

Metoprolol Tartrate

Injection, USP

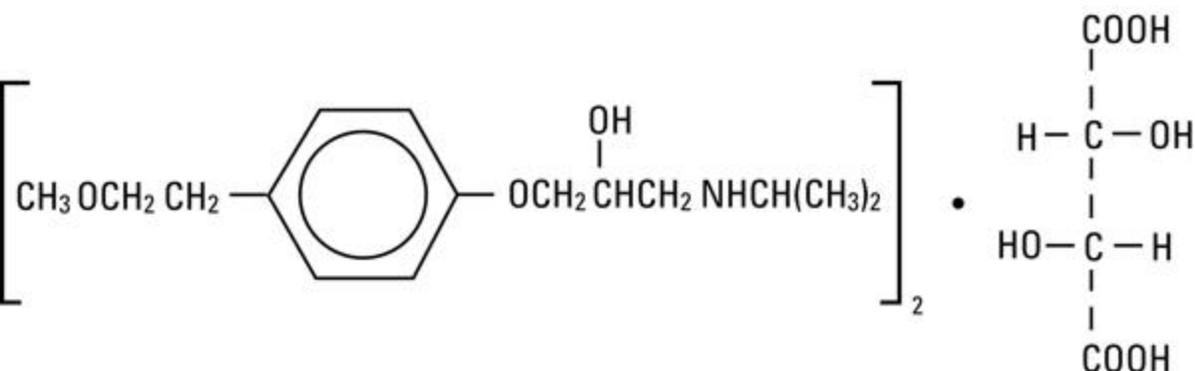


Rx only

Prescribing Information

DESCRIPTION

Metoprolol tartrate injection, USP is a sterile solution containing metoprolol tartrate, a selective beta₁-adrenoreceptor blocking agent, available in 5 mL ampuls and 5 mL Carpuject™ sterile cartridge units, for intravenous administration. Each ampul and Carpuject™ sterile cartridge unit, contains a sterile solution of metoprolol tartrate USP, 5 mg and sodium chloride USP, 45 mg. Metoprolol tartrate is (±)-1-(isopropylamino)-3-[p-(2-methoxyethyl) phenoxy]-2-propanol (2:1) *dextro*-tartrate salt, and its structural formula is:



Metoprolol tartrate USP is a white, practically odorless, crystalline powder with a molecular weight of 684.83. Its molecular formula is $(C_{15}H_{25}NO_3)_2 \cdot C_4H_6O_6$. It is very soluble in water; freely soluble in methylene chloride, in chloroform, and in alcohol; slightly soluble in acetone; and insoluble in ether.

CLINICAL PHARMACOLOGY

Mechanism of Action

Metoprolol tartrate is a beta₁-selective (cardioselective) adrenergic receptor blocker. This preferential effect is not absolute, however, and at higher plasma concentrations, metoprolol tartrate also inhibits beta₂-adrenoreceptors, chiefly located in the bronchial and vascular musculature.

Clinical pharmacology studies have demonstrated the beta-blocking activity of metoprolol, as shown by (1) reduction in heart rate and cardiac output at rest and upon exercise, (2) reduction of systolic blood pressure upon exercise, (3) inhibition of isoproterenol-induced tachycardia, and (4) reduction of reflex orthostatic tachycardia.

Hypertension

The mechanism of the antihypertensive effects of beta-blocking agents has not been fully elucidated. However, several possible mechanisms have been proposed: (1) competitive antagonism of catecholamines at peripheral (especially cardiac) adrenergic neuron sites, leading to decreased cardiac output; (2) a central effect leading to reduced sympathetic outflow to the periphery; and (3) suppression of renin activity.

Angina Pectoris

By blocking catecholamine-induced increases in heart rate, in velocity and extent of myocardial contraction, and in blood pressure, metoprolol tartrate reduces the oxygen requirements of the heart at any given level of effort, thus making it useful in the long-term management of angina pectoris.

Myocardial Infarction

The precise mechanism of action of metoprolol tartrate in patients with suspected or definite myocardial infarction is not known.

Pharmacodynamics

Relative beta₁ selectivity is demonstrated by the following: (1) In healthy subjects, metoprolol tartrate is unable to reverse the beta₂-mediated vasodilating effects of epinephrine. This contrasts with the effect of nonselective (beta₁ plus beta₂) beta-blockers, which completely reverse the vasodilating effects of epinephrine. (2) In asthmatic patients, metoprolol tartrate reduces FEV₁ and FVC significantly less than a nonselective beta blocker, propranolol, at equivalent beta₁-receptor blocking doses.

Metoprolol tartrate has no intrinsic sympathomimetic activity, and membrane-stabilizing activity is detectable only at doses much greater than required for beta blockade. Animal and human experiments indicate that metoprolol tartrate slows the sinus rate and decreases AV nodal conduction.

When the drug was infused over a 10-minute period, in normal volunteers, maximum beta blockade was achieved at approximately 20 minutes. Equivalent maximal beta blocking effect is achieved with oral and intravenous doses in the ratio of approximately 2.5:1. There is a linear relationship between the log of plasma levels and reduction of exercise heart rate.

In several studies of patients with acute myocardial infarction, intravenous followed by oral administration of metoprolol tartrate caused a reduction in heart rate, systolic blood pressure and cardiac output. Stroke volume, diastolic blood pressure and pulmonary artery end diastolic pressure remained unchanged.

Pharmacokinetics

Absorption

The estimated oral bioavailability of immediate release metoprolol is about 50% because of pre-systemic metabolism which is saturable leading to non-proportionate increase in the exposure with increased dose.

Distribution

Metoprolol is extensively distributed with a reported volume of distribution of 3.2 to 5.6 L/kg. About 10% of metoprolol in plasma is bound to serum albumin. Metoprolol is known to cross the placenta and is found in breast milk. Metoprolol is also known to cross the blood brain barrier following oral administration and CSF concentrations close to that observed in plasma have been reported. Metoprolol is not a significant P-glycoprotein substrate.

Metabolism

Metoprolol tartrate is primarily metabolized by CYP2D6. Metoprolol is a racemic mixture of R- and S-enantiomers, and when administered orally, it exhibits stereo selective metabolism that is dependent on oxidation phenotype. CYP2D6 is absent (poor metabolizers) in about 8% of Caucasians and about 2% of most other populations. Poor CYP2D6 metabolizers exhibit several-fold higher plasma concentrations of metoprolol tartrate than extensive metabolizers with normal CYP2D6 activity thereby decreasing metoprolol tartrate's cardioselectivity.

Elimination

Elimination of metoprolol tartrate is mainly by biotransformation in the liver. The mean elimination half-life of metoprolol is 3 to 4 hours; in poor CYP2D6 metabolizers the half-life may be 7 to 9 hours. Approximately 95% of the dose can be recovered in urine. In most subjects (extensive metabolizers), less than 10% of an intravenous dose are excreted as unchanged drug in the urine. In poor metabolizers, up to 30% or 40% of oral or intravenous doses, respectively, may be excreted unchanged; the rest is excreted by the kidneys as metabolites that appear to have no beta blocking activity. The renal clearance of the stereoisomers does not exhibit stereo-selectivity in renal excretion.

Special populations

Geriatric Patients

The geriatric population may show slightly higher plasma concentrations of metoprolol as a combined result of a decreased metabolism of the drug in elderly population and a decreased hepatic blood flow. However, this increase is not clinically significant or therapeutically relevant.

Renal impairment

The systemic availability and half-life of metoprolol tartrate in patients with renal failure do not differ to a clinically significant degree from those in normal subjects. Consequently, no reduction in dosage is usually needed in patients with chronic renal failure.

Hepatic Impairment

Since the drug is primarily eliminated by hepatic metabolism, hepatic impairment may impact the pharmacokinetics of metoprolol. The elimination half-life of metoprolol is considerably prolonged, depending on severity (up to 7.2 h).

Clinical Studies

Hypertension

In controlled clinical studies, metoprolol tartrate has been shown to be an effective antihypertensive agent when used alone or as concomitant therapy with thiazide-type diuretics, at oral dosages of 100-450 mg daily. In controlled, comparative, clinical studies, metoprolol tartrate has been shown to be as effective an antihypertensive agent as propranolol, methyldopa, and thiazide-type diuretics, to be equally effective in supine and standing positions.

Angina Pectoris

In controlled clinical trials, metoprolol tartrate, administered orally two or four times daily, has been shown to be an effective antianginal agent, reducing the number of angina attacks and increasing exercise tolerance. The oral dosage used in these studies ranged from 100-400 mg daily. A controlled, comparative, clinical trial showed that metoprolol tartrate was indistinguishable from propranolol in the treatment of angina pectoris.

Myocardial Infarction

In a large (1,395 patients randomized), double-blind, placebo-controlled clinical study, metoprolol tartrate was shown to reduce 3-month mortality by 36% in patients with suspected or definite myocardial infarction.

Patients were randomized and treated as soon as possible after their arrival in the hospital, once their clinical condition had stabilized and their hemodynamic status had been carefully evaluated. Subjects were ineligible if they had hypotension, bradycardia, peripheral signs of shock, and/or more than minimal basal rales as signs of congestive heart failure. Initial treatment consisted of intravenous followed by oral administration of metoprolol tartrate or placebo, given in a coronary care or comparable unit. Oral maintenance therapy with metoprolol tartrate or placebo was then continued for 3 months. After this double-blind period, all patients were given metoprolol tartrate and followed up to 1 year.

The median delay from the onset of symptoms to the initiation of therapy was 8 hours in both the metoprolol tartrate- and placebo-treatment groups. Among patients treated with metoprolol tartrate, there were comparable reductions in 3-month mortality for those treated early (≤ 8 hours) and those in whom treatment was started later. Significant reductions in the incidence of ventricular fibrillation and in chest pain following initial intravenous therapy were also observed with metoprolol tartrate and were independent of the interval between onset of symptoms and initiation of therapy.

In this study, patients treated with metoprolol received the drug both very early (intravenously) and during a subsequent 3-month period, while placebo patients received no beta-blocker treatment for this period. The study thus was able to show a benefit from the overall metoprolol regimen but cannot separate the benefit of very early intravenous treatment from the benefit of later beta-blocker therapy. Nonetheless, because the overall regimen showed a clear beneficial effect on survival without evidence of an early adverse effect on survival, one acceptable dosage regimen is the precise regimen used in the trial. Because the specific benefit of very early treatment remains to be defined however, it is also reasonable to administer the drug orally to patients at a later time as is recommended for certain other beta blockers.

INDICATIONS AND USAGE

Myocardial Infarction

Metoprolol tartrate injection is indicated in the treatment of hemodynamically stable patients with definite or suspected acute myocardial infarction to reduce cardiovascular mortality when used in conjunction with oral metoprolol tartrate maintenance therapy. Treatment with intravenous metoprolol tartrate can be initiated as soon as the patient's clinical condition allows (see **DOSAGE AND ADMINISTRATION**, **CONTRAINDICATIONS**, and **WARNINGS**).

CONTRAINDICATIONS

Hypersensitivity to metoprolol tartrate and related derivatives, or to any of the excipients; hypersensitivity to other beta-blockers (cross sensitivity between beta-blockers can occur).

Myocardial Infarction

Metoprolol tartrate is contraindicated in patients with a heart rate <45 beats/min; second- and third-degree heart block; significant first-degree heart block (P-R interval ≥ 0.24 sec); systolic blood pressure <100 mmHg; or moderate-to-severe cardiac failure (see **WARNINGS**).

WARNINGS

Heart Failure

Beta blockers, like metoprolol tartrate, can cause depression of myocardial contractility and may precipitate heart failure and cardiogenic shock. If signs or symptoms of heart failure develop, treat the patient according to recommended guidelines. It may be necessary to lower the dose of metoprolol tartrate or to discontinue it.

Ischemic Heart Disease

Do not abruptly discontinue metoprolol tartrate therapy in patients with coronary artery disease. Severe exacerbation of angina, myocardial infarction and ventricular arrhythmias have been reported in patients with coronary artery disease following the abrupt discontinuation of therapy with beta-blockers. When discontinuing chronically administered metoprolol tartrate, particularly in patients with coronary artery disease, the dosage should be gradually reduced over a period of 1 to 2 weeks and the patient should be carefully monitored. If angina markedly worsens or acute coronary insufficiency develops, metoprolol tartrate administration should be reinstated promptly, at least temporarily, and other measures appropriate for the management of unstable angina should be taken. Patients should be warned against interruption or discontinuation of therapy without the physician's advice. Because coronary artery disease is common and may be unrecognized, it may be prudent not to discontinue metoprolol tartrate therapy abruptly even in patients treated only for hypertension.

Use During Major Surgery

Chronically administered beta-blocking therapy should not be routinely withdrawn prior to major surgery; however, the impaired ability of the heart to respond to reflex adrenergic stimuli may augment the risks of general anesthesia and surgical procedures.

Bradycardia

Bradycardia, including sinus pause, heart block, and cardiac arrest have occurred with the use of metoprolol tartrate. Patients with first-degree atrioventricular block, sinus node dysfunction, or conduction disorders may be at increased risk. Monitor heart rate and rhythm in patients receiving metoprolol tartrate. If severe bradycardia develops, reduce or stop metoprolol tartrate.

Exacerbation of Bronchospastic Disease

Patients with bronchospastic disease, should, in general, not receive beta blockers, including metoprolol tartrate. Because of its relative beta₁ selectivity, however, metoprolol tartrate may be used in patients with bronchospastic disease who do not respond to, or cannot tolerate, other antihypertensive treatment. Because beta₁ selectivity is not absolute use the lowest possible dose of metoprolol tartrate and consider administering metoprolol tartrate in smaller doses three times daily, instead of larger doses two times daily, to avoid the higher plasma levels associated with the longer dosing interval (see **DOSAGE AND ADMINISTRATION**). Bronchodilators, including beta₂ agonists, should be readily available or administered concomitantly.

Diabetes and Hypoglycemia

Beta blockers may mask tachycardia occurring with hypoglycemia, but other manifestations such as dizziness and sweating may not be significantly affected.

Pheochromocytoma

If metoprolol tartrate is used in the setting of pheochromocytoma, it should be given in combination with an alpha blocker, and only after the alpha blocker has been initiated. Administration of beta-blockers alone in the setting of pheochromocytoma has been associated with a paradoxical increase in blood pressure due to the attenuation of beta-mediated vasodilatation in skeletal muscle.

Thyrotoxicosis

Metoprolol tartrate may mask certain clinical signs (e.g., tachycardia) of hyperthyroidism. Avoid abrupt withdrawal of beta blockade, which might precipitate a thyroid storm.

PRECAUTIONS

Risk of Anaphylactic Reactions

While taking beta blockers, patients with a history of severe anaphylactic reaction to a variety of allergens may be more reactive to repeated challenge, either accidental, diagnostic, or therapeutic. Such patients may be unresponsive to the usual doses of epinephrine used to treat allergic reaction.

Information for Patients

Advise patients (1) to avoid operating automobiles and machinery or engaging in other tasks requiring alertness until the patient's response to therapy with metoprolol tartrate has been determined; (2) to contact the physician if any difficulty in breathing occurs; (3) to inform the physician or dentist before any type of surgery that he or she is taking metoprolol tartrate.

Drug Interactions

Catecholamine-depleting drugs: Catecholamine-depleting drugs (e.g., reserpine) may have an additive effect when given with beta-blocking agents or monoamine oxidase (MAO) inhibitors. Observe patients treated with metoprolol tartrate plus a catecholamine depletor for evidence of hypotension or marked bradycardia, which may produce vertigo, syncope, or postural hypotension. In addition, possibly significant hypertension may theoretically occur up to 14 days following discontinuation of the concomitant administration with an irreversible MAO inhibitor.

Digitalis glycosides and beta blockers: Both digitalis glycosides and beta-blockers slow atrioventricular conduction and decrease heart rate. Concomitant use can increase the risk of bradycardia. Monitor heart rate and PR interval.

Calcium channel blockers: Concomitant administration of a beta-adrenergic antagonist with a calcium channel blocker may produce an additive reduction in myocardial contractility because of negative chronotropic and inotropic effects.

General Anesthetics:

Some inhalation anesthetics may enhance the cardiodepressant effect of beta-blockers (see **WARNINGS, Major Surgery**).

CYP2D6 Inhibitors:

Potent inhibitors of the CYP2D6 enzyme may increase the plasma concentration of metoprolol tartrate which would mimic the pharmacokinetics of CYP2D6 poor metabolizer (see **Pharmacokinetics** section). Increase in plasma concentrations of metoprolol would decrease the cardioselectivity of metoprolol. Known clinically significant potent inhibitors of CYP2D6 are antidepressants such as fluvoxamine, fluoxetine, paroxetine, sertraline, bupropion, clomipramine, and desipramine; antipsychotics such as chlorpromazine, fluphenazine, haloperidol, and thioridazine; antiarrhythmics such as quinidine or propafenone; antiretrovirals such as ritonavir; antihistamines such as diphenhydramine; antimalarials such as hydroxychloroquine or quinidine; antifungals such as terbinafine.

Hydralazine: Concomitant administration of hydralazine may inhibit presystemic metabolism of metoprolol leading to increased concentrations of metoprolol.

Alpha-adrenergic agents: Antihypertensive effect of alpha-adrenergic blockers such as guanethidine, betanidine, reserpine, alpha-methyldopa or clonidine may be potentiated by beta-blockers including methoprolol tartrate. Beta-adrenergic blockers may also potentiate the postural hypotensive effect of the first dose of prazosin, probably by preventing reflex tachycardia. On the contrary, beta adrenergic blockers may also potentiate the hypertensive response to withdrawal of clonidine in patients receiving concomitant clonidine and beta-adrenergic blocker. If a patient is treated with clonidine and metoprolol tartrate concurrently, and clonidine treatment is to be discontinued, stop metoprolol tartrate several days before clonidine is withdrawn. Rebound hypertension that can follow withdrawal of clonidine may be increased in patients receiving concurrent beta-blocker treatment.

Ergot alkaloid: Concomitant administration with beta-blockers may enhance the vasoconstrictive action of ergot alkaloids.

Dipyridamole: In general, administration of a beta-blocker should be withheld before dipyridamole testing, with careful monitoring of heart rate following the dipyridamole injection.

Carcinogenesis, Mutagenesis, Impairment of Fertility

Long-term studies in animals have been conducted to evaluate carcinogenic potential. In a 2-year study in rats at three oral dosage levels of up to 800 mg/kg per day, there was no increase in the development of spontaneously occurring benign or malignant neoplasms of any type. The only histologic changes that appeared to be drug related were an increased incidence of generally mild focal accumulation of foamy macrophages in pulmonary alveoli and a slight increase in biliary hyperplasia. In a 21-month study in Swiss albino mice at three oral dosage levels of up to 750 mg/kg per day, benign lung tumors (small

adenomas) occurred more frequently in female mice receiving the highest dose than in untreated control animals. There was no increase in malignant or total (benign plus malignant) lung tumors, or in the overall incidence of tumors or malignant tumors. This 21-month study was repeated in CD-1 mice, and no statistically or biologically significant differences were observed between treated and control mice of either sex for any type of tumor.

All mutagenicity tests performed (a dominant lethal study in mice, chromosome studies in somatic cells, a Salmonella/mammalian-microsome mutagenicity test, and a nucleus anomaly test in somatic interphase nuclei) were negative.

Reproduction toxicity studies in mice, rats and rabbits did not indicate teratogenic potential for metoprolol tartrate. Embryotoxicity and/or fetotoxicity in rats and rabbits were noted starting at doses of 50 mg/kg in rats and 25 mg/kg in rabbits, as demonstrated by increases in preimplantation loss, decreases in the number of viable fetuses per dose, and/or decreases in neonatal survival. High doses were associated with some maternal toxicity, and growth delay of the offspring in utero, which was reflected in minimally lower weights at birth. The oral NOAELs for embryo-fetal development in mice, rats, and rabbits were considered to be 25, 200, and 12.5 mg/kg. This corresponds to dose levels that are approximately 0.3, 4, and 0.5 times, respectively, when based on surface area, the maximum human oral dose (8 mg/kg/day) of metoprolol tartrate. Metoprolol tartrate has been associated with reversible adverse effects on spermatogenesis starting at oral dose levels of 3.5 mg/kg in rats (a dose that is only 0.1-times the human dose, when based on surface area), although other studies have shown no effect of metoprolol tartrate on reproductive performance in male rats.

Pregnancy Category C

Upon confirming the diagnosis of pregnancy, women should immediately inform the doctor.

Metoprolol tartrate has been shown to increase postimplantation loss and decrease neonatal survival in rats at doses up to 11 times the maximum daily human dose of 450 mg, when based on surface area. Distribution studies in mice confirm exposure of the fetus when metoprolol tartrate is administered to the pregnant animal. These limited animal studies do not indicate direct or indirect harmful effects with respect to teratogenicity (see **Carcinogenesis, Mutagenesis, Impairment of Fertility**).

There are no adequate and well-controlled studies in pregnant women. The amount of data on the use of metoprolol in pregnant women is limited. The risk to the fetus/mother is unknown. Because animal reproduction studies are not always predictive of human response, this drug should be used during pregnancy only if clearly needed.

Nursing Mothers

Metoprolol tartrate is excreted in breast milk in a very small quantity. An infant consuming 1 liter of breast milk daily would receive a dose of less than 1 mg of the drug.

Fertility

The effects of metoprolol tartrate on the fertility of humans have not been studied.

Metoprolol tartrate showed effects on spermatogenesis in male rats at a therapeutic dose level, but had no effect on rates of conception at higher doses in animal fertility studies (see **Carcinogenesis, Mutagenesis, Impairment of Fertility**).

Pediatric Use

Safety and effectiveness in pediatric patients have not been established.

Geriatric Use

In worldwide clinical trials of metoprolol tartrate in myocardial infarction, where approximately 478 patients were over 65 years of age (0 over 75 years of age), no age-related differences in safety and effectiveness were found. Other reported clinical experience in myocardial infarction has not identified differences in response between the elderly and younger patients. However, greater sensitivity of some elderly individuals taking metoprolol tartrate cannot be categorically ruled out. Therefore, in general, it is recommended that dosing proceed with caution in this population.

ADVERSE REACTIONS

Hypertension and Angina

These adverse reactions were reported for treatment with oral metoprolol tartrate. Most adverse effects have been mild and transient.

Central Nervous System

Tiredness and dizziness have occurred in about 10 of 100 patients. Depression has been reported in about 5 of 100 patients. Mental confusion and short-term memory loss have been reported. Headache, nightmares, and insomnia have also been reported.

Cardiovascular

Shortness of breath and bradycardia have occurred in approximately 3 of 100 patients. Cold extremities; arterial insufficiency, usually of the Raynaud type; palpitations; congestive heart failure; peripheral edema; and hypotension have been reported in about 1 of 100 patients. Gangrene in patients with pre-existing severe peripheral circulatory disorders has also been reported very rarely. (See **CONTRAINDICATIONS**, **WARNINGS**, and **PRECAUTIONS**.)

Respiratory

Wheezing (bronchospasm) and dyspnea have been reported in about 1 of 100 patients (see **WARNINGS**). Rhinitis has also been reported.

Gastrointestinal

Diarrhea has occurred in about 5 of 100 patients. Nausea, dry mouth, gastric pain, constipation, flatulence, and heartburn have been reported in about 1 of 100 patients. Vomiting was a common occurrence. Post-marketing experience reveals very rare reports of hepatitis, jaundice and non-specific hepatic dysfunction. Isolated cases of transaminase, alkaline phosphatase, and lactic dehydrogenase elevations have also been reported.

Hypersensitive Reactions

Pruritus or rash have occurred in about 5 of 100 patients. Very rarely, photosensitivity and worsening of psoriasis has been reported.

Miscellaneous

Peyronie's disease has been reported in fewer than 1 of 100,000 patients. Musculoskeletal pain, blurred vision, and tinnitus have also been reported.

There have been rare reports of reversible alopecia, agranulocytosis, and dry eyes. Discontinuation of the drug should be considered if any such reaction is not otherwise explicable. There have been very rare reports of weight gain, arthritis, and retroperitoneal fibrosis (relationship to metoprolol tartrate has not been definitely established).

The oculomucocutaneous syndrome associated with the beta-blocker practolol has not been reported with metoprolol tartrate.

Myocardial Infarction

These adverse reactions were reported from treatment regimens where intravenous metoprolol was administered, when tolerated.

Central Nervous System

Tiredness has been reported in about 1 of 100 patients. Vertigo, sleep disturbances, hallucinations, headache, dizziness, visual disturbances, confusion, and reduced libido have also been reported, but a drug relationship is not clear.

Cardiovascular

In the randomized comparison of metoprolol tartrate and placebo described in the **CLINICAL PHARMACOLOGY** section, the following adverse reactions were reported:

	Metoprolol Tartrate	Placebo
Hypotension (systolic BP <90 mmHg)	27.4%	23.2%
Bradycardia (heart rate <40 beats/min)	15.9%	6.7%
Second- or third-degree heart block	4.7%	4.7%
First-degree heart block (P-R \geq 0.26 sec)	5.3%	1.9%

Respiratory

Dyspnea of pulmonary origin has been reported in fewer than 1 of 100 patients.

Gastrointestinal

Nausea and abdominal pain have been reported in fewer than 1 of 100 patients.

Dermatologic

Rash and worsened psoriasis have been reported, but a drug relationship is not clear.

Miscellaneous

Unstable diabetes and claudication have been reported, but a drug relationship is not clear.

Potential Adverse Reactions

A variety of adverse reactions not listed above have been reported with other beta-adrenergic blocking agents and should be considered potential adverse reactions to metoprolol tartrate.

Central Nervous System

Reversible mental depression progressing to catatonia; an acute reversible syndrome characterized by disorientation for time and place, short-term memory loss, emotional lability, slightly clouded sensorium, and decreased performance on neuropsychometrics.

Cardiovascular

Intensification of AV block (see [CONTRAINDICATIONS](#)).

Hematologic

Agranulocytosis, nonthrombocytopenic purpura and thrombocytopenic purpura.

Hypersensitive Reactions

Fever combined with aching and sore throat, laryngospasm and respiratory distress.

Post-marketing Experience

The following adverse reactions have been reported during post approval use of metoprolol tartrate: confusional state, an increase in blood triglycerides and a decrease in High Density Lipoprotein (HDL). Because these reports are from a population of uncertain size and are subject to confounding factors, it is not possible to reliably estimate their frequency.

OVERDOSAGE**Acute Toxicity**

Several cases of overdosage have been reported, some leading to death.

Oral LD₅₀'s (mg/kg): mice, 1158 to 2460; rats, 3090 to 4670.

Signs and Symptoms

Potential signs and symptoms associated with overdosage with metoprolol tartrate are bradycardia, hypotension, bronchospasm, myocardial infarction, cardiac failure and death.

Management

There is no specific antidote.

In general, patients with acute or recent myocardial infarction may be more hemodynamically unstable than other patients and should be treated accordingly (see [WARNINGS, Myocardial Infarction](#)).

On the basis of the pharmacologic actions of metoprolol tartrate, the following general measures should be employed.

Elimination of the Drug: Gastric lavage should be performed.

Other clinical manifestations of overdose should be managed symptomatically based on modern methods of intensive care.

Hypotension

Administer a vasopressor e.g., levarterenol or dopamine.

Bronchospasm

Administer a beta₂-stimulating agent and/or a theophylline derivative.

Cardiac Failure

Administer digitalis glycoside and diuretic. In shock resulting from inadequate cardiac contractility, consider administration of dobutamine, isoproterenol or glucagon.

DOSAGE AND ADMINISTRATION

Myocardial Infarction

Early Treatment

During the early phase of definite or suspected acute myocardial infarction, initiate treatment with metoprolol tartrate as soon as possible after the patient's arrival in the hospital. Such treatment should be initiated in a coronary care or similar unit immediately after the patient's hemodynamic condition has stabilized.

Begin treatment in this early phase with the intravenous administration of three bolus injections of 5 mg of metoprolol tartrate each; give the injections at approximately 2-minute intervals. During the intravenous administration of metoprolol tartrate, monitor blood pressure, heart rate, and electrocardiogram.

In patients who tolerate the full intravenous dose (15 mg), initiate metoprolol tartrate tablets, 50 mg every 6 hours, 15 minutes after the last intravenous dose and continue for 48 hours. Thereafter, the maintenance dosage is 100 mg orally twice daily.

Start patients who appear not to tolerate the full intravenous dose on metoprolol tartrate tablets either 25 mg or 50 mg every 6 hours (depending on the degree of intolerance) 15 minutes after the last intravenous dose or as soon as their clinical condition allows. In patients with severe intolerance, discontinue metoprolol tartrate (see **WARNINGS**).

Special populations

Pediatric patients: No pediatric studies have been performed. The safety and efficacy of metoprolol tartrate in pediatric patients have not been established.

Renal impairment: No dose adjustment of metoprolol tartrate is required in patients with renal impairment.

Hepatic impairment: Metoprolol tartrate blood levels are likely to increase substantially in patients with hepatic impairment. Therefore, metoprolol tartrate should be initiated at low doses with cautious gradual dose titration according to clinical response.

Geriatric patients (>65 years): In general, use a low initial starting dose in elderly patients given their greater frequency of decreased hepatic, renal, or cardiac function, and of concomitant disease or other drug therapy.

Method of administration: Parenteral administration of metoprolol tartrate (ampoule) should be done in a setting with intensive monitoring.

NOTE: Parenteral drug products should be inspected visually for particulate matter and discoloration prior to administration, whenever solution and container permit.

HOW SUPPLIED

Metoprolol Tartrate Injection, USP is available as:

Unit of Sale	Concentration	Each
NDC 0409-1778-35 Carton of 3	5 mg/5 mL (1 mg per mL)	NDC 0409-1778-30 Carpject Luer Lock Glass Syringe (no needle)

Unit of Sale	Carton	Concentration	Each
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Unit of Sale	Carton	Concentration	Each
NDC 0409-2285-05 4 Cartons per bundle	NDC 0409-2285-25 3 Ampuls per carton	5 mg/5 mL (1 mg per mL)	NDC 0409-2285-15 Glass Ampul

Instructions for Use of the Syringe Systems

Instructions for using the Carpuject Syringe are available with the reusable Carpuject Holder, List 2049-02.

Store at 20 to 25°C (68 to 77°F). [See USP Controlled Room Temperature.] Do not freeze.

PROTECT FROM LIGHT. Retain in carton until time of use.

Discard unused portion.



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