**Table 28.**

Diagnostic Findings Differentiating Prerenal Acute Kidney Injury From Acute Tubular Necrosis

| Condition | BUN-Creatinine Ratio | Urine Osmolality (mOsm/kg $H_2O$) | Urine Sodium (mEq/L [mmol/L]) | $FE_{Na}$[a] | $FE_{Urea}$[b] | Urinalysis and Microscopy |
|---|---|---|---|---|---|---|
| Prerenal | >20:1 | >500 | <20 | <1%[c] | <35% | Specific gravity >1.020; normal or hyaline casts |
| Acute tubular necrosis | 10-15:1 | ~300 | >40 | >2%[d] | >35% | Specific gravity ~1.010; pigmented granular (muddy brown) casts and tubular epithelial cells |

BUN = blood urea nitrogen; $FE_{Na}$ = fractional excretion of sodium; $FE_{Urea}$ = fractional excretion of urea.

[a]$FE_{Na}$ = (Urine sodium concentration × Plasma creatinine concentration)/(Urine creatinine concentration × Plasma sodium concentration) × 100.

[b]$FE_{Urea}$ = (Urine urea concentration × Plasma creatinine concentration)/(Urine creatinine concentration × Plasma urea concentration) × 100

[c]$FE_{Na}$ can be high in prerenal states with diuretic use, adrenal insufficiency, or metabolic alkalosis.

[d]$FE_{Na}$ can be low in acute tubular necrosis due to contrast-associated nephropathy, pigment nephropathy, glomerulonephritis, or early obstruction.