Quinine (ko-o-nine) (Qualaquin)

**Classification**
Therapeutic: antimalarials

**Pregnancy Category**
C

### Indications
- Chloroquine-resistant falciparum malaria (alone or with pyrimethamine and a sulfonamide or with a tetracycline; has also been used with Indinavir and nevirapine).
- Unlabeled Use: Leg cramps (not recommended due to potentially fatal cardiac side effects).

### Action
Therapeutic mechanism of the quinoline derivatives is to interfere with the ability of the parasite to transport calcium into the parasite. This disrupts the metabolism of the erythrocytic phase of Plasmodium falciparum, increases the refractory period of skeletal muscle, increases the distribution of calcium within muscle fibers, decreases the excitability of motor end-plate regions, resulting in decreased response to repetitive nerve stimulation and acetylcholine.

### Therapeutic Effects:
- Death of P. falciparum.

### Pharmacokinetics

#### Absorption:
- Rapidly and almost completely (80%) absorbed following oral administration.

#### Distribution:
- Varies with condition and patient; does not enter CSF well. Crosses the placenta and enters breast milk.

#### Protein Binding:
- 90% in patients with cerebral malaria, pregnant women, and children; 85-90% in patients with uncomplicated malaria; 70% in healthy adults.

#### Metabolism and Excretion:
- 80% metabolized by the liver; metabolites have less activity than quinine; metabolites excreted in urine. 20% excreted unchanged in urine. Excretion is pH-dependent.
- Half-life: 11 hr (in patients with malaria).

### Contraindications/Precautions
- Contraindicated in:
  - Hypersensitivity to quinine, quinidine, or mefloquine.
  - History of previous serious adverse reaction to quinine including thrombotic thrombocytopenic purpura, thrombocytopenia, acute intravascular hemolysis, hemoglobinuria, or hemoglobinemia.
  - QTc prolongation or conditions predisposing to QTc prolongation including hypokalemia and bradycardia.
  - Concurrent use of Class IA or Class III antiarrhythmics, mefloquine, pimozide, or macrolide anti-infectives (risk of arrhythmias).
  - G6PD deficiency.
  - Myasthenia gravis.
  - Optic neuritis.
  - Severe hepatic impairment.
- Use Cautiously in:
  - Recurrent or interrupted malaria therapy.
  - History of arrhythmias, especially QTc prolongation.
  - Hypoglycemia.
  - History of thrombocytopenic purpura, mild or moderate hepatic impairment.
  - OB: Use only if potential maternal benefit outweighs fetal risk; consider alternative therapies.
  - Lactation: Discontinue drug or breast feeding.
  - Geri: Avoid if possible (risk of arrhythmias).

### Adverse Reactions/Side Effects

#### CV:
- Torsoles de pointes, PR interval prolongation, QT interval prolongation.

#### GI:
- Abdominal cramps/pain, diarrhea, nausea, vomiting, hepatotoxicity.

#### Derm:
- Rash.

#### Endo:
- Hypoglycemia (in pregnancy).

#### Hemat:
- Bleeding, blood dyscrasias, thrombotic thrombocytopenic purpura, thrombocytopenia.

#### Misc:
- Cinchonism, hypersensitivity reactions including fever and anaphylaxis, hemolytic uremic syndrome, Stevens-Johnson syndrome.

### Interactions

#### Drug-Drug:
- Concurrent use of Class IA antiarrhythmics (quinidine, procainamide, disopyramide), Class III antiarrhythmics, mefloquine, pimozide, or macrolide anti-infectives (risk of arrhythmias and should be avoided).
- Antacids containing aluminum or magnesium; absorption of quinine may be decreased.
- Cimetidine, ketoconazole, ritonavir, tetracycline, theophylline, and erythromycin may increase levels; avoid concurrent use with ritonavir.
- Rifampin and rifabutin may increase levels; avoid concurrent use with rifampin.
- Concomitant use with anticonvulsants may increase risk of seizures and adverse cardiovascular reactions.
- Neuro-muscular blocking agents may increase risk of respiratory failure.
- Concomitant use with mefloquine may increase risk of seizures.

### Dosage and Administration

#### Antimalarial Blood Levels

<table>
<thead>
<tr>
<th>ROUTE</th>
<th>ONSET</th>
<th>PEAK</th>
<th>DURATION</th>
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<tbody>
<tr>
<td>PO</td>
<td>unknown</td>
<td>3.2–5.9 hr</td>
<td>8 hr</td>
</tr>
</tbody>
</table>

### Notes
- Cautiously: Cardiac arrhythmias, especially QTc prolongation.
- Hypoglycemia.
- Use with caution in patients with cerebral malaria, pregnant women, and children.
- Use with caution in patients with uncomplicated malaria.
- Use with caution in healthy adults.

### Genetically Implicated CAPI TALS
- Life-threatening: ...
- Most frequent: ...
- Strikethrough: Discontinued.
Route/Dosage
PO (Adults): Malaria—648 mg every 8 hr for 7 days.

Renal Impairment
PO (Adults): Severe chronic renal failure—648 mg initially, then 324 mg every 12 hr for 7 days.

NURSING IMPLICATIONS
Assessment
● Malaria: Assess patient for improvement in signs and symptoms of condition daily during therapy.

● Assess for rash periodically during therapy. May cause Stevens-Johnson syndrome or toxic epidermal necrolysis. Discontinue therapy if severe rash occurs or if accompanied with fever, general malaise, fatigue, muscle or joint aches, blisters, rash, lesions, conjunctivitis, hepatitis, and/or eosinophilia.

● Monitor for thrombocytopenia; usually resolved within 1 wk of discontinuation, but may cause a fatal hemorrhage if quinine is not discontinued.

● Lab Test Considerations: May cause urinary 17-ketogenic steroids when metyrapone or Zimmerman method is used.

● Toxicity and Overdose: Plasma quinine levels of 10 mcg/mL may cause tinnitus and impaired hearing.

● Signs of toxicity or indication include tinnitus, headache, nausea, and slightly disturbed vision; usually disappear rapidly upon discontinuing quinine.

Potential Nursing Diagnoses
Risk for infection (Indications)

Implementation
● Do not confuse quinine with quinidine.

● PO: Administer with or after meals to minimize GI distress. Aluminum-containing antacids will decrease and delay absorption; avoid concurrent use.

Patient/Family Teaching
● Instruct patient to take medication as directed and continue full course of therapy, even if feeling better. Take missed doses as soon as remembered, unless almost time for the next dose. If more than 4 hr has elapsed since missed dose, wait and take the next dose as scheduled. Do not double doses or take more than recommended. Advise patient to read the Patient Information leaflet prior to starting therapy and reread at each refill.

● Review methods of minimizing exposure to mosquitoes with patients receiving quinine (use insect repellent, wear long-sleeved shirt and long trousers, use screens or netting).

● Quinine may cause visual changes. Caution patient to avoid driving or other activities requiring alertness until response to medication is known.

● May cause diarrhea, nausea, vomiting or pain, cramping, or change in the ears. Advise patient to notify health care professional promptly if these become pronounced.

● Advise patient to stop quinine and notify health care professional of any evidence of allergy (hives, itching, rash, fever, facial swelling, stomach pain, difficulty breathing, ringing in the ears, visual problems) or rash.

● Instruct patient to notify health care professional of all Rx or OTC medications, vitamins, or herbal products being taken and consult health care professional before taking any new medications.

● Advise patient to notify health care professional if pregnancy is planned or suspected or if breast feeding.

Evaluation/Desired Outcomes
● Improvement in signs and symptoms of malaria. Advise patient to contact health care professional if not feeling better within 1–2 days or if fever returns following therapy.

Why was this drug prescribed for your patient?