**Gentamicin:**

**Class:** Antibiotic.

**Indications:**

Treatment of susceptible bacterial infections, normally gram-negative organisms, including *Pseudomonas, Proteus, Serratia,* and gram-positive *Staphylococcus;* treatment of bone infections, respiratory tract infections, skin and soft tissue infections, as well as abdominal and urinary tract infections, and septicemia; treatment of infective endocarditis

**Available dosage form in the hospital:** 20 MG AMP OR VIAL, 0.3% EYE DROPS, 10MG EYE OINT, 80MG VIAL OR AMP.

**Trade Names:**

**Dosage:**

**Usual dosage ranges:**

I.M., I.V.:

Conventional: 1-2.5 mg/kg/dose every 8-12 hours; to ensure adequate peak concentrations early in therapy, higher initial dosage may be considered in selected patients when extracellular water is increased (edema, septic shock, postsurgical, or trauma)

Once daily: 4-7 mg/kg/dose once daily; some clinicians recommend this approach for all patients with normal renal function; this dose is at least as efficacious with similar, if not less, toxicity than conventional dosing

Intrathecal: 4-8 mg/day

**Indication-specific dosing:** I.M., I.V.:

**Brucellosis:** 240 mg (I.M.) daily or 5 mg/kg (I.V.) daily for 7 days; either regimen recommended in combination with doxycycline

**Cholangitis:** 4-6 mg/kg once daily with ampicillin

**Diverticulitis (complicated):** 1.5-2 mg/kg every 8 hours (with ampicillin and metronidazole)

**Endocarditis:** Treatment: 3 mg/kg/day in 1-3 divided doses

**Meningitis Enterococcus sp or Pseudomonas aeruginosa:** I.V.: Loading dose 2 mg/kg, then 1.7 mg/kg/dose every 8 hours (administered with another bacteriocidal drug)

**Pelvic inflammatory disease:** Loading dose: 2 mg/kg, then 1.5 mg/kg every 8 hours

Alternate therapy: 4.5 mg/kg once daily
**Plague (Yersinia pestis):** Treatment: 5 mg/kg/day, followed by postexposure prophylaxis with doxycycline

**Pneumonia, hospital- or ventilator-associated:** 7 mg/kg/day (with antipseudomonal beta-lactam or carbapenem)

**Synergy (for gram-positive infections):** 3 mg/kg/day in 1-3 divided doses (with ampicillin)

**Tularemia:** 5 mg/kg/day divided every 8 hours for 1-2 weeks

**Urinary tract infection:** 1.5 mg/kg/dose every 8 hours

### Dosing: Renal Impairment

Conventional dosing:

- $\text{Cl}_\text{cr} \geq 60$ mL/minute: Administer every 8 hours
- $\text{Cl}_\text{cr} 40-60$ mL/minute: Administer every 12 hours
- $\text{Cl}_\text{cr} 20-40$ mL/minute: Administer every 24 hours
- $\text{Cl}_\text{cr} < 20$ mL/minute: Loading dose, then monitor levels

High-dose therapy: Interval may be extended (eg, every 48 hours) in patients with moderate renal impairment ($\text{Cl}_\text{cr} 30-59$ mL/minute) and/or adjusted based on serum level determinations.

Intermittent hemodialysis (IHD) (administer after hemodialysis on dialysis days) (Heintz, 2009): Dialyzable (~50%; variable; dependent on filter, duration, and type of IHD):

- Loading dose of $2-3$ mg/kg loading dose followed by:
  - Mild UTI or synergy: 1 mg/kg every 48-72 hours; consider redosing for pre-HD or post-HD concentrations <1 mg/L
  - Moderate-to-severe UTI: 1-1.5 mg/kg every 48-72 hours; consider redosing for pre-HD concentrations <1.5-2 mg/L or post-HD concentrations <1 mg/L
  - Systemic gram-negative rod infection: 1.5-2 mg/kg every 48-72 hours; consider redosing for pre-HD concentrations <3-5 mg/L or post-HD concentrations <2 mg/L

**Note:** Dosing dependent on the assumption of 3 times/week, complete IHD sessions.

Peritoneal dialysis (PD):

- Administration via PD fluid:
  - Gram-positive infection (eg, synergy): 3-4 mg/L (3-4 mcg/mL) of PD fluid
  - Gram-negative infection: 4-8 mg/L (4-8 mcg/mL) of PD fluid
- Administration via I.V., I.M. route during PD: Dose as for $\text{Cl}_\text{cr} < 10$ mL/minute and follow levels

Continuous renal replacement therapy (CRRT) (Heintz, 2009; Trotman, 2005): Drug clearance is highly dependent on the method of renal replacement, filter type, and flow rate. Appropriate dosing requires close monitoring of pharmacologic response, signs of adverse reactions due to drug accumulation, as well as drug concentrations in relation
to target trough (if appropriate). The following are general recommendations only (based on dialysate flow/ultrafiltration rates of 1-2 L/hour and minimal residual renal function) and should not supersede clinical judgment:

CVVH/CVVHD/CVVHDF: Loading dose of 2-3 mg/kg followed by:

- Mild UTI or synergy: 1 mg/kg every 24-36 hours (redose when concentration <1 mg/L)
- Moderate-to-severe UTI: 1-1.5 mg/kg every 24-36 hours (redose when concentration <1.5-2 mg/L)
- Systemic gram-negative infection: 1.5-2.5 mg/kg every 24-48 hours (redose when concentration <3-5 mg/L)

**Common side effect:**

**Cardiovascular:** Edema, hyper/hypotension

**Central nervous system:** Ataxia, confusion, depression, dizziness, drowsiness, encephalopathy, fever, headache, lethargy, pseudomotor cerebri, seizures, vertigo

**Dermatologic:** Alopecia, erythema, itching, purpura, rash, urticaria

**Endocrine & metabolic:** Hypocalcemia, hypokalemia, hypomagnesemia, hyponatremia

**Otic:** Hearing impairment, hearing loss (associated with persistently increased serum concentrations; early toxicity usually affects high-pitched sound), tinnitus

**Renal:** BUN increased, casts (hyaline, granular) in urine, creatinine clearance decreased, distal tubular dysfunction, Fanconi-like syndrome (high dose, prolonged course) (infants and adults), oliguria, renal failure (high trough serum concentrations), polyuria, proteinuria, serum creatinine increased, tubular necrosis, urine specific gravity decreased

**Pregnancy Risk Factor:** D