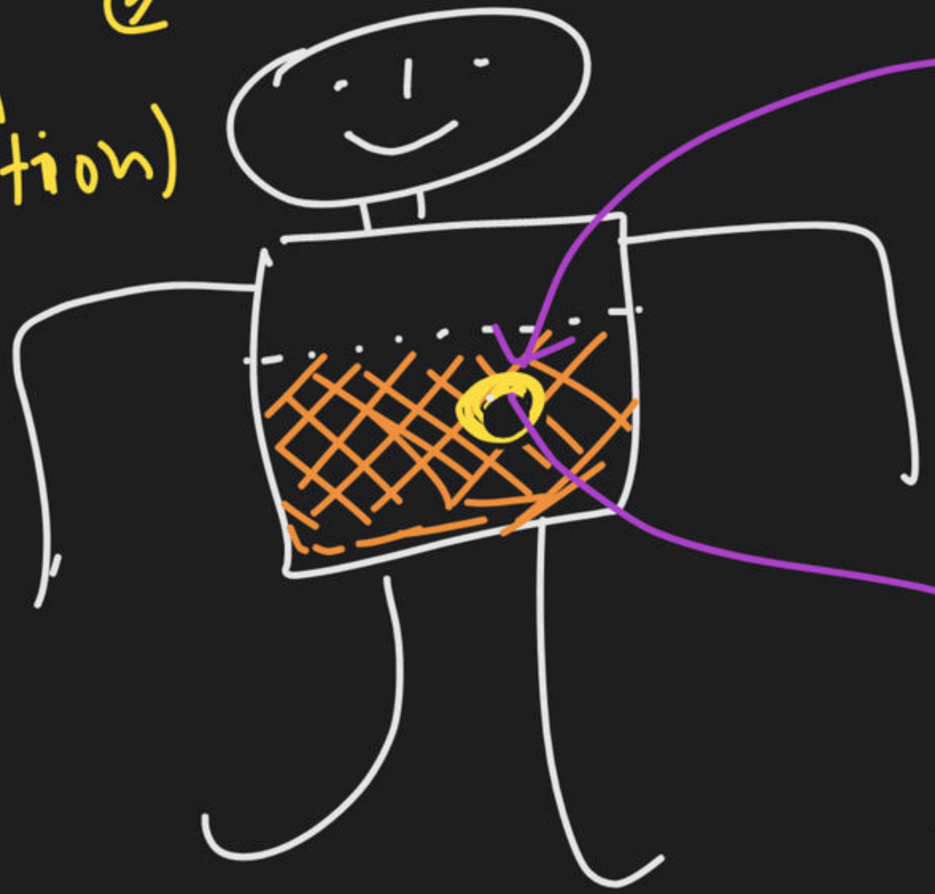
# Continuous Ambulatory Peritoneal Dialysis

(in motion)

Peritoneum




Dialysis fluid without urea



fresh D. fluid.

urea वाला D. fluid

# AMBULANCE

Care at Rest = hospital

Care in Motion

Ambulance

Charge at Rest

Charge in motion

Electrostatic

Electrodynamic.

# DEVELOPMENT OF KIDNEY

During embryonic development, nephrotome plate develops from mesoderm which is made up of fine tubules called **nephros**.

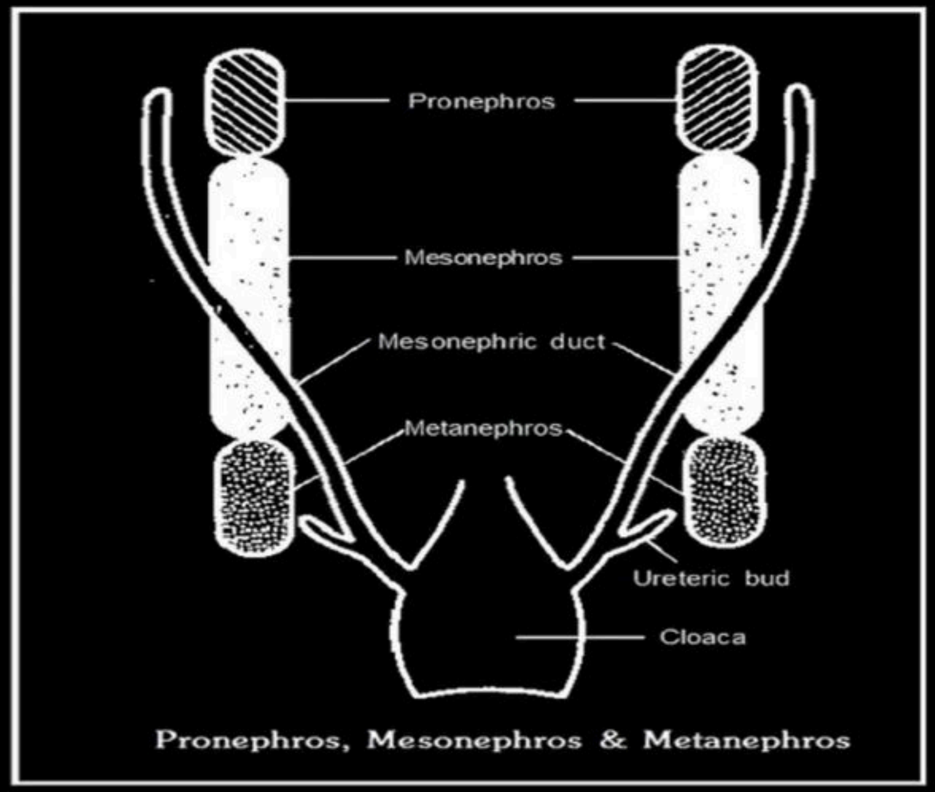
Nephrotome develops into kidney while nephros develops into Nephrons or uriniferous tubules.

On the basis of development, kidney are of 3 types;

(1) **Pronephric Kidney** :- Develop from anterior part (Pronephros) of Nephrotome plate, Its nephrons are in simple tubular shape. Nephrons are not differentiated
Eg. Cyclostomates & Tadpole of frog.

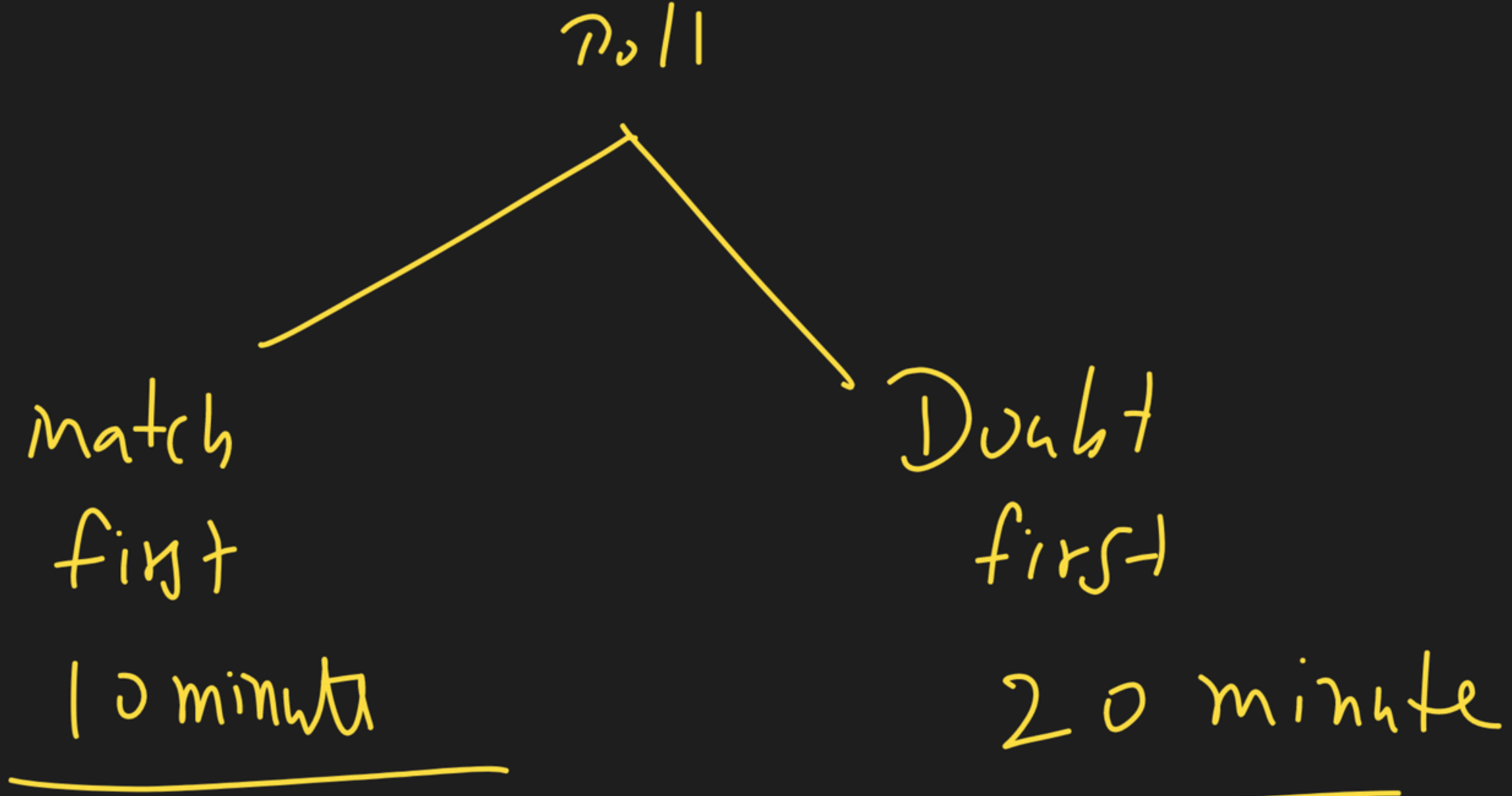
(2) **Mesonephric Kidney** or **opisthonephros** :- develop from middle part (Mesonephros) of Nephrotome plate & remaining part of nephtotome is destroyed. Only Bowman's capsule is found in nephrons while remaining
part is simple tubular.
Eg. Most of the fishes & adult Amphibians.

(3) **Metanephric Kidney** :- Develops from posterior part (Metanephros) of nephrotome while remaining part is destroyed. Nephrons are well differentiated in to Bowman's capsule PCT, DCT & loop of Henle's
Eg. Reptile, Aves, Mammals



Pronephros, Mesonephros & Metanephros

**Henle's Loop** :-
Less developed in Reptiles
Incompletely Developed in Aves
Mammals have most developed Henles loops.


Poll
match fixt 10 minute
Doubt first 20 minute

NTA NEET Test 1 02:59:01 SUBMIT

Physics Chemistry Biology

**Q. 9 Single Choice**

↓ BP ⇒

A fall in glomerular filtration rate (GFR) activates

A

A Adrenal cortex to release aldosterone

B

B Adrenal medulla to release adrenaline

C

C Juxta-glomerular cells to release renin

D

D Posterior pituitary to relase vasopressin

RAAS

NTA NEET Test 1 02:57:07 SUBMIT

Physics Chemistry Biology

**Q. 22 Single Choice**

Find the incorrect pair.

A Bowman's capsule - Glomerular filtration

B PCT - Absorption of $Na^+$ and $K^+$

C DCT - Absorption of glucose

D None of these

## Q. 63 Single Choice

The net pressure gradient that causes the fluid to filter out from the glomeruli into the capsule is

A 50 mm Hg

B 75 mm Hg

C 10 mm Hg

D 30 mm Hg

4. Which of the following statement is/are true?

I. Glomerular filtrate is isotonic to plasma.

II. When the urine passes into collecting tubule, it becomes hypotonic.

III. Filtrate is isotonic in proximal convoluted tubule.

IV. Filtrate becomes more and more hypotonic as it passes through descending limb of Henle's loop.

Choose the correct option :-

A (1) I and III

B (2) I, II and III

C (3) II and III

D (4) Only II

Ureotelic Animals ⇒ Urea

Urease → Ammonia

A) Lack Urease

B) Do not Excrete Urea

C) Do not produce Ammonia

D) Live on Land Only

What will happen if one kidney is removed from the body of a human being?

(1) Death due to poisoning
(2) Ureamia and death
(3) Stoppage of urination
(4) The person will survive

**134.** यदि मनुष्य के शरीर से एक वृक्क निकाल दिया जाए तो क्या होगा?

(1) विषाक्तता के कारण मृत्यु
(2) यूरेमिया व मृत्यु
(3) मूत्र त्याग में अवरोध
(4) व्यक्ति जीवित रहेगा

**Question**
from Ranjan

3. Among the following the partial pressure of oxygen is maximum in

(a) alveolar air (b) arterial blood

(c) venous blood (d) expired air.

30/08/2021 23:32

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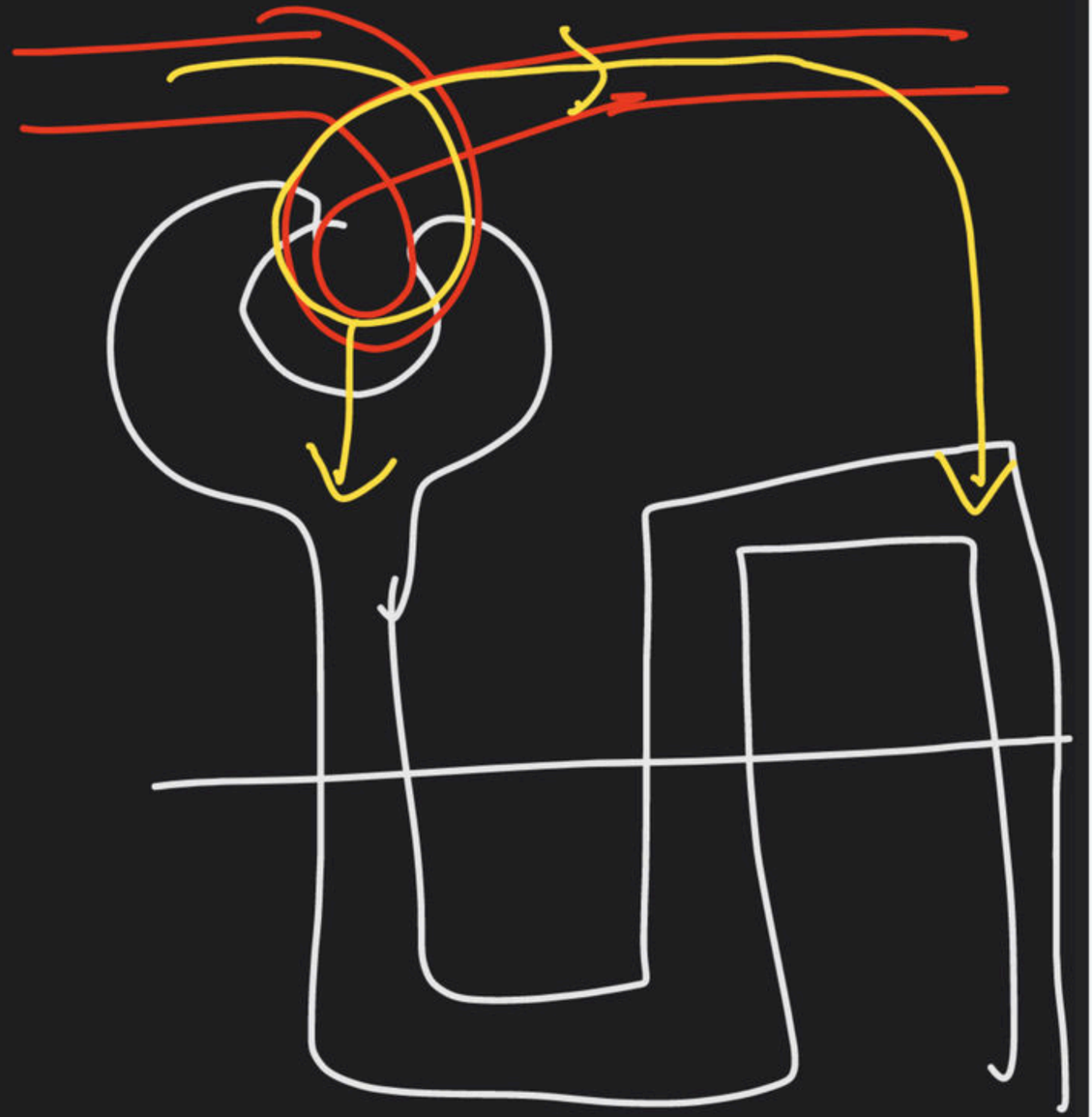
**Question**
from Shrutibodk...

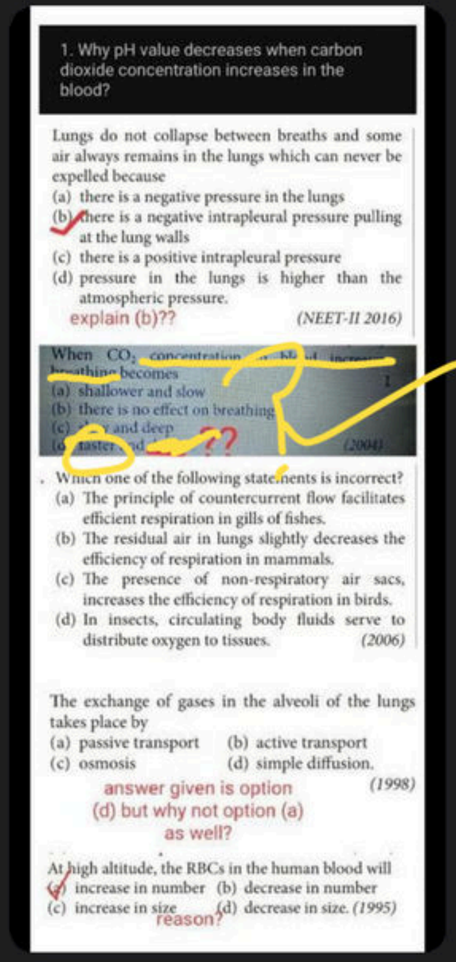
47. Hippuric acid, creatinines and ketones are added to urine through
(a) selective reabsorption (b) glomerular filtration
(c) tubular secretion (d) both (b) and (c).

sir esa ka and c diya hai but wo sb toa athershold compounds hai toa wo reabsorbe nhii hoge toa tubular secretion kese plz explain

bAC-



# Question
from Sheee



1. Why pH value decreases when carbon dioxide concentration increases in the blood?

Lungs do not collapse between breaths and some air always remains in the lungs which can never be expelled because
(a) there is a negative pressure in the lungs
(b) there is a negative intrapleural pressure pulling at the lung walls
(c) there is a positive intrapleural pressure
(d) pressure in the lungs is higher than the atmospheric pressure.

explain (b)??

*(NEET-II 2016)*

When $CO_2$ concentration ... breathing becomes
(a) shallower and slow
(b) there is no effect on breathing
(c) ... and deep
(d) faster and ...

??

*(2004)*

. Which one of the following statements is incorrect?
(a) The principle of countercurrent flow facilitates efficient respiration in gills of fishes.
(b) The residual air in lungs slightly decreases the efficiency of respiration in mammals.
(c) The presence of non-respiratory air sacs, increases the efficiency of respiration in birds.
(d) In insects, circulating body fluids serve to distribute oxygen to tissues. *(2006)*

The exchange of gases in the alveoli of the lungs takes place by
(a) passive transport (b) active transport
(c) osmosis (d) simple diffusion. *(1998)*

answer given is option (d) but why not option (a) as well?

At high altitude, the RBCs in the human blood will
(a) increase in number (b) decrease in number
(c) increase in size (d) decrease in size. *(1995)*

reason?

## Question

from Shrutibodk...

4) **Collecting Duct:** This long duct extends from the cortex of the kidney to the inner parts of the medulla. Large amounts of water could be reabsorbed from this region to produce a concentrated urine. This segment allows passage of small amounts of urea into the medullary interstitium to keep up the osmolarity. It also plays a role in the maintenance of pH and ionic balance of blood by the selective secretion of $H^+$ and $K^+$ ions (Figure 19.5).

sir yaha ncert Mai jo lika hai wo glt hai ??

19.4 MECHANISM OF CONCENTRATION OF THE FILTRATE

Question
from Devesh

Q71) Consider the following statements

I. Flame cells are excretory structures in flat worms

II.Green glands are excretory organs in animals

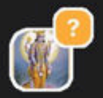
III. Columns of Bertin are conical projections of renal pelvis into renal medulla between the renal pyramids

Kerala 2007

a) II and III correct

b) I and II correct

c) I and III correct



## Question

from SoumyaDwiv...

Read the following statements and select the incorrect option.

A Paneth cells are highly specialized secretory epithelial cells located in the small intestinal crypts of Lieberkuhn.

You Missed (12%)

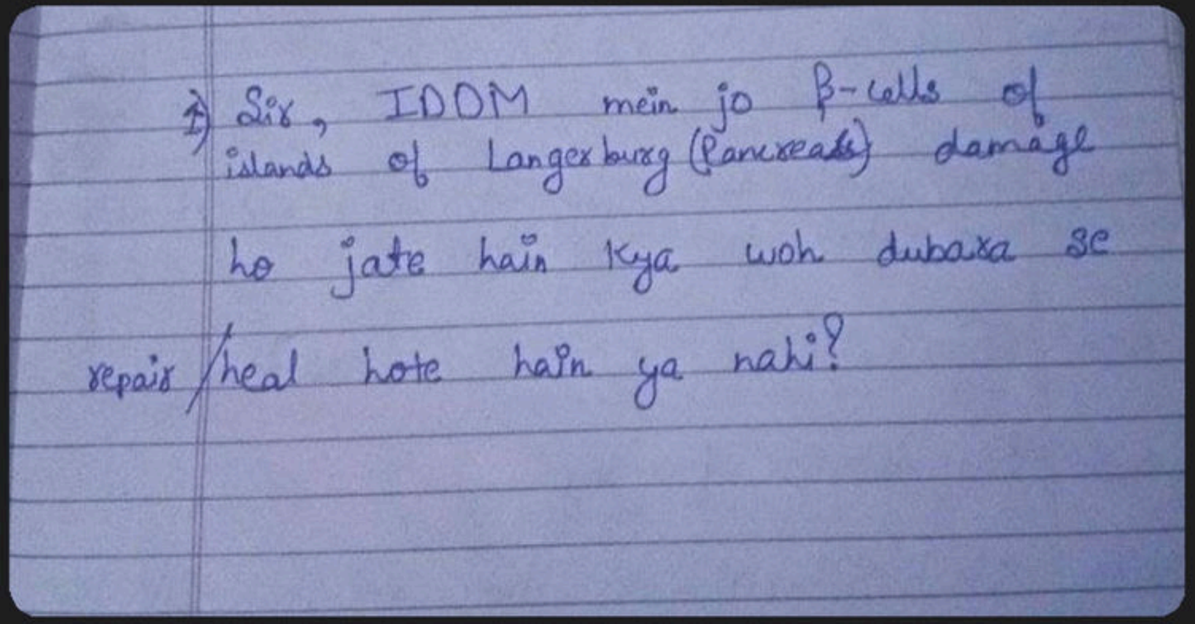
B Parietal cells also known as oxyntic cells secrete hydrochloric acid.

C Argentaffin cells are associated with the production of serotonin.

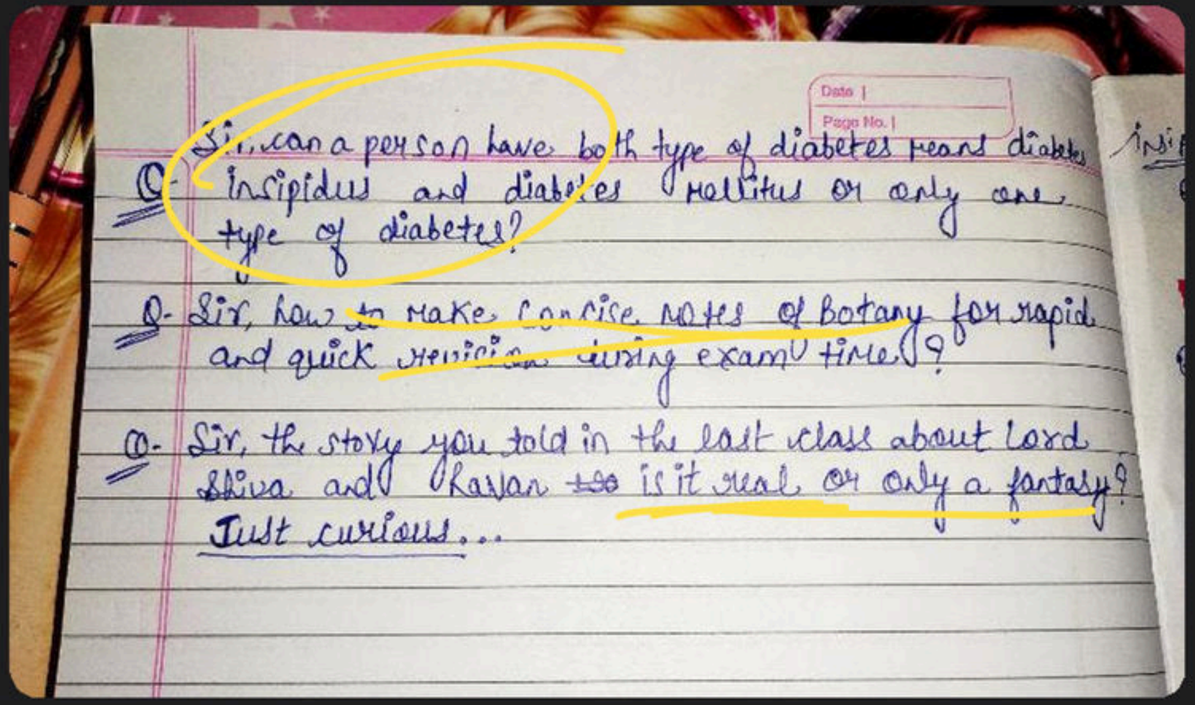
You Marked (47%)

D Chief cells secrete hydrochloric acid that converts the inactive pepsinogen into active enzyme pepsin.

**Question**
from OmUpadhyay



## Question
from Nitya

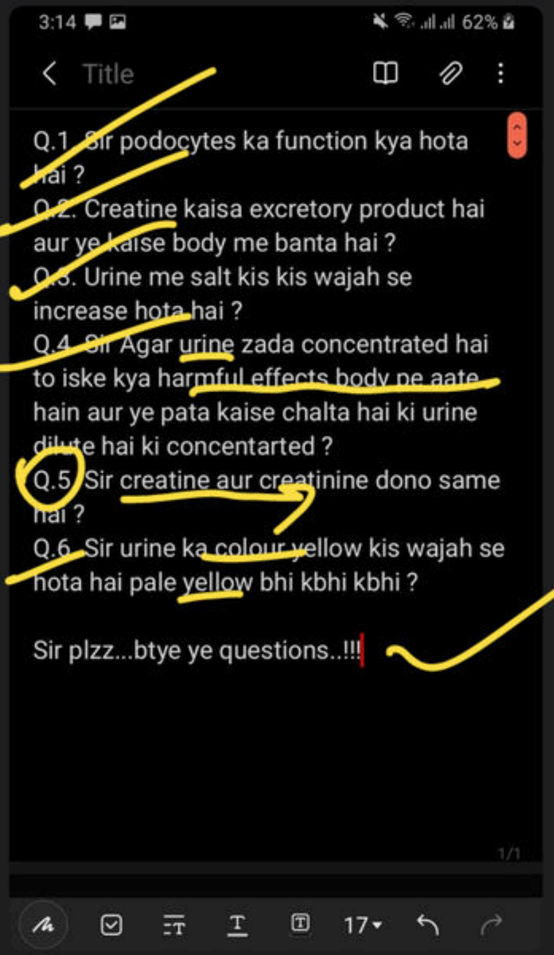


Sir, can a person have both type of diabetes mean diabetes insipidus and diabetes mellitus or only one type of diabetes?

Q- Sir, how to make concise notes of Botany for rapid and quick revision during exam time?

Q- Sir, the story you told in the last class about Lord Shiva and Ravan ~~to~~ is it real or only a fantasy? Just curious...

## Question from Abbas



**Question**
from KanakR2023

Sir if afferent arteriole diameter is less than efferent arteriole then what happen?

**Question**
from Devesh

QUESTION

Q22) Bidder's canal occurs in

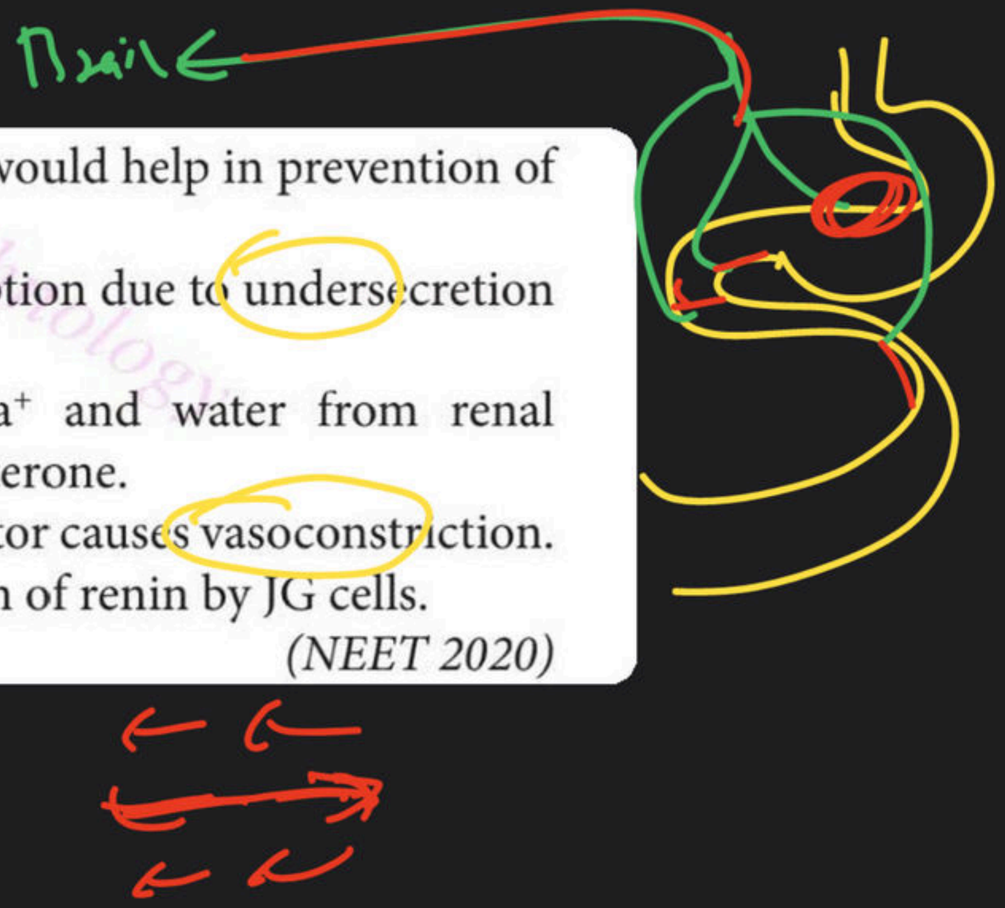
a) Testis of frog

b) Kidney of frog

c) Kidney of rabbit

d) Both B and C

Question
from Meet



Which of the following would help in prevention of diuresis?

(a) More water reabsorption due to undersecretion of ADH.

(b) Reabsorption of $Na^+$ and water from renal tubules due to aldosterone.

(c) Atrial natriuretic factor causes vasoconstriction.

(d) Decrease in secretion of renin by JG cells.

*(NEET 2020)*