The Case of the Man with Blood on the Brain

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A 20-year-old man presents to the emergency department one afternoon with a severe headache that he describes as the “worst of [his] life.” The headache began yesterday while he was doing his laundry. The onset was sudden, the pain severe and associated with nausea and vomiting. He had some mild neck tenderness but no photophobia or diplopia, no weakness, and no numbness. He went to bed because the headache was so bad, however, it became worse this morning prompting him to come to the emergency department. Past medical history is significant for meningitis at age 6. He is on no medications and reports no allergies. Exam shows a sleepy but easily roused young man. Pupils are equal and reactive to light. There is full extraocular motion, normal visual fields, normal CN V-XII, a supple neck and mild left pronator drift. Grip strength is 5/5 bilaterally in upper and lower extremities. Sensation is grossly normal to light touch. Reflexes are equal bilaterally. Cerebellar exam is normal. The lumbar puncture is positive for blood; CT shows an intracranial hemorrhage (Figure 1).

Figure 1. CT scan showing right temporal lobe intracranial hemorrhage with minimal shift and some edema.
Q1: What is the differential diagnosis of intracranial bleeding?

Q2: What is the likely diagnosis in this case?

Q3: What further investigations would you like to order?

Q4: What are the treatment options?

Figure 2. Angiogram of the right internal carotid artery and branches showing a nidus of vessels within the right temporal lobe which appear to be supplied by at least two branches of the right middle cerebral artery.
A1: Causes of intracranial hemorrhage include trauma, ruptured aneurysm, arteriovenous malformation (AVM), neoplasm, and hypertensive hemorrhage. The CT scan shown in Figure 1 demonstrates intraparenchymal hemorrhage in the pole of the right temporal lobe. There is likely also some subarachnoid hemorrhage (SAH). Ruptured aneurysm is the cause in 85% of cases of SAH excluding trauma.¹

A2: Trauma is the most common cause of intracranial bleeding, but presents with a different clinical picture. The “worst headache of my life” description is classic for ruptured aneurysm, but also non-specific—the cause proves relatively innocuous in 90% of patients presenting with this as the only symptom. Because of the patient’s young age and absence of a history of trauma or hypertension, an underlying neoplastic lesion is unlikely. Ruptured AVM is the most likely diagnosis.

Arteriovenous malformations (AVMs) are a type of congenital vascular malformation composed of tortuous tangles of arteries connected directly to veins without intervening capillaries (a direct shunt).²³ There are three distinct zones within an AVM: the feeding arteries, the nidus (“nest”)—the tangle itself, and the draining veins. The involved vessels are histologically abnormal, with thin walls due to poor development of elastic and muscle tissue within the media. There are often secondary changes such as thrombosis, calcification, and fibrosis. The larger arteries feeding the AVM usually have a thickened endothelium and hypertrophied media. When brain tissue is present within an AVM (rare), it is nonfunctional. They are most common within the distribution of the middle cerebral artery. Complications include: rupture followed by intracranial hemorrhage, headache, and various neurologic signs and symptoms from local ischemic damage or “vascular steal” from cerebral cortex in the area of the shunt.

Most AVMs present with intracranial hemorrhage. Hemorrhage may be intraparenchymal, subarachnoid, or often both. Patients may present with headache, nausea, vomiting, and possibly fever (classic signs of subarachnoid hemorrhage) but these symptoms are less severe than with subarachnoid hemorrhage. This may be due to the fact that pressure associated with the AVM is lower than that with a ruptured aneurysm or intracerebral hematoma. Obstructive hydrocephalus may also occur, depending on the location of the lesion.

Intracranial hemorrhage from vascular malformations accounts for 1% of all strokes and 10% of all SAHs. The prevalence of AVMs among the general population is uncertain, but autopsy studies of unselected patients indicate that 4 to 5% harbor some form of vascular malformation; only 10 to 15% of these produce symptoms.²⁴ Small AVMs actually pose a greater threat than larger ones. This is because large AVMs have more severe arterial hypotension and are therefore less likely to hemorrhage.

A3: CT scanning is indicated in all patients for whom intracranial bleeding is suspected, followed by lumbar puncture if CT is negative. CT identifies SAH in up to 95% of cases.¹³⁶ A negative CT does not rule out SAH, therefore lumbar puncture is required with a classic history. In the case of AVMs, more detailed information about the location and course of the involved vessels is required for assessing the lesion and planning treatment. This is most practically accomplished by carotid angiography (see Figure 2). CT and MR angiography are emerging as important tools in the detailed evaluation of AVMs.⁷⁻⁹

A4: This patient’s headache was treated with morphine and gravol. He is also given phenytoin to reduce the risk of seizure and dexamethasone to reduce the inflammatory response to the subarachnoid blood.

The major therapeutic options for an AVM are: (1) surgical resection, (2) intravascular embolization, and (3) gamma-knife radiosurgery.¹⁰¹¹ Intravascular embolization involves use of various materials (e.g. coils, glue, plastic spheres) to pack the malformation and obstruct bloodflow to and through it. This option is limited by a high rate of disabling or fatal complications and difficulty obtaining complete occlusion. Gamma-knife radiosurgery uses precisely targeted fine beams of ionizing radiation to destroy abnormal tissue while sparing adjacent normal areas. Resolution of an AVM typically occurs over months to two years following a single treatment. Since this patient’s aneurysm has already ruptured and bled, neither of these latter options is available leaving surgery as the definitive management.

The risk of surgical resection depends mainly on the size, location and drainage pattern history of an AVM. Size and vascular architecture determine the risks of embolization therapy and radiotherapy. This patient underwent frontotemporal craniotomy for resection of the temporal lobe AVM. A post-operative angiogram showed no residual nidus; he was discharged in stable condition ten days after admission.

REFERENCES


LUPORT is contraindicated during pregnancy (see CONTRAINDICATIONS).

Aflamukast is a chronic process and discontinuation of lipid-lowering drugs during pregnancy should have little impact on the outcome of long-term therapy of primary hypercholesterolemia. Cholesterol and other products of cholesterol biosynthesis are essential components for fetal development (including synthesis of steroids and cell membranes). Since HMG-CoA reductase inhibitors decrease cholesterol synthesis and possibly the synthesis of other biologically active substances derived from cholesterol, they may cause harm to the fetus when administered to pregnant women.

There are no data on the use of LUPORT during pregnancy. LUPORT should be administered to women of childbearing age only when they are highly likely to conceive and have been informed of the potential hazards. If the patient becomes pregnant while taking LUPORT, the drug should be discontinued and the patient apprised of the potential risk to the fetus.

Nursing Mothers

In rats and rabbits, concentrations of atorvastatin are similar to those in plasma. It is not known whether this drug is excreted in human milk. Because the potential for adverse reactions in nursing infants, women taking LUPORT should not breast feed (see CONTRAINDICATIONS).

Pediatric Use

Treatment experience in children (10 years and older) (N=221) with doses of LUPORT up to 80 mg/day (31 demonstrated that the safety and effectiveness of atorvastatin in this population was similar to that of patients <70 years of age. Pharmacokinetic evaluation of atorvastatin in subjects over the age of 65 indicates an increased AUC. As a precautionary measure, the lowest dose should be administered initially (see PHARMACOLOGICAL, Human Pharmacokinetics; SELECTED BIBLIOGRAPHY).

Renal Insufficiency

Pharmacokinetic and pharmacodynamic assessments and LDL lowering efficacy of LUPORT was shown to be similar in patients with moderate renal insufficiency compared with patients with normal renal function. However, since several cases of drug-induced liver injury have been reported in patients with a history of renal insufficiency of unknown severity, as a precautionary measure and based on further experience in renal disease, the lowest dose (10 mg/day) of LUPORT should be used in these patients. Similar precautions apply in severe renal insufficiency (creatinine clearance <30 mL/min or 0.5 mL/sec).

Reference is that this drug should be used with caution in patients who consume substantial quantities of alcohol and/or have a past history of liver disease. Active liver disease or unexplained transaminase elevations are contraindications to the use of LUPORT, if such a condition should develop during therapy, the drug should be discontinued.

Muscle Effects

Myopathy, defined as muscle ache or muscle weakness in conjunction with increases in creatine phosphokinase (CPK) values greater than 10 times the upper limit of normal, should be considered in any patient with diffuse muscle pain or weakness, and/or marked elevation of CPK. Patients should be advised to report promptly unexplained pain, muscle tenderness or weakness, and/or marked elevation of CPK. Patients should be advised to discontinue LUPORT if in any event CPK is markedly increased (10 times the upper limit of normal). The risk of myopathy and rhabdomyolysis during treatment with HMG-CoA reductase inhibitors is increased with concurrent administration of cyclosporin, fibrinolytic agents, erythromycin, clindamycin, niacin (nicotinic acid), and potent CYP3A4 inhibitors. If LUPORT is given concurrently with these drugs, with the exception of pharmacokinetic studies conducted in healthy subjects with erythromycin and clindamycin, the benefits and risks of such combined therapy should be carefully considered (see PRECAUTIONS). Pharmacokinetic Drug Interactions. Rhabdomyolysis has been reported in very rare cases with use of LUPORT (see PRECAUTIONS, Drug Interactions).

Administration with renal dysfunction secondary to myoglobinuria has also been reported with HMG-CoA reductase inhibitors. LUPORT therapy should be discontinued or withheld in any patient with an acute severe condition suggestive of a myopathy or having a risk factor predisposing to the development of renal failure secondary to rhabdomyolysis (such as acute severe infection, hypotension, major surgery, trauma, severe metabolic, endocrine and electrolyte disorders, and uncontrolled sepsis). PRECAUTIONS General

The effects of atorvastatin-induced changes in lipoprotein levels, including reduction of serum cholesterol on cardiovascular morbidity or mortality or total mortality have not been established. Before instituting therapy with LUPORT (atorvastatin calcium), an attempt should be made to control serum lipoprotein levels with appropriate diet, exercise, and weight reduction in overweight patients, and to treat other underlying medical problems (see INDICATIONS AND CLINICAL USE). Patients should be advised to inform subsequent physicians of the prior use of LUPORT or any other lipid-lowering agents.

Effect on the Lens

Current long-term data from clinical trials do not indicate an adverse effect of atorvastatin on the human lens.

Effect on Ubiquitine (Gol) Levels

Significant increase in circulating ubiquilin levels in patients treated with atorvastatin and other statins have been observed. The clinical significance of a potential long-term statin-induced decrease of ubiquilin has not been established. It has been reported that a decrease in myocardial ubiquilin levels could lead to impaired cardiac function in patients with borderline cardiac distress (see SELECTED BIBLIOGRAPHY).

Effect on Lipoprotein (a)

In some patients, the beneficial effect of lowered total cholesterol and LDL-C levels may be partly blunted by a concomitant increase in Lipoprotein (a) levels. Until further experience is obtained, it is suggested, where feasible, that patients with evidence of hyperlipidemia should be managed with a combination of diet and drug therapy.

LUPORT should be used with caution in patients who consume substantial quantities of alcohol and/or have a past history of liver disease. Active liver disease or unexplained transaminase elevations are contraindications to the use of LUPORT, if such a condition should develop during therapy, the drug should be discontinued.
Concomitant Therapy with Other Lipid Metabolism Regulators: Combined drug therapy should be approached with caution as information from controlled studies is limited.

Bile Acid Sequestrants:

Patients with mild to moderate hypercholesterolemia (LDL-C reduction was greater when LITPOR 10 mg or the combination 20 mg was coadministered with LITPOR as compared to when LITPOR was administered alone). In patients with more severe hypercholesterolemia, LDL-C reduction was similar (25% when LITPOR 40 mg was coadministered and 30% when LITPOR 40 mg plus colestipol 20 g were coadministered compared to 25% when LITPOR 40 mg alone was administered). These findings were also observed in hypercholesterolemic patients receiving a combination of antihypertensive medications (see PHARMACODYNAMIC, CLINICAL STUDIES).

Fibric Acid Derivatives (Gemfibrozil, Fenofibrate, Bezafibrate) and Nicotinic Acid (Nicotinic Acid): Although there is no experience with patients concurrently treated with LITPOR, combined fibric acid derivatives and nicotinic acid may inhibit the effects and risk of such a concomitant therapy should be carefully considered. The risk of myopathy during treatment with other drugs in this class is increased with concurrent administration (see WARNINGS, Muscle Effects).

Concoitant Antagonists: LITPOR has not been studied specifically in combination with any other antihypertensive agent to date. However, when LITPOR was coadministered with some antihypertensive agents, a greater than additive decrease in blood pressure was observed. Thus, caution should be exercised when starting or adjusting dosages of antihypertensive agents, especially patients who are salt sensitive. Additionally, since LITPOR is renally excreted, it is possible that the effects of these agents may be additive. Close clinical and laboratory monitoring should be provided when these agents are coadministered (see PHARMACODYNAMIC, INTERACTIONS, DOSAGE AND ADMINISTRATION).

Antianginal agents (amidoplastics): In clinical studies, LITPOR was used concurrently with antianginal agents without evidence to date of clinically significant adverse interactions. In healthy subjects, amidoplastics were not altered by the coadministration of LITPOR 80 mg and amidoprine 10 mg at steady state (see Human Pharmacokinetics).

Oral Contraceptives and Hormone Replacement Therapy: Concomitant administration of LITPOR with an oral contraceptive containing 1 mg mestranol and 35 mcg ethinyl estradiol, increased plasma concentrations of both drugs approximately 20% and 20%, respectively. These increases should be considered when oral contraceptives are being used for contraception.

Hormone replacement therapy: Use of hormone replacement therapy with LITPOR has not been formally evaluated. However, since LITPOR is renally excreted, it is possible that the effects of these agents may be additive. Close clinical and laboratory monitoring should be provided when these agents are coadministered (see PHARMACODYNAMIC, INTERACTIONS, DOSAGE AND ADMINISTRATION).

Antifungal: Antifungals: LITPOR has not been studied specifically in combination with any other antifungal agent to date. However, when LITPOR was coadministered with some antifungal agents, a greater than additive decrease in plasma levels was observed. Thus, caution should be exercised when starting or adjusting dosages of antifungal agents, especially patients who are salt sensitive. Additionally, since LITPOR is renally excreted, it is possible that the effects of these agents may be additive. Close clinical and laboratory monitoring should be provided when these agents are coadministered (see PHARMACODYNAMIC, INTERACTIONS, DOSAGE AND ADMINISTRATION).

Antiviral: LITPOR has not been studied specifically in combination with any other antiviral agent to date. However, when LITPOR was coadministered with some antiviral agents, a greater than additive decrease in plasma levels was observed. Thus, caution should be exercised when starting or adjusting dosages of antiviral agents, especially patients who are salt sensitive. Additionally, since LITPOR is renally excreted, it is possible that the effects of these agents may be additive. Close clinical and laboratory monitoring should be provided when these agents are coadministered (see PHARMACODYNAMIC, INTERACTIONS, DOSAGE AND ADMINISTRATION).

Adverse reactions to LITPOR did not alter plasma concentrations or LDC levels lowering effect of LITPOR, however, the triglyceride-lowering effect of LITPOR was reduced from 34% to 26%.

Cytobromone P-450-mediated Interactions: Administration of LITPOR may be metabolized by the cytochrome P-450 isozyme, CYP 3A4 (see CLINICAL PHARMACOLOGY, PHARMACOKINETICS). CYP 3A4 substrates include drugs and substrates that are metabolized by the CYP 3A4 enzymes, such as grapefruit juice, some macrolide antibiotics (i.e. erythromycin, clarithromycin), immunosuppressants (cyclosporine),azole antifungal agents (i.e. itraconazole, ketoconazole), or the antidepressant, nefazodone, may have the potential to increase plasma concentrations of LITPOR, which may reduce the efficacy of the latter. Close clinical and laboratory monitoring should be provided when these agents are coadministered (see PHARMACODYNAMIC, INTERACTIONS, DOSAGE AND ADMINISTRATION).

In healthy subjects, coadministration of the minimum dose of both alostalastin (60 mg) and tefandrine (120 mg) to CYP 3A4 substrates, was found to produce a modest increase in tefandrine AUC. The CYP 3A4 inhibitors were well tolerated and the laboratory values were not altered.

Concurrent use in patients with severe hypercholesterolemia (LDL-C reduction was greater when LITPOR was administered alone). In patients with the combination of antihypertensive medications (see PHARMACODYNAMIC, CLINICAL STUDIES).

Cautions should be exercised in patients who are also being treated with anticoagulants or antiplatelet agents. Only patients with severe renal impairment (creatinine clearance 10 to 50 ml/min) require for some patients with severe hypercholesterolemia (LDL-C reduction was greater when LITPOR was administered alone). In patients with the combination of antihypertensive medications (see PHARMACODYNAMIC, CLINICAL STUDIES).

Adverse Reactions to LITPOR LITPOR may induce severe transaminase and CPK levels from skeletal muscle. In the differential diagnosis of chest pain in a patient on therapy with LITPOR, cardiac and noncardiac fractures of these enzymes should be determined.

Drug/Laboratory Test Interactions LITPOR may induce severe transaminase and CPK levels from skeletal muscle. In the differential diagnosis of chest pain in a patient on therapy with LITPOR, cardiac and noncardiac fractures of these enzymes should be determined.

GASTROINTESTINAL:

Constipation 1
Diarrhea 1
Dyspepsia 2
Retinopathy 2
Nausea 2
Vomiting 2
Hair Loss 1
Diabetes 1
Arthritis 1
DHEAS 2
MISCELLANEOUS:

Pain 1
Myalgia 1
Asthma 1

The following adverse events were reported in clinical trials, not all events listed below have been associated with a causal relationship to LITPOR therapy: Myosis, myoclonus, myopathy, peripheral neuropathy, serotonin syndrome, headache, cholestatic jaundice, anorexia, vomiting, alopecia, pruritus, rash, impotence, hyperglycemia, and hypoglycemia.

Geriatric considerations: Very rare reactions: severe myopathy with or without rhabdomyolysis (see WARNINGS, Muscle Effects, PREDICTIONS, Renal Insufficiency and Drug Interactions); isolated reports: thrombosis, allergies, and allergic reactions including urticaria, anaphylactic reactions, angioedema and bullous rashes, including erythema multiforme, Steven-Johnson syndrome and toxic epidermal necrolysis. These may have no causal relationship to atorvastatin.

Optimal weight diet: Serum transaminase levels have been noted in clinical trials (see WARNINGS).

SYMPTOMS AND TREATMENT OF OVERDOSE:
The following are specific recommendations for atorvastatin overdose. Should an overdose occur, the patient should be treated symptomatically and supportive measures instituted as required. Due to extensive drug binding to plasma proteins, hemodialysis is not expected to result in any appreciable drug removal (see PRECAUTIONS, PHARMACODYNAMIC, PHARMACOKINETICS).

DOSEAGE AND ADMINISTRATION:

LITPOR is indicated for the treatment of hypercholesterolemia and hypertriglyceridemia alone or in combination with dietary modifications (see CLINICAL PHARMACOLOGY, PHARMACOKINETICS). Dosage is based on patient's body weight and serum cholesterol levels (see CLINICAL PHARMACOLOGY, PHARMACOKINETICS, CLINICAL STUDIES).

Table: LITPOR Dosage in Patients With Moderate to Severe Hypercholesterolemia

<table>
<thead>
<tr>
<th>LDL Cholesterol (mg/dL)</th>
<th>LITPOR Dose (mg/day)</th>
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<tr>
<td>120-199</td>
<td>10</td>
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<tr>
<td>200-299</td>
<td>20</td>
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<tr>
<td>300-399</td>
<td>40</td>
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<tr>
<td>400-499</td>
<td>80</td>
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Doses can be given at any time of the day, with or without food and should preferably be given in the evening. In the absence of individual patient data, the following dosages are recommended: 10 mg for adults who are normal weight and 20 mg for adults who are overweight.

LITPOR is not recommended for patients with severe renal impairment (creatinine clearance 10 to 50 ml/min).

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ATROVASTATIN

**ATROVASTATIN**

In healthy volunteers, co-administration of multiple 10 mg doses of ATROVASTATIN with 80 mg of atorvastatin resulted in no significant change in the pharmacokinetics of atorvastatin.

**ADVERSE REACTIONS**

The most common adverse reactions in controlled clinical trials were: diarrhea (5%), headache (4%), and upper respiratory tract infections (4%). Other adverse reactions reported during therapy were of mild-to-moderate severity.

**Hypertension**

In the 60% hypertensive patients treated with ATROVASTATIN in controlled clinical trials, adverse effects were reported in 29.1% of patients and required discontinuation of therapy due to side effects in 1.9% of patients. The most common adverse reactions in controlled clinical trials were: edema (8%), headache (7%), and nasal congestion (6%).

**Carotid revascularization**

In the AHA/ASA Trial of Angioplasty vs Medical Therapy, ATROVASTATIN showed a significant reduction in the risk of major cardiovascular events compared with placebo.

**Cardiovascular revascularization**

In the COURAGE trial, ATROVASTATIN significantly reduced the risk of major cardiovascular events compared with placebo.

**Angina**

In controlled trials, angina continued in patients treated with ATROVASTATIN. The adverse effects were reported in 5.6% of patients, which was not significantly different from placebo.

**Special Senses**

In the COURAGE trial, the adverse effect of vision was increased in patients treated with ATROVASTATIN compared with placebo.

**Dosage and Administration**

ATROVASTATIN is contraindicated in patients with severe hypersensitivity to the drug or other statins.

**NORVASC**

NORVASC is contraindicated in patients with hypertension, diabetes mellitus, or in patients with serum creatinine levels greater than 2.5 mg/dL.

**Norvasc**

Norvasc is contraindicated in patients with severe hepatic impairment, and in patients with serum creatinine levels greater than 2.5 mg/dL.

**Precautions**

When using calcium blockers, caution is advised due to the potential for increased risk of myocardial ischemia.

**WARNINGS**

Increased Blood Pressure and/or Myocardial Infarction

Rapidly, patients who are on calcium channel blockers should be used with caution in patients with heart disease, as it has been observed that NORVASC may increase blood pressure and/or heart rate.

**Outflow Obstruction (Aortic Stenosis)**

Patients with aortic stenosis should be advised to use calcium channel blockers with caution.

**Micturition**

NORVASC should be used with caution in patients with a history of urinary tract obstruction.

**Use in Patients with Hepatic Impairment**

There are no adequate studies in patients with liver dysfunction and dose adjustments have not been established.

**Peripheral Edema**

Mild-to-moderate edema was the most common adverse event in the clinical trials (see ADVERSE REACTIONS). The incidence of peripheral edema was dose-dependent and increased in frequency from 3.3% to 5.0% in patients treated with NORVASC.

**NURSING MOTHERS**

It is not known whether NORVASC is excreted in human milk.

**Use in Children**

The use of NORVASC is not recommended in children since safety and efficacy have not been established in those populations.

**Use in Elderly Patients**

In elderly patients (65 years), the clearance of NORVASC is decreased in contrast to younger patients.

**In Pregnancy**

The use of NORVASC is not recommended in pregnant women.

**Drug Interactions**

As with all drugs, caution should be exercised when using concomitant medications with calcium channel blockers.

**Other Calcium Channel Blockers**

In controlled trials, the incidence of adverse reactions in elderly patients was significantly lower than those in younger patients.

**Beta-Blockers**

Beta-blockers may have an additive effect on blood pressure lowering effect of calcium channel blockers, but this has not been well studied.

**Bacterial Endocarditis**

In long-term trials of NORVASC, there was an increase in the incidence of bacterial endocarditis.

**Anticoagulants**

Anticoagulants may increase the risk of bleeding complications.

**Calcium Antagonist**

Calcium channel blockers are contraindicated in patients with aortic stenosis.

**Cardiac Conduction**

Calcium channel blockers may increase the risk of cardiac conduction abnormalities.

**Carcinogenesis, Mutagenesis, Impairment of Fertility**

Calcium channel blockers may have a teratogenic effect in pregnant women.

**Pharmacokinetics**

Calcium channel blockers are contraindicated in patients with aortic stenosis.

**Special Populations**

Calcium channel blockers are contraindicated in patients with aortic stenosis and in patients with a history of hypotension.

**PATIENTS WITH ANILOUS OROGENITAL FUSION**

Calcium channel blockers are contraindicated in patients with aortic stenosis.

**Hypertension**

Calcium channel blockers are contraindicated in patients with aortic stenosis.

**Cardiac Conduction**

Calcium channel blockers may increase the risk of cardiac conduction abnormalities.

**Hypotension**

Calcium channel blockers are contraindicated in patients with aortic stenosis.

**Immunodeficiency**

Calcium channel blockers are contraindicated in patients with aortic stenosis.
Outstanding Optical Performance and Versatility

The E600 biological research microscope with Nikon's revolutionary CFI60 infinity optics provides dramatically improved performance in all applications. Ideal for epi-fluorescence and other sophisticated microscopy, the E600 opens up new dimensions in advanced research applications simply, easily and economically.
THE CANADIAN HYPERTENSION SOCIETY recognizes long-acting dihydropyridine calcium channel blockers as a preferred therapy for uncomplicated hypertension in patients of all ages.++

BP CONTROL THAT ENDURES. FROM ONE DAY WELL INTO THE NEXT.

Long-acting BP control for mild-to-moderate hypertensives1,2+

NORVASC* is indicated in the treatment of mild-to-moderate essential hypertension when diuretics or beta-blockers are unsuitable.

The most common adverse reactions include edema (8.9%) and headache (8.3%).1

Consult prescribing information for important safety information and drug interactions.

Impressive tolerability after 4 years3+

† NORVASC* should always be prescribed as once-daily therapy.
‡ NORVASC* (n=1,114), 83% of NORVASC* patients remained on therapy after 48 months.
++ Low-dose thiazide diuretics, ACE inhibitors, and beta-blockers (<60 years old) are also considered preferred therapies.
§ Based on the 2000 Canadian Recommendations for the Management of Hypertension.