



**SNS COLLEGE OF ALLIED HEALTH SCIENCES**  
SNS Kalvi Nagar, Coimbatore - 35  
Affiliated to Dr MGR Medical University, Chennai



**DEPARTMENT OF CARDIOPULMONARY PERFUSION CARE**  
**TECHNOLOGY**

**COURSE NAME: PATHOLOGY II**

**II YEAR**

**UNIT III : PATHOLOGY OF KIDNEY**

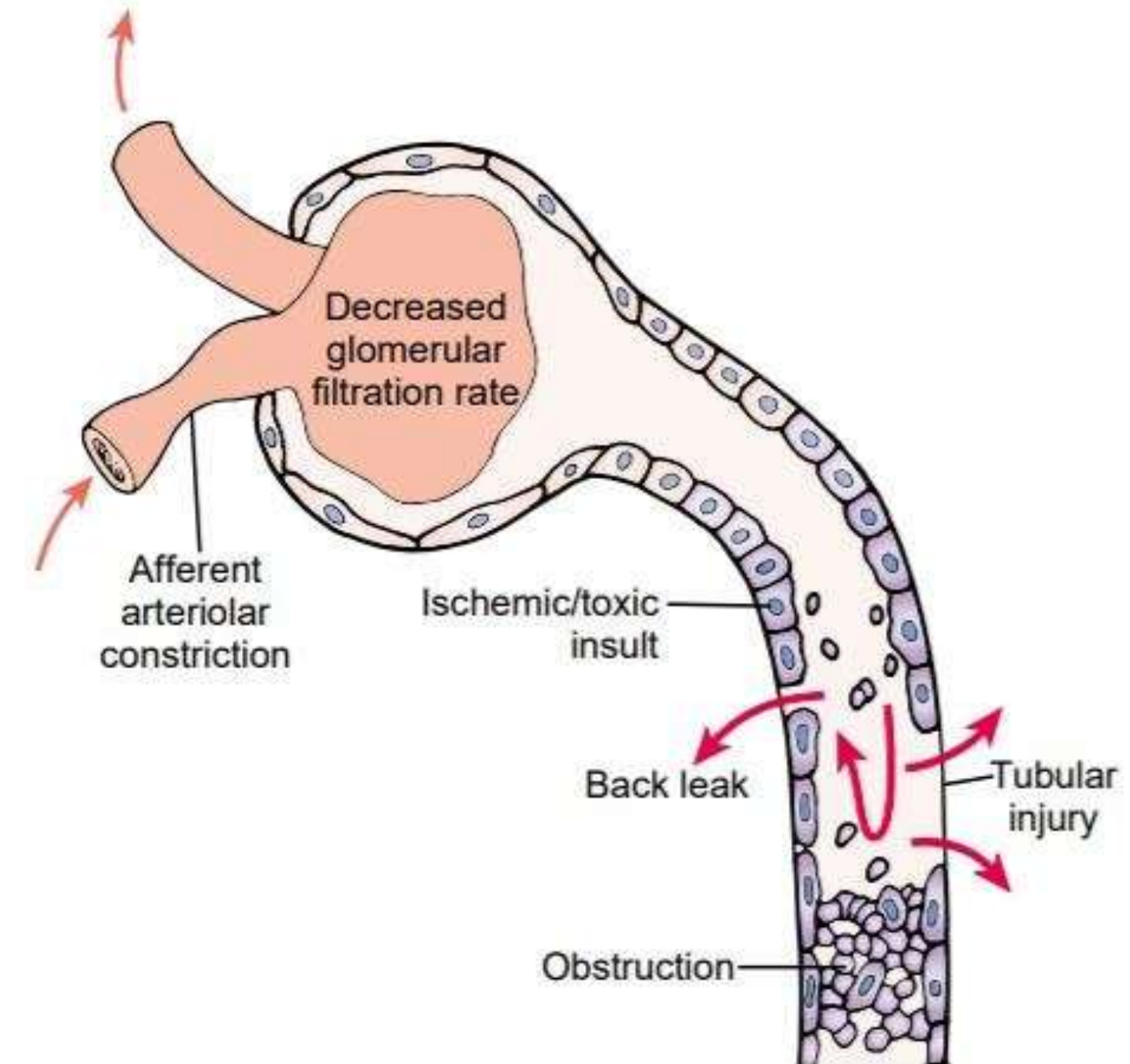
**TOPIC 8 : ACUTE TUBULAR NECROSIS (ATN)**



# Acute Tubular Necrosis



- Diseases of the tubules affect interstitium too and hence they are collectively referred to as **tubulointerstitial diseases**.
- **Acute tubular necrosis (ATN)** is the term used for acute renal failure (ARF) resulting from destruction of tubular epithelial cells.
- Based on etiology and morphology, two forms of ATN are distinguished— **ischaemic and toxic**





## Why PCT are prone to Injury?

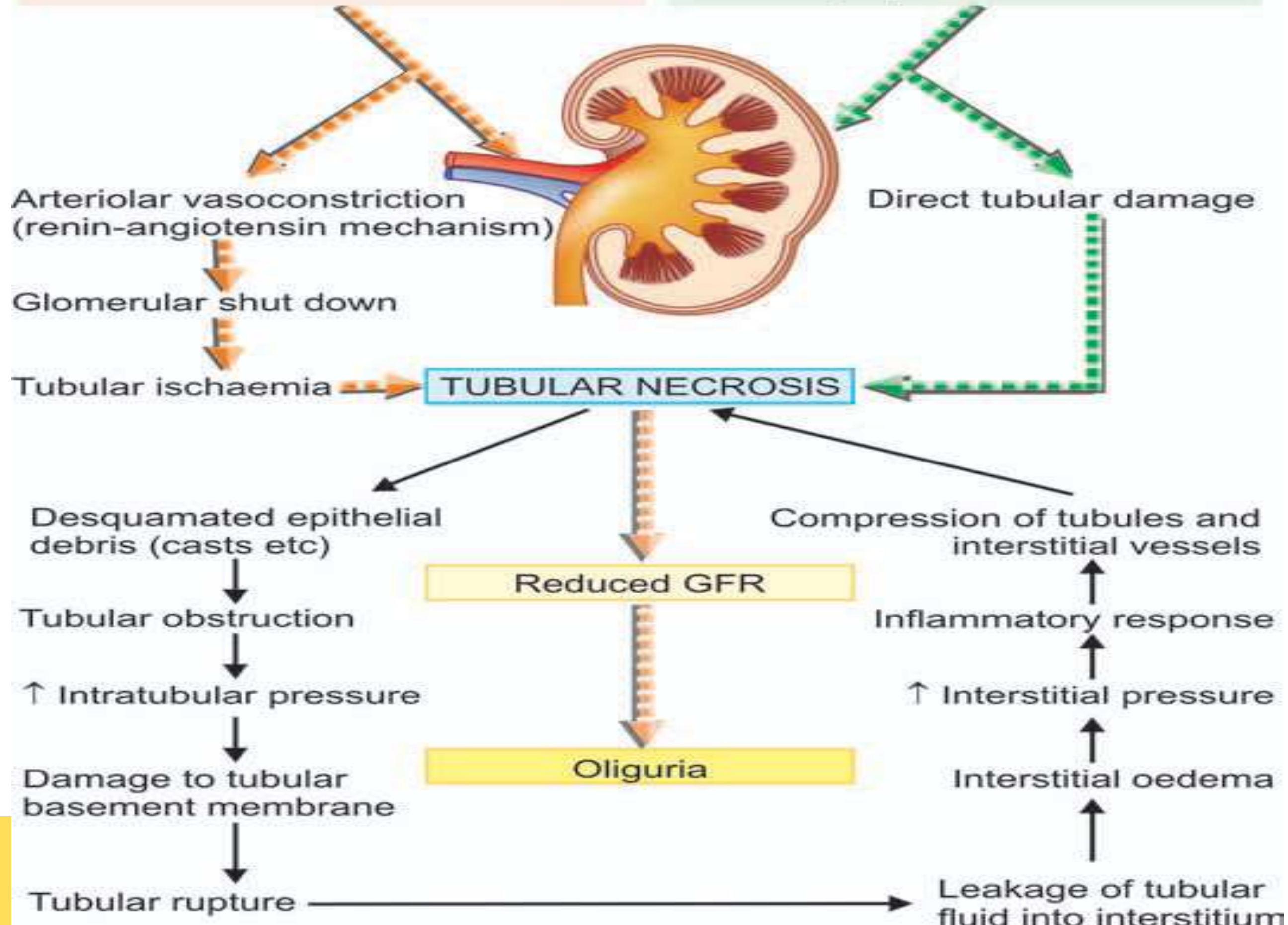


- Proximal Convoluted Tubules have Increased surface area for reabsorption and have Very active transport systems for ions and organic acids, both of which leads to High rate of metabolism and thereby High Oxygen consumption
- Hence they are Sensitive to Ischemia & vulnerable to toxins



- ### ISCHAEMIC CAUSES
- Shock
  - Crush injuries
  - Non-traumatic rhabdomyolysis
  - Mismatched blood transfusions

- ### TOXIC CAUSES
- General poisons
  - Heavy metals
  - Drugs
  - Radiographic contrast medium





# Ischemic ATN



- Ischaemic ATN, also called tubulorrhectic ATN, lower (distal) nephron nephrosis, anoxic nephrosis, or shock kidney
- Occurs because of hypoperfusion of the kidneys



**Damage to distal parts of the convoluted tubules**

## **Etiology:**

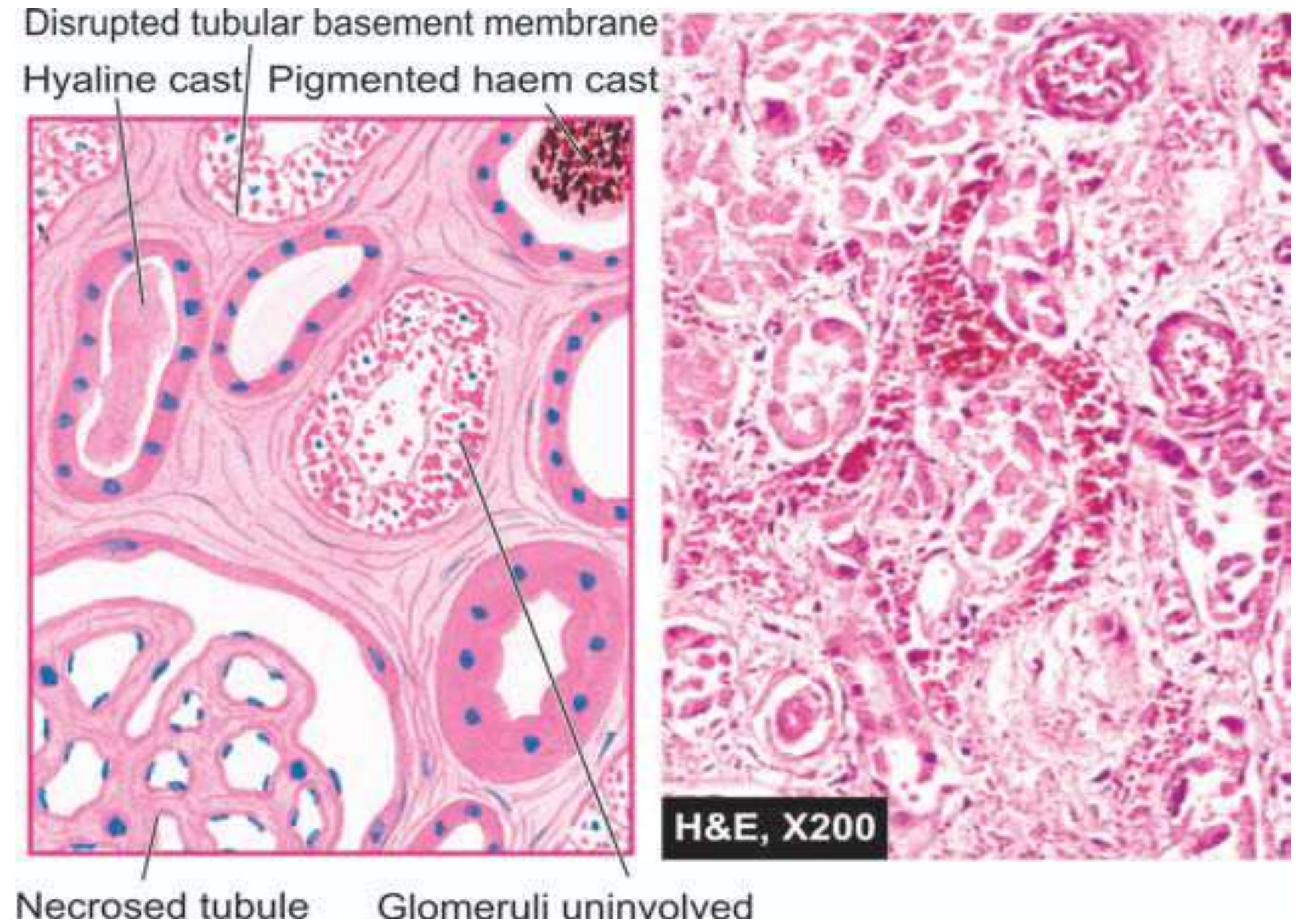
- **Shock** (post-traumatic, surgical, burns, dehydration, obstetrical and septic type).
- **Crush injuries.**
- **Mismatched blood transfusions** (haemoglobinuric nephrosis)
- **Non-traumatic rhabdomyolysis** (life-threatening syndrome resulting from the breakdown of skeletal muscle fibers with leakage of muscle contents into the circulation)



# Ischemic ATN - Morphology



- The kidneys are enlarged and swollen.
- On cut section, the cortex is often widened and pale, while medulla is dark.





# Toxic ATN



- Toxic ATN, also called nephrotoxic ATN or toxic nephrosis or upper (proximal) nephron nephrosis.
- Occurs as a result of direct damage to tubules by ingestion, injection or inhalation of a number of toxic agents.

## **Etiology:**

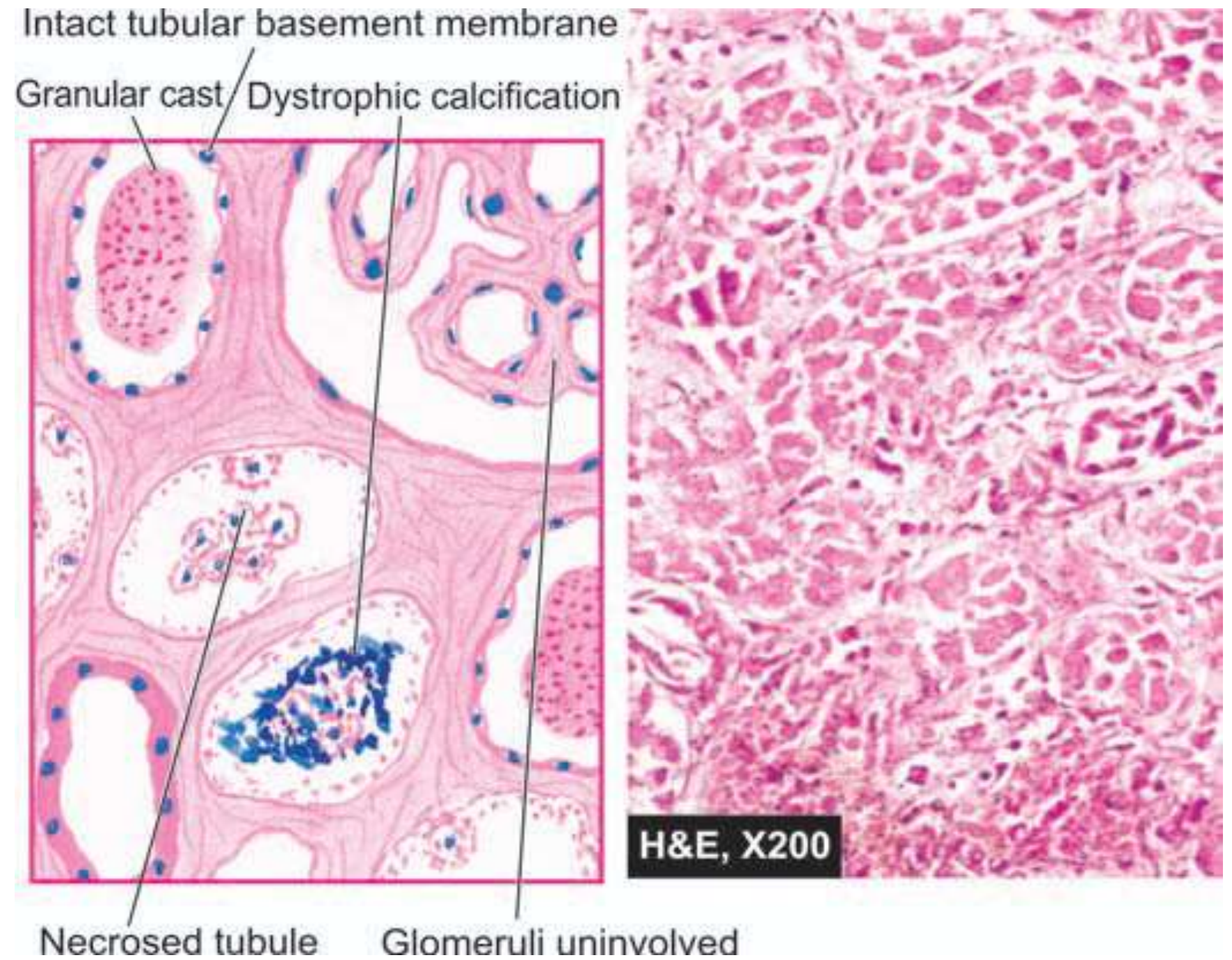
- General poisons such as mercuric chloride, mushroom poisoning and insecticides.
- Heavy metals (mercury, lead, arsenic, phosphorus and gold)
- Radiographic contrast material
- Drugs such as sulfonamides, certain antibiotics (gentamycin, cephalosporin)



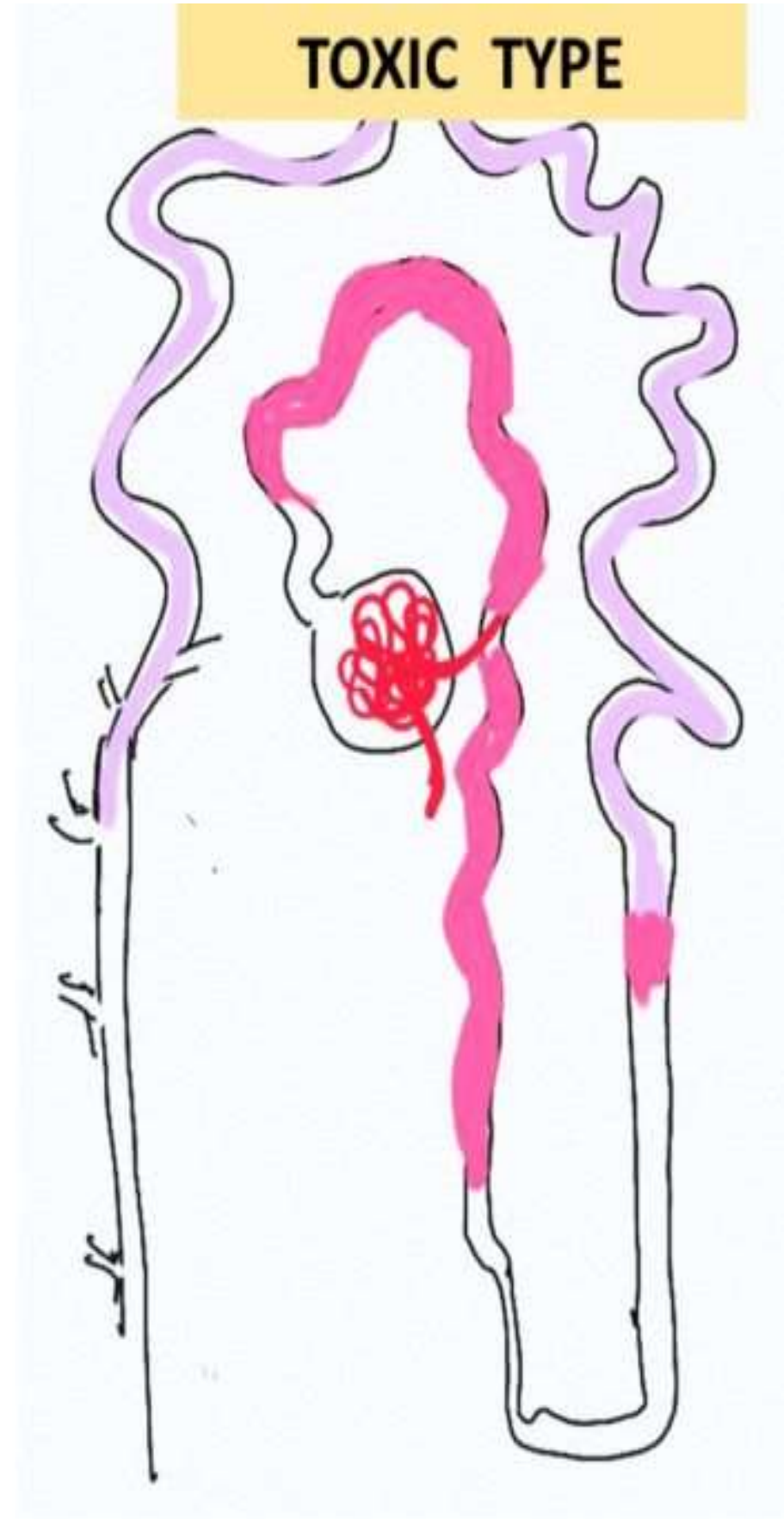
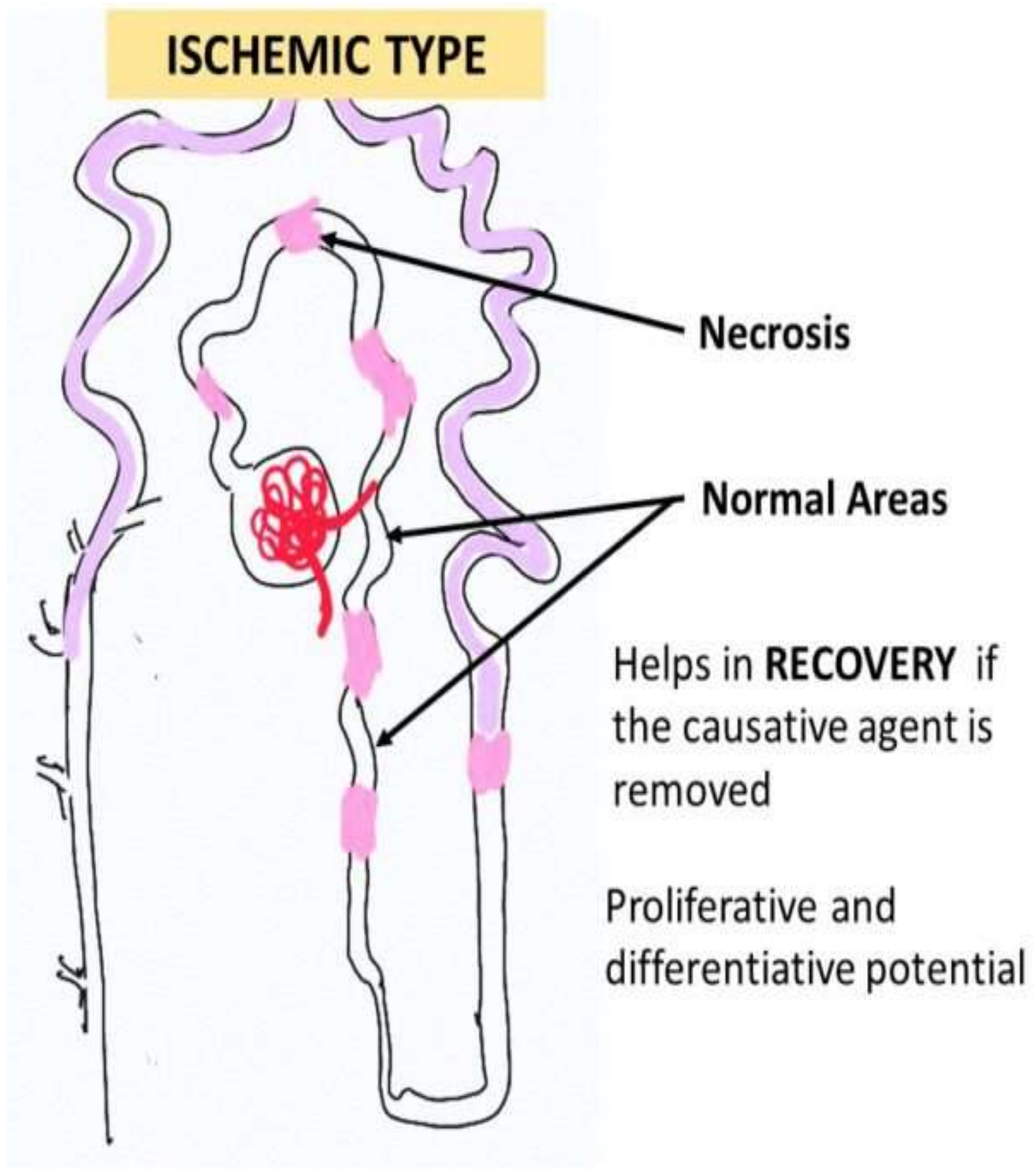
# Toxic ATN - Morphology



- The kidneys are enlarged and swollen.
- On cut section, the cortex is pale and swollen, while the medulla is slightly darker than normal.









## CLINICAL FEATURES

### PHASES

#### INITIATION

36 hrs

↓ Urine output

↑ BUN

#### MAINTENANCE

Oliguria

↑↑ BUN

Salt & Water  
overload

Hyperkalemia

Metabolic  
acidosis

#### RECOVERY

Steady increase  
in urine output

Large amounts of  
Na<sup>+</sup>, K<sup>+</sup> are lost

Hypokalemia

Susceptibility to  
infections.



# Treatment



## **Prognosis:**

Nephrotoxic type of acute tubular injury have better prognosis as compared to ischemic type of acute tubular injury.

## **Treatment:**

- Fluid and dietary restrictions
- Maintain electrolytes
- Dialysis – Haemodialysis & Peritoneal Dialysis
- Stimulation of urine with IV Fluids, Dopamine & Diuretics etc.,
- Continuous Renal Replacement Therapy (CRRT)



**THANK YOU**