LevoFLOXacin (Levaquin)

Identification

› Therapeutic class: Antibiotic

› Type: Fluoroquinolone

› Generic: LevoFLOXacin (LEE-vo-FLOKS-uh-sin)

› Brand(s) (drug company: region): Cravit (Daiichi: Asia); Levaquin (Janssen: Canada, South America, U.S.); Iquix, Oftaquix, Quixin (Santen: Asia, Europe, U.K., U.S.); Tavanic (Sanofi-Aventis: Europe, Mexico, South America, U.K.)

Regulatory Status

› Levofoxacin requires a prescription but is not a controlled substance

Description

› Levofoxacin is available as oral tablets (250 mg, 500 mg, 750 mg), oral solution (500 mg/20 mL, 250 mg/10 mL, 25 mg/mL), oral syrup (25 mg/mL), concentrated parenteral solution (25 mg/mL; 500 mg, 750 mg), premixed parenteral solution (in D₅W, 5 mg/mL; 250 mg, 500 mg, 750 mg), and ophthalmic solution (0.5%, 1.5%)

Common Usage/Primary Action

› Levofoxacin is U.S. FDA–approved for infections caused by susceptible bacteria in adults unless otherwise noted:

• Uncomplicated/complicated urinary tract infections (UTI), acute pyelonephritis, chronic bacterial prostatitis

• Community-associated pneumonia, hospital-associated pneumonia, acute bacterial sinusitis (second-/third-line), acute bacterial exacerbation of chronic bronchitis

• Uncomplicated/complicated skin and skin structure infections

• Inhalational anthrax (postexposure prophylaxis; patients ≥ 6 months)

• Plague (treatment, postexposure prophylaxis; patients ≥ 6 months)

• Bacterial conjunctivitis, corneal ulcer (ophthalmic solution only)

› Levofoxacin inhibits activity of DNA-gyrase in susceptible bacteria, preventing DNA replication; it is usually bacteriocidal

• Susceptible bacteria include methicillin-susceptible Staphylococcus spp., Streptococcus pneumoniae, S. pyogenes, S. viridans, Enterococcus spp., Enterobacter cloacae, Escherichia coli, Haemophilus influenzae, H. parainfluenzae, Klebsiella pneumoniae, Legionella, Moraxella catarrhalis, Proteus mirabilis, Pseudomonas aeruginosa, Serratia spp., Salmonella spp., Shigella spp., Chlamydia pneumoniae, Mycoplasma pneumoniae, Yersinia pestis, and Bacillus anthracis

Associated Laboratory/Diagnostic Tests

› During long-term therapy, monitor CBC/differential, renal/liver function tests, blood glucose, and serum electrolytes
Dosage and Administration
› P.O. and I.V. dosage forms are interchangeable
› Administer tablets without regard to food; administer oral solution 1 hour before/2 hours after food
› Dilute concentrated parenteral solution to final concentration of 5 mg/mL, and administer by I.V. infusion only; compatible diluents include normal saline and D5W. Infuse 250–500 mg (50–100 mL) over 60 minutes; infuse 750 mg (150 mL) over 90 minutes
› Usual dosage ranges (P.O./I.V.): Adults: 250–500 mg (750 mg for severe/complicated infections) every 24 hours; Children ≥ 6 months (anthrax or plague only): < 50 kg: 8 mg/kg (max 250 mg) every 12 hours; ≥ 50 kg: 500 mg every 24 hours; Duration of therapy determined by infection; see prescribing information for details
› Reduce dose in patients with creatinine clearance (CrCl) < 50 mL/min; see prescribing information for details

Adverse Reactions
› Common adverse reactions (≥ 3%, most to least frequent) include nausea, headache, diarrhea, insomnia, dizziness, and constipation
› Serious adverse reactions include cardiotoxicity, phototoxicity, erythema multiforme, Stevens-Johnson syndrome, toxic epidermal necrolysis, Clostridium difficile–associated diarrhea, pancreatitis, agranulocytosis, a plastic anemia, hemolytic anemia, pancytopenia, hepatotoxicity, anaphylactoid reaction, rhabdomyolysis, tendon rupture, polyneuropathy, ↑ intracranial pressure, seizures, psychosis, suicidal ideation, nephrotoxicity, extrinsic allergic alveolitis, pyrexia, and serum sickness
› See Drugdex System for additional adverse reactions

Nursing Assessment/Implications
› Promote adequate patient hydration to avoid possible crystalluria
› Monitor for fever and signs/symptoms (S/S) of infection; monitor culture/sensitivity if appropriate
› Monitor for S/S of CNS toxicity (e.g., confusions, tremor, hallucinations)

Red Flags
› Drug Interactions
  • Amifampridine, amisulpride, bepridil, cisapride, dronedarone, mesoridazine, pimozide, piperazine, saquinavir, sparfloxacin, terfenadine, thioridazine, ziprasidone: Contraindicated; possible additive QT prolongation
  • Drugs that prolong QT interval (e.g., class Ia/III antiarrhythmics, antidepressants, antipsychotics, cyclobenzaprine, droperidol, fluconazole, miFEPRISTONE, quININE, sodium phosphate, vemurafenib, vinflunine, among others): Not recommended; ↑ risk for cardiotoxicity. If unavoidable, closely monitor ECG
  • bCG (intravesical), cholera vaccine: Not recommended; ↓ effectiveness
  • Theophylline: Possible ↑ theophylline levels; use cautiously, monitor theophylline levels and adjust dose as necessary
  • Warfarin: ↑ bleeding risk; use cautiously and monitor PT/INR
  • Antidiabetic agents: Possible loss of glycemic control; use cautiously and closely monitor blood glucose in patients with diabetes mellitus (DM)
  • Antacids, buffered didanosine, sucralfate, products containing calcium, iron, or zinc: ↓ levofloxacin absorption (P.O. only); administer levofloxacin ≥ 2 hours before or afterward
  • There are many more interactions; see Drugdex System

Drug Precautions
› Warnings
  – Fluoroquinolones have been associated with tendinitis and/or tendon rupture; ↑ risk in patients ≥ 60 years, solid organ transplant recipients, and patients with concurrent corticosteroid therapy. If tendon pain, swelling, or rupture occurs, discontinue immediately and contact the clinician
Levofloxacin is **not recommended** for patients with myasthenia gravis

- Use **cautiously** in older patients and in patients with DM, uncorrected hypokalemia, CNS disorders, renal impairment, history of QT prolongation, or history of tendon disorders (2-4,5-7)

**Drug Allergy**

- Levofloxacin is **contraindicated** in patients with known hypersensitivity to levofloxacin, other fluoroquinolones, or formulation components (2-3,4,5,7)

**Contraindications**

- See **Drug Interactions** and **Drug Allergy** above

**Pregnancy/Lactation**

- Pregnancy: **Category C**: Either serious adverse effects in animals or insufficient human/animal research; use only if potential benefit outweighs risk (4)
- Lactation: **Not recommended**; undetermined infant risk (4)

**Name Alert**

- Do not confuse levoFLOXacin with levETIRAcetam, levodopa, Levophed, or levothyroxine
- Do not confuse Levaquin with Lariam, Levoxyl, Levsin, or Lovenox

**Use in Children**

- Safety and effectiveness have not been established in patients < 18 years (< 6 months for inhalational anthrax or plague) (4)

**Food for Thought**

- In their systematic review, Bidell and Lodise (2016) found that levofloxacin and ofloxacin were associated with higher numbers of tendinopathy cases than other fluoroquinolones; they also identified renal impairment as an additional risk factor (1)

- In a population of U.S. veterans (mean age 56.5 years, 71% White, 88% male), levofloxacin was associated with significantly higher risk for serious arrhythmias and cardiovascular death than either amoxicillin or azithromycin; the risk was significantly higher during both days 1–5 and 6–10 of levofloxacin therapy (6)

**What to Tell the Patient**

- Instruct the patient to immediately report allergy symptoms; chest pain, tachycardia, bradycardia, or dysrhythmias; blistering, red, or peeling skin; severe headache; peripheral paresthesias or numbness; confusion, behavior changes, hallucinations, or **suicidal ideation**; tremors or seizures; changes in urinary frequency and/or quantity; lightheadedness, dizziness, or syncope; nausea, vomiting, anorexia, or upper stomach pain; jaundice; dark urine or pale stools; severe and possibly bloody diarrhea; sudden tendon pain; joint bruising, swelling, or pain; or unusual bleeding, bruising, or weakness (4)

- Educate the patient to drink plenty of fluids

- Educate the patient to avoid driving or hazardous activities if not alert

- Educate the patient to take ≥ 2 hours before or after milk products, antacids, and products containing calcium, iron, or zinc

- Educate the patient to avoid excessive sunlight or UV exposure, use sunscreen, and wear protective clothing when outdoors

- Advise the patient to consult the clinician or pharmacist before taking any other prescription or over-the-counter medications (particularly antidiarrheals), herbal preparations, or dietary supplements

**References**


