

For the use of Cardiologist or a Hospital or a Laboratory Only  
**Nifedipine Extended Release Tablets USP 60mg**  
**Nicardia® XL 60**

**GENERIC NAME**  
Nifedipine Extended Release Tablets USP 60mg  
**COMPOSITION**  
Each extended release film coated tablet contains:  
Nifedipine IP.....60mg  
Excipients.....q.s.

**DOSE FORM/S**  
Extended release film coated tablets.

**INDICATIONS**

**1) Vasospastic Angina**  
Nifedipine is indicated for the management of vasospastic angina confirmed by any of the following criteria: 1) classical pattern of angina at rest accompanied by ST segment elevation 2) angina or coronary artery spasm provoked by ergonovine or 3) angiographically demonstrated coronary artery spasm.

Nifedipine extended-release may also be used where the clinical presentation suggests a possible vasospastic component but where vasospasm has not been confirmed, e.g. where pain has a variable threshold on exertion or in unstable angina where electrocardiographic findings are compatible with intermittent vasospasm, or when angina is refractory to nitrates and/or adequate doses of beta blockers.

**2) Chronic Stable Angina (Classical Effort-Associated Angina)**

Nifedipine is indicated for the management of chronic stable angina (effort-associated angina) without evidence of vasospasm in patients who remain symptomatic despite adequate doses of beta blockers and/or organic nitrates or who cannot tolerate those agents.

In chronic stable angina (effort-associated angina) Nifedipine has been effective in controlled trials of up to eight weeks duration in reducing angina pain and increasing exercise tolerance, but confirmation of sustained effectiveness and evaluation of long-term safety in these patients is incomplete.

**3) Hypertension**

Nifedipine is indicated for the treatment of hypertension, to lower blood pressure. Lowering blood pressure reduces the risk of fatal and nonfatal cardiovascular events, primarily strokes and myocardial infarctions. These benefits have been seen in controlled trials of antihypertensive drugs from a wide variety of pharmacologic classes including Nifedipine Extended Release Tablets.

Nifedipine Extended Release Tablet may be used alone or in combination with other antihypertensive agents.

**DOSE AND METHOD OF ADMINISTRATION**

Dosage must be adjusted according to each patient's needs. Therapy for either hypertension or angina should be initiated with 30 or 60 mg once daily. Nifedipine Extended Release Tablets should be swallowed whole and should not be bitten or divided. In general, titration should proceed over a 7-14 day period so that the physician can fully assess the response to each dose level and monitor blood pressure before proceeding to higher doses. Since steady-state plasma levels are achieved on the second day of dosing, titration may proceed more rapidly, if symptoms so warrant, provided the patient is assessed frequently. Titration to doses above 120 mg are not recommended.

Angina patients controlled on Nifedipine alone or in combination with other antianginal medications may be safely switched to Nifedipine Extended Release Tablets at the nearest equivalent total daily dose (e.g., 30 mg t.i.d. of Nifedipine may be changed to 90 mg once daily of Nifedipine Extended Release Tablets). Subsequent titration to higher or lower doses may be necessary and should be initiated as clinically warranted. Experience with doses greater than 90 mg in patients with angina is limited. Therefore, doses greater than 90 mg should be used with caution and only when clinically warranted.

Avoid co-administration of nifedipine with grapefruit juice.

No "rebound effect" has been observed upon discontinuation of Nifedipine Extended Release Tablets. However, if discontinuation of nifedipine is necessary, sound clinical practice suggests that the dosage should be decreased gradually with close physician supervision.

Care should be taken when dispensing Nifedipine Extended Release Tablets to assure that the extended release dosage form has been prescribed.

**USE IN SPECIAL POPULATIONS**

**Use in pregnancy & Lactation:**

Pregnancy Category C: Nifedipine has been shown to produce teratogenic findings in rats and rabbits, including digital anomalies similar to those reported for phenytoin.

Digital anomalies have been reported to occur with other members of the dihydropyridine class and are possibly a result of compromised uterine blood flow. Nifedipine administration was associated with a variety of embryotoxic, placental toxic, and fetotoxic effects, including stunted fetuses (rats, mice, rabbits), rib deformities (mice), cleft palate (mice), small placentas and underdeveloped chorionic villi (monkeys), embryos and fetal deaths (rats, mice, rabbits), and prolonged pregnancy/decreased neonatal survival (rats; not evaluated in other species). On a mg/kg basis, all of the doses associated with the teratogenic embryotoxic or fetotoxic effects in animals were higher (5 to 50 times) than the maximum recommended human dose of 120 mg/day. On a mg/m<sup>2</sup> basis, some doses were higher and some were lower than the maximum recommended human dose, but all are within an order of magnitude of it. The doses associated with placental toxic effects in monkeys were equivalent to or lower than the maximum recommended human dose on a mg/m<sup>2</sup> basis.

There are no adequate and well-controlled studies in pregnant women. Nifedipine Extended Release Tablets should be used during pregnancy only if the potential benefit justifies the potential risk.

Lactation: Nifedipine is transferred through breast milk. Nifedipine Extended Release Tablets should be used during breast-feeding only if the potential benefit justifies the potential risk.

**Paediatrics:**

Safety and effectiveness in pediatric patients have not been established.

**Geriatric:**

Age appears to have a significant effect on the pharmacokinetics of nifedipine. The clearance is decreased resulting in a higher AUC in the elderly. These changes are not due to changes in renal function.

**CONTRA-INDICATIONS**

Known hypersensitivity reaction to nifedipine.

**WARNINGS & PRECAUTIONS**

**Excessive Hypotension**

Although in most angina patients the hypotensive effect of nifedipine is modest and well tolerated, occasional patients have had excessive and poorly tolerated hypotension. These responses have usually occurred during initial titration or at the time of subsequent upward dosage adjustment, and may be more likely in patients on concomitant beta blockers.

Severe hypotension and/or increased fluid volume requirements have been reported in patients receiving nifedipine together with a beta-blocking agent who underwent coronary artery bypass surgery using high dose fentanyl anesthesia. The interaction with high dose fentanyl appears to be due to the combination of nifedipine and a beta blocker, but the possibility that it may occur with nifedipine alone, with low doses of fentanyl, in other surgical procedures, or with other narcotic analgesics cannot be ruled out. In nifedipine-treated patients where surgery using high dose fentanyl anesthesia is contemplated, the physician should be aware of these potential problems and, if the patient's condition permits, sufficient time (at least 36 hours) should be allowed for nifedipine to be washed out of the body prior to surgery.

The following information should be taken into account in those patients who are being treated for hypertension as well as angina:

**Increased Angina and/or Myocardial Infarction**

Rarely, patients, particularly those who have severe obstructive coronary artery disease, have developed well documented increased frequency, duration and/or severity of angina or acute myocardial infarction on starting nifedipine or at the time of dosage increase. The mechanism of this effect is not established.

**Beta Blocker Withdrawal**

It is important to taper beta blockers if possible, rather than stopping them abruptly before beginning nifedipine. Patients recently withdrawn from beta blockers may develop a withdrawal syndrome with increased angina, probably related to increased sensitivity to catecholamines.

Initiation of nifedipine treatment will not prevent this occurrence and on occasion has been reported to increase it.

**Congestive Heart Failure**

Rarely, patients, usually receiving a beta blocker, have developed heart failure after beginning nifedipine. Patients with tight aortic stenosis may be at greater risk for such an event, as the unloading effect of nifedipine would be expected to be of less benefit, owing to the fixed impedance to flow across the aortic valve in these patients.

**Gastrointestinal Obstruction Requiring Surgery**

There have been rare reports of obstructive symptoms in patients with known strictures in association with the ingestion of Nifedipine Extended Release Tablets. Bezoars can occur in very rare cases and may require surgical intervention.

Cases of serious gastrointestinal obstruction have been identified in patients with no known gastrointestinal disease, including the need for hospitalization and surgical intervention.

Risk factors for a gastrointestinal obstruction identified from post-marketing reports of Nifedipine Extended Release Tablets include alteration in gastrointestinal anatomy (e.g., severe gastrointestinal narrowing, colon cancer, small bowel obstruction, bowel resection, gastric bypass, vertical banded gastroplasty, colostomy, diverticulitis, and inflammatory bowel disease), motility disorders (e.g., constipation, gastroesophageal reflux disease, ileus, obesity, hypothyroidism, and diabetes) and concomitant medications (e.g., H2-histamine blockers, opiates, nonsteroidal anti-inflammatory drugs, laxatives, anticholinergic agents, levothyroxine, and neuromuscular blocking agents).

**Gastrointestinal Ulcers**

Cases of tablet adherence to the gastrointestinal wall with ulceration have been reported, some requiring hospitalization and intervention.

**General Precautions:**

**Hypotension:** Because nifedipine decreases peripheral vascular resistance, careful monitoring of blood pressure during the initial administration and titration of nifedipine is suggested. Close observation is especially recommended for patients already taking medications that are known to lower blood pressure.

**Peripheral Edema:** Mild to moderate peripheral edema occurs in a dose dependent manner with an incidence ranging from approximately 10% to about 30% at the highest dose studied (180 mg). It is a local phenomenon thought to be associated with vasodilation of dependent arterioles and small blood vessels and not due to left ventricular dysfunction or generalized fluid retention. With patients whose angina or hypertension is complicated by congestive heart failure, care should be taken to differentiate this peripheral edema from the effects of increasing left ventricular dysfunction.

**Information for Patients:** Nifedipine Extended Release Tablets should be swallowed whole. Do not chew, divide or crush tablets. Do not be concerned if you occasionally notice in your stool something that looks like a tablet. In Nifedipine Extended Release Tablets, the medication is contained within a non-absorbable shell that has been specially designed to slowly release the drug for your body to absorb. When this process is completed, the empty tablet is eliminated from your body.

**Laboratory Tests:** Rare, usually transient, but occasionally significant elevations of enzymes such as alkaline phosphatase, CPK, LDH, SGOT and SGPT have been noted. The relationship of nifedipine therapy is uncertain in most cases, but probable in some. These laboratory abnormalities have rarely been associated with clinical symptoms; however, cholestasis with or without jaundice has been reported. A small (5.4%) increase in mean alkaline phosphatase was noted in patients treated with Nifedipine Extended Release Tablets. This was an isolated finding not associated with clinical symptoms and it rarely resulted in values which fell outside the normal range. Rare instances of allergic hepatitis have been reported. In controlled studies, Nifedipine Extended Release Tablets did not adversely affect serum uric acid, glucose, or cholesterol. Serum potassium was unchanged in patients receiving Nifedipine Extended Release Tablets in the absence of concomitant diuretic therapy, and slightly decreased in patients receiving concomitant diuretics.

Nifedipine, like other calcium channel blockers, decreases platelet aggregation in vitro. Limited clinical studies have demonstrated a moderate but statistically significant decrease in platelet aggregation and an increase in bleeding time in some nifedipine patients. This is thought to be a function of inhibition of calcium transport across the platelet membrane. No clinical significance for these findings has been demonstrated.

Positive direct Coombs test with/without hemolytic anemia has been reported, but a causal relationship between nifedipine administration and positivity of this laboratory test, including hemolysis, could not be determined.

Although nifedipine has been used safely in patients with renal dysfunction and has been reported to exert a beneficial effect, in certain cases, rare, reversible elevations in BUN and serum creatinine have been reported in patients with preexisting chronic renal insufficiency. The relationship to nifedipine therapy is uncertain in most cases but probable in some.

**DRUG INTERACTIONS**

**Beta-adrenergic blocking agents:**

Concomitant administration of nifedipine and beta-blocking agents is usually well tolerated, but there have been occasional reports suggesting that the combination may increase the likelihood of congestive heart failure, severe hypotension, or exacerbation of angina.

**Long-acting Nitrates:**

Nifedipine may be safely co-administered with nitrates, but there have been no controlled studies to evaluate the antianginal effectiveness of this combination.

**Digitoxin:**

Administration of nifedipine with digoxin increased digoxin levels in nine of twelve normal volunteers. The average increase was 45%. Another investigator found no increase in digoxin levels in thirteen patients with coronary artery disease. In an uncontrolled study of over two hundred patients with congestive heart failure during which digoxin blood levels were not measured, digitalis toxicity was not observed. Since there have been isolated reports of patients with elevated digoxin levels, it is recommended that digoxin levels be monitored when initiating, adjusting, and discontinuing nifedipine to avoid possible over- or under-digitalization.

**Coumarin Anticoagulants:**

There have been rare reports of increased prothrombin time in patients taking coumarin anticoagulants to whom nifedipine was administered. However, the relationship to nifedipine therapy is uncertain.

**Cimetidine:**

A study in six healthy volunteers has shown a significant increase in peak nifedipine plasma levels (80%) and area-under-the-curve (74%), after a one week course of cimetidine at 1000 mg per day and nifedipine at 40 mg per day. Ranitidine produced smaller, non-significant increases. The effect may be mediated by the known inhibition of cimetidine on hepatic cytochrome P-450, the enzyme system probably responsible for the first-pass metabolism of nifedipine. If nifedipine therapy is initiated in a patient currently receiving cimetidine, cautious titration is advised.

**Nifedipine:**

Nifedipine is metabolized by CYP3A4. Co-administration of nifedipine with phenytoin, an inducer of CYP3A4, lowers the systemic exposure to nifedipine by approximately 70%. Avoid co-administration of nifedipine with phenytoin or any known CYP3A4 inducer or consider an alternative antihypertensive.

**CYP3A4 Inhibitors:**

CYP3A4 inhibitors such as fluconazole, itraconazole, clarithromycin, erythromycin, nefazodone, fluoxetine, saquinavir, indinavir, and nelfinavir may result in increased exposure to nifedipine when co-administered. Careful monitoring and dose adjustment may be necessary; consider initiating nifedipine at the lowest dose available if given concomitantly with these medications.

**Other Interactions:**

Grapefruit Juice: Co-administration of nifedipine with grapefruit juice resulted in approximately a doubling in nifedipine AUC and Cmax with no change in half-life. The increased plasma concentrations most likely result from inhibition of CYP 3A4 related first-pass metabolism. Avoid ingestion of grapefruit and grapefruit juice should be avoided while taking nifedipine.

**Carcinogenesis, Mutagenesis, Impairment of Fertility:**

Nifedipine was administered orally to rats for two years and was not shown to be carcinogenic. When given to rats prior to mating, nifedipine caused reduced fertility at a dose approximately 5 times the maximum recommended human dose. There is a literature report of reversible reduction in the ability of human sperm obtained from a limited number of infertile men taking recommended doses of nifedipine to bind to and fertilize an ovum in vitro. In vivo mutagenicity studies were negative.

**UNDESIRABLE EFFECTS**

The most common side effect reported with Nifedipine Extended Release Tablets was edema which was dose related and ranged in frequency from approximately 10% to about 30% at the highest dose studied (180 mg). Other common adverse experiences reported were headache, fatigue, dizziness, constipation, nausea.

The following adverse reactions occurred with an incidence of less than 3.0%.

**Body as a Whole/Systemic:** asthenia, flushing, pain

**Cardiovascular:** palpitations

**Central Nervous System:** insomnia, nervousness, paresthesia, somnolence

**Dermatologic:** pruritus, rash

**Gastrointestinal:** abdominal pain, diarrhea, dry mouth, dyspepsia, flatulence

**Musculoskeletal:** arthralgia, leg cramps

**Respiratory:** chest pain (nonspecific), dyspnea **Urogenital:** impotence, polyuria.

Other adverse reactions were reported sporadically with an incidence of 1.0% or less. These include:

**Body as a Whole/Systemic:** face edema, fever, hot flashes, malaise, periorbital edema, rigors **Cardiovascular:** arrhythmia, hypotension, increased angina, tachycardia, syncope

**Central Nervous System:** anxiety, ataxia, decreased libido, depression, hypertension, hypoesthesia, migraine, paroxysia, tremor, vertigo

**Dermatologic:** alopecia, increased sweating, urticaria, purpura

**Gastrointestinal:** eructation, gastritis, gastroesophageal reflux, gum hyperplasia, melena, vomiting, weight increase

**Musculoskeletal:** back pain, gout, myalgias

**Respiratory:** coughing, epistaxis, upper respiratory tract infection, respiratory disorder, sinusitis **Special Senses:** abnormal lacrimation, abnormal vision, taste perversion, tinnitus **Urogenital/Reproductive:** breast pain, dysuria, hematuria, nocturia

The following adverse experiences, reported in less than 1% of patients, occurred under conditions where a causal relationship is uncertain:

gastrointestinal irritation, gastrointestinal bleeding, gynecomastia.

There have been rare reports of exfoliative dermatitis caused by nifedipine. There have been rare reports of exfoliative or bullous skin adverse events (such as erythema multiforme, Stevens - Johnson syndrome, and toxic epidermal necrolysis) and photosensitivity reactions. Acute generalized exanthematic pustulosis also has been reported.

**OVERDOSE**

Experience with nifedipine overdosage is limited. Generally, overdosage with nifedipine leading to pronounced hypotension calls for active cardiovascular support, including monitoring of cardiovascular and respiratory function, elevation of extremities, judicious use of calcium infusion, pressor agents, and fluids. Clearance of nifedipine would be expected to be prolonged in patients with impaired liver function.