

PRESCRIBING INFORMATION

Pr APO-QUININE

**Quinine Sulfate Capsules
200 mg and 300 mg**

Apotex Standard

ANTIMALARIAL AGENT

**APOTEX INC.
150 Signet Drive
Toronto, Ontario
M9L 1T9
Control Number: 215567**

**DATE OF REVISION:
September 19, 2018**

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Antimalarial Agent

PART I: HEALTH PROFESSIONAL INFORMATION

SUMMARY PRODUCT INFORMATION

Route of Administration	Dosage Form / Strength	All Non-medicinal Ingredients
Oral	Capsule, 200 mg and 300 mg	Carboxymethylcellulose sodium, colloidal silicon dioxide, gelatin, magnesium stearate, talc, titanium dioxide.

INDICATIONS AND CLINICAL USE

APO-QUININE (quinine sulfate) is indicated (in combination with a second antimalarial drug) for the treatment of uncomplicated *Plasmodium falciparum* malaria. Quinine sulfate has been shown to be effective in geographical regions where resistance to chloroquine has been documented.

Strains of *P. falciparum* with decreased susceptibility to quinine can be selected *in vivo*. *P. falciparum* malaria that is clinically resistant to quinine has been reported in some areas of South America, Southeast Asia, and Bangladesh.

Geriatrics (≥ 65 years of age):

Reported clinical experience has not identified differences in responses between the elderly and younger patients.

Pediatrics (< 16 years of age):

Quinine is considered acceptable for use in children at doses recommended for the treatment of malaria.

CONTRAINDICATIONS

- Patients who are hypersensitive to this drug or to any ingredient in the formulation or component of the container. For a complete listing, see the Dosage Forms, Composition and Packaging section of the prescribing information.
- Hypersensitivity reactions include, but are not limited to the following:
 - Thrombocytopenia
 - Idiopathic thrombocytopenia purpura (ITP) and Thrombotic thrombocytopenic purpura (TTP)

- Hemolytic uremic syndrome (HUS)
- Blackwater fever (acute intravascular hemolysis, hemoglobinuria, and hemoglobinemia)

(see WARNINGS AND PRECAUTIONS – Hematologic and Immune).

APO-QUININE is also contraindicated in patients with the following:

- Prolongation of QT interval (see WARNINGS AND PRECAUTIONS – Cardiovascular)
- Glucose-6-phosphate dehydrogenase (G6PD) deficiency
- Myasthenia gravis
- Known hypersensitivity to quinine, mefloquine, or quinidine
- Optic neuritis

WARNINGS AND PRECAUTIONS

Serious Warnings and Precautions

APO-QUININE use for the treatment or prevention of nocturnal leg cramps may result in serious and life-threatening hematologic reactions, including thrombocytopenia and hemolytic uremic syndrome/thrombotic thrombocytopenic purpura (HUS/TTP). Chronic renal impairment associated with the development of TTP has been reported. The risk associated with quinine sulfate use in the absence of evidence of its effectiveness in the treatment or prevention of nocturnal leg cramps outweighs any potential benefit (see WARNINGS AND PRECAUTIONS - General).

General

Quinine sulfate is not approved for:

- Treatment of severe or complicated *P. falciparum* malaria.
- Prevention of malaria.
- Treatment or prevention of nocturnal leg cramps.

Use of APO-QUININE for Treatment or Prevention of Nocturnal Leg Cramps

APO-QUININE may cause unpredictable serious and life-threatening hematologic reactions including thrombocytopenia and hemolytic-uremic syndrome/thrombotic thrombocytopenic purpura (HUS/TTP) in addition to hypersensitivity reactions, QT prolongation, serious cardiac arrhythmias including torsades de pointes, and other serious adverse events requiring medical intervention and hospitalization. Chronic renal impairment associated with the development of TTP and fatalities have also been reported. The risk associated with the use of APO-QUININE in the absence of evidence of its effectiveness for treatment or prevention of nocturnal leg cramps outweighs any potential benefit in treating and/or preventing this benign, self-limiting condition.

Cardiovascular

QT Prolongation and Ventricular Arrhythmias

QT interval prolongation has been a consistent finding in studies which evaluated electrocardiographic changes with oral or parenteral quinine administration, regardless of age, clinical status, or severity of disease. The maximum increase in QT interval has been shown to

correspond with peak quinine plasma concentration. Quinine sulfate has been rarely associated with potentially fatal cardiac arrhythmias, including torsades de pointes and ventricular fibrillation.

APO-QUININE is not recommended for use with other drugs known to cause QT prolongation, including Class IA antiarrhythmic agents (e.g. quinidine, procainamide, disopyramide) and Class III antiarrhythmic agents (e.g. amiodarone, sotalol, dofetilide).

The use of macrolide antibiotics such as erythromycin should be avoided in patients receiving APO-QUININE. Fatal torsades de pointes was reported in an elderly patient who received concomitant quinine, erythromycin, and dopamine. Although a causal relationship between a specific drug and the arrhythmia was not established in this case, erythromycin is a CYP3A4 inhibitor and could potentially increase quinine plasma levels when used concomitantly.

Quinine may inhibit the metabolism of certain drugs that are CYP3A4 substrates and are known to cause QT prolongation, e.g. astemizole, cisapride, terfenadine, pimoziide, halofantrine and quinidine. Torsades de pointes has been reported in patients who received concomitant quinine and astemizole. Therefore, concurrent use of APO-QUININE with these medications or drugs with similar properties should be avoided (see DRUG INTERACTIONS).

Concomitant administration of APO-QUININE with the antimalarial drugs, mefloquine or halofantrine, may result in electrocardiographic abnormalities, including QT prolongation and increase the risk for torsades de pointes or other serious ventricular arrhythmias. APO-QUININE should also be avoided in patients with known prolongation of QT interval and in patients with clinical conditions known to prolong the QT interval, such as uncorrected hypokalemia, bradycardia, and certain cardiac conditions.

Atrial Fibrillation and Flutter

APO-QUININE should be used with caution in patients with atrial fibrillation or atrial flutter. A paradoxical increase in ventricular response rate may occur with quinine, similar to that observed with quinidine. If digoxin is used to prevent a rapid ventricular response, serum digoxin levels should be closely monitored, because digoxin levels may be increased with use of quinine (see DRUG INTERACTIONS).

Hematologic

Thrombocytopenia

Quinine-induced thrombocytopenia is an immune-mediated disorder. Severe cases of thrombocytopenia that are fatal or life threatening have been reported, including cases of HUS/TTP. Chronic renal impairment associated with the development of TTP has also been reported. Thrombocytopenia usually resolves within a week upon discontinuation of quinine. If quinine is not stopped, a patient is at risk for fatal hemorrhage. Upon re-exposure to quinine from any source, a patient with quinine-dependent antibodies could develop thrombocytopenia that is more rapid in onset and more severe than the original episode.

Hepatic/Biliary/Pancreatic

Hepatic

Close monitoring is recommended for patients with impaired liver function, as this may result in increased exposure to quinine.

Hypoglycemia

Quinine stimulates release of insulin from the pancreas, and patients, especially pregnant women, may experience clinically significant hypoglycemia.

Immune

Hypersensitivity

Serious hypersensitivity reactions reported with quinine sulfate include anaphylactic shock, anaphylactoid reactions, urticaria, serious skin rashes, including Stevens-Johnson syndrome and toxic epidermal necrolysis, angioedema, facial edema, bronchospasm, and pruritus.

A number of other serious adverse reactions reported with quinine, including thrombotic thrombocytopenic purpura (TTP) and hemolytic uremic syndrome (HUS), thrombocytopenia, immune thrombocytopenic purpura (ITP), blackwater fever, disseminated intravascular coagulation, leukopenia, neutropenia, granulomatous hepatitis, and acute interstitial nephritis may also be due to hypersensitivity reactions.

APO-QUININE should be discontinued if there are any signs or symptoms of hypersensitivity.

Musculoskeletal

Quinine has neuromuscular blocking activity, and may exacerbate myasthenia gravis.

Neurologic

Concurrent use of APO-QUININE and mefloquine may increase the risk of seizures (see DRUG INTERACTIONS).

Renal

Clearance of quinine is decreased in patients with severe chronic renal failure; the dosage and dosing frequency of quinine sulfate should be reduced in these patients. The effects of mild and moderate renal impairment on the safety and pharmacokinetics of quinine sulfate are not known.

Special Populations

Pregnant Women:

Published data on over 1,000 pregnancy exposures to quinine did not show an increase in teratogenic effects over the background rate in the general population; however the majority of these exposures were not in the first trimester. In developmental and reproductive toxicity studies, central nervous system (CNS) and ear abnormalities and increased fetal deaths occurred in some species when pregnant animals received quinine at doses about 1 to 4 times the human clinical dose. Quinine should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus.

P. falciparum malaria carries a higher risk of morbidity and mortality in pregnant women than in the general population. Pregnant women with *P. falciparum* malaria have an increased incidence of fetal loss (including spontaneous abortion and stillbirth), preterm labor and delivery, intrauterine growth retardation, low birth weight, and maternal death. Therefore, treatment of malaria in pregnancy is important.

Hypoglycemia, due to increased pancreatic secretion of insulin, has been associated with

quinine use, particularly in pregnant women.

No information is available on the effect of quinine on fertility in animals or humans.

Nursing Women:

Quinine is distributed into breast milk. Although quinine is generally considered compatible with breastfeeding, the risks and benefits to infant and mother should be assessed. Caution should be exercised when administered to a nursing woman.

Pediatrics: Quinine is considered acceptable for use in children at doses recommended for the treatment of malaria.

Geriatrics: Reported clinical experience has not identified differences in responses between the elderly and younger patients.

ADVERSE REACTIONS

Adverse Drug Reaction Overview

The most common adverse events associated with quinine use are a cluster of symptoms called “cinchonism”, which occurs to some degree in almost all patients taking quinine. Symptoms of mild cinchonism include headache, vasodilation and sweating, nausea, tinnitus, hearing impairment, vertigo or dizziness, blurred vision, and disturbance in color perception. More severe symptoms of cinchonism are vomiting, diarrhea, abdominal pain, deafness, blindness, and disturbances in cardiac rhythm or conduction. Most symptoms of cinchonism are reversible and resolve with discontinuation of quinine.

The following ADVERSE REACTIONS have been reported with quinine sulfate. Most of these reactions are thought to be uncommon, but the actual incidence is unknown:

Blood and lymphatic system disorders: agranulocytosis, hypoprothrombinemia, thrombocytopenia, disseminated intravascular coagulation, hemolytic anemia; hemolytic uremic syndrome, thrombotic thrombocytopenic purpura, idiopathic thrombocytopenic purpura, petechiae, ecchymosis, hemorrhage, coagulopathy, blackwater fever, leukopenia, neutropenia, pancytopenia, aplastic anemia.

Cardiac disorders: chest pain, tachycardia, bradycardia, palpitations, syncope, atrioventricular block, atrial fibrillation, irregular rhythm, unifocal premature ventricular contractions, nodal escape beats, U waves, QT prolongation, ventricular fibrillation, ventricular tachycardia, torsades de pointes, and cardiac arrest.

Ear and labyrinth disorders: vertigo, tinnitus, hearing impairment, and deafness.

Eye disorders: visual disturbances, including blurred vision with scotomata, sudden loss of vision, photophobia, diplopia, night blindness, diminished visual fields, fixed pupillary dilatation, disturbed color vision, optic neuritis, blindness.

Gastrointestinal system disorders: nausea, vomiting, diarrhea, abdominal pain, gastric irritation, and esophagitis.

Hepatobiliary disorders: granulomatous hepatitis, hepatitis, jaundice, and abnormal liver function tests.

Immune system disorders: fever, chills, sweating, flushing, lupus-like syndrome, and hypersensitivity reactions.

Metabolism and nutrition disorders: hypoglycemia and anorexia.

Musculoskeletal system disorders: myalgias and muscle weakness.

Nervous system disorders: headache, diplopia, confusion, altered mental status, seizures, coma, disorientation, tremors, restlessness, ataxia, acute dystonic reaction, aphasia, and suicide.

Renal disorders: hemoglobinuria, renal failure, renal impairment, and acute interstitial nephritis.

Respiratory disorders: asthma, dyspnea, pulmonary edema.

Skin and subcutaneous tissue disorders: cutaneous rashes, including urticarial, papular, or scarlatinal rashes, pruritus, bullous dermatitis, exfoliative dermatitis, erythema multiforme, Stevens-Johnson syndrome, toxic epidermal necrolysis, fixed drug eruption, photosensitivity reactions, allergic contact dermatitis, acral necrosis, and cutaneous vasculitis.

Vascular disorders: vasodilatation, hypotension, postural hypotension.

DRUG INTERACTIONS

Overview

Quinine is a P-gp substrate and is primarily metabolized by CYP3A4. Other enzymes, including CYP1A2, CYP2C8, CYP2C9, CYP2C19, CYP2D6, and CYP2E1 may contribute to the metabolism of quinine. Results of *in vivo* drug interaction studies suggest that quinine has the potential to inhibit the metabolism of drugs that are substrates of CYP3A4 and CYP2D6. Quinine inhibits P-gp and has the potential to affect the transport of drugs that are P-gp substrates.

Drug-Drug Interactions

Effects of Drugs and Other Substances on Quinine Pharmacokinetics

Quinine is a P-gp substrate and is primarily metabolized by CYP3A4. Other enzymes, including CYP1A2, CYP2C8, CYP2C9, CYP2C19, CYP2D6, and CYP2E1 may contribute to the metabolism of quinine.

Hepatic Microsomal Enzyme Inhibitors: Inhibitors of CYP 3A4 may decrease the metabolism of quinine. Although the clinical significance of this interaction is unknown, drugs such as cyclosporine, antifungal agents (e.g. itraconazole, ketoconazole), macrolide antibiotics including erythromycin and clarithromycin, antidepressants (e.g. nefazodone), and HIV protease inhibitors (e.g. ritonavir) or other agents which inhibit CYP 3A4, should be avoided.

Hepatic Microsomal Enzyme Inducers: Inducers of CYP 3A4 may increase the metabolism

of quinine and may decrease quinine plasma concentrations if used concurrently with APO-QUININE (e.g. carbamazepine, phenobarbital, and phenytoin).

Antacids: Antacids containing aluminum and/or magnesium may delay or decrease absorption of quinine. Concomitant administration of these antacids with APO-QUININE should be avoided.

Urinary Alkalizers (acetazolamide, sodium bicarbonate): Agents which increase urinary pH may inhibit the renal excretion of quinine and increase the risk of quinine toxicity.

Effects of Quinine on the Pharmacokinetics of Other Drugs

Results of *in vivo* drug interaction studies suggest that quinine has the potential to inhibit the metabolism of drugs that are substrates of CYP3A4 and CYP2D6. Quinine inhibits P-gp and has the potential to affect the transport of drugs that are P-gp substrates.

Astemizole (CYP3A4 substrate): Elevated plasma astemizole concentrations were reported in a subject who experienced torsades de pointes after receiving three doses of quinine sulfate for nocturnal leg cramps concomitantly with chronic astemizole 10 mg/day. The concurrent use of APO-QUININE with astemizole and other CYP3A4 substrates with QT prolongation potential (e.g. cisapride, terfenadine, halofantrine, pimozone and quinidine) should also be avoided (see WARNINGS AND PRECAUTIONS – Cardiovascular).

Atorvastatin (CYP3A4 substrate): Rhabdomyolysis with acute renal failure secondary to myoglobinuria was reported in a patient taking atorvastatin administered with a single dose of quinine. Quinine may increase plasma concentrations of atorvastatin, thereby increasing the risk of myopathy or rhabdomyolysis. Thus, clinicians considering combined therapy of APO-QUININE with atorvastatin or other HMG-CoA reductase inhibitors (“statins”) that are CYP3A4 substrates (e.g. simvastatin, lovastatin) should carefully weigh the potential benefits and risks of each medication. If APO-QUININE is used concomitantly with any of these statins, lower starting and maintenance doses of the statin should be considered. Patients should also be monitored closely for any signs or symptoms of muscle pain, tenderness, or weakness, particularly during initial therapy. If marked creatine phosphokinase (CPK) elevation occurs or myopathy (defined as muscle aches or muscle weakness in conjunction with CPK values >10 times the upper limit of normal) is diagnosed or suspected, atorvastatin or other statin should be discontinued.

Digoxin (P-gp substrate): Quinine increases plasma concentrations of digoxin. Thus, if APO-QUININE is administered to patients receiving digoxin, plasma digoxin concentrations should be closely monitored, and the digoxin dose adjusted as necessary (see WARNINGS AND PRECAUTIONS – Cardiovascular).

Mefloquine: The concomitant administration of mefloquine and APO-QUININE may produce electrocardiographic abnormalities (including QTc prolongation) and may increase the risk of seizures (see WARNINGS AND PRECAUTIONS).

Neuromuscular blocking agents (pancuronium, succinylcholine, tubocurarine): Quinine may potentiate the effects of neuromuscular blockers such as pancuronium, succinylcholine and tubocurarine resulting in respiratory difficulties.

Warfarin and oral anticoagulants: Cinchona alkaloids, including quinine, may have the potential to depress hepatic enzyme synthesis of vitamin K-dependent coagulation pathway proteins and may enhance the action of warfarin and other oral anticoagulants. Quinine may also interfere with the anticoagulant effect of heparin. Thus, in patients receiving these anticoagulants, the prothrombin time (PT), partial thromboplastin time (PTT), or international normalization ratio (INR) should be closely monitored as appropriate, during concurrent therapy with APO-QUININE.

Drug-Laboratory Interactions

Quinine may produce an elevated value for urinary 17-ketogenic steroids when the Zimmerman method is used.

DOSAGE AND ADMINISTRATION

Dosing Considerations

Quinine sulfate 200 mg is approximately equivalent to quinine base 167 mg.
Quinine sulfate 300 mg is approximately equivalent to quinine base 250 mg.

Patients should be instructed to:

- Take all of the medication as directed.
- Take no more of the medication than the amount prescribed.
- Take with food to minimize possible gastrointestinal irritation.

Completion of a 7-day oral quinine treatment regimen may be limited by drug intolerance, and shorter courses (3 days) of quinine combination therapy have been used. However, the published data from randomized, controlled clinical trials for shorter regimens of oral quinine in conjunction with tetracycline, doxycycline, or clindamycin for treatment of uncomplicated *P. falciparum* malaria are limited, and these shorter course combination regimens may not be as effective as the longer regimens.

Recommended Dose and Dosage Adjustment

Adults (≥ 16 years of age): Quinine sulfate 600 mg (500 mg quinine base) every 8 hours for 3 to 7 days.

Children (< 16 years of age): Quinine sulfate 9 mg/kg (7.5 mg quinine base/kg) to a maximum of 600 mg (500 mg quinine base) every 8 hours for 3 to 7 days. The pharmacist will prepare the children's dosage from the capsules.

Patients with severe chronic renal impairment: One loading dose of 600 mg quinine sulfate followed 12 hours later by 300 mg quinine sulfate every 12 hours for 7 days.

Missed Dose

If a dose is missed, patients should be instructed not to double the next dose. If more than 4 hours has elapsed since the missed dose, the patient should wait and take the next dose as previously scheduled.

OVERDOSAGE

For management of a suspected drug overdose contact your regional Poison Control Centre immediately.

Quinine overdose can be associated with serious complications, including visual impairment, hypoglycemia, cardiac arrhythmias, and death. Visual impairment can range from blurred vision and defective color perception to visual field constriction and permanent blindness.

Cinchonism occurs in virtually all patients with quinine overdose. Symptoms range from headache, nausea, vomiting, abdominal pain, diarrhea, tinnitus, vertigo, hearing impairment, sweating, flushing, and blurred vision, to deafness, blindness, serious cardiac arrhythmias, hypotension, and circulatory collapse. Central nervous system toxicity (drowsiness, disturbances of consciousness, ataxia, convulsions, respiratory depression and coma) has also been reported with quinine overdose, as well as pulmonary edema and adult respiratory distress syndrome.

Quinine, like quinidine, has Class I antiarrhythmic properties. The cardiotoxicity of quinine is due to its negative inotropic action, and to its effect on cardiac conduction, resulting in decreased rates of depolarization and conduction, and increased action potential and effective refractory period. ECG changes observed with quinine overdose include sinus tachycardia, PR prolongation, T wave inversion, bundle branch block, an increased QT interval, and a widening of the QRS complex. Quinine's alpha-blocking properties may result in hypotension and further exacerbate myocardial depression by decreasing coronary perfusion. Quinine overdose has been also associated with hypotension, cardiogenic shock, and circulatory collapse, ventricular arrhythmias, including ventricular tachycardia, ventricular fibrillation, idioventricular rhythm, and torsades de pointes, as well as bradycardia and atrioventricular block.

Most toxic reactions are dose-related; however, some reactions may be idiosyncratic because of the variable sensitivity of patients to the toxic effects of quinine. A lethal dose of quinine has not been clearly defined, but fatalities have been reported after the ingestion of 2 to 8 grams in adults.

Quinine is rapidly absorbed, and attempts to remove residual quinine sulfate from the stomach by gastric lavage may not be effective. Multiple-dose activated charcoal has been shown to decrease plasma quinine concentrations. Forced acid diuresis, hemodialysis, charcoal column hemoperfusion, and plasma exchange were not found to be effective in significantly increasing quinine elimination.

ACTION AND CLINICAL PHARMACOLOGY

Mechanism of Action

Quinine is an antimalarial agent. Quinine inhibits nucleic acid synthesis, protein synthesis, and glycolysis in *Plasmodium falciparum* and can bind with hemazoin in parasitized erythrocytes. However, the precise mechanism of the antimalarial activity of quinine sulfate is not completely understood.

Quinine sulfate acts primarily on the blood schizont form of *P. falciparum*. It is not gametocidal and has little effect on the sporozoite or pre-erythrocytic forms.

Pharmacokinetics

Following oral administration, quinine is rapidly and almost completely absorbed from the gastrointestinal tract. It is widely distributed to body tissues and approximately 70% protein bound. Quinine readily crosses the placenta and is excreted into breast milk. Concentrations in cerebrospinal fluid are 2 to 7% of plasma levels. Quinine is metabolized in the liver by the cytochrome P450 isoenzyme CYP3A4 and excreted mainly in the urine. Anywhere from < 5 to 20% of the drug is excreted unchanged in the urine. Renal excretion of the drug is enhanced at low urinary pH. The elimination half-life of quinine in healthy individuals ranges from 7 to 12 hours. Plasma concentrations of the drug may be higher and the half-life longer in patients with malaria due to impaired hepatic metabolism of the drug.

STORAGE AND STABILITY

Store at room temperature 15°C to 30°C.

DOSAGE FORMS, COMPOSITION AND PACKAGING

APO-QUININE (Quinine Sulfate) Capsules, containing 200 mg of Quinine Sulfate: Each white, opaque capsule, identified APO 200, contains quinine sulfate USP 200 mg. Non-medicinal ingredients: carboxymethylcellulose sodium, colloidal silicon dioxide, gelatin, magnesium stearate, talc, titanium dioxide. Available in bottles of 100 capsules.

APO-QUININE (Quinine Sulfate) Capsules, containing 300 mg of Quinine Sulfate: Each white, opaque capsule, identified APO 300, contains quinine sulfate USP 300 mg. Non-medicinal ingredients: carboxymethylcellulose sodium, colloidal silicon dioxide, gelatin, magnesium stearate, talc, titanium dioxide. Available in bottles of 100 capsules.

Imprinting ink TekPrint SW-9008 Black ink composition:

Shellac NF, Dehydrated Alcohol USP, Isopropyl Alcohol USP, Butyl Alcohol NF, Propylene Glycol USP, Purified Water USP, Strong Ammonia Solution NF, Potassium Hydroxide NF, Black Iron Oxide NF (C.I. E172).

Imprinting ink TekPrint SW-9009 Black ink composition:

Shellac NF, Dehydrated Alcohol USP, Isopropyl Alcohol USP, Butyl Alcohol NF, Propylene Glycol USP, Purified Water USP, Strong Ammonia Solution NF, Potassium Hydroxide NF, Black Iron Oxide NF (C.I. E172).

REFERENCE

TEVA-QUININE (Quinine Sulfate Capsules, USP) Control Number# 198967, Product Monograph; Apotex Inc. Ltd (December 29, 2016).

Consumer Information

^{Pr}APO-QUININE Quinine Sulfate Capsules 200 mg and 300 mg

Apotex Standard

This leaflet is consumer information to complement the Prescribing Information (Part I) for APO-QUININE. Part I is designed for health care practitioner and consumer information is designed specifically for patients consumers. This leaflet is a summary and will not tell you everything about APO-QUININE. Contact your doctor or pharmacist if you have any questions about the drug.

ABOUT THIS MEDICATION

What the medication is used for:

APO-QUININE is used orally in combination with a second antimalarial drug for the treatment of uncomplicated *Plasmodium falciparum* malaria, as determined by the doctor.

What it does:

The exact mechanism of APO-QUININE action has not been determined but it is believed to concentrate in the parasite, disrupt the transport of key biological substances and activities, thereby killing the parasite.

When it should not be used:

APO-QUININE should not be used if you:

- have a known hypersensitivity (allergic reaction) to quinine, quinidine, mefloquine or the non-medicinal ingredients in the formulation (e.g. list of non-medicinal ingredients).

Hypersensitivity reactions may include:

- thrombocytopenia (decreased blood platelets) and related conditions
- hemolytic uremic syndrome (disease with acute kidney failure, low blood platelet count and hemolytic anemia (early destruction of red blood cells))
- blackwater fever (complication of malaria when the red blood cells burst in the bloodstream with symptoms such as chills, fever, jaundice, vomiting, dark red or black urine)
- have heart rhythm problems (e.g. QT interval prolongation)
- have myasthenia gravis (autoimmune disease with muscle weakness)

- have low levels of glucose-6-phosphate dehydrogenase (G-6-PD), a certain enzyme
- have optic neuritis (inflammation of the eye)
- have hypoglycemia (low blood sugar)

What the medicinal ingredient is:

Quinine sulfate

What the non-medicinal ingredients are:

The non-medicinal ingredients are: carboxymethylcellulose sodium, colloidal silicon dioxide, gelatin, magnesium stearate, talc and titanium dioxide.

What dosage forms it comes in:

200 mg and 300 mg Capsules

WARNINGS AND PRECAUTIONS

Talk to your doctor about all the drugs you are taking before taking APO-QUININE (see Interactions with this medicine).

BEFORE you use APO-QUININE talk to your doctor or pharmacist if:

- You have heart rhythm problems such as irregular or fast heartbeat, QT prolongation.
- You have kidney, liver problems or other medical conditions.
- Are pregnant or planning to become pregnant. Treatment of malaria is important as this can be a serious disease for a pregnant women and her unborn baby. Discuss with your doctor.
- You are breastfeeding. Small amounts of APO-QUININE can pass into breast milk. Discuss with your doctor.
- Tell your doctor all the medications that you take, including prescription and nonprescription drugs, natural health products, vitamins and herbs (see Interactions with this medication).

Talk to your doctor if the following occurs while taking APO-QUININE:

- You develop low blood sugar with symptoms such as weakness, dizziness, fatigue, etc.
- You develop a hypersensitivity (allergic) reaction with symptoms such as difficulty breathing, swelling of mouth, throat and extremities, serious skin rash, blistering or peeling skin, itching and other skin reactions. Discontinue APO-QUININE and see a health care practitioner immediately.
- You develop thrombocytopenia (decrease in blood platelets), or other blood (hematologic) conditions with symptoms such as bleeding in the nose, gums, urine or stool, easy bruising,

unusual purple, brown or red spots on the skin. Discontinue APO-QUININE and contact your health care practitioner immediately.

- You develop heart rhythm irregularities with symptoms such as rapid or irregular rhythm, chest pain, weakness, sweating. Discontinue APO-QUININE and contact your health care practitioner immediately.
- You develop vision problems including sudden blindness, sensitivity to light, appearance of “floaters” in the eye, eye inflammation (optic neuritis), night blindness. Contact your health care practitioner immediately.
- If your fever comes back after finishing treatment, contact your health care practitioner immediately.

INTERACTIONS WITH THIS MEDICATION

Drugs that may interact with APO-QUININE include:

- antacids containing aluminum or magnesium
- anticoagulants (e.g. warfarin)
- antiepileptics (e.g. carbamazepine, phenobarbital, phenytoin)
- digoxin
- inhibitors of CYP 3A4 enzyme such as cyclosporine, antifungal agents (e.g. ketoconazole, itraconazole), macrolide antibiotics (e.g. erythromycin, clarithromycin), HIV protease inhibitors (e.g. ritonavir) and antidepressants (e.g. nefazodone)
- mefloquine (antimalarial)
- neuromuscular blocking agents (e.g. pancuronium, tubocurarine, succinyl chloride)
- quinidine, astemizole*, cisapride*, terfenadine*, halofantrine
- urinary alkalinizers (e.g. sodium bicarbonate, acetazolamide)
- HMG-CoA reductase inhibitors (“statins”) to reduce serum cholesterol (e.g. atorvastatin, simvastatin, lovastatin...)

* no longer marketed in Canada

PROPER USE OF THIS MEDICATION

Usual dose:

As directed by a doctor:

For uncomplicated *P. falciparum* malaria: APO-QUININE will likely be taken with an appropriate antibiotic chosen by the doctor (e.g. tetracycline, doxycycline or clindamycin)

- a) Adults (16 years of age and older): Quinine sulfate 600 mg, every 8 hours after meals for 3 to 7 days.
- b) Children (less than 16 years): Quinine sulfate 9 mg/kg to a maximum of 600 mg, every 8 hours after meals for 3 to 7 days. The pharmacist will prepare the children’s dosage from the capsules.

Finish all APO-QUININE that is prescribed even though you feel better. Do not stop taking the medication without talking to your doctor.

Your doctor may adjust the dosage if you have kidney problems.

If using antacids, take them 2 hours before or 2 hours after APO-QUININE.

Your doctor/pharmacist will provide instructions on how to use the antibiotic(s).

Overdose:

In case of drug overdose, contact a health care practitioner, hospital emergency department or regional Poison Control Centre immediately, even if there are no symptoms.

Symptoms of overdose may include headache, confusion, blurred vision, irregular or fast heartbeat, vomiting, abdominal pain, breathing difficulties, low blood pressure, coma, and convulsions.

Missed Dose:

If a dose of this medication has been missed, it should be taken as soon as possible. However, if more than 4 hours have passed since the missed dose, skip the missed dose and go back to the regular dosing schedule. Do not double doses.

SIDE EFFECTS AND WHAT TO DO ABOUT THEM

Common side effects include ringing in the ears, headache, impaired hearing, nausea, blurred vision, sweating, flushing and dizziness.

Other side effects include vomiting, stomach pain, flushed skin, fever, sweating, diarrhea, deafness, blindness, disturbances in colour perception, heart rhythm irregularities and low blood pressure.

Quinine can affect the retina and optic nerve to cause symptoms such as photophobia (aversion to light), night blindness, altered colour perception and may not be reversible. Contact your doctor if these symptoms appear.

Low blood sugar (hypoglycemia) has also been reported with quinine use with symptoms such as weakness, dizziness, sweating.

Tell your health care practitioner if you have any side effect that bothers you or does not go away.

SERIOUS SIDE EFFECTS, HOW OFTEN THEY HAPPEN AND WHAT TO DO ABOUT THEM

Symptom / effect	Talk with your doctor or pharmacist		Stop taking drug and seek immediate emergency medical attention
	Only if severe	In all cases	
Blood disorders with symptoms such as bleeding in nose, gums, stool, easy bruising, red/purple or brown spots on the skin, fatigue, weakness			✓
Heart rhythm irregularities with symptoms such as fast or irregular heartbeat, chest pain, weakness, sweating, etc.			✓
Hypersensitivity (allergic reaction) with symptoms such as difficult breathing, swelling of mouth, throat, rash, serious skin reactions including blistering and peeling skin, etc.			✓
Vision abnormalities such as sensitivity to light, night blindness, sudden blindness, appearance of “floaters”, eye inflammation, altered colour perception			✓

This is not a complete list of side effects. For any unexpected effects while taking APO-QUININE, contact your doctor or pharmacist.

Reporting Side Effects

You can report any suspected side effects associated with the use of health products to Health Canada by:

- Visiting the Web page on Adverse Reaction Reporting (<https://www.canada.ca/en/health-canada/services/drugs-health-products/medeffect-canada/adverse-reaction-reporting.html>) for information on how to report online, by mail or by fax; or
- Calling toll-free at 1-866-234-2345.

NOTE: Contact your health professional if you need information about how to manage your side effects. The Canada Vigilance Program does not provide medical advice.

HOW TO STORE IT

Store at room temperature 15°C to 30°C.

Keep out of reach and sight of children.

If you want more information about APO-QUININE:

- Talk to your healthcare professional
- Find the full product monograph that is prepared for healthcare professionals and includes this consumer information by visiting the Health Canada website (<https://www.canada.ca/en/health-canada.html>); the manufacturer's website (<http://www.apotex.ca/products>), or by calling 1-800-667-4708.

This leaflet was prepared by Apotex Inc., Toronto, Ontario, M9L 1T9.

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