

# Viramune® (nevirapine) Tablets



# Viramune® (nevirapine) Oral Suspension

Rx only

## WARNING

Severe, life-threatening, and in some cases fatal hepatotoxicity, including fulminant and cholestatic hepatitis, hepatic necrosis and hepatic failure, has been reported in patients treated with VIRAMUNE®. In some cases, patients presented with non-specific prodromal signs or symptoms of hepatitis and progressed to hepatic failure. These events are often associated with rash. Women, and patients with higher CD4 counts, are at increased risk of these hepatic events. Women with CD4 counts  $>250$  cells/mm<sup>3</sup>, including pregnant women receiving chronic treatment for HIV infection, are at considerably higher risk of these events. Patients with signs or symptoms of hepatitis must discontinue VIRAMUNE and seek medical evaluation immediately. (See WARNINGS)

Severe, life-threatening skin reactions, including fatal cases, have occurred in patients treated with VIRAMUNE. These have included cases of Stevens-Johnson syndrome, toxic epidermal necrolysis, and hypersensitivity reactions characterized by rash, constitutional findings, and organ dysfunction. Patients developing signs or symptoms of severe skin reactions or hypersensitivity reactions must discontinue VIRAMUNE and seek medical evaluation immediately. (See WARNINGS)

It is essential that patients be monitored intensively during the first 18 weeks of therapy with VIRAMUNE to detect potentially life-threatening hepatotoxicity or skin reactions. The greatest risk of severe rash or hepatic events (often associated with rash) occurs in the first 6 weeks of therapy. However, the risk of any hepatic event, with or without rash, continues past this period and monitoring should continue at frequent intervals. In some cases, hepatic injury has progressed despite discontinuation of treatment. VIRAMUNE should not be restarted following severe hepatic, skin or hypersensitivity reactions. In addition, the 14-day lead-in period with VIRAMUNE 200 mg daily dosing must be strictly followed. (See WARNINGS)

## DESCRIPTION

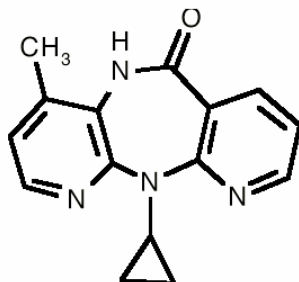
VIRAMUNE is the brand name for nevirapine (NVP), a non-nucleoside reverse transcriptase inhibitor with activity against Human Immunodeficiency Virus Type 1 (HIV-1). Nevirapine is structurally a member of the dipyridodiazepinone chemical class of compounds.

VIRAMUNE Tablets are for oral administration. Each tablet contains 200 mg of nevirapine and the inactive ingredients microcrystalline cellulose, lactose monohydrate, povidone, sodium starch glycolate, colloidal silicon dioxide and magnesium stearate.

VIRAMUNE Oral Suspension is for oral administration. Each 5 mL of VIRAMUNE suspension contains 50 mg of nevirapine (as nevirapine hemihydrate). The suspension also contains the

following excipients: carbomer 934P, methylparaben, propylparaben, sorbitol, sucrose, polysorbate 80, sodium hydroxide and purified water.

The chemical name of nevirapine is 11-cyclopropyl-5,11-dihydro-4-methyl-6H-dipyrido [3,2-b:2',3'-e][1,4] diazepin-6-one. Nevirapine is a white to off-white crystalline powder with the molecular weight of 266.30 and the molecular formula C<sub>15</sub>H<sub>14</sub>N<sub>4</sub>O. Nevirapine has the following structural formula:



## **MICROBIOLOGY**

### ***Mechanism of Action:***

Nevirapine is a non-nucleoside reverse transcriptase inhibitor (NNRTI) of HIV-1. Nevirapine binds directly to reverse transcriptase (RT) and blocks the RNA-dependent and DNA-dependent DNA polymerase activities by causing a disruption of the enzyme's catalytic site. The activity of nevirapine does not compete with template or nucleoside triphosphates. HIV-2 RT and eukaryotic DNA polymerases (such as human DNA polymerases  $\alpha$ ,  $\beta$ ,  $\gamma$ , or  $\delta$ ) are not inhibited by nevirapine.

### ***In Vitro HIV Susceptibility:***

The *in vitro* antiviral activity of nevirapine was measured in peripheral blood mononuclear cells, monocyte derived macrophages, and lymphoblastoid cell lines. IC<sub>50</sub> values (50% inhibitory concentration) ranged from 10-100 nM against laboratory and clinical isolates of HIV-1. In cell culture, nevirapine demonstrated additive to synergistic activity against HIV-1 in drug combination regimens with zidovudine (ZDV), didanosine (ddI), stavudine (d4T), lamivudine (3TC), saquinavir, and indinavir. The relationship between *in vitro* susceptibility of HIV-1 to nevirapine and the inhibition of HIV-1 replication in humans has not been established.

### ***Resistance:***

HIV-1 isolates with reduced susceptibility (100-250-fold) to nevirapine emerge *in vitro*. Genotypic analysis showed mutations in the HIV-1 RT gene Y181C and/or V106A depending upon the virus strain and cell line employed. Time to emergence of nevirapine resistance *in vitro* was not altered when selection included nevirapine in combination with several other NNRTIs.

Phenotypic and genotypic changes in HIV-1 isolates from patients treated with either nevirapine (n=24) or nevirapine and ZDV (n=14) were monitored in Phase I/II trials over 1 to  $\geq$ 12 weeks. After 1 week of nevirapine monotherapy, isolates from 3/3 patients had decreased susceptibility to nevirapine *in vitro*; one or more of the RT mutations K103N, V106A, V108I, Y181C, Y188C and G190A were detected in HIV-1 isolates from some patients as early as 2 weeks after therapy initiation. By week eight of nevirapine monotherapy, 100% of the patients tested (n=24) had HIV-1 isolates with a >100-fold decrease in susceptibility to nevirapine *in vitro* compared to baseline, and had one or more of the nevirapine-associated RT resistance mutations; 19 of 24 patients (80%) had isolates with Y181C mutations regardless of dose. Nevirapine+ZDV combination therapy did not alter the emergence rate of nevirapine-resistant virus or the magnitude of nevirapine resistance *in vitro*. The clinical relevance of phenotypic and genotypic changes associated with nevirapine therapy has not been established.

**Cross-resistance:**

Rapid emergence of HIV-1 strains which are cross-resistant to NNRTIs has been observed *in vitro*. Nevirapine-resistant HIV-1 isolates were cross-resistant to the NNRTIs efavirenz and delavirdine. However, nevirapine-resistant isolates were susceptible to the nucleoside analogues ZDV and ddI. Similarly, ZDV-resistant isolates were susceptible to nevirapine *in vitro*.

**ANIMAL PHARMACOLOGY**

Animal studies have shown that nevirapine is widely distributed to nearly all tissues and readily crosses the blood-brain barrier.

**CLINICAL PHARMACOLOGY****Pharmacokinetics in Adults:**

**Absorption and Bioavailability:** Nevirapine is readily absorbed (>90%) after oral administration in healthy volunteers and in adults with HIV-1 infection. Absolute bioavailability in 12 healthy adults following single-dose administration was  $93 \pm 9\%$  (mean  $\pm$  SD) for a 50 mg tablet and  $91 \pm 8\%$  for an oral solution. Peak plasma nevirapine concentrations of  $2 \pm 0.4 \mu\text{g/mL}$  ( $7.5 \mu\text{M}$ ) were attained by 4 hours following a single 200 mg dose. Following multiple doses, nevirapine peak concentrations appear to increase linearly in the dose range of 200 to 400 mg/day. Steady state trough nevirapine concentrations of  $4.5 \pm 1.9 \mu\text{g/mL}$  ( $17 \pm 7 \mu\text{M}$ ), ( $n = 242$ ) were attained at 400 mg/day. Nevirapine tablets and suspension have been shown to be comparably bioavailable and interchangeable at doses up to 200 mg. When VIRAMUNE (200 mg) was administered to 24 healthy adults (12 female, 12 male), with either a high fat breakfast (857 kcal, 50 g fat, 53% of calories from fat) or antacid (Maalox<sup>®</sup> 30 mL), the extent of nevirapine absorption (AUC) was comparable to that observed under fasting conditions. In a separate study in HIV-1 infected patients ( $n=6$ ), nevirapine steady-state systemic exposure ( $\text{AUC}_{\tau}$ ) was not significantly altered by didanosine, which is formulated with an alkaline buffering agent. VIRAMUNE may be administered with or without food, antacid or didanosine.

**Distribution:** Nevirapine is highly lipophilic and is essentially nonionized at physiologic pH. Following intravenous administration to healthy adults, the apparent volume of distribution ( $V_{\text{dss}}$ ) of nevirapine was  $1.21 \pm 0.09 \text{ L/kg}$ , suggesting that nevirapine is widely distributed in humans. Nevirapine readily crosses the placenta and is also found in breast milk. (See PRECAUTIONS, *Nursing Mothers*) Nevirapine is about 60% bound to plasma proteins in the plasma concentration range of 1-10  $\mu\text{g/mL}$ . Nevirapine concentrations in human cerebrospinal fluid ( $n=6$ ) were 45% ( $\pm 5\%$ ) of the concentrations in plasma; this ratio is approximately equal to the fraction not bound to plasma protein.

**Metabolism/Elimination:** *In vivo* studies in humans and *in vitro* studies with human liver microsomes have shown that nevirapine is extensively biotransformed via cytochrome P450 (oxidative) metabolism to several hydroxylated metabolites. *In vitro* studies with human liver microsomes suggest that oxidative metabolism of nevirapine is mediated primarily by cytochrome P450 (CYP) isozymes from the CYP3A4 and CYP2B6 families, although other isozymes may have a secondary role. In a mass balance/excretion study in eight healthy male volunteers dosed to steady state with nevirapine 200 mg given twice daily followed by a single 50 mg dose of <sup>14</sup>C-nevirapine, approximately  $91.4 \pm 10.5\%$  of the radiolabeled dose was recovered, with urine ( $81.3 \pm 11.1\%$ ) representing the primary route of excretion compared to feces ( $10.1 \pm 1.5\%$ ). Greater than 80% of the radioactivity in urine was made up of glucuronide conjugates of hydroxylated metabolites. Thus cytochrome P450 metabolism, glucuronide conjugation, and urinary excretion of glucuronidated metabolites represent the primary route of nevirapine biotransformation and elimination in humans. Only a small fraction (<5%) of the radioactivity in urine (representing <3% of the total dose) was made up of parent compound; therefore, renal excretion plays a minor role in elimination of the parent compound.

Nevirapine is an inducer of hepatic cytochrome P450 (CYP) metabolic enzymes 3A4 and 2B6. Nevirapine induces CYP3A4 and CYP2B6 by approximately 20-25%, as indicated by

erythromycin breath test results and urine metabolites. Autoinduction of CYP3A4 and CYP2B6 mediated metabolism leads to an approximately 1.5 to 2 fold increase in the apparent oral clearance of nevirapine as treatment continues from a single dose to two-to-four weeks of dosing with 200-400 mg/day. Autoinduction also results in a corresponding decrease in the terminal phase half-life of nevirapine in plasma, from approximately 45 hours (single dose) to approximately 25-30 hours following multiple dosing with 200-400 mg/day.

***Pharmacokinetics in Special Populations:***

**Renal Impairment:** HIV seronegative adults with mild (CrCL 50-79 mL/min; n=7), moderate (CrCL 30-49 mL/min; n=6), or severe (CrCL <30 mL/min; n=4) renal impairment received a single 200 mg dose of nevirapine in a pharmacokinetic study. These subjects did not require dialysis. The study included six additional subjects with renal failure requiring dialysis.

In subjects with renal impairment (mild, moderate or severe), there were no significant changes in the pharmacokinetics of nevirapine. However, subjects requiring dialysis exhibited a 44% reduction in nevirapine AUC over a one-week exposure period. There was also evidence of accumulation of nevirapine hydroxy-metabolites in plasma in subjects requiring dialysis. An additional 200 mg dose following each dialysis treatment is indicated. (See DOSAGE and ADMINISTRATION; PRECAUTIONS)

**Hepatic Impairment:** HIV seronegative adults with mild (Child-Pugh Class A; n=6) or moderate (Child-Pugh Class B; n=4) hepatic impairment received a single 200 mg dose of nevirapine in a pharmacokinetic study.

In the majority of patients with mild or moderate hepatic impairment, no significant changes were seen in the pharmacokinetics of nevirapine. However, a significant increase in the AUC of nevirapine observed in one patient with Child-Pugh Class B and ascites suggests that patients with worsening hepatic function and ascites may be at risk of accumulating nevirapine in the systemic circulation. Because nevirapine induces its own metabolism with multiple dosing, a single dose study may not reflect the impact of hepatic impairment on multiple dose pharmacokinetics. (See PRECAUTIONS) Nevirapine should not be administered to patients with severe hepatic impairment. (See WARNINGS)

**Gender:** In one Phase I study in healthy volunteers (15 females, 15 males), the weight-adjusted apparent volume of distribution ( $V_{dss}/F$ ) of nevirapine was higher in the female subjects (1.54 L/kg) compared to the males (1.38 L/kg), suggesting that nevirapine was distributed more extensively in the female subjects. However, this difference was offset by a slightly shorter terminal-phase half-life in the females resulting in no significant gender difference in nevirapine oral clearance ( $24.6 \pm 7.7$  mL/kg/hr in females vs.  $19.9 \pm 3.9$  mL/kg/hr in males after single dose) or plasma concentrations following either single- or multiple-dose administration(s).

**Race:** An evaluation of nevirapine plasma concentrations (pooled data from several clinical trials) from HIV-1-infected patients (27 Black, 24 Hispanic, 189 Caucasian) revealed no marked difference in nevirapine steady-state trough concentrations (median  $C_{minss}$  = 4.7 µg/mL Black, 3.8 µg/mL Hispanic, 4.3 µg/mL Caucasian) with long-term nevirapine treatment at 400 mg/day. However, the pharmacokinetics of nevirapine have not been evaluated specifically for the effects of ethnicity.

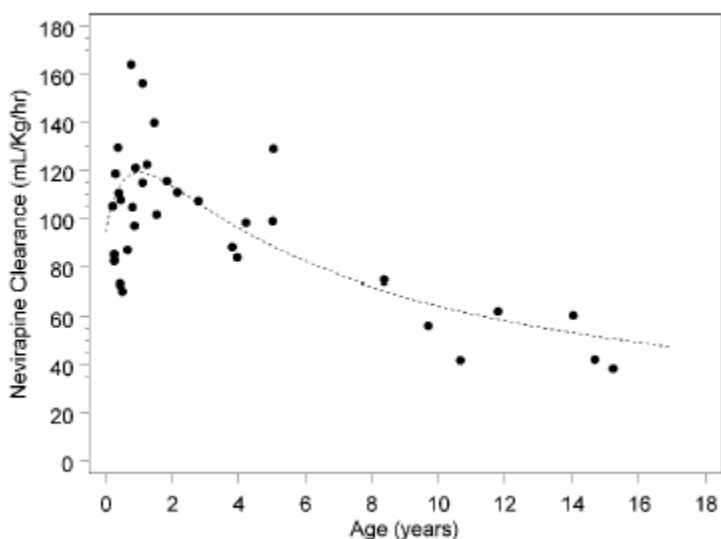
**Geriatric Patients:** Nevirapine pharmacokinetics in HIV-1 infected adults do not appear to change with age (range 18–68 years); however, nevirapine has not been extensively evaluated in patients beyond the age of 55 years.

**Pediatric Patients:** The pharmacokinetics of nevirapine have been studied in two open-label studies in children with HIV-1 infection. In one study (BI 853; ACTG 165), nine HIV-1-infected children ranging in age from 9 months to 14 years were administered a single dose (7.5 mg, 30 mg, or 120 mg per  $m^2$ ; n=3 per dose) of nevirapine suspension after an overnight fast. The mean

nevirapine apparent clearance adjusted for body weight was greater in children compared to adults.

In a multiple dose study (BI 882; ACTG 180), nevirapine suspension or tablets (240 or 400 mg/m<sup>2</sup>/day) were administered as monotherapy or in combination with ZDV or ZDV+ddl to 37 HIV-1-infected pediatric patients with the following demographics: male (54%), racial minority groups (73%), median age of 11 months (range: 2 months-15 years). The majority of these patients received 120 mg/m<sup>2</sup>/day of nevirapine for approximately 4 weeks followed by 120 mg/m<sup>2</sup>/b.i.d. (patients > 9 years of age) or 200 mg/m<sup>2</sup>/b.i.d. (patients ≤ 9 years of age). Nevirapine apparent clearance adjusted for body weight reached maximum values by age 1 to 2 years and then decreased with increasing age. Nevirapine apparent clearance adjusted for body weight was at least two-fold greater in children younger than 8 years compared to adults. The relationship between nevirapine clearance with long term drug administration and age is shown in Figure 1. The pediatric dosing regimens were selected in order to achieve steady-state plasma concentrations in pediatric patients that approximate those in adults. (See DOSAGE AND ADMINISTRATION, *Pediatric Patients*)

Figure 1: Nevirapine Apparent Clearance (mL/kg/hr) in Pediatric Patients



**Drug Interactions:** (See PRECAUTIONS, *Drug Interactions*) Nevirapine induces hepatic cytochrome P450 metabolic isoenzymes 3A4 and 2B6. Co-administration of VIRAMUNE and drugs primarily metabolized by CYP3A4 or CYP2B6 may result in decreased plasma concentrations of these drugs and attenuate their therapeutic effects.

While primarily an inducer of cytochrome P450 3A4 and 2B6 enzymes, nevirapine may also inhibit this system. Among human hepatic cytochrome P450s, nevirapine was capable in vitro of inhibiting the 10-hydroxylation of (R)-warfarin (CYP3A4). The estimated K<sub>i</sub> for the inhibition of CYP3A4 was 270 μM, a concentration that is unlikely to be achieved in patients as the therapeutic range is <25 μM. Therefore, nevirapine may have minimal inhibitory effect on other substrates of CYP3A4.

Nevirapine does not appear to affect the plasma concentrations of drugs that are substrates of other CYP450 enzyme systems, such as 1A2, 2D6, 2A6, 2E1, 2C9 or 2C19.

Table 1 (see below) contains the results of drug interaction studies performed with VIRAMUNE and other drugs likely to be co-administered. The effects of VIRAMUNE on the AUC, C<sub>max</sub>, and

$C_{min}$  of co-administered drugs are summarized. To measure the full potential pharmacokinetic interaction effect following induction, patients on the concomitant drug at steady state were administered 28 days of VIRAMUNE (200 mg QD for 14 days followed by 200 mg BID for 14 days) followed by a steady state reassessment of the concomitant drug.

Table 1: Drug Interactions:  
Changes in Pharmacokinetic Parameters for Co-administered Drug in the Presence of VIRAMUNE  
(All interaction studies were conducted in HIV-1 positive patients)

Co-administered Drug	Dose of Co-administered Drug	Dose Regimen of VIRAMUNE	n	% Change of Co-administered Drug Pharmacokinetic Parameters (90% CI)		
				AUC	Cmax	Cmin
Antiretrovirals				AUC	Cmax	Cmin
Didanosine	100-150 mg BID	200 mg QD x 14 days; 200 mg BID x 14 days	18	↔	↔	§
Efavirenz <sup>a</sup>	600 mg QD	200 mg QD x 14 days; 400 mg QD x 14 days	17	↓28 (↓34 to ↓14)	↓12 (↓23 to ↑1)	↓32 (↓35 to ↓19)
Indinavir <sup>a</sup>	800 mg q8H	200 mg QD x 14 days; 200 mg BID x 14 days	19	↓31 (↓39 to ↓22)	↓15 (↓24 to ↓4)	↓44 (↓53 to ↓33)
Lopinavir <sup>a,b</sup>	300/75 mg/m <sup>2</sup> (lopinavir/ ritonavir) <sup>b</sup>	7 mg/kg or 4 mg/kg QD x 2 weeks; BID x 1 week	12, 15 <sup>c</sup>	↓14 (↓36 to ↑16)	↓22 (↓44 to ↑9)	↓55 (↓75 to ↓9)
Lopinavir <sup>a</sup>	400/100 mg BID (lopinavir/ ritonavir)	200 mg QD x 14 days; 200 mg BID > 1 year	22, 19 <sup>c</sup>	↓27 (↓47 to ↓2)	↓19 (↓38 to ↑5)	↓51 (↓72 to ↓26)
Nelfinavir <sup>a</sup>	750 mg TID	200 mg QD x 14 days; 200 mg BID x 14 days	23	↔	↔	↓32 (↓50 to ↑5)
Nelfinavir-M8 metabolite				↓62 (↓70 to ↓53)	↓59 (↓68 to ↓48)	↓66 (↓74 to ↓55)
Ritonavir	600 mg BID	200 mg QD x 14 days; 200 mg BID x 14 days	18	↔	↔	↔
Saquinavir <sup>a</sup>	600 mg TID	200 mg QD x 14 days; 200 mg BID x 21 days	23	↓38 (↓47 to ↓11)	↓32 (↓44 to ↓6)	§
Stavudine	30-40 mg BID	200 mg QD x 14 days; 200 mg BID x 14 days	22	↔	↔	§
Zalcitabine	0.125-0.25 mg TID	200 mg QD x 14 days; 200 mg BID x 14 days	6	↔	↔	§
Zidovudine	100-200 mg TID	200 mg QD x 14 days; 200 mg BID x 14 days	11	↓28 (↓40 to ↓4)	↓30 (↓51 to ↑14)	§

Other Medications				AUC	Cmax	Cmin
Clarithromycin <sup>a</sup>	500 mg BID	200 mg QD x 14 days; 200 mg BID x 14 days	15	↓31 (↓38 to ↓24)	↓23 (↓31 to ↓14)	↓57 (↓70 to ↓36)
Metabolite 14-OH-clarithromycin				↑42 (↑16 to ↑73)	↑47 (↑21 to ↑80)	↔
Ethinyl estradiol <sup>a</sup> and Norethindrone <sup>a</sup>	0.035 mg (as Ortho-Novum® 1/35)  1 mg (as Ortho-Novum® 1/35)	200 mg QD x 14 days; 200 mg BID x 14 days	10	↓20 (↓33 to ↓3)	↔	§
				↓19 (↓30 to ↓7)	↓16 (↓27 to ↓3)	§
Fluconazole	200 mg QD	200 mg QD x 14 days; 200 mg BID x 14 days	19	↔	↔	↔
Ketoconazole <sup>a</sup>	400 mg QD	200 mg QD x 14 days; 200 mg BID x 14 days	21	↓72 (↓80 to ↓60)	↓44 (↓58 to ↓27)	§
Rifabutin <sup>a</sup>	150 or 300 mg QD	200 mg QD x 14 days; 200 mg BID x 14 days	19	↑17 (↓2 to ↑40)	↑28 (↑9 to ↑51)	↔
Metabolite 25-O-desacetyl-rifabutin				↑24 (↓16 to ↑84)	↑29 (↓2 to ↑68)	↑22 (↓14 to ↑74)
Rifampin <sup>a</sup>	600 mg QD	200 mg QD x 14 days; 200 mg BID x 14 days	14	↑11 (↓4 to ↑28)	↔	§

§ = C<sub>min</sub> below detectable level of the assay

↑ = Increase, ↓ = Decrease, ↔ = No Effect

<sup>a</sup> For information regarding clinical recommendations see PRECAUTIONS, *Drug Interactions*, Table 3

<sup>b</sup> Pediatric subjects ranging in age from 6 months to 12 years

<sup>c</sup> Parallel group design; n for VIRAMUNE +lopinavir/ritonavir, n for lopinavir/ritonavir alone

Because of the design of the drug interaction trials (addition of 28 days of VIRAMUNE therapy to existing HIV therapy) the effect of the concomitant drug on plasma nevirapine steady state concentrations was estimated by comparison to historical controls.

Administration of rifampin had a clinically significant effect on nevirapine pharmacokinetics, decreasing AUC and C<sub>max</sub> by greater than 50%. Administration of fluconazole resulted in an approximate 100% increase in nevirapine exposure, based on a comparison to historic data. (See PRECAUTIONS, *Drug Interactions*, Table 3). The effect of other drugs listed in Table 1 on nevirapine pharmacokinetics was not significant.

## INDICATIONS AND USAGE

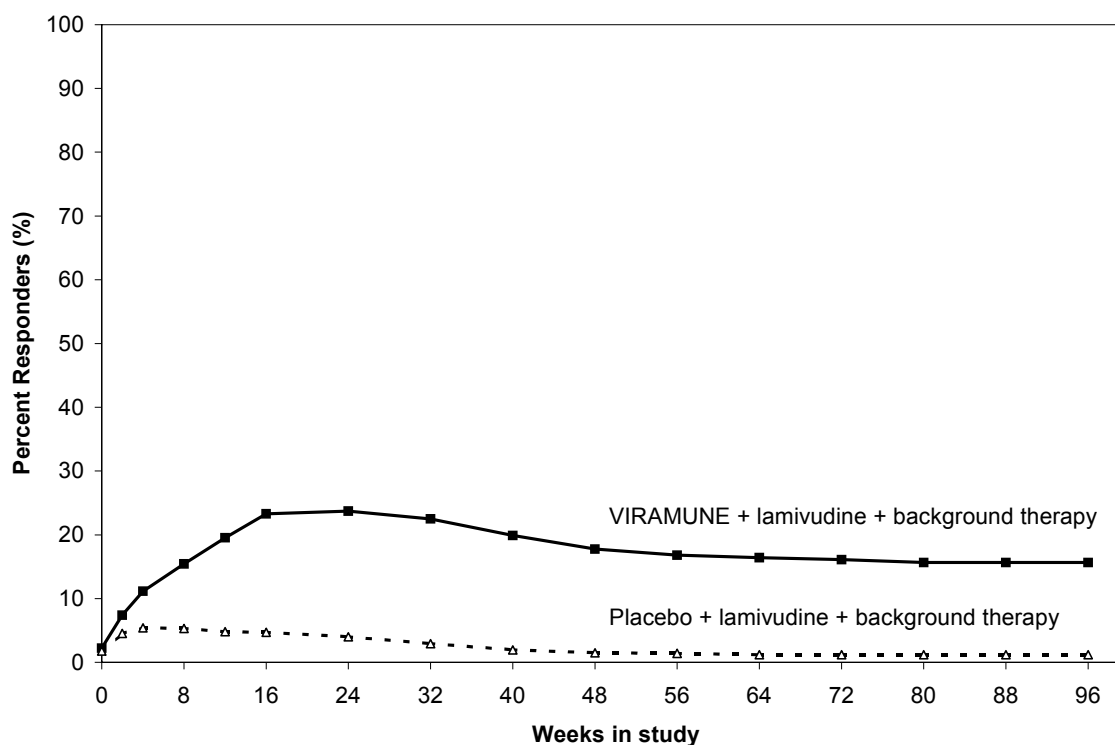
VIRAMUNE (nevirapine) is indicated for use in combination with other antiretroviral agents for the treatment of HIV-1 infection. This indication is based on one principal clinical trial that demonstrated prolonged suppression of HIV-RNA and two smaller supportive studies, one of which is described below.

### ***Description of Clinical Studies:***

**Trial BI 1090**, was a placebo-controlled, double-blind, randomized trial in 2249 HIV-1 infected patients with <200 CD4+ cells at screening. Initiated in 1995, BI 1090 compared treatment with VIRAMUNE + lamivudine + background therapy versus lamivudine + background therapy in NNRTI naïve patients. Treatment doses were VIRAMUNE, 200 mg daily for two weeks followed by 200 mg twice daily or placebo, and lamivudine 150 mg twice daily. Other antiretroviral agents were given at approved doses. Initial background therapy (in addition to lamivudine) was one NRTI in 1309 patients (58%), two or more NRTIs in 771 (34%), and PIs and NRTIs in 169 (8%). The patients (median age 36.5 years, 70% Caucasian, 79% male) had advanced HIV infection, with a median baseline CD4+ cell count of 96 cells/mm<sup>3</sup> and a baseline HIV RNA of 4.58 log<sub>10</sub> copies/mL (38,291 copies/mL). Prior to entering the trial, 45% had previously experienced an AIDS-defining clinical event. Eighty-nine percent had antiretroviral treatment prior to entering the trial. BI 1090 was originally designed as a clinical endpoint study. Prior to unblinding the trial, the primary endpoint was changed to proportion of patients with HIV RNA <50 copies/mL and not previously failed at 48 weeks. Treatment response and outcomes are shown in Figure 2 and Table 2.



Figure 2: BI 1090: Percent Responders by Visit (LOQ=50 copies/mL)



Total number of patients with HIV-RNA data at specified time point, plus number of patients who previously reached a failure endpoint:

	8 Weeks	48 Weeks	96 Weeks
VIRAMUNE:	1120	1097	941
Placebo:	1128	1120	1105

Table 2: BI 1090 Outcomes through 48 weeks

Outcome	VIRAMUNE (N=1121) %	Placebo (N=1128) %
Responders at 48 weeks: HIV RNA <50 copies/mL	18.0	1.6
Treatment Failure	82.0	98.4
Never suppressed viral load	44.6	66.4
Virologic failure after response	7.2	4.3
CDC category C event or death	9.6	11.2
Added antiretroviral therapy <sup>1</sup> while <50 copies/mL	5.0	0.9
Discontinued trial therapy due to AE	7.0	5.9
Discontinued trial <48 weeks <sup>2</sup>	8.5	9.8

<sup>1</sup> including change to open-label NVP

<sup>2</sup> includes withdrawal of consent, lost to follow-up, non-compliance with protocol, other administrative reasons

The change from baseline in CD4+ cell count through one year of therapy was significantly greater for the VIRAMUNE group compared to the placebo group for the overall study population (64 cells/mm<sup>3</sup> vs 22 cells/mm<sup>3</sup>, respectively), as well as for patients who entered the trial as treatment naïve or having received only ZDV (85 cells/mm<sup>3</sup> vs 25 cells/mm<sup>3</sup>, respectively).

At two years into the study, 16% of subjects on VIRAMUNE had experienced class C CDC events as compared to 21% of subjects on the control arm.

**Trial BI 1046** (INCAS) was a double-blind, placebo-controlled, randomized, three arm trial with 151 HIV-1 infected patients with CD4+ cell counts of 200-600 at baseline. BI 1046 compared treatment with VIRAMUNE+zidovudine+didanosine to VIRAMUNE+zidovudine and zidovudine+didanosine. Treatment doses were VIRAMUNE at 200 mg daily for two weeks followed by 200 mg twice daily or placebo, zidovudine at 200 mg three times daily, and didanosine at 125 or 200 mg twice daily (depending on body weight). The patients had mean baseline HIV RNA of 4.41 log<sub>10</sub> copies/mL (25,704 copies/mL) and mean baseline CD4+ cell count of 376 cells/mm<sup>3</sup>. The primary endpoint was the proportion of patients with HIV-RNA < 400 copies/mL and not previously failed at 48 weeks. The virologic responder rates at 48 weeks were 45% for patients treated with VIRAMUNE+zidovudine+didanosine, 19% for patients treated with zidovudine+didanosine, and 0% for patients treated with VIRAMUNE+zidovudine.

CD4+ cell counts in the VIRAMUNE+ZDV+ddl group increased above baseline by a mean of 139 cells/mm<sup>3</sup> at one year, significantly greater than the increase of 87 cells/mm<sup>3</sup> in the ZDV+ddl patients. The VIRAMUNE+ZDV group mean decreased by 6 cells/mm<sup>3</sup> below baseline.

## CONTRAINDICATIONS

VIRAMUNE (nevirapine) is contraindicated in patients with clinically significant hypersensitivity to any of the components contained in the tablet or the oral suspension.

## WARNINGS

### **General:**

**The first 18 weeks of therapy with VIRAMUNE are a critical period during which intensive monitoring of patients is required to detect potentially life-threatening hepatic events and skin reactions.** The optimal frequency of monitoring during this time period has not been established. Some experts recommend clinical and laboratory monitoring more often than once per month, and in particular, would include monitoring of liver function tests at baseline, prior to dose escalation and at two weeks post-dose escalation. After the initial 18 week period, frequent clinical and laboratory monitoring should continue throughout VIRAMUNE treatment. In addition, the 14-day lead-in period with VIRAMUNE 200 mg daily dosing has been demonstrated to reduce the frequency of rash.

Resistant virus emerges rapidly and uniformly when VIRAMUNE is administered as monotherapy. Therefore, VIRAMUNE should always be administered in combination with other antiretroviral agents for the treatment of HIV-1 infection.

### **Hepatic Events:**

Severe, life-threatening, and in some cases fatal hepatotoxicity, including fulminant and cholestatic hepatitis, hepatic necrosis and hepatic failure, have been reported in patients treated with VIRAMUNE. In clinical trials, the risk of hepatic events regardless of severity was greatest in the first 6 weeks of therapy. The risk continued to be greater in the VIRAMUNE groups compared to controls through 18 weeks of treatment. However, hepatic events may occur at any time during treatment. In some cases, patients presented with non-specific, prodromal signs or symptoms of fatigue, malaise, anorexia, nausea, jaundice, liver tenderness or hepatomegaly, with or without initially abnormal serum transaminase levels. Some of these events have progressed

to hepatic failure with transaminase elevation, with or without hyperbilirubinemia, prolonged partial thromboplastin time, or eosinophilia. Rash and fever accompanied some of these hepatic events. Patients with signs or symptoms of hepatitis must be advised to discontinue VIRAMUNE and immediately seek medical evaluation, which should include liver function tests.

The patients at greatest risk of hepatic events, including potentially fatal events, are women with high CD4 counts.

In addition, serious hepatotoxicity (including liver failure requiring transplantation in one instance) has been reported in HIV-uninfected individuals receiving multiple doses of VIRAMUNE in the setting of post-exposure prophylaxis, an unapproved use.

Increased AST or ALT levels and/or co-infection with hepatitis B or C at the start of antiretroviral therapy are associated with a greater risk of hepatic adverse events.

In general, women have a three fold higher risk than men for symptomatic, often rash-associated, hepatic events (5.8% versus 2.2%), and patients with higher CD4 counts at initiation of VIRAMUNE therapy are at higher risk for symptomatic hepatic events with VIRAMUNE. In a retrospective review, women with CD4 counts  $>250$  cells/mm<sup>3</sup> had a 12 fold higher risk of symptomatic hepatic adverse events compared to women with CD4 counts  $<250$  cells/mm<sup>3</sup> (11.0% versus 0.9%). An increased risk was observed in men with CD4 counts  $>400$  cells/mm<sup>3</sup> (6.3% versus 2.3% for men with CD4 counts  $<400$  cells/mm<sup>3</sup>).

Because increased nevirapine levels and nevirapine accumulation may be observed in patients with serious liver disease, VIRAMUNE should not be administered to patients with severe hepatic impairment. (See CLINICAL PHARMACOLOGY, *Pharmacokinetics in Special Populations: Hepatic Impairment*; PRECAUTIONS, *General*).

**Intensive clinical and laboratory monitoring, including liver function tests, is essential at baseline and during the first 18 weeks of treatment. (See WARNINGS, *General*) Monitoring should continue at frequent intervals thereafter. Liver function tests should be performed immediately if a patient experiences signs or symptoms suggestive of hepatitis and/or hypersensitivity reaction. Liver function tests should also be obtained for all patients who develop a rash in the first 18 weeks of treatment. Physicians and patients should be vigilant for the appearance of signs or symptoms of hepatitis, such as fatigue, malaise, anorexia, nausea, jaundice, bilirubinuria, acholic stools, liver tenderness or hepatomegaly. The diagnosis of hepatotoxicity should be considered in this setting, even if liver function tests are initially normal or alternative diagnoses are possible. (See PRECAUTIONS, *Information for Patients*; ADVERSE REACTIONS; DOSAGE AND ADMINISTRATION).**

If clinical hepatitis occurs, VIRAMUNE should be permanently discontinued and not restarted after recovery. In some cases, hepatic injury progresses despite discontinuation of treatment.

#### ***Skin Reactions:***

Severe, life-threatening skin reactions, including fatal cases, have been reported with VIRAMUNE treatment, occurring most frequently during the first 6 weeks of therapy. These have included cases of Stevens-Johnson syndrome, toxic epidermal necrolysis, and hypersensitivity reactions characterized by rash, constitutional findings, and organ dysfunction. Patients developing signs or symptoms of severe skin reactions or hypersensitivity reactions (including, but not limited to, severe rash or rash accompanied by fever, general malaise, fatigue, muscle or joint aches, blisters, oral lesions, conjunctivitis, facial edema, and/or hepatitis, eosinophilia, granulocytopenia, lymphadenopathy, and renal dysfunction) must permanently discontinue VIRAMUNE and seek medical evaluation immediately. (See PRECAUTIONS, *Information for Patients*; ADVERSE REACTIONS) VIRAMUNE should not be restarted following severe skin rash or hypersensitivity reaction. Some of the risk factors for developing serious cutaneous reactions include failure to

follow the initial dosing of 200 mg daily during the 14-day lead-in period and delay in stopping the VIRAMUNE treatment after the onset of the initial symptoms.

If patients present with a suspected VIRAMUNE-associated rash, liver function tests should be performed. Patients with rash-associated AST or ALT elevations should be permanently discontinued from VIRAMUNE.

Therapy with VIRAMUNE must be initiated with a 14-day lead-in period of 200 mg/day (4 mg/kg/day in pediatric patients), which has been shown to reduce the frequency of rash. If rash is observed during this lead-in period, dose escalation should not occur until the rash has resolved. (See DOSAGE AND ADMINISTRATION) Patients should be monitored closely if isolated rash of any severity occurs.

Women appear to be at higher risk than men of developing rash with VIRAMUNE.

In a clinical trial, concomitant prednisone use (40 mg/day for the first 14 days of VIRAMUNE administration) was associated with an increase in incidence and severity of rash during the first 6 weeks of VIRAMUNE therapy. Therefore, use of prednisone to prevent VIRAMUNE-associated rash is not recommended.

**St. John's wort:**

Concomitant use of St. John's wort (*hypericum perforatum*) or St. John's wort containing products and VIRAMUNE is not recommended. Co-administration of Non-Nucleoside Reverse Transcriptase Inhibitors (NNRTIs), including VIRAMUNE, with St. John's wort is expected to substantially decrease NNRTI concentrations and may result in sub-optimal levels of VIRAMUNE and lead to loss of virologic response and possible resistance to VIRAMUNE or to the class of NNRTIs.

**PRECAUTIONS**

**General:**

Nevirapine is extensively metabolized by the liver and nevirapine metabolites are extensively eliminated by the kidney. No adjustment in nevirapine dosing is required in patients with CrCL  $\geq 20$  mL/min. In patients undergoing chronic hemodialysis, an additional 200 mg dose following each dialysis treatment is indicated. Nevirapine metabolites may accumulate in patients receiving dialysis; however, the clinical significance of this accumulation is not known. (See CLINICAL PHARMACOLOGY, *Pharmacokinetics in Special Populations: Renal Impairment*; DOSAGE AND ADMINISTRATION, *Dosage Adjustment*)

It is not clear whether a dosing adjustment is needed for patients with mild to moderate hepatic impairment, because multiple dose pharmacokinetic data are not available for this population. However, patients with moderate hepatic impairment and ascites may be at risk of accumulating nevirapine in the systemic circulation. Caution should be exercised when nevirapine is administered to patients with moderate hepatic impairment. Nevirapine should not be administered to patients with severe hepatic impairment. (See WARNINGS; CLINICAL PHARMACOLOGY, *Pharmacokinetics in Special Populations: Hepatic Impairment*)

The duration of clinical benefit from antiretroviral therapy may be limited. Patients receiving VIRAMUNE or any other antiretroviral therapy may continue to develop opportunistic infections and other complications of HIV infection, and therefore should remain under close clinical observation by physicians experienced in the treatment of patients with associated HIV diseases.

When administering VIRAMUNE as part of an antiretroviral regimen, the complete product information for each therapeutic component should be consulted before initiation of treatment.

**Drug Interactions:**

Nevirapine is principally metabolized by the liver via the cytochrome P450 isoenzymes, 3A4 and 2B6. Nevirapine is known to be an inducer of these enzymes. As a result, drugs that are metabolized by these enzyme systems may have lower than expected plasma levels when co-administered with nevirapine.

The specific pharmacokinetic changes that occur with co-administration of nevirapine and other drugs are listed in CLINICAL PHARMACOLOGY, Table 1. Clinical comments about possible dosage modifications based on these pharmacokinetic changes are listed in Table 3. The data in Tables 1 and 3 are based on the results of drug interaction studies conducted in HIV-1 seropositive subjects unless otherwise indicated.

In addition to established drug interactions, there may be potential pharmacokinetic interactions between nevirapine and other drug classes that are metabolized by the cytochrome P450 system. These potential drug interactions are listed in Table 4. Although specific drug interaction studies in HIV-1 seropositive subjects have not been conducted for the classes of drugs listed in Table 4, additional clinical monitoring may be warranted when co-administering these drugs.

The *in vitro* interaction between nevirapine and the antithrombotic agent warfarin is complex. As a result, when giving these drugs concomitantly, plasma warfarin levels may change with the potential for increases in coagulation time. When warfarin is co-administered with nevirapine, anticoagulation levels should be monitored frequently.

<b>Table 3</b> <b>Established Drug Interactions: Alteration in Dose or Regimen May Be Recommended Based on Drug Interaction Studies</b> <b>(See CLINICAL PHARMACOLOGY, Table 1 for Magnitude of Interaction)</b>		
<b>Drug Name</b>	<b>Effect on Concentration of Nevirapine or Concomitant Drug</b>	<b>Clinical Comment</b>
Clarithromycin	↓ Clarithromycin ↑ 14-OH clarithromycin	Clarithromycin exposure was significantly decreased by nevirapine; however, 14-OH metabolite concentrations were increased. Because clarithromycin active metabolite has reduced activity against <i>Mycobacterium avium-intracellulare</i> complex, overall activity against this pathogen may be altered. Alternatives to clarithromycin, such as azithromycin, should be considered.
Efavirenz	↓ Efavirenz	Appropriate doses for this combination are not established.
Ethinyl estradiol and Norethindrone	↓ Ethinyl estradiol ↓ Norethindrone	Oral contraceptives and other hormonal methods of birth control should not be used as the sole method of contraception in women taking nevirapine, since nevirapine may lower the plasma levels of these medications. An alternative or additional method of contraception is recommended.
Fluconazole	↑ Nevirapine	Because of the risk of increased exposure to nevirapine, caution should be used in concomitant administration, and patients should be monitored closely for nevirapine-associated adverse events.

Indinavir	↓ Indinavir	Appropriate doses for this combination are not established, but an increase in the dosage of indinavir may be required.
Ketoconazole	↓ Ketoconazole	Nevirapine and ketoconazole should not be administered concomitantly because decreases in ketoconazole plasma concentrations may reduce the efficacy of the drug.
Lopinavir/Ritonavir	↓Lopinavir	A dose increase of lopinavir/ritonavir to 533/133 mg twice daily with food is recommended in combination with nevirapine.
Methadone	↓ Methadone <sup>a</sup>	Methadone levels may be decreased; increased dosages may be required to prevent symptoms of opiate withdrawal. Methadone maintained patients beginning nevirapine therapy should be monitored for evidence of withdrawal and methadone dose should be adjusted accordingly.

Nelfinavir	↓Nelfinavir M8 Metabolite ↓Nelfinavir Cmin	The appropriate dose for nelfinavir in combination with nevirapine, with respect to safety and efficacy, has not been established.
Rifabutin	↑Rifabutin	Rifabutin and its metabolite concentrations were moderately increased. Due to high intersubject variability, however, some patients may experience large increases in rifabutin exposure and may be at higher risk for rifabutin toxicity. Therefore, caution should be used in concomitant administration.
Rifampin	↓ Nevirapine	Nevirapine and rifampin should not be administered concomitantly because decreases in nevirapine plasma concentrations may reduce the efficacy of the drug. Physicians needing to treat patients co-infected with tuberculosis and using a nevirapine containing regimen may use rifabutin instead.
Saquinavir	↓Saquinavir	Appropriate doses for this combination are not established, but an increase in the dosage of saquinavir may be required.

<sup>a</sup>Based on reports of narcotic withdrawal syndrome in patients treated with nevirapine and methadone concurrently, and evidence of decreased plasma concentrations of methadone.

<b>Table 4</b> <b>Potential Drug Interactions: Use With Caution,</b> <b>Dose Adjustment of Co-administered Drug May Be Needed due to Possible Decrease in Clinical Effect</b>	
<b>Examples of Drugs in Which Plasma Concentrations May Be Decreased By Co-administration With Nevirapine</b>	
<b>Drug Class</b>	<b>Examples of Drugs</b>
Antiarrhythmics	Amiodarone, disopyramide, lidocaine
Anticonvulsants	Carbamazepine, clonazepam, ethosuximide
Antifungals	Itraconazole
Calcium channel blockers	Diltiazem, nifedipine, verapamil
Cancer chemotherapy	Cyclophosphamide
Ergot alkaloids	Ergotamine
Immunosuppressants	Cyclosporin, tacrolimus, sirolimus
Motility agents	Cisapride
Opiate agonists	Fentanyl
<b>Examples of Drugs in Which Plasma Concentrations May Be Increased By Co-administration With Nevirapine</b>	
Antithrombotics	Warfarin Potential effect on anticoagulation. Monitoring of anticoagulation levels is recommended.

**Fat redistribution:** Redistribution/accumulation of body fat including central obesity, dorsocervical fat enlargement (buffalo hump), peripheral wasting, facial wasting, breast enlargement, and “cushingoid appearance” have been observed in patients receiving

antiretroviral therapy. The mechanism and long-term consequences of these events are currently unknown. A causal relationship has not been established.

**Information for Patients:**

**Patients should be informed of the possibility of severe liver disease or skin reactions associated with VIRAMUNE that may result in death. Patients developing signs or symptoms of liver disease or severe skin reactions should be instructed to discontinue VIRAMUNE and seek medical attention immediately, including performance of laboratory monitoring. Symptoms of liver disease include fatigue, malaise, anorexia, nausea, jaundice, acholic stools, liver tenderness or hepatomegaly. Symptoms of severe skin or hypersensitivity reactions include rash accompanied by fever, general malaise, fatigue, muscle or joint aches, blisters, oral lesions, conjunctivitis, facial edema and/or hepatitis.**

Intensive clinical and laboratory monitoring, including liver function tests, is essential during the first 18 weeks of therapy with VIRAMUNE to detect potentially life-threatening hepatotoxicity. However, liver disease can occur after this period, therefore monitoring should continue at frequent intervals throughout VIRAMUNE treatment. Extra vigilance is warranted during the first 6 weeks of therapy, which is the period of greatest risk of hepatic events and skin reactions.

Patients with signs and symptoms of hepatitis should discontinue VIRAMUNE and seek medical evaluation immediately. If VIRAMUNE is discontinued due to hepatitis, it should not be restarted. Patients should be advised that co-infection with hepatitis B or C and/or increased liver function tests at the start of antiretroviral therapy are associated with a greater risk of hepatic events with VIRAMUNE. Patients, particularly women, with increased CD4+ cell count at initiation of VIRAMUNE therapy ( $>250$  cells/mm<sup>3</sup> in women and  $>400$  cells/mm<sup>3</sup> in men) may be at substantially higher risk for development of hepatic events, often associated with rash. (See WARNINGS, *Hepatic Events*)

The majority of rashes associated with VIRAMUNE occur within the first 6 weeks of initiation of therapy. Patients should be instructed that if any rash occurs during the two-week lead-in period, the VIRAMUNE dose should not be escalated until the rash resolves. Any patient experiencing severe rash or hypersensitivity reactions should discontinue VIRAMUNE and consult a physician. VIRAMUNE should not be restarted following severe skin rash or hypersensitivity reaction. Women tend to be at higher risk for development of VIRAMUNE associated rash.

Oral contraceptives and other hormonal methods of birth control should not be used as the sole method of contraception in women taking VIRAMUNE, since nevirapine may lower the plasma levels of these medications. Additionally, when oral contraceptives are used for hormonal regulation during VIRAMUNE therapy, the therapeutic effect of the hormonal therapy should be monitored. (See PRECAUTIONS, *Drug Interactions*)

Patients should be informed that VIRAMUNE therapy has not been shown to reduce the risk of transmission of HIV-1 to others through sexual contact or blood contamination. The long-term effects of VIRAMUNE are unknown at this time.

VIRAMUNE is not a cure for HIV-1 infection; patients may continue to experience illnesses associated with advanced HIV-1 infection, including opportunistic infections. Patients should be advised to remain under the care of a physician when using VIRAMUNE.

Patients should be informed to take VIRAMUNE every day as prescribed. Patients should not alter the dose without consulting their doctor. If a dose is missed, patients should take the next dose as soon as possible. However, if a dose is skipped, the patient should not double the next dose. Patients should be advised to report to their doctor the use of any other medications. Based on the known metabolism of methadone, nevirapine may decrease plasma concentrations of methadone by increasing its hepatic metabolism. Narcotic withdrawal syndrome has been reported in patients treated with VIRAMUNE and methadone concomitantly. Methadone-



maintained patients beginning nevirapine therapy should be monitored for evidence of withdrawal and methadone dose should be adjusted accordingly.

VIRAMUNE may interact with some drugs, therefore, patients should be advised to report to their doctor the use of any other prescription, non-prescription medication or herbal products, particularly St. John's wort.

Patients should be informed that redistribution or accumulation of body fat may occur in patients receiving antiretroviral therapy and that the cause and long term health effects of these conditions are not known at this time.

The Patient Package Insert provides written information for the patient, and should be dispensed with each new prescription and refill.

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

Long-term carcinogenicity studies in mice and rats were carried out with nevirapine. Mice were dosed with 0, 50, 375 or 750 mg/kg/day for two years. Hepatocellular adenomas and carcinomas were increased at all doses in males and at the two high doses in females. In studies in which rats were administered nevirapine at doses of 0, 3.5, 17.5 or 35 mg/kg/day for two years, an increase in hepatocellular adenomas was seen in males at all doses and in females at the high dose. The systemic exposure (based on AUCs) at all doses in the two animal studies were lower than that measured in humans at the 200 mg bid dose. The mechanism of the carcinogenic potential is unknown. However, in genetic toxicology assays, nevirapine showed no evidence of mutagenic or clastogenic activity in a battery of *in vitro* and *in vivo* studies. These included microbial assays for gene mutation (Ames: Salmonella strains and *E. coli*), mammalian cell gene mutation assay (CHO/HGPRT), cytogenetic assays using a Chinese hamster ovary cell line and a mouse bone marrow micronucleus assay following oral administration. Given the lack of genotoxic activity of nevirapine, the relevance to humans of hepatocellular neoplasms in nevirapine treated mice and rats is not known. In reproductive toxicology studies, evidence of impaired fertility was seen in female rats at doses providing systemic exposure, based on AUC, approximately equivalent to that provided with the recommended clinical dose of VIRAMUNE.

***Pregnancy:*** Pregnancy Category C

No observable teratogenicity was detected in reproductive studies performed in pregnant rats and rabbits. In rats, a significant decrease in fetal body weight occurred at doses providing systemic exposure approximately 50% higher, based on AUC, than that seen at the recommended human clinical dose.

The maternal and developmental no-observable-effect level dosages in rats and rabbits produced systemic exposures approximately equivalent to or approximately 50% higher, respectively, than those seen at the recommended daily human dose, based on AUC. There are no adequate and well-controlled studies in pregnant women. VIRAMUNE should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus. Severe hepatic events, including fatalities, have been reported in pregnant women receiving chronic VIRAMUNE therapy as part of combination treatment of HIV infection. It is unclear if pregnancy augments the already increased risk observed in non-pregnant women. (see Boxed WARNING)

***Antiretroviral Pregnancy Registry:***

To monitor maternal-fetal outcomes of pregnant women exposed to VIRAMUNE, an Antiretroviral Pregnancy Registry has been established. Physicians are encouraged to register patients by calling (800) 258-4263.

***Nursing Mothers:***

**The Centers for Disease Control and Prevention recommend that HIV-infected mothers not breast-feed their infants to avoid risking postnatal transmission of HIV. Nevirapine is excreted in breast milk. Because of both the potential for HIV transmission and the**

**potential for serious adverse reactions in nursing infants, mothers should be instructed not to breast-feed if they are receiving VIRAMUNE.**

***Pediatric Use:***

The pharmacokinetics of nevirapine have been studied in two open-label studies in children with HIV-1 infection. (See CLINICAL PHARMACOLOGY, *Pharmacokinetics in Special Populations*) For dose recommendations for pediatric patients see DOSAGE AND ADMINISTRATION. The most frequently reported adverse events related to VIRAMUNE in pediatric patients were similar to those observed in adults, with the exception of granulocytopenia, which was more commonly observed in children. (See ADVERSE REACTIONS, *Pediatric Patients*) The evaluation of the antiviral activity of VIRAMUNE in pediatric patients is ongoing.

***Geriatric Use:***

Clinical studies of VIRAMUNE did not include sufficient numbers of subjects aged 65 and older to determine whether elderly subjects respond differently from younger subjects. In general, dose selection for an elderly patient should be cautious, reflecting the greater frequency of decreased hepatic, renal or cardiac function, and of concomitant disease or other drug therapy.

**ADVERSE REACTIONS**

***Adults:***

Clinical practice has shown that the most serious adverse reactions associated with VIRAMUNE are clinical hepatitis/hepatic failure, Stevens-Johnson syndrome, toxic epidermal necrolysis, and hypersensitivity reactions. Clinical hepatitis/hepatic failure may be isolated or associated with signs of hypersensitivity which may include severe rash or rash accompanied by fever, general malaise, fatigue, muscle or joint aches, blisters, oral lesions, conjunctivitis, facial edema, and/or hepatitis, eosinophilia, granulocytopenia, lymphadenopathy, and renal dysfunction.

Severe and life-threatening hepatotoxicity, and fatal fulminant hepatitis have been reported in patients treated with VIRAMUNE. Hepatic adverse events have been reported to occur more frequently during the first 18 weeks of treatment, but such events may occur at any time during treatment.

In controlled clinical trials, clinical hepatic events regardless of severity occurred in 4.0% (range 2.5% to 11.0%) of patients who received VIRAMUNE and 1.2% of patients in control groups. Transaminase elevations (ALT or AST > 5X ULN) were observed in 8.8% of patients receiving VIRAMUNE and 6.2% of patients in control groups in clinical trials. In a retrospective analysis of controlled and uncontrolled clinical trials, patients with higher CD4 counts at initiation of VIRAMUNE therapy, particularly women, were at greater risk for acute symptomatic hepatic events, including death, especially in the first six weeks of therapy. Patients with chronic hepatitis B or C infection were at higher risk for later hepatic events. (See WARNINGS)

The most common clinical toxicity of VIRAMUNE is rash. Severe or life-threatening rash occurred in approximately 2% of VIRAMUNE-treated patients, most frequently within the first 6 weeks of therapy. (See Table 5) Rashes are usually mild to moderate, maculopapular erythematous cutaneous eruptions, with or without pruritus, located on the trunk, face and extremities. Women tend to be at higher risk for development of VIRAMUNE associated rash.

**Table 5: Risk of Rash (%) in Adult Placebo Controlled Trials <sup>1</sup> – Regardless of Causality**

		<b>VIRAMUNE</b>	<b>Placebo</b>
		n=1374	n=1331
		%	%
<b>Through 6 weeks of treatment<sup>2</sup></b>			
Rash events of all grades <sup>3</sup>		14.8	5.9
Grade 1	Erythema, pruritus	8.5	4.2
Grade 2	Diffuse maculopapular rash, dry desquamation	4.8	1.6
Grade 3 or 4	Grade 3: vesiculation, moist desquamation, ulceration; Grade 4: erythema multiforme, Stevens Johnson syndrome, toxic epidermal necrolysis, necrosis requiring surgery, exfoliative dermatitis	1.5	0.1
<b>Through 52 weeks of treatment<sup>2</sup></b>			
Rash events of all grades <sup>3</sup>		24.0	14.9
Grade 1	See above	15.5	10.8
Grade 2	See above	7.1	3.9
Grade 3 or 4	See above	1.7	0.2
<b>Proportion of Patients who Discontinued Treatment Due to Rash</b>			
		4.3	1.2

<sup>1</sup> Trials 1037, 1038, 1046 and 1090

<sup>2</sup> % based on Kaplan-Meier probability estimates

<sup>3</sup> NCI grading system

Treatment related, adverse experiences of moderate or severe intensity observed in >2% of patients receiving VIRAMUNE in placebo-controlled trials are shown in Table 6.

**Table 6: Percentage of Patients with Moderate or Severe Drug Related Events in Adult Placebo Controlled Trials**

	Trial 1090 <sup>1</sup>		Trials 1037, 1038, 1046 <sup>2</sup>	
	<b>VIRAMUNE</b> (n=1121)	<b>Placebo</b> (n=1128)	<b>VIRAMUNE</b> (n=253)	<b>Placebo</b> (n=203)
Median exposure (weeks)	58	52	28	28
Any adverse event	14.5%	11.1%	31.6%	13.3%
Rash	5.1	1.8	6.7	1.5
Abnormal LFTs	1.2	0.9	6.7	1.5
Nausea	0.5	1.1	8.7	3.9
Granulocytopenia	1.8	2.8	0.4	0
Headache	0.7	0.4	3.6	0.5
Fatigue	0.2	0.3	4.7	3.9
Diarrhea	0.2	0.8	2.0	0.5
Abdominal pain	0.1	0.4	2.0	0
Myalgia	0.2	0	1.2	2.0

<sup>1</sup> Background therapy included 3TC for all patients and combinations of NRTIs and PIs. Patients had CD4+ cell counts <200 cells/mm<sup>3</sup>.

<sup>2</sup> Background therapy included ZDV and ZDV+ddi; VIRAMUNE monotherapy was administered in some patients. Patients had CD4+ cell count ≥200 cells/mm<sup>3</sup>.

**Laboratory Abnormalities:** Liver function test abnormalities (AST, ALT) were observed more frequently in patients receiving VIRAMUNE than in controls. (Table 7) Asymptomatic elevations in GGT occur frequently but are not a contraindication to continue VIRAMUNE therapy in the

absence of elevations in other liver function tests. Other laboratory abnormalities (bilirubin, anemia, neutropenia, thrombocytopenia) were observed with similar frequencies in clinical trials comparing VIRAMUNE and control regimens. (See Table 7)

**Table 7: Percentage of Adult Patients with Laboratory Abnormalities**

Laboratory Abnormality	Trial 1090 <sup>1</sup>		Trials 1037, 1038, 1046 <sup>2</sup>	
	VIRAMUNE n=1121	Placebo n=1128	VIRAMUNE n=253	Placebo n=203
<b>Blood Chemistry</b>				
SGPT (ALT) >250 U/L	5.3%	4.4%	14.0%	4.0%
SGOT (AST) >250 U/L	3.7	2.5	7.6	1.5
Bilirubin >2.5 mg/dL	1.7	2.2	1.7	1.5
<b>Hematology</b>				
Hemoglobin <8.0 g/dL	3.2	4.1	0	0
Platelets <50,000/mm <sup>3</sup>	1.3	1.0	0.4	1.5
Neutrophils <750/mm <sup>3</sup>	13.3	13.5	3.6	1.0

<sup>1</sup> Background therapy included 3TC for all patients and combinations of NRTIs and PIs. Patients had CD4+ cell counts <200 cells/mm<sup>3</sup>.

<sup>2</sup> Background therapy included ZDV and ZDV+ddi; VIRAMUNE monotherapy was administered in some patients. Patients had CD4+ cell count ≥200 cells/mm<sup>3</sup>.

Because clinical hepatitis has been reported in VIRAMUNE-treated patients, intensive clinical and laboratory monitoring, including liver function tests, is essential at baseline and during the first 18 weeks of treatment. Monitoring should continue at frequent intervals thereafter, depending on the patient's clinical status. (See WARNINGS)

**Post Marketing Surveillance:** In addition to the adverse events identified during clinical trials, the following events have been reported with the use of VIRAMUNE in clinical practice:

Body as a Whole: fever, somnolence, drug withdrawal (See PRECAUTIONS: *Drug Interactions*), redistribution/accumulation of body fat (see PRECAUTIONS, Fat redistribution).

Gastrointestinal: vomiting

Liver and Biliary: jaundice, fulminant and cholestatic hepatitis, hepatic necrosis, hepatic failure

Hematology: anemia, eosinophilia, neutropenia

Musculoskeletal: arthralgia

Neurologic: paraesthesia

Skin and Appendages: allergic reactions including anaphylaxis, angioedema, bullous eruptions, ulcerative stomatitis and urticaria have all been reported. In addition, hypersensitivity syndrome and hypersensitivity reactions with rash associated with constitutional findings such as fever, blistering, oral lesions, conjunctivitis, facial edema, muscle or joint aches, general malaise, fatigue or significant hepatic abnormalities (See WARNINGS) plus one or more of the following: hepatitis, eosinophilia, granulocytopenia, lymphadenopathy and/or renal dysfunction have been reported with the use of VIRAMUNE.

**Pediatric Patients:**

Safety was assessed in trial BI 882 in which patients were followed for a mean duration of 33.9 months (range: 6.8 months to 5.3 years, including long-term follow-up in 29 of these patients in trial BI 892). The most frequently reported adverse events related to VIRAMUNE in pediatric patients were similar to those observed in adults, with the exception of granulocytopenia, which was more commonly observed in children. Serious adverse events were assessed in ACTG 245, a double-blind, placebo-controlled trial of VIRAMUNE (n = 305) in which pediatric patients received combination treatment with VIRAMUNE. In this trial two patients were reported to

experience Stevens-Johnson syndrome or Stevens-Johnson/toxic epidermal necrolysis transition syndrome. Cases of allergic reaction, including one case of anaphylaxis, were also reported.

Table 8 summarizes the marked laboratory abnormalities occurring in pediatric patients in Trial BI 882 and in follow-up Trial BI 892.

**Table 8: Number of Pediatric Patients (%) with Laboratory Abnormalities In Trials BI 882 and BI 892 Combined**

	No. (%) of Patients n=37
<b>Blood Chemistry</b>	
Increased ALT (>250 U/L)	4 (11)
Increased AST (>250 U/L)	5 (14)
Increased GGT (>450 U/L)	4 (11)
Increased total bilirubin (>2.5 mg/dL)	1 (3)
Increased alkaline phosphatase (>2x ULN)	19 (51)
Increased amylase (>2x ULN)	6 (16)
<b>Hematology</b>	
Decreased Hg (<8.0 g/dL)	7 (19)
Decreased platelets (<50,000/mm <sup>3</sup> )	4 (11)
Decreased neutrophils (<750/mm <sup>3</sup> )	14 (38)
Increased MCV (>100 F/L)	13 (35)

## OVERDOSAGE

There is no known antidote for VIRAMUNE overdosage. Cases of VIRAMUNE overdose at doses ranging from 800 to 1800 mg per day for up to 15 days have been reported. Patients have experienced events including edema, erythema nodosum, fatigue, fever, headache, insomnia, nausea, pulmonary infiltrates, rash, vertigo, vomiting and weight decrease. All events subsided following discontinuation of VIRAMUNE.

## DOSAGE AND ADMINISTRATION

### **Adults:**

The recommended dose for VIRAMUNE is one 200 mg tablet daily for the first 14 days (**this lead-in period should be used because it has been found to lessen the frequency of rash**), followed by one 200 mg tablet twice daily, in combination with other antiretroviral agents. For concomitantly administered antiretroviral therapy, the manufacturer's recommended dosage and monitoring should be followed.

### **Pediatric Patients:**

The recommended oral dose of VIRAMUNE for pediatric patients 2 months up to 8 years of age is 4 mg/kg once daily for the first 14 days followed by 7 mg/kg twice daily thereafter. For patients 8 years and older the recommended dose is 4 mg/kg once daily for two weeks followed by 4 mg/kg twice daily thereafter. The total daily dose should not exceed 400 mg for any patient.

VIRAMUNE suspension should be shaken gently prior to administration. It is important to administer the entire measured dose of suspension by using an oral dosing syringe or dosing cup. An oral dosing syringe is recommended, particularly for volumes of 5 mL or less. If a dosing cup is used, it should be thoroughly rinsed with water and the rinse should also be administered to the patient.

**Monitoring of Patients:**

Intensive clinical and laboratory monitoring, including liver function tests, is essential at baseline and during the first 18 weeks of treatment with VIRAMUNE. The optimal frequency of monitoring during this period has not been established. Some experts recommend clinical and laboratory monitoring more often than once per month, and in particular, would include monitoring of liver function tests at baseline, prior to dose escalation, and at two weeks post dose escalation. After the initial 18 week period, frequent clinical and laboratory monitoring should continue throughout VIRAMUNE treatment. (See WARNINGS) In some cases, hepatic injury has progressed despite discontinuation of treatment.

**Dosage Adjustment:**

**VIRAMUNE should be discontinued if patients experience severe rash or a rash accompanied by constitutional findings. (See WARNINGS) Patients experiencing rash during the 14-day lead-in period of 200 mg/day (4 mg/kg/day in pediatric patients) should not have their VIRAMUNE dose increased until the rash has resolved. (See PRECAUTIONS, Information for Patients)**

**If clinical hepatitis occurs, VIRAMUNE should be permanently discontinued and not restarted after recovery.**

Patients who interrupt VIRAMUNE dosing for more than 7 days should restart the recommended dosing, using one 200 mg tablet daily (4 mg/kg/day in pediatric patients) for the first 14 days (lead-in) followed by one 200 mg tablet twice daily (4 or 7 mg/kg twice daily, according to age, for pediatric patients).

An additional 200 mg dose of VIRAMUNE following each dialysis treatment is indicated in patients requiring dialysis. Nevirapine metabolites may accumulate in patients receiving dialysis; however, the clinical significance of this accumulation is not known. (See CLINICAL PHARMACOLOGY, *Pharmacokinetics in Special Populations: Renal Impairment*) Patients with CrCL  $\geq$ 20 mL/min do not require an adjustment in VIRAMUNE dosing.

**HOW SUPPLIED**

**VIRAMUNE (nevirapine) Tablets**, 200 mg, are white, oval, biconvex tablets, 9.3 mm x 19.1 mm. One side is embossed with "54 193", with a single bisect separating the "54" and "193". The opposite side has a single bisect.

VIRAMUNE Tablets are supplied in bottles of 60 (NDC 0597-0046-60).

**VIRAMUNE (nevirapine) Oral Suspension** is a white to off-white preserved suspension containing 50 mg nevirapine (as nevirapine hemihydrate) in each 5 mL. VIRAMUNE suspension is supplied in plastic bottles with child-resistant closures containing 240 mL of suspension (NDC 0597-0047-24).

**VIRAMUNE Tablets and VIRAMUNE Oral Suspension should be stored at 25°C (77°F); excursions permitted to 15°–30°C (59°F–86°F).** [see USP Controlled Room Temperature]. Store in a safe place out of the reach of children.

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# Viramune® (nevirapine) Tablets



# Viramune® (nevirapine) Oral Suspension

Rx Only

## Patient Information about VIRAMUNE® for HIV (Human Immunodeficiency Virus) Infection

Read this information before you start taking VIRAMUNE (VIH-rah-mune). Read it again each time you refill your prescription. There may be new information. This leaflet does not take the place of talking with your doctor. You and your doctor should discuss VIRAMUNE when you start taking your medicine and at regular checkups. You should stay under a doctor's care when using VIRAMUNE. Do not change treatment or stop treatment without first talking to your doctor.

### What is VIRAMUNE?

VIRAMUNE is a medicine to treat Human Immunodeficiency Virus (HIV), the virus that causes AIDS (Acquired Immune Deficiency Syndrome).

VIRAMUNE is a type of anti-HIV medicine called a "non-nucleoside reverse transcriptase inhibitor" (NNRTI). It works by lowering the amount of HIV in the blood ("viral load"). You must take VIRAMUNE with other anti-HIV medicines. When taken with other anti-HIV medicines, VIRAMUNE can reduce viral load and increase the number of CD4 cells. CD4 is a type of immune helper cell in the blood. VIRAMUNE may not have these effects in every patient.

VIRAMUNE does not cure HIV or AIDS, and it is not known if it will help you live longer with HIV. People taking VIRAMUNE may still get infections common in people with HIV (opportunistic infections). Therefore, it is very important that you stay under the care of your doctor.

VIRAMUNE has not been shown to reduce the risk of passing HIV to others through sexual contact or blood contamination. Therefore, do not share needles, avoid blood contacts, and practice safe sex by using condoms.

### What is the most important information I should know about VIRAMUNE?

**Patients taking VIRAMUNE may develop severe liver disease or skin reactions that can cause death.** The risk of these reactions is greatest during the first 18 weeks of treatment, but these reactions also can occur later. Your doctor should check you and do liver function tests (blood tests) often in the first 18 weeks of therapy. Checks for liver problems should continue regularly during your therapy. Patients with higher liver function tests and patients with hepatitis B or C have a greater chance of liver damage while taking VIRAMUNE. Women and patients with higher CD4 counts seem to have a greater chance of developing liver damage, often accompanied by a rash, while taking VIRAMUNE. Women with higher CD4 counts are at the greatest risk of these events.

In rare cases, liver problems have led to liver failure, which can lead to liver transplants or death. **Therefore, if you develop any of the following symptoms of liver problems, stop taking VIRAMUNE and call your doctor right away:**

- general ill feeling or “flu-like” symptoms
- tiredness
- nausea (feeling sick to your stomach)
- lack of appetite
- yellowing skin or whites of your eyes
- dark urine
- pale stools (bowel movements)
- pain, ache, or sensitivity to touch on your right side below your ribs

**VIRAMUNE can cause serious skin rash.** Skin rash is the most common side effect of VIRAMUNE. Most rashes occur in the first 6 weeks of treatment. In a small number of patients, rash can be serious and result in death. Therefore, **if you develop a rash with any of the following symptoms, stop using VIRAMUNE and call your doctor right away:**

- general ill feeling or “flu-like” symptoms
- fever
- muscle or joint aches
- tiredness
- conjunctivitis (red or inflamed eyelids, like “pink eye”)
- blisters
- mouth sores
- swelling of your face

If your doctor tells you to stop treatment with VIRAMUNE because you have these types of serious reactions, never take VIRAMUNE again.

Changes in body fat have been seen in some patients taking antiretroviral therapy. These changes may include increased amount of fat in the upper back and neck (“buffalo hump”), breast, and around the trunk. Loss of fat from the legs, arms and face may also happen. The cause and long term health effects of these conditions are not known at this time.

These are not all the side effects of VIRAMUNE. Your doctor or pharmacist can give you a complete list.

Tell your doctor if you have any side effects from VIRAMUNE. Some side effects can be dangerous.

#### **Who should not take VIRAMUNE?**

- Do not take VIRAMUNE if you are allergic to VIRAMUNE or any of its ingredients. The active ingredient is nevirapine. Your doctor or pharmacist can tell you about the inactive ingredients.
- Do not restart VIRAMUNE after you recover from serious liver or skin reactions that happened when you took VIRAMUNE.
- Do not take VIRAMUNE if you take certain medicines (See “Can I take other medicines with VIRAMUNE?” for a list of medicines.)

Your doctor needs to know certain information about you before deciding if VIRAMUNE is right for you. Tell your doctor if you:

- have problems with your liver, have had hepatitis, or are undergoing dialysis
- have skin conditions, such as rash
- are pregnant or want to become pregnant
- are breast-feeding

#### **Can I take other medicines with VIRAMUNE?**

- VIRAMUNE may change the effect of other medicines, including ones for HIV. Some medicines and products can change the effect of VIRAMUNE. Therefore, your doctor may change your medicines or change their doses. For this reason, it is very important to:
  - Let all your doctors and pharmacists know that you take VIRAMUNE.
  - Tell your doctors and pharmacists about **all** medicines and supplements you take. This includes non-prescription medicines and herbal or natural remedies, such as St. John’s wort.
- Do **not** take Nizoral (ketoconazole) with VIRAMUNE.



- Tell your doctor if you take rifampin, rifabutin or fluconazole. VIRAMUNE may not be right for you, or you may need careful monitoring.
- It is recommended that you not take St. John's wort or products containing St. John's wort. St. John's wort can reduce the amount of VIRAMUNE® in your body so the medicine will not work well, and your virus may develop resistance to anti-HIV medicines.
- If you take birth control pills, you should not rely on them to prevent pregnancy. They may not work if you take VIRAMUNE. Talk with your doctor about other types of birth control that you can use.

Bring all your medicines when you see your doctor, or make a list of the names of the medicines, how much you take, and how often you take them. This will give your doctor a complete picture of the medicines you use. Then he or she can decide the best approach for your situation.

### How should I take VIRAMUNE?

- You must be taking other anti-HIV medicines when you take VIRAMUNE. If you take only VIRAMUNE, your HIV virus may develop resistance, and anti-HIV medicines may not work for you.
- The usual dose of VIRAMUNE for adults is one 200 mg tablet daily for the first 14 days, followed by one 200 mg tablet twice daily. Starting with one dose a day lowers the chance of rash, which could be serious. Therefore, it is important to strictly follow the once daily dose for the first 14 days. Do not start taking VIRAMUNE twice a day if you have any symptoms of liver problems or skin rash. (See the first section "What is the most important information I should know about VIRAMUNE?")
- The dose of VIRAMUNE for children is based on their age and weight. Children's dosing also starts with once a day for 14 days and then twice a day after that.
- You may take VIRAMUNE with water, milk, or soda, with or without meals.
- If you or your child uses VIRAMUNE suspension (liquid), shake it gently before use. Use an oral dosing syringe or dosing cup to measure the right dose. After drinking the medicine, rinse the dosing cup with water and drink the rinse to make sure you get all the medicine. If the dose is less than 5 mL (one teaspoon), use the syringe.
- Take the exact amount of VIRAMUNE your doctor prescribes. Never change the dose on your own. Talk to your doctor before stopping VIRAMUNE. **If you have any symptoms of liver problems, or develop a rash with symptoms, stop taking VIRAMUNE and call your doctor right away.** See "What is the most important information I should know about VIRAMUNE?" for a list of symptoms to report.
- When your VIRAMUNE supply starts to run low, get more from your doctor or pharmacy. The amount of virus in your blood may increase if the medicine is stopped for even a short time. If you miss or lower the dose of VIRAMUNE, it and other anti-HIV medicines may lose power to control the virus.
- Do not miss a dose of VIRAMUNE. If you forget to take VIRAMUNE, take the missed dose right away. If it is almost time for your next dose, do not take the missed dose. Instead, follow your regular dosing schedule by taking the next dose at its regular time. If you need help planning the best times to take your medicine, ask your doctor or pharmacist.
- If you stop taking VIRAMUNE for more than 7 days, before you start taking it again, ask your doctor how much to take. You may need to start with a once-a-day dose.
- If you suspect that too much VIRAMUNE has been taken, contact your local poison control center or emergency room right away.
- Tell your doctor if you start a new medicine or change any other medicine you take. Your doses of these medications may need to be changed.
- Before you take VIRAMUNE and while you take it, your doctor will check you often for serious side effects. These checks will be done most often in the first 18 weeks of treatment.

**What should I avoid while taking VIRAMUNE?**

- Avoid getting pregnant while taking VIRAMUNE. Use condoms to prevent pregnancy, as VIRAMUNE may reduce the effectiveness of birth control pills. Do not rely on birth control pills to prevent pregnancy if you are taking VIRAMUNE. However, you may use birth control pills for purposes other than birth control. Tell your doctor right away if you become pregnant.
- The Centers for Disease Control and Prevention advises mothers with HIV not to breast feed so they will not pass HIV to the infant through their milk. Also, the medicine in VIRAMUNE can pass to the baby through your milk and may harm the infant. Ask your doctor about the best way to feed your infant.

**How should I store VIRAMUNE?**

VIRAMUNE is available as 200 mg tablets or as oral suspension (liquid). Keep VIRAMUNE at room temperature (59° to 86° F) in the bottle given to you by your pharmacist. Keep VIRAMUNE out of the reach of children.

**General advice about VIRAMUNE**

Medicines are sometimes prescribed for conditions that are not mentioned in patient information leaflets. Do not use VIRAMUNE for a condition for which it was not prescribed. Do not give VIRAMUNE to other people, even if they have the same condition you have. It may harm them.

This leaflet summarizes the most important information about VIRAMUNE. If you would like more information, talk with your doctor. You can ask your pharmacist or doctor for information about VIRAMUNE that is written for health professionals.

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