

**FIGURE 48-1** Acute interstitial nephritis. Light microscopic findings demonstrate the loss of normal tubulointerstitial architecture with a dense mononuclear cell infiltrate and some evidence of tubular dilation and atrophy. Note that the renal tubules are displaced by infiltrating mononuclear cells, edema, and mild interstitial fibrosis. (Magnification  $\times 100$ .)

**TABLE 48-1 Acute Interstitial Nephritis**

**Drugs**

Antibiotics (most commonly penicillin analogues, cephalosporins, sulfonamides, and rifampin)  
Nonsteroidal anti-inflammatory drugs  
Diuretics (most commonly thiazides and furosemide)

**Infections**

Direct infection of renal parenchyma (ie *Pyelonephritis*)  
Associated with a systemic infection

**Immunologic disorders**

Systemic lupus erythematosus  
Sjögren's syndrome  
Sarcoidosis  
Mixed essential cryoglobulinemia  
Acute allograft rejection

**Idiopathic**

**TABLE 48-4 Infections Associated with Acute Interstitial Nephritis\***

**Bacterial infections**

*Streptococcus*, *diphtheria*, *brucella*, *legionella*,  
*pneumococcus*, *tuberculosis*

**Viral infections**

Epstein-Barr virus, *cytomegalovirus*, *polyomavirus*, *Hantaan virus*, measles (rubeola), human immunodeficiency virus, herpes simplex virus type 1

**Fungal infections**

*Candidiasis*, *histoplasmosis*

**Other infections**

*Toxoplasmosis*, *leishmaniasis*, *schistosomiasis*, *Rocky Mountain spotted fever*, *ehrlichiosis*, *malaria*, *mycoplasma*, *leptospirosis*, *syphilis*, *ascaris lumbricoides*

\*Infections associated with direct renal infection are shown in *italics*.

**TABLE 48-3 Drug-Induced Acute Interstitial Nephritis\***

**Antibiotics**

Penicillin analogues  
*Methicillin*, *ampicillin*, *penicillin*, *nafcillin*, *carbenicillin*,  
*oxacillin*, *amoxicillin*, *mezlocillin*, *flucloxacillin*  
Cephalosporins  
*Cephalothin*, *cefotetan*, *cephradine*, *cephalexin*,  
*cefoxitin*, *cefazolin*, *cefaclor*, *cefotaxime*  
Sulfonamide derivatives  
*Sulfamethoxazole*, *cotrimoxazole*  
Other antibiotics  
*Rifampin*, *ciprofloxacin*, *gentamicin*, *kanamycin*,  
*vancomycin*, *acyclovir*, *indinavir*, *aztreonam*,  
*erythromycin*, *azithromycin*, *ethambutol*,  
*tetracyclines*, *nitrofurantoin*

**Nonsteroidal anti-inflammatory drugs**

*Fenoprofen*, *ibuprofen*, *indomethacin*, *piroxicam*, *tolmetin*,  
*naproxen*, *zomepirac*, *diflunisal*, *sulindac*,  
*phenylbutazone*, *aspirin*, *phenacetin*, *mefenamic acid*, *5-aminosalicylates*

**Diuretics**

*Thiazides*, *furosemide*, *triamterene*, *chlorthalidone*

**Miscellaneous medications**

*Phenytoin*, *allopurinol*, *cimetidine*, *omeprazole*, *ranitidine*,  
*famotidine*, *phenobarbital*, *azathioprine*, *cyclosporine*,  
 *$\alpha$ -methyl dopa*, *carbamazepine*, *diazepam*,  
*phenylpropanolamine*, *captopril*, *clofibrate*,  *$\alpha$ -interferon*,  
*interleukin-2*, *anti-CD4 monoclonal antibodies*,  
*ticlopidine*, *quinine*, *propylthiouracil*, *streptokinase*,  
*Chinese herbs*, *clozapine*, *phentermine/phendimetrazine*,  
*pranlukast*, *lansoprazole*

\*Drugs reported with greatest frequency are shown in *italics*.

**TABLE 48-2 Laboratory Findings in Acute Interstitial Nephritis**

Parameter	Finding
Urinary sediment	Erythrocytes, leukocytes (eosinophils), leukocyte casts
Urinary protein excretion	<1 g/day, rarely >1 g/day (NSAIDs)
Fractional excretion of sodium	Usually >1%
Proximal tubular defects	Glucosuria, bicarbonaturia, phosphaturia, aminoaciduria, proximal RTA
Distal tubular defects	Hyperkalemia, sodium wasting, distal RTA
Medullary defects	Sodium wasting, urine-concentrating defects

NSAIDs, nonsteroidal anti-inflammatory drugs; RTA, renal tubular acidosis.

**TABLE 48-5 Chronic Interstitial Nephritis**

**Drugs/toxins**

*Analgesics*  
*Heavy metals* (lead, cadmium)  
*Lithium*  
*Chinese herbs*  
*Calcineurin inhibitors* (cyclosporine, tacrolimus)  
*Cisplatin*  
*Nitrosoureas*

**Hereditary disorders**

*Polycystic kidney disease*  
*Medullary cystic disease–juvenile nephronophthisis*  
*Hereditary nephritis*

**Metabolic disturbances**

*Hypercalcemia/Nephrocalcinosis*  
*Hypokalemia*  
*Hyperuricemia*  
*Hyperoxaluria*  
*Cystinosis*

**Immune-mediated disorders**

*Renal allograft rejection*  
*Systemic lupus erythematosus*  
*Sjögren's syndrome*  
*Sarcoidosis*  
*Wegener's granulomatosis*  
*Vasculitis*

**Hematologic disturbances**

*Multiple myeloma*  
*Light chain disease*  
*Dysproteinemias*  
*Lymphoproliferative disease*  
*Sickle cell disease*

**Infections**

*Renal*  
*Systemic*

**Obstruction/mechanical disorders**

*Tumors*  
*Stones*  
*Vesicoureteral reflux*

**Miscellaneous disorders**

*Endemic nephropathy*  
*Radiation nephritis*  
*Aging*  
*Hypertension*  
*Renal ischemia*