

# Tubulointerstitial Diseases

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## 1. Tubular & Interstitial Diseases

- Most forms of tubular injury also involve the interstitium.
- Diseases are characterized by:
  - 1) Inflammatory involvement of tubules & interstitium (Tubulointerstitial nephritis).
  - 2) Ischemic or toxic tubular injury → Acute tubular injury & AKI.

## 2. Tubulointerstitial Nephritis

- Group of inflammatory diseases involving tubules & interstitium.
- Acute or chronic.
- Distinguished from glomerular diseases by:
  - No nephritic or nephrotic syndrome.
  - Presence of tubular dysfunction.
- Causes:
  - Bacterial infections
  - Drugs
  - Metabolic disorders
  - Irradiation
  - Immune reactions

## 3. Acute Pyelonephritis

- Acute suppurative inflammation of tubules, interstitium & renal pelvis.
- Caused by bacterial infection.

**Most common organism: E. coli**

- Other organisms:  
Proteus, Klebsiella, Enterobacter, Pseudomonas, Staphylococci, Streptococcus faecalis.

## 4. UTI Risk Factors

- Female sex
- Catheterization & instrumentation
- Obstruction (stones, BPH)
- Diabetes mellitus
- Pregnancy
- Vesicoureteral reflux (VUR)

## 5. Vesicoureteral Reflux (VUR)

- Allows bacteria to ascend ureter into renal pelvis.
- In children: congenital incompetence of ureterovesical valve.
- In adults: neurogenic bladder, diabetes, spinal cord injury.
- Causes residual urine → bacterial growth.

## 6. Acute Pyelonephritis Clinical Features

- Fever & chills
- Flank pain / costovertebral angle tenderness
- Dysuria, urgency, frequency
- Pyuria
- Usually unilateral

## 7. Chronic Pyelonephritis

- Chronic tubulointerstitial inflammation with scarring.
- Most common type: reflux-associated pyelonephritis.

### Hallmark:

- Pelvic & calyceal scarring
- Papillary blunting
- Calyceal deformities

## 8. Drug-Induced Tubulointerstitial Nephritis

- Hypersensitivity reaction (Type I & IV).
- Common drugs:
  - Penicillins
  - Rifampin
  - NSAIDs
  - Furosemide
  - Omeprazole

**Key morphology:** eosinophilic interstitial infiltrate.

## 9. Acute Tubular Injury / Necrosis (ATI/ATN)

- Damage to tubular epithelial cells.
- Most common cause of acute renal failure.
- Usually reversible if treated early.

## 10. Causes of ATI

### Ischemic ATI:

Shock, trauma, blood loss, sepsis, pancreatitis.

**Nephrotoxic ATI:**

Heavy metals, organic solvents, gentamicin, contrast agents.

## 11. ATI Morphology & Clinical Features

- Tubular epithelial necrosis
- Vacuolization & sloughing
- Proteinaceous casts
- Oliguria
- ↑ Creatinine
- ↓ GFR
- Electrolyte imbalance & acidosis

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**HIGH-YIELD PEARLS: E. coli is the most common cause of pyelonephritis • VUR predisposes to chronic pyelonephritis • ATI is the most common cause of AKI • Drug-induced TIN is associated with eosinophils.**