

PRODUCT MONOGRAPH

EMEND[®]

aprepitant capsules

80 and 125 mg

Neurokinin 1 (NK₁) receptor antagonist

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Date of Revision:
January 22, 2014

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Submission Control No: 168159 and internal filing March 05, 2018

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EMEND®

aprepitant capsules

PART I: HEALTH PROFESSIONAL INFORMATION

SUMMARY PRODUCT INFORMATION

Route of Administration	Dosage Form / Strength	Clinically Relevant Non-Medicinal Ingredients
oral	Capsule/ 80 mg, 125 mg	<i>For a complete listing see DOSAGE FORMS, COMPOSITION AND PACKAGING section.</i>

INDICATIONS AND CLINICAL USE

EMEND® (aprepitant), in combination with a 5-HT₃ antagonist class of antiemetics and dexamethasone, is indicated for the:

1. prevention of acute and delayed nausea and vomiting due to highly emetogenic cancer chemotherapy
2. prevention of nausea and vomiting in women due to treatment with moderately emetogenic cancer chemotherapy.

Geriatrics (≥65 years of age): In clinical studies, the efficacy and safety of EMEND® in the elderly (≥65 years) were comparable to those seen in younger patients (<65 years). No dosage adjustment is necessary in elderly patients.

Pediatrics (<18 years of age): No data available.

CONTRAINDICATIONS

- Patients who are hypersensitive to this drug or to any ingredient in the formulation. For a complete listing, see the DOSAGE FORMS, COMPOSITION AND PACKAGING section of the product monograph.
- EMEND® should not be used concurrently with pimozide, terfenadine, astemizole, or cisapride. Inhibition of cytochrome P450 isoenzyme 3A4 (CYP3A4) by aprepitant could result in elevated plasma concentrations of these drugs, potentially causing serious or life-threatening reactions (see DRUG INTERACTIONS).

WARNINGS AND PRECAUTIONS

Serious Warnings and Precautions

Drug interactions with:

- Medicinal products, including chemotherapeutic agents, that are metabolized through CYP3A4 (see DRUG INTERACTIONS)
- Warfarin (see DRUG INTERACTIONS)
- Hormonal contraception (see DRUG INTERACTIONS)

Drug Interactions

CYP3A4 substrates: EMEND[®] is a moderate inhibitor of CYP3A4. Caution should be used when EMEND[®] is co-administered with CYP3A4 substrates, including chemotherapeutic agents (see DRUG INTERACTIONS).

Serious post-marketing reports of neurotoxicity, a potential adverse reaction of ifosfamide, have been reported in patients after EMEND[®] and ifosfamide co-administration. Caution and careful monitoring are advised. Refer to IFEX (ifosfamide for injection) product monograph. (see ADVERSE REACTIONS / Post-Market Adverse Drug Reactions and DRUG INTERACTIONS).

Warfarin: Co-administration of EMEND[®] with warfarin may cause a clinically significant decrease in the INR. In patients on chronic warfarin therapy, the INR should be closely monitored in the 2-week period, particularly at 7 to 10 days, following initiation of the 3-day regimen of EMEND[®] with each chemotherapy cycle (see DRUG INTERACTIONS).

Hormonal contraception: EMEND[®] may reduce the efficacy of hormonal contraception. Alternative or backup methods should be used during and for 1 month following the last dose of EMEND[®] (see DRUG INTERACTIONS).

Special Populations

Pregnant Women: Reproductive studies have been performed in rats and rabbits at doses up to 1.5 times the systemic exposure at the adult human dose and have revealed no evidence of impaired fertility or harm to the fetus due to aprepitant. However, there are no adequate and well-controlled studies in pregnant women; therefore, EMEND[®] is not recommended for use during pregnancy unless clearly necessary.

Nursing Women: Aprepitant is excreted in the milk of lactating rats. It is not known whether this drug is excreted in human milk; therefore, breastfeeding is not recommended during treatment with EMEND[®].

Pediatrics (<18 years of age): Safety and effectiveness of EMEND[®] in pediatric patients have not been established.

Geriatrics (≥ 65 years of age): In 2 well-controlled clinical studies, of the total number of patients (N=544) treated with EMEND[®], 31% were 65 and over, while 5% were 75 and over. No overall differences in safety or effectiveness were observed between these subjects and younger subjects. Greater sensitivity of some older individuals cannot be ruled out. Dosage adjustment in the elderly is not necessary.

ADVERSE REACTIONS

Clinical Trial Adverse Experiences

The overall safety of aprepitant was evaluated in approximately 6500 individuals.

Highly Emetogenic Chemotherapy (HEC)

In 2 well-controlled clinical trials in patients receiving cisplatin-based chemotherapy, 544 patients were treated with aprepitant during Cycle 1 of chemotherapy and 413 of these patients continued into the Multiple-Cycle extension for up to 6 cycles of chemotherapy. EMEND[®] was given in combination with ondansetron and dexamethasone and was generally well tolerated. Most adverse experiences reported in these clinical studies were described as mild to moderate in intensity.

In Cycle 1, clinical adverse experiences were reported in approximately 74% of patients treated with the aprepitant regimen compared with approximately 72% of patients treated with standard therapy. Table 1 shows the percent of patients with clinical adverse experiences reported at an incidence $\geq 3\%$.

Table 1 – All adverse experiences, regardless of causality (incidence $\geq 3\%$), occurring in patients receiving highly emetogenic chemotherapy who were treated with the aprepitant regimen for chemotherapy induced nausea and vomiting (CINV) in clinical studies (cycle 1)

	Aprepitant Regimen N=544 %	Standard Therapy N=550 %
General Disorders and Administration Site Conditions		
Asthenia	10.1	7.1
Fatigue	8.8	5.8
Pyrexia	2.4	3.1
Gastrointestinal Disorders		
Abdominal Pain	4.2	3.1
Abdominal Pain Upper	3.7	3.3
Constipation	10.8	12.7
Diarrhea	10.3	7.5
Dyspepsia	8.3	6.9
Gastritis	3.9	2.9
Nausea	12.7	11.8
Stomatitis	2.2	3.1
Vomiting	7.5	7.5
Ear and Labyrinth Disorders		
Tinnitus	3.7	3.6
Metabolism and Nutrition Disorders		
Decreased appetite	11.8	10.0
Dehydration	5.5	4.7
Nervous System Disorders		
Dizziness	6.3	4.4
Headache	8.3	8.4
Psychiatric Disorders		
Insomnia	2.9	3.1
Respiratory, Thoracic and Mediastinal Disorders		
Hiccups	10.8	5.6

In addition, isolated cases of serious adverse experiences, regardless of causality, of bradycardia, disorientation, and perforating duodenal ulcer were reported in highly emetogenic CINV clinical studies.

Moderately Emetogenic Chemotherapy (MEC)

During Cycle 1 of 2 moderately emetogenic chemotherapy studies, 868 patients were treated with the aprepitant regimen and 686 of these patients continued into extensions for up to 4 cycles of chemotherapy. In the combined analysis of Cycle 1 data for these 2 studies, adverse experiences were reported in approximately 69% of patients treated with the aprepitant regimen compared with approximately 72% of patients treated with standard therapy.

In the combined analysis of Cycle 1 data for these 2 studies, the adverse experience profile in both moderately emetogenic chemotherapy studies was generally comparable to the highly emetogenic chemotherapy studies. Table 2 shows the percent of patients with clinical adverse experiences reported at an incidence $\geq 3\%$.

Table 2 – All adverse experiences, regardless of causality (incidence $\geq 3\%$), occurring in patients receiving moderately emetogenic chemotherapy who were treated with the aprepitant regimen for CINV in clinical studies (cycle 1)

	Aprepitant Regimen	Standard Therapy
	N=868 %	N=846 %
Blood and Lymphatic System Disorders		
Neutropenia	5.8	5.6
Metabolism and Nutrition Disorders		
Decreased appetite	7.6	8.5
Psychiatric Disorders		
Insomnia	2.6	3.7
Nervous System Disorders		
Dizziness	2.8	3.4
Headache	13.2	14.3
Gastrointestinal Disorders		
Constipation	10.3	15.5
Diarrhea	7.9	8.9
Dyspepsia	5.8	3.8
Nausea	5.8	5.1
Stomatitis	3.1	2.7
Skin and Subcutaneous Tissue Disorders		
Alopecia	12.4	11.9
General Disorders and General Administration Site Conditions		
Asthenia	4.7	4.6
Fatigue	15.4	15.6

In a combined analysis of these two studies, isolated cases of serious adverse experiences were similar in the two treatment groups.

Additional Clinical Trial Adverse Experiences (>0.5% and greater than standard therapy), Regardless of Causality, Occurring in Patients Receiving Highly and Moderately Emetogenic Chemotherapy

Blood and lymphatic system disorders: anemia, febrile neutropenia, neutropenia, thrombocytopenia.

Cardiac disorders: myocardial infarction, palpitations, tachycardia.

Eye disorders: conjunctivitis.

Gastrointestinal disorders: dry mouth, dysphagia, epigastric discomfort, eructation, flatulence, gastroesophageal reflux disease, odynophagia, salivary hypersecretion.

General disorders and administrative site conditions: chest pain, edema peripheral, malaise, pain.

Infections and infestations: oral candidiasis, pharyngitis, septic shock.

Investigations: weight decreased.

Metabolism and nutrition disorders: diabetes mellitus, hypokalemia.

Musculoskeletal and connective tissue disorders: musculoskeletal pain.

Nervous system disorders: dysgeusia, peripheral neuropathy, peripheral sensory neuropathy.

Psychiatric disorders: anxiety, confusion, depression.

Renal and urinary disorders: dysuria, renal insufficiency.

Respiratory, thoracic and mediastinal disorders: cough, dyspnea, oropharyngeal pain, pneumonitis, pulmonary embolism, respiratory insufficiency, vocal disturbance.

Skin and subcutaneous tissue disorders: hyperhidrosis, acne, rash.

Vascular disorders: deep venous thrombosis, flushing, hot flush, hypertension, hypotension.

Other Clinical Trials

Stevens-Johnson syndrome was reported as a serious adverse experience in a patient receiving aprepitant with cancer chemotherapy in another CINV study.

Abnormal Hematologic and Clinical Chemistry Findings

Table 3 shows the percent of patients with laboratory adverse experiences reported at an incidence $\geq 3\%$ in patients receiving highly emetogenic chemotherapy.

Table 3 – All laboratory abnormalities, regardless of causality (incidence $\geq 3\%$), occurring in patients receiving highly emetogenic chemotherapy who were treated with the aprepitant regimen for CINV in clinical studies (cycle 1)

	Aprepitant Regimen N=544 %	Standard Therapy N=550 %
ALT increased	5.9	3.8
Blood urea increased	4.6	3.5
Blood creatinine increased	3.7	3.8
Protein urine present	6.1	4.5

Table 4 shows the percent of patients with laboratory adverse experiences reported at an incidence $\geq 3\%$ in patients receiving moderately emetogenic chemotherapy.

Table 4 – Percent of Patients Receiving Moderately Emetogenic Chemotherapy with Laboratory Adverse Experiences (Incidence $\geq 3\%$) – Cycle 1

	Aprepitant Regimen (N=868)	Standard Therapy (N=846)
Neutrophil Count Decreased	4.6	4.6
White Blood Cell Count Decreased	5.1	4.7

Other Abnormal Hematological and Clinical Chemistry Findings Observed in Clinical Trials

The following additional laboratory adverse experiences, regardless of causality, were reported in patients treated with aprepitant regimen: AST increased, blood alkaline phosphatase increased, blood glucose increased, blood sodium decreased, white blood cell count increased, red blood cell urine positive, white blood cell urine positive. The adverse experiences of increased AST and ALT were generally mild and transient.

The adverse experience profiles in the Multiple-Cycle extensions of Highly and Moderately Emetogenic Chemotherapy studies for up to 6 cycles of chemotherapy were generally similar to those observed in Cycle 1.

Post-Market Adverse Drug Reactions

Regardless of causality with EMEND[®], the following adverse events have been reported rarely or very rarely and occur with multiple confounding factors: loss of consciousness, depressed level of consciousness, convulsion, somnolence, paresthesia, syndrome of inappropriate antidiuretic hormone, hallucination, pruritus, rash, urticaria, Stevens-Johnson syndrome/toxic epidermal necrolysis, and hypersensitivity reactions including anaphylactic reactions.

Serious post-marketing events of neurotoxicity, a potential adverse reaction of ifosfamide, have been reported after oral aprepitant and ifosfamide co-administration, including acute psychosis, encephalopathy, toxic encephalopathy, delirium, convulsion, decreased level of consciousness and hallucination (see DRUG INTERACTIONS).

DRUG INTERACTIONS

Serious Drug Interactions

- EMEND[®] should be used with caution in patients receiving concomitant medicinal products that are primarily metabolized through CYP3A4 and CYP2C9, including chemotherapy agents. Inhibition of CYP3A4 by aprepitant could result in elevated plasma concentrations of these concomitant medicinal products. Induction of CYP2C9 by aprepitant could result in decreased plasma concentrations of these concomitant medicinal products (see **CONTRAINDICATIONS** and **Drug-Drug Interactions** below).
- The effect of EMEND[®] on the pharmacokinetics of orally administered CYP3A4 substrates is greater than the effect of EMEND[®] on the pharmacokinetics of intravenously administered CYP3A4 substrates.
- Coadministration of EMEND[®] with warfarin results in decreased prothrombin time, reported as International Normalized Ratio (INR). In patients on chronic warfarin therapy, the prothrombin time (INR) should be closely monitored in the 2-week period, particularly at 7 to 10 days, following initiation of the 3-day regimen of EMEND[®] with each chemotherapy cycle (see **Drug-Drug Interactions** below).
- The efficacy of hormonal contraceptives during and for 28 days after administration of EMEND[®] may be reduced. Alternative or back-up methods of contraception should be used during treatment with EMEND[®] and for 1 month following the last dose of EMEND[®] (see **Drug-Drug Interactions** below).

Overview

Aprepitant is a substrate, a moderate inhibitor, and an inducer of CYP3A4. Aprepitant is also an inducer of CYP2C9.

Chronic continuous use of EMEND[®] is not recommended because it has not been studied and because the drug interaction profile may change during chronic dosing.

Effect of aprepitant on the pharmacokinetics of other agents

As a moderate inhibitor of CYP3A4, aprepitant can increase plasma concentrations of coadministered medicinal products that are metabolized through CYP3A4. EMEND[®] may increase the plasma concentration of orally administered CYP3A4 substrates to a greater extent than if the substrate was administered intravenously.

Aprepitant has been shown to induce the metabolism of S(-) warfarin and tolbutamide, which are metabolized through CYP2C9. Coadministration of EMEND[®] with these drugs or other drugs that are known to be metabolized by CYP2C9, such as phenytoin, may result in lower plasma concentrations of these drugs.

Effect of other agents on the pharmacokinetics of aprepitant

Aprepitant is a substrate for CYP3A4; therefore, coadministration of EMEND[®] with drugs that inhibit CYP3A4 activity may result in increased plasma concentrations of aprepitant. Consequently, concomitant administration of EMEND[®] with strong CYP3A4 inhibitors (e.g., ketoconazole, itraconazole, nefazodone, troleandomycin, clarithromycin, ritonavir, nelfinavir) should be approached cautiously. Moderate CYP3A4 inhibitors (e.g., diltiazem) resulted in a 2-fold increase in plasma concentrations of aprepitant; therefore, concomitant administration should also be approached with caution.

Aprepitant is a substrate for CYP3A4; therefore, coadministration of EMEND[®] with drugs that strongly induce CYP3A4 activity (e.g., rifampin, carbamazepine, phenytoin) may result in reduced plasma concentrations of aprepitant that may result in decreased efficacy of EMEND[®].

Drug-Drug Interactions

Chemotherapeutic agents: Chemotherapy agents that are known to be metabolized by CYP3A4 include docetaxel, paclitaxel, etoposide, irinotecan, ifosfamide, imatinib, vinorelbine, vinblastine and vincristine. In clinical studies, EMEND[®] was administered commonly with etoposide, vinorelbine, paclitaxel and cyclophosphamide. The doses of these agents were not adjusted to account for potential drug interactions.

In separate pharmacokinetic studies, EMEND[®] did not influence the pharmacokinetics of IV administered vinorelbine or docetaxel. However, EMEND[®] may increase the plasma concentration of oral CYP3A4 substrates to a greater extent than if the substrates were administered intravenously. No additional drug-drug interaction studies with chemotherapeutic agents metabolized by CYP3A4 were carried out.

Serious post-marketing events of neurotoxicity, a potential adverse reaction of ifosfamide, have been reported in patients after EMEND[®] and ifosfamide co-administration. Refer to IFEX (ifosfamide for injection) product monograph.

Caution and careful monitoring are advised in patients receiving chemotherapy agents metabolized by CYP3A4, particularly those that were not studied in the clinical trials. (see **WARNINGS AND PRECAUTIONS**).

Established or Potential Drug-Drug Interactions:

Proper name	Ref	Effect	Clinical comment
pimozide	T	↑ pimozide concentration	Potentially causing serious or life-threatening reactions.
terfenadine	T	↑ terfenadine concentration	Potentially causing serious or life-threatening reactions.
Astemizole	T	↑ astemizole concentration	Potentially causing serious or life-threatening reactions.

Proper name	Ref	Effect	Clinical comment
Cisapride	T	↑ cisapride concentration	Potentially causing serious or life-threatening reactions.
Warfarin	CT	↓ Warfarin concentration ↓ INR	In patients on chronic warfarin therapy, the INR should be closely monitored in the 2-week period, particularly at 7 to 10 days, following initiation of the 3-day regimen of EMEND [®] with each chemotherapy cycle (see WARNINGS AND PRECAUTIONS and DETAILED PHARMACOLOGY).
tolbutamide	CT	↓ tolbutamide concentration	Aprepitant induces the metabolism of drug metabolized by CYP2C9 (see DETAILED PHARMACOLOGY).
Phenytoin	T	↓ phenytoin concentration	Aprepitant induces the metabolism of drug metabolized by CYP2C9.
dexamethasone	CT	↑ dexamethasone concentration	The usual oral dexamethasone doses should be reduced by approximately 50% when coadministered with EMEND [®] , to achieve exposures of dexamethasone similar to those obtained when it is given without EMEND [®] (see DETAILED PHARMACOLOGY).
methylprednisolone	CT	↑ methylprednisolone concentration	The usual IV methylprednisolone dose should be reduced by approximately 25%, and the usual oral methylprednisolone dose should be reduced by approximately 50% when coadministered with EMEND [®] , to achieve exposures of methylprednisolone similar to those obtained when it is given without EMEND [®] (see DETAILED PHARMACOLOGY).
hormone contraceptives with all routes of administration	CT	↓ hormone concentration	The efficacy of hormonal contraceptives during and for 28 days after administration of EMEND [®] may be reduced. Alternative or back-up methods of contraception should be used during treatment with EMEND [®] and for 1 month following the last dose of EMEND [®] (see WARNINGS AND PRECAUTIONS and DETAILED PHARMACOLOGY).
Midazolam oral and IV	CT	↑ midazolam concentration	The potential effects of increased plasma concentrations of midazolam or other benzodiazepines metabolized via CYP3A4 (alprazolam, triazolam) should be considered when coadministering these agents with EMEND [®] (see DETAILED PHARMACOLOGY).
ketoconazole	CT	↑ aprepitant concentration	Concomitant administration of EMEND [®] with strong CYP3A4 inhibitors should be approached cautiously (see DETAILED PHARMACOLOGY).

Proper name	Ref	Effect	Clinical comment
Rifampin	CT	↓ aprepitant concentration	Coadministration of EMEND [®] with drugs that induce CYP3A4 activity may result in reduced plasma concentrations and decreased efficacy of EMEND [®] (see DETAILED PHARMACOLOGY).
Diltiazem	CT	↑ aprepitant and diltiazem concentration	No clinically meaningful changes in ECG, heart rate, or blood pressure beyond those changes induced by diltiazem alone (see DETAILED PHARMACOLOGY).
paroxetine	CT	↓ aprepitant and paroxetine concentration	See DETAILED PHARMACOLOGY.

Legend: CT = Clinical Trial; T = Theoretical

5-HT₃ antagonists: In clinical drug interaction studies, aprepitant did not have clinically important effects on the pharmacokinetics of ondansetron administered intravenously, granisetron administered orally, or hydrodolasetron (the active metabolite of dolasetron) following oral administration of dolasetron.

P-glycoprotein transporter substrates: EMEND[®] is unlikely to interact with drugs that are substrates for the P-glycoprotein transporter, as demonstrated by the lack of interaction of EMEND[®] with digoxin in a clinical drug interaction study.

Drug-Food Interactions

EMEND[®] may be administered with or without food.

Drug-Herb Interactions

Interactions with herbal products have not been established.

Drug-Laboratory Interactions

Interactions with laboratory tests have not been established.

DOSAGE AND ADMINISTRATION

Dosing Consideration

EMEND[®] is indicated for use for a maximum of 3 consecutive days per chemotherapy cycle.

EMEND[®] has not been demonstrated to be effective as a single anti-emetic agent and must be administered with other anti-emetic agents.

Recommended Dose and Dosage Adjustment

The recommended dose of EMEND[®] is 125 mg orally 1 hour prior to chemotherapy treatment (Day 1) and 80 mg once daily in the morning on Days 2 and 3.

Recommended dosing for the prevention of nausea and vomiting associated with cisplatin-based highly emetogenic cancer chemotherapy:

	Day 1	Day 2	Day 3	Day 4
EMEND ^{®*}	125 mg orally	80 mg orally	80 mg orally	none
Dexamethasone**	12 mg orally	8 mg orally	8 mg orally	8 mg orally
5-HT ₃ antagonist	See the package insert for the selected 5-HT ₃ antagonist for appropriate dosing information.	none	none	none

* EMEND[®] was administered orally 1 hour prior to chemotherapy treatment on Day 1 and in the morning on Days 2 and 3.

** Dexamethasone should be administered 30 minutes prior to chemotherapy treatment on Day 1 and in the morning on Days 2 through 4. **The dose of dexamethasone accounts for drug interactions. Increasing the dose of dexamethasone is not recommended (see DRUG INTERACTIONS).**

For highly emetogenic chemotherapy, there is only limited efficacy data with EMEND[®] in combination with oral ondansetron or other 5-HT₃ antagonist class of antiemetics and dexamethasone. In the highly emetogenic chemotherapy clinical trials, the 5-HT₃ antagonist studied was ondansetron administered by the intravenous route. However, the dose used was 32 mg and this is no longer a recommended dose due to the dose-dependent risk of QTc prolongation (see the package insert for ondansetron for additional details).

Recommended dosing for the prevention of nausea and vomiting associated with moderately emetogenic cancer chemotherapy:

	Day 1	Day 2	Day 3
EMEND ^{®*}	125 mg orally	80 mg orally	80 mg orally
Dexamethasone**	12 mg orally	none	none
5-HT ₃ antagonist	See the package insert for the selected 5-HT ₃ antagonist for appropriate dosing information.	none	none

* EMEND[®] was administered orally 1 hour prior to chemotherapy treatment on Day 1 and in the morning on Days 2 and 3.

** Dexamethasone should be administered 30 minutes prior to chemotherapy treatment on Day 1. **The dose of dexamethasone accounts for drug interactions. Increasing the dose of dexamethasone is not recommended (see DRUG INTERACTIONS).**

For moderately emetogenic chemotherapy, there is only limited efficacy data with EMEND[®] in combination with other 5-HT₃ antagonist class of antiemetics and dexamethasone. In the moderately emetogenic clinical trials, the 5-HT₃ antagonist studied was ondansetron administered by the oral route.

See DRUG INTERACTIONS for additional information on the administration of EMEND[®] with corticosteroids.

Refer to each product's respective Product Monograph for additional information on coadministered antiemetic agents.

EMEND[®] may be taken with or without food.

No dosage adjustment is necessary based on age, gender, race or Body Mass Index (BMI).

No dosage adjustment is necessary for patients with severe renal insufficiency (creatinine clearance <30 mL/min) or for patients with end stage renal disease undergoing hemodialysis.

No dosage adjustment is necessary for patients with mild to moderate hepatic insufficiency (Child-Pugh score 5 to 9). There are no clinical data in patients with severe hepatic insufficiency (Child-Pugh score >9).

OVERDOSAGE

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

No specific information is available on the treatment of overdose with EMEND[®]. Single doses up to 600 mg of aprepitant were generally well tolerated in healthy subjects. Aprepitant was generally well tolerated when administered as 375 mg once daily for up to 42 days to patients in non-CINV studies. In 33 cancer patients, administration of a single 375-mg dose of aprepitant on Day 1 and 250 mg once daily on Days 2 to 5 was generally well tolerated.

Drowsiness and headache were reported in one patient who ingested 1440 mg of aprepitant.

In the event of overdose, EMEND[®] should be discontinued and general supportive treatment and monitoring should be provided. Because of the antiemetic activity of aprepitant, drug-induced emesis may not be effective.

Aprepitant cannot be removed by hemodialysis.

ACTION AND CLINICAL PHARMACOLOGY

Mechanism of Action

Aprepitant has a unique mode of action; it is a selective high affinity antagonist at human substance P neurokinin 1 (NK₁) receptors. Counter-screening assays showed that aprepitant was at least 3,000-fold selective for the NK₁ receptor over other enzyme, transporter, ion channel and receptor sites including the dopamine and serotonin receptors that are targets for existing chemotherapy induced nausea and vomiting (CINV) therapies.

NK₁-receptor antagonists have been shown pre-clinically to inhibit emesis induced by cytotoxic chemotherapeutic agents, such as cisplatin, via central actions. Preclinical and human Positron Emission Tomography (PET) studies with aprepitant have shown that it is brain penetrant and occupies brain NK₁ receptors. However, the relationship between NK₁ receptor occupancy and the clinical efficacy of aprepitant has not been established. Preclinical studies show that aprepitant has a long duration of central activity, inhibits both the acute and delayed phases of cisplatin-induced emesis, and augments the antiemetic activity of the 5-HT₃-receptor antagonist ondansetron and the corticosteroid dexamethasone against cisplatin-induced emesis.

Pharmacokinetics

Table 6 – Summary of pharmacokinetic parameters of EMEND[®] in healthy subjects

	C _{max} (µg/mL)	AUC _{0-24hr} (µg•hr/mL)
Day 1 oral dose aprepitant 125 mg	1.5	19.5
Day 3 oral dose aprepitant 80 mg	1.4	20.1

Absorption: The mean absolute oral bioavailability of aprepitant is approximately 60 to 65% and the mean peak plasma concentration (C_{max}) of aprepitant occurred at approximately 4 hours (T_{max}). Oral administration of the capsule with a standard breakfast had no clinically meaningful effect on the bioavailability of aprepitant.

The pharmacokinetics of aprepitant are non-linear across the clinical dose range. In healthy young adults, the increase in AUC_{0-∞} was 26% greater than dose proportional between 80-mg and 125-mg single doses administered in the fed state.

Following oral administration of a single 125-mg dose of EMEND[®] on Day 1 and 80 mg once daily on Days 2 and 3, the AUC_{0-24hr} was approximately 19.5 µg•hr/mL and 20.1 µg•hr/mL on Day 1 and Day 3, respectively. The C_{max} of 1.5 µg/mL and 1.4 µg/mL were reached in approximately 4 hours (T_{max}) on Day 1 and Day 3, respectively.

Distribution: Aprepitant is greater than 95% bound to plasma proteins. The geometric mean apparent volume of distribution at steady state (Vd_{ss}) is approximately 66 L in humans.

Aprepitant crosses the placenta in rats, and crosses the blood brain barrier in rats and ferrets. PET studies in humans indicate that aprepitant crosses the blood brain barrier (see ACTION AND CLINICAL PHARMACOLOGY).

Metabolism: Aprepitant undergoes extensive metabolism. In healthy young adults, aprepitant accounts for approximately 24% of the radioactivity in plasma over 72 hours following a single oral 300-mg dose of [¹⁴C]-aprepitant, indicating a substantial presence of metabolites in the plasma. Seven metabolites of aprepitant, which are only weakly active, have been identified in human plasma. The metabolism of aprepitant occurs largely via oxidation at the morpholine ring and its side chains. *In vitro* studies using human liver microsomes indicate that aprepitant is metabolized primarily by CYP3A4 with minor metabolism by CYP1A2 and CYP2C19, and no metabolism by CYP2D6, CYP2C9, or CYP2E1.

Excretion: Aprepitant is eliminated primarily by metabolism; aprepitant is not renally excreted. Following administration of a single oral 300-mg dose of [¹⁴C]-aprepitant to healthy subjects, 5% of the radioactivity was recovered in urine and 86% in feces.

The apparent plasma clearance of aprepitant ranged from approximately 60 to 84 mL/min. The apparent terminal half-life ranged from approximately 9 to 13 hours.

Pharmacodynamics

Cardiac Electrophysiology: In a randomized, double-blind, positive-controlled, thorough QTc study, a single 200-mg dose of fosaprepitant (a prodrug of aprepitant) had no effect on the QTc interval.

Special Populations and Conditions

Pediatrics: The pharmacokinetics of EMEND[®] have not been evaluated in patients below 18 years of age.

Geriatrics: Following oral administration of a single 125-mg dose of EMEND[®] on Day 1 and 80 mg once daily on Days 2 through 5, the AUC_{0-24hr} of aprepitant was 21% higher on Day 1 and 36% higher on Day 5 in elderly (≥65 years) relative to younger adults. The C_{max} was 10% higher on Day 1 and 24% higher on Day 5 in elderly relative to younger adults. These differences are not considered clinically meaningful. No dosage adjustment for EMEND[®] is necessary in elderly patients.

Gender: Following oral administration of a single dose of EMEND[®], the AUC_{0-24hr} and C_{max} for aprepitant are 9% and 17% higher, respectively, in females as compared with males. The half-life of aprepitant is approximately 25% lower in females as compared with males and its T_{max} occurs at approximately the same time. No dosage adjustment for EMEND[®] is necessary based on gender.

Race: Following oral administration of a single dose of EMEND[®], there was no difference in the AUC_{0-24hr} or C_{max} between Caucasians and Blacks. Single dose administration of oral aprepitant

in Hispanics resulted in a 27% and 19% increase in AUC_{0-24hr} and C_{max} , respectively, as compared to Caucasians. Single dose administration of oral aprepitant in Asians resulted in a 74% and 47% increase in AUC_{0-24hr} and C_{max} , respectively, as compared to Caucasians. These differences are not considered clinically meaningful. No dosage adjustment is necessary based on race.

Body Mass Index (BMI): For every 5 kg/m² increase in BMI, AUC_{0-24h} decreased by 8.5% and C_{max} decreased by 10.2%. These differences are not considered clinically meaningful. No dosage adjustment is necessary based on BMI.

Hepatic Insufficiency: EMEND[®] was well tolerated in patients with mild to moderate hepatic insufficiency. Following administration of a single 125-mg dose of EMEND[®] on Day 1 and 80 mg once daily on Days 2 and 3 to patients with mild hepatic insufficiency (Child-Pugh score 5 to 6), the AUC_{0-24hr} of aprepitant was 11% lower on Day 1 and 36% lower on Day 3, as compared with healthy subjects given the same regimen. In patients with moderate hepatic insufficiency (Child-Pugh score 7 to 9), the AUC_{0-24hr} of aprepitant was 10% higher on Day 1 and 18% higher on Day 3, as compared with healthy subjects given the same regimen. These differences in AUC_{0-24hr} are not considered clinically meaningful; therefore, no dosage adjustment for EMEND[®] is necessary in patients with mild to moderate hepatic insufficiency.

There are no clinical or pharmacokinetic data in patients with severe hepatic insufficiency (Child-Pugh score >9).

Renal Insufficiency: A single 240-mg dose of EMEND[®] was administered to patients with severe renal insufficiency ($CrCl < 30$ mL/min) and to patients with end stage renal disease (ESRD) requiring hemodialysis.

In patients with severe renal insufficiency, the $AUC_{0-\infty}$ of total aprepitant (unbound and protein bound) decreased by 21% and C_{max} decreased by 32%, relative to healthy subjects. In patients with ESRD undergoing hemodialysis, the $AUC_{0-\infty}$ of total aprepitant decreased by 42% and C_{max} decreased by 32%. Due to modest decreases in protein binding of aprepitant in patients with renal disease, the AUC of pharmacologically active unbound drug was not significantly affected in patients with renal insufficiency compared with healthy subjects. Hemodialysis conducted 4 or 48 hours after dosing had no significant effect on the pharmacokinetics of aprepitant; less than 0.2% of the dose was recovered in the dialysate.

No dosage adjustment for EMEND[®] is necessary for patients with severe renal insufficiency or for patients with ESRD undergoing hemodialysis.

STORAGE AND STABILITY

Blisters: Store at room temperature (15°C–30°C) in the original package.

DOSAGE FORMS, COMPOSITION AND PACKAGING

Tri-Pack which contains 2 capsules of EMEND[®] 80 mg and 1 capsule of EMEND[®] 125 mg.

EMEND[®] 80 mg capsules are white, opaque hard gelatin capsules with 461 and 80 mg printed radially in black ink. Available in blister packages of 2 and 6 capsules.

EMEND[®] 125 mg capsules are opaque, hard gelatin capsules with white body and pink cap with 462 and 125 mg printed radially in black ink. Available in blister packages of 6 capsules.

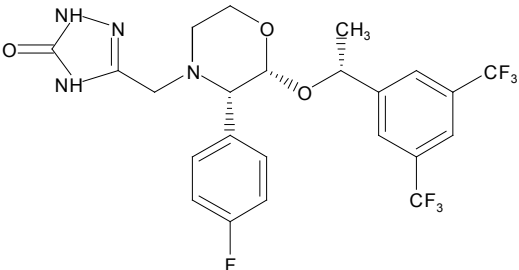
Active ingredients: each capsule of EMEND[®] for oral administration contains either 80 mg or 125 mg of aprepitant.

Inactive ingredients: Each capsule of EMEND[®] contains the following inactive ingredients: sucrose, microcrystalline cellulose, hydroxypropyl cellulose and sodium lauryl sulfate. The capsule shell excipients are gelatin and titanium dioxide. The 125-mg capsule shell also contains red ferric oxide and yellow ferric oxide.

PART II: SCIENTIFIC INFORMATION

PHARMACEUTICAL INFORMATION

Drug Substance

Proper name:	Aprepitant
Chemical name:	Aprepitant is a structurally novel substance P neurokinin 1 (NK ₁) receptor antagonist, chemically described as 5-[[[(2 <i>R</i> ,3 <i>S</i>)-2-[(1 <i>R</i>)-1-[3,5-bis(trifluoromethyl)phenyl]ethoxy]-3-(4-fluorophenyl)-4-morpholinyl]methyl]-1,2-dihydro-3 <i>H</i> -1,2,4-triazol-3-one.
Molecular formula:	C ₂₃ H ₂₁ F ₇ N ₄ O ₃
Molecular mass:	534.43
Structural formula:	 The chemical structure of Aprepitant is shown. It features a central morpholine ring. Attached to the nitrogen of the morpholine is a 1,2,4-triazol-3-one ring. Attached to the carbon at the 2-position of the morpholine is a 4-fluorophenyl group. Attached to the carbon at the 3-position of the morpholine is a 1-(3,5-bis(trifluoromethyl)phenyl)ethoxy group, where the methyl group is shown with a wedge bond.

Physicochemical properties: Description: Aprepitant is a white to off-white crystalline solid.

Solubilities: It is practically insoluble in water. Aprepitant is sparingly soluble in ethanol and isopropyl acetate and slightly soluble in acetonitrile.

CLINICAL TRIALS

Oral administration of EMEND[®] (aprepitant) in combination with ondansetron and dexamethasone has been shown to prevent nausea and vomiting associated with highly and moderately emetogenic chemotherapy in well-controlled clinical studies.

Highly Emetogenic Chemotherapy

Study Demographics and Trial Design

Table 7 – Summary of patient demographics for clinical trials in highly emetogenic chemotherapy

Study #	Trial design	Dosage, route of administration and duration	Study subjects (n=number)	Mean age (Range)	Gender
052*	Randomized, double-blind, placebo-controlled, parallel-group	EMEND® 125 mg on Day 1 and 80 mg/day on Days 2 and 3 in combination with ondansetron 32 mg IV on Day 1 and dexamethasone 12 mg on Day 1 and 8 mg once daily on Days 2 through 4. OR Standard therapy which consisted of placebo in combination with ondansetron 32 mg IV on Day 1 and dexamethasone 20 mg on Day 1 and 8 mg twice daily on Days 2 through 4.	266 268	14–84	Male Female
054*	Randomized, double-blind, placebo-controlled, parallel-group	EMEND® 125 mg on Day 1 and 80 mg/day on Days 2 and 3 in combination with ondansetron 32 mg IV on Day 1 and dexamethasone 12 mg on Day 1 and 8 mg once daily on Days 2 through 4. OR Standard therapy which consisted of placebo in combination with ondansetron 32 mg IV on Day 1 and dexamethasone 20 mg on Day 1 and 8 mg twice daily on Days 2 through 4.	283 286	18–82	Male Female

*Although a 32 mg IV dose of ondansetron was used in clinical trials, this is no longer a recommended dose due to the dose-dependent risk of QTc prolongation (see the package insert for ondansetron for additional details).

Studies 052 and 054

In the above clinical studies, all enrolled patients received high-dose cisplatin ≥ 70 mg/m². Approximately 95% of the patients in the aprepitant group received a concomitant chemotherapeutic agent. The most common chemotherapeutic agents and the number of aprepitant patients exposed follows: etoposide (106), fluorouracil (100), gemcitabine (89), vinorelbine (82), paclitaxel (52), cyclophosphamide (50), doxorubicin (38), docetaxel (11). The efficacy of EMEND[®] has not been investigated in highly emetogenic chemotherapy clinical trials without cisplatin.

The antiemetic activity of EMEND[®] was evaluated during the acute phase (0 to 24 hours post-cisplatin treatment), the delayed phase (25 to 120 hours post-cisplatin treatment) and overall (0 to 120 hours post-cisplatin treatment) in Cycle 1. Efficacy was based on evaluation of the following endpoints:

Primary endpoint:

- complete response (defined as no emetic episodes and no use of rescue therapy)

Other prespecified endpoints:

- complete protection (defined as no emetic episodes, no use of rescue therapy, and a maximum nausea visual analogue scale [VAS] score <25 mm on a 0 to 100 mm scale)
- no emesis (defined as no emetic episodes regardless of use of rescue therapy)
- no nausea (maximum VAS <5 mm on a 0 to 100 mm scale)
- no significant nausea (maximum VAS <25 mm on a 0 to 100 mm scale)

A summary of the key study results from each individual study analysis is shown in Table 8 and in Table 9.

Study Results

Table 8 – Percent of patients receiving highly emetogenic chemotherapy responding by treatment group and phase for study 1 – Cycle 1

ENDPOINTS	Aprepitant Regimen (N=260) [†] %	Standard Therapy (N=261) [†] %	p-Value
PRIMARY ENDPOINT			
Complete Response			
Overall [‡]	73	52	<0.001
OTHER PRESPECIFIED ENDPOINTS			
Complete Response			
Acute phase [§]	89	78	<0.001
Delayed phase	75	56	<0.001
Complete Protection			
Overall	63	49	0.001
Acute phase	85	75	NS*
Delayed phase	66	52	<0.001
No Emesis			
Overall	78	55	<0.001
Acute phase	90	79	0.001
Delayed phase	81	59	<0.001
No Nausea			
Overall	48	44	NS**
Delayed phase	51	48	NS**
No Significant Nausea			
Overall	73	66	NS**
Delayed phase	75	69	NS**

[†] N: Number of patients (older than 18 years of age) who received cisplatin, study drug, and had at least one post-treatment efficacy evaluation.

[‡] Overall: 0 to 120 hours post-cisplatin treatment.

[§] Acute phase: 0 to 24 hours post-cisplatin treatment.

^{||} Delayed phase: 25 to 120 hours post-cisplatin treatment.

* Not statistically significant when adjusted for multiple comparisons.

** Not statistically significant.

Visual analogue scale (VAS) score range: 0 mm = no nausea; 100 mm = nausea as bad as it could be.

Table 9 – Percent of patients receiving highly emetogenic chemotherapy responding by treatment group and phase for study 2 – Cycle 1

ENDPOINTS	Aprepitant Regimen (N=261) [†] %	Standard Therapy (N=263) [†] %	p-Value
PRIMARY ENDPOINT			
Complete Response			
Overall [‡]	63	43	<0.001
OTHER PRESPECIFIED ENDPOINTS			
Complete Response			
Acute phase [§]	83	68	<0.001
Delayed phase	68	47	<0.001
Complete Protection			
Overall	56	41	<0.001
Acute phase	80	65	<0.001
Delayed phase	61	44	<0.001
No Emesis			
Overall	66	44	<0.001
Acute phase	84	69	<0.001
Delayed phase	72	48	<0.001
No Nausea			
Overall	49	39	NS*
Delayed phase	53	40	NS*
No Significant Nausea			
Overall	71	64	NS**
Delayed phase	73	65	NS**

[†] N: Number of patients (older than 18 years of age) who received cisplatin, study drug, and had at least one post-treatment efficacy evaluation.

[‡] Overall: 0 to 120 hours post-cisplatin treatment.

[§] Acute phase: 0 to 24 hours post-cisplatin treatment.

^{||} Delayed phase: 25 to 120 hours post-cisplatin treatment.

* Not statistically significant when adjusted for multiple comparisons.

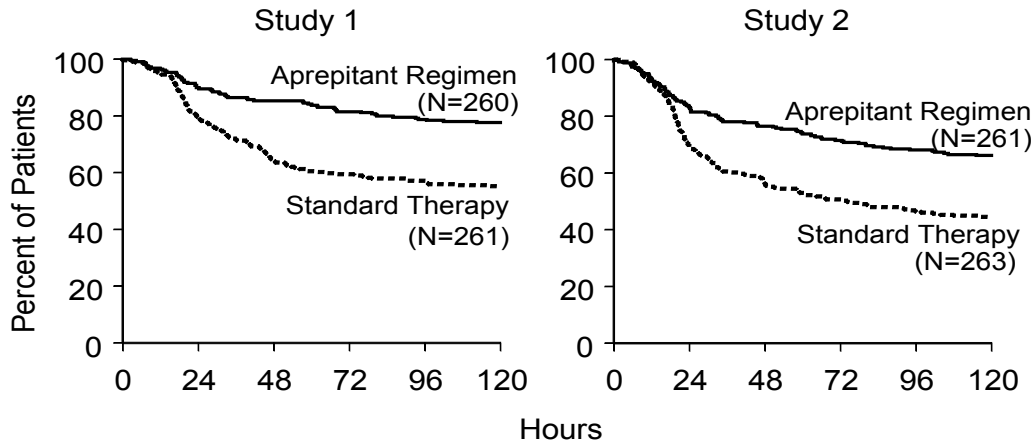
** Not statistically significant.

Visual analogue scale (VAS) score range: 0 mm = no nausea; 100 mm = nausea as bad as it could be.

In both studies, a statistically significantly higher proportion of patients receiving the aprepitant regimen in Cycle 1 had a complete response (primary endpoint), compared with patients receiving standard therapy. A statistically significant difference in complete response in favor of the aprepitant regimen was also observed when the acute phase and the delayed phase were analyzed separately.

In both studies, the estimated time to first emesis after initiation of cisplatin treatment was longer with the aprepitant regimen, and the incidence of first emesis was reduced in the aprepitant regimen group compared with standard therapy group as depicted in the Kaplan-Meier curves in Figure 1.

Figure 1 – Percent of patients receiving highly emetogenic chemotherapy who remain emesis free over time – Cycle 1



p-Value <0.001 based on a log rank test for Study 1 and Study 2; nominal p-values not adjusted for multiplicity.

Patient-Reported Outcomes: The impact of nausea and vomiting on patients’ daily lives was assessed in Cycle 1 of both Phase III studies using the Functional Living Index–Emesis (FLIE), a validated nausea and vomiting-specific patient-reported outcome measure. Minimal or no impact of nausea and vomiting on patients’ daily lives is defined as a FLIE total score >108. In each of the 2 studies, a higher proportion of patients receiving the aprepitant regimen reported minimal or no impact of nausea and vomiting on daily life (Study 1: 74% versus 64%; Study 2: 75% versus 64%).

Multiple-Cycle Extension: In the same 2 clinical studies, 851 patients continued into the Multiple-Cycle extension for up to 6 cycles of chemotherapy. The efficacy of the aprepitant regimen was maintained during all cycles.

Moderately Emetogenic Chemotherapy

Study Demographics and Trial Design

Table 10 – Summary of patient demographics for clinical trials in moderately emetogenic chemotherapy

Study #	Trial design	Dosage, route of administration and duration	Study subjects (n=number)	Mean age (Range)	Gender
071	Randomized, double-blind, parallel-group, standard therapy	EMEND® 125 mg on Day 1 and 80 mg/day on Days 2 and 3 in combination with ondansetron 8 mg orally twice on Day 1 plus dexamethasone 12 mg orally on Day 1. Standard Therapy consisted of placebo in combination with ondansetron 8 mg orally (twice on Day 1, and every 12 hours on Days 2 and 3) plus dexamethasone 20 mg orally on Day 1.	866	526 (23–78)	Female: 864 Male: 2
130	Randomized, Double-Blind, Parallel-Group Study Conducted Under In-House Blinding Conditions	EMEND® 125 mg on Day 1 and 80 mg/day on Days 2 and 3 in combination with ondansetron 8 mg orally twice on Day 1 plus dexamethasone 12 mg orally on Day 1. Standard Therapy consisted of placebo in combination with ondansetron 8 mg orally (twice on Day 1, and every 12 hours on Days 2 and 3) plus dexamethasone 20 mg orally on Day 1.	848	56 (19–87)	Female: 652 Male: 196

Study 071

The first MEC study (P071) enrolled breast cancer patients (99% women) receiving a chemotherapy regimen that included cyclophosphamide 750–1500 mg/m²; or cyclophosphamide 500–1500 mg/m² and doxorubicin (≤ 60 mg/m²) or epirubicin (≤ 100 mg/m²). Some patients also received other chemotherapeutic agents such as fluorouracil, methotrexate, docetaxel or paclitaxel. In this study (P071), the most common combinations were cyclophosphamide + doxorubicin (60.6%); and cyclophosphamide + epirubicin + fluorouracil (21.6%).

In the first MEC study (P071), the antiemetic activity of EMEND[®] was evaluated during the acute phase (0 to 24 hours post-chemotherapy treatment), the delayed phase (25 to 120 hours post-chemotherapy treatment) and overall (0 to 120 hours post-chemotherapy treatment) in Cycle 1. The antiemetic activity of EMEND[®] was evaluated based on the following endpoints:

Primary endpoint:

- complete response (defined as no emetic episodes and no use of rescue therapy) in the overall phase (0 to 120 hours post-chemotherapy)

Other prespecified endpoints:

- no emesis (defined as no emetic episodes regardless of use of rescue therapy)
- no nausea (maximum VAS < 5 mm on a 0 to 100 mm scale)
- no significant nausea (maximum VAS < 25 mm on a 0 to 100 mm scale)
- complete protection (defined as no emetic episodes, no use of rescue therapy, and a maximum nausea visual analogue scale [VAS] score < 25 mm on a 0 to 100 mm scale)
- complete response during the acute and delayed phases

A summary of the key results from this study is shown in Table 11.

Study Results

Table 11 – Percent of patients receiving moderately emetogenic chemotherapy responding by treatment group and phase – Cycle 1

ENDPOINTS	Aprepitant Regimen (N=433) [†] %	Standard Therapy (N=424) [†] %	p-Value
PRIMARY ENDPOINT			
Complete Response [‡]	51	42	0.015
OTHER PRESPECIFIED ENDPOINTS			
No Emesis	76	59	NS*
No Nausea	33	33	NS
No Significant Nausea	61	56	NS
No Rescue Therapy	59	56	NS
Complete Protection	43	37	NS

[†] N: Number of patients included in the primary analysis of complete response.

[‡] Overall: 0 to 120 hours post-chemotherapy treatment.

* NS when adjusted for prespecified multiple comparisons rule; unadjusted p-value <0.001.

In this study, a statistically significantly ($p=0.015$) higher proportion of patients receiving the aprepitant regimen (51%) in Cycle 1 had a complete response (primary endpoint) during the overall phase compared with patients receiving standard therapy (42%). The difference between treatment groups was primarily driven by the "No Emesis Endpoint", a principal component of this composite primary endpoint. In addition, a higher proportion of patients receiving the aprepitant regimen in Cycle 1 had a complete response during the acute (0–24 hours) and delayed (25–120 hours) phases compared with patients receiving standard therapy; however, the treatment group differences failed to reach statistical significance, after multiplicity adjustments.

Patient-Reported Outcomes: In a phase III study in patients receiving moderately emetogenic chemotherapy, the impact of nausea and vomiting on patients' daily lives was assessed in Cycle 1 using the FLIE. A higher proportion of patients receiving the aprepitant regimen reported minimal or no impact on daily life (64% versus 56%). This difference between treatment groups was primarily driven by the "No Vomiting Domain" of this composite endpoint.

Multiple-Cycle Extension: A total of 744 patients receiving moderately emetogenic cancer chemotherapy continued into the Multiple-Cycle extension for up to 4 cycles of chemotherapy. The efficacy of the aprepitant regimen was maintained during all cycles.

Study 130

In a second multicenter, randomized, double-blind, parallel-group, clinical study (130), the aprepitant regimen was compared with standard therapy in 848 patients receiving a chemotherapy regimen that included any IV dose of oxaliplatin, carboplatin, epirubicin, idarubicin, ifosfamide, irinotecan, daunorubicin, doxorubicin; cyclophosphamide IV (<1500 mg/m²); or cytarabine IV (>1 g/m²). Patients who were randomized to receive the aprepitant regimen consisted of

76% women and 24% men. Patients receiving the aprepitant regimen were receiving chemotherapy for a variety of tumor types including 52% with breast cancer, 21% with gastrointestinal cancers including colorectal cancer, 13% with lung cancer and 6% with gynecological cancers. In this study, 48% of patients received AC therapy, defined as anthracycline (doxorubicin, epirubicin) + cyclophosphamide chemotherapy regimen, and 52% received non-AC therapy.

The aprepitant regimen consisted of EMEND[®] 125 mg on Day 1 and 80 mg/day on Days 2 and 3 in combination with ondansetron 8 mg orally twice on Day 1 plus dexamethasone 12 mg orally on Day 1. Standard therapy consisted of placebo in combination with ondansetron 8 mg orally (twice on Day 1, and every 12 hours on Days 2 and 3) plus dexamethasone 20 mg orally on Day 1.

The antiemetic activity of EMEND[®] was evaluated during the overall phase (0 to 120 hours post-chemotherapy treatment) in Cycle 1. Efficacy was based on the evaluation of the following endpoints:

Primary endpoint:

- no vomiting in the overall period (0 to 120 hours post-chemotherapy)

Other prespecified endpoints:

- complete response (defined as no vomiting and no use of rescue therapy) in the overall period (0 to 120 hours post-chemotherapy)
- time to first vomiting episode overall (0 to 120 hours post-chemotherapy)
- no vomiting – Acute (0 to 24 hours following initiation of chemotherapy infusion) and Delayed (25 to 120 hours following initiation of chemotherapy infusion)
- complete response – Acute and Delayed, as defined above
- no use of rescue therapy – Overall, Acute, and Delayed, as defined above
- no Impact on Daily Life (Functional Living Index-Emesis [FLIE] total score >108) – Overall, as defined above
- no vomiting and no significant nausea (VAS <25 mm) – Overall, as defined above

A summary of the key study results is shown in Table 12.

Table 12 – Percent of Patients Receiving Moderately Emetogenic Chemotherapy Responding by Treatment Group and Phase for Study 2 – Cycle 1

ENDPOINTS	Aprepitant Regimen (N=430) [†] %	Standard Therapy (N=418) [†] %	p-Value
PRIMARY ENDPOINT			
No Vomiting			
Overall	76	62	<0.0001
KEY SECONDARY ENDPOINT			
Complete Response			
Overall	69	56	0.0003
OTHER SECONDARY ENDPOINTS			
No Vomiting			
Acute phase	92	84	0.0002
Delayed phase	78	67	0.0005
No Impact on Daily Life (FLIE total score >108)			
Overall	73	66	0.035
Complete Response			
Acute phase	89	80	0.0005
Delayed phase	71	61	0.0042
No Use of Rescue Therapy			
Overall	81	75	0.0427 ^B
Acute phase	95	91	0.0179 ^B
Delayed phase	84	79	0.0922 ^B
No Vomiting and No Significant Nausea (VAS <25 mm)			
Overall	65	53	0.0011

[†] N = Number of patients who received chemotherapy treatment, study drug, and had at least one post-treatment efficacy evaluation.

^B Not statistically significant after adjustment for multiplicity.

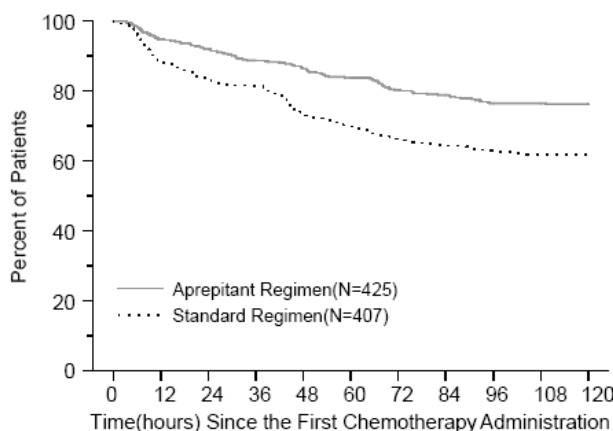
Visual analogue scale (VAS) score range: 0 mm = no nausea; 100 mm = nausea as bad as it could be.

In this study, a statistically significantly ($p < 0.0001$) higher proportion of patients receiving the aprepitant regimen (76%) in Cycle 1 had no vomiting (primary endpoint) during the overall phase compared with patients receiving standard therapy (62%). In addition, a higher proportion of patients receiving the aprepitant regimen in Cycle 1 had a complete response in the overall phase (0–120 hours) compared with patients receiving standard therapy. Aprepitant was numerically superior versus standard therapy regardless of age, gender, chemotherapy regimen, or tumor type (breast, gastrointestinal, lung or other) as assessed by the No Vomiting and Complete Response endpoints. However, the proportion of patients with no vomiting and complete response in the standard therapy group, as well as the size of the difference in no vomiting and complete response between the treatment groups, differed by gender and

chemotherapy regimen. During the overall phase, complete response to the aprepitant regimen and standard therapy, respectively, was reached in 209/324 (65%) and 161/320 (50%) in women and 83/101 (82%) and 68/87 (78%) of men. No vomiting in the aprepitant regimen and standard therapy, respectively, was reached in 235/324 (73%) and 181/319 (57%) in women and 89/101 (88%) and 71/87 (82%) in men. During the overall phase, complete response to the aprepitant regimen and standard therapy, respectively, was reached in 125/199 (63%) and 96/204 (47%) in AC therapy and 167/226 (74%) and 133/203 (66%) in non-AC therapy. No vomiting in the aprepitant regimen and standard therapy, respectively, was reached in 136/199 (68%) and 108/204 (53%) in AC-therapy and 188/226 (83%) and 144/202 (71%) in non-AC therapy.

In this study, the estimated time to first vomiting after initiation of chemotherapy treatment was longer with the aprepitant regimen, and the incidence was reduced in the aprepitant regimen group compared with standard therapy group as depicted in the Kaplan-Meier curves in Figure 2.

Figure 2 – Kaplan-Meier Curves for Time to First Vomiting Episode From Start of Chemotherapy Administration in the Overall Phase – Cycle 1 (Full Analysis Set Patient Population)



In this study, a statistically significantly higher proportion of patients receiving the aprepitant regimen in Cycle 1 reported no impact of nausea and vomiting on daily life, as measured by a FLIE total score >108, compared with patients receiving standard therapy.

DETAILED PHARMACOLOGY

Dexamethasone: EMEND[®], when given as a regimen of 125 mg with dexamethasone coadministered orally as 20 mg on Day 1, and EMEND[®] when given as 80 mg/day with dexamethasone coadministered orally as 8 mg on Days 2 through 5, increased the AUC of dexamethasone, a CYP3A4 substrate by 2.2-fold, on Days 1 and 5. The usual oral dexamethasone doses should be reduced by approximately 50% when coadministered with EMEND[®], to achieve exposures of dexamethasone similar to those obtained when it is given without EMEND[®]. The daily dose of dexamethasone administered in clinical studies with EMEND[®] reflects an approximate 50% reduction of the dose of dexamethasone (see DOSAGE AND ADMINISTRATION).

Methylprednisolone: EMEND[®], when given as a regimen of 125 mg on Day 1 and 80 mg/day on Days 2 and 3, increased the AUC of methylprednisolone, a CYP3A4 substrate, by 1.3-fold on Day 1 and by 2.5-fold on Day 3, when methylprednisolone was coadministered intravenously as 125 mg on Day 1 and orally as 40 mg on Days 2 and 3. The usual IV methylprednisolone dose should be reduced by approximately 25%, and the usual oral methylprednisolone dose should be reduced by approximately 50% when coadministered with EMEND[®], to achieve exposures of methylprednisolone similar to those obtained when it is given without EMEND[®].

Warfarin: A single 125-mg dose of EMEND[®] was administered on Day 1 and 80 mg/day on Days 2 and 3 to healthy subjects who were stabilized on chronic warfarin therapy. Although there was no effect of EMEND[®] on the plasma AUC of R(+) or S(-) warfarin determined on Day 3, there was a 34% decrease in S(-) warfarin (a CYP2C9 substrate) trough concentration accompanied by a 14% decrease in the prothrombin time (reported as International Normalized Ratio or INR) 5 days after completion of dosing with EMEND[®]. In patients on chronic warfarin therapy, the prothrombin time (INR) should be closely monitored in the 2-week period, particularly at 7 to 10 days, following initiation of the 3-day regimen of EMEND[®] with each chemotherapy cycle (see WARNINGS AND PRECAUTIONS).

Tolbutamide: EMEND[®], when given as 125 mg on Day 1 and 80 mg/day on Days 2 and 3, decreased the AUC of tolbutamide (a CYP2C9 substrate) by 23% on Day 4, 28% on Day 8, and 15% on Day 15, when a single dose of tolbutamide 500 mg was administered orally prior to the administration of the 3-day regimen of EMEND[®] and on Days 4, 8, and 15.

Oral contraceptives: Aprepitant, when given once daily for 14 days as a 100-mg capsule with an oral contraceptive containing 35 mcg of ethinyl estradiol and 1 mg of norethindrone, decreased the AUC of ethinyl estradiol by 43%, and decreased the AUC of norethindrone by 8%; therefore the efficacy of hormonal contraceptives during and for 28 days after administration of EMEND[®] may be reduced. Alternative or back-up methods of contraception should be used during treatment with EMEND[®] and for 1 month following the last dose of EMEND[®] (see WARNINGS AND PRECAUTIONS).

Midazolam: EMEND[®] increased the AUC of midazolam, a sensitive CYP3A4 substrate, by 2.3-fold on Day 1 and 3.3-fold on Day 5, when a single oral dose of midazolam 2 mg was coadministered on Day 1 and Day 5 of a regimen of EMEND[®] 125 mg on Day 1 and 80 mg/day on Days 2 through 5. The potential effects of increased plasma concentrations of midazolam or other benzodiazepines metabolized via CYP3A4 (alprazolam, triazolam) should be considered when coadministering these agents with EMEND[®].

In another study with intravenous administration of midazolam, EMEND[®] was given as 125 mg on Day 1 and 80 mg/day on Days 2 and 3, and midazolam 2 mg IV was given prior to the administration of the 3-day regimen of EMEND[®] and on Days 4, 8, and 15. EMEND[®] increased the AUC of midazolam by 25% on Day 4 and decreased the AUC of midazolam by 19% on Day 8 relative to the dosing of EMEND[®] on Days 1 through 3. These effects were not considered clinically important. The AUC of midazolam on Day 15 was similar to that observed at baseline.

An additional study was completed with intravenous administration of midazolam and EMEND[®]. Intravenous midazolam 2 mg was given 1 hour after oral administration of a single dose of EMEND[®] 125 mg. The plasma AUC of midazolam was increased by 1.5-fold. Depending on clinical situations (e.g., elderly patients) and degree of monitoring available, dosage adjustment for intravenous midazolam may be necessary when it is coadministered with EMEND[®] for the chemotherapy induced nausea and vomiting indication (125 mg on Day 1 followed by 80 mg on Days 2 and 3).

Ketoconazole: When a single 125-mg dose of EMEND[®] was administered on Day 5 of a 10-day regimen of 400 mg/day of ketoconazole, a strong CYP3A4 inhibitor, the AUC of aprepitant increased approximately 5-fold and the mean terminal half-life of aprepitant increased approximately 3-fold. Concomitant administration of EMEND[®] with strong CYP3A4 inhibitors should be approached cautiously.

Rifampin: When a single 375-mg dose of EMEND[®] was administered on Day 9 of a 14-day regimen of 600 mg/day of rifampin, a strong CYP3A4 inducer, the AUC of aprepitant decreased approximately 11-fold and the mean terminal half-life decreased approximately 3-fold. Coadministration of EMEND[®] with drugs that induce CYP3A4 activity may result in reduced plasma concentrations and decreased efficacy of EMEND[®].

Diltiazem: In patients with mild to moderate hypertension, administration of aprepitant once daily, as a tablet formulation comparable to 230 mg of the capsule formulation, with diltiazem 120 mg 3 times daily for 5 days, resulted in a 2-fold increase of aprepitant AUC and a simultaneous 1.7-fold increase of diltiazem AUC. These pharmacokinetic effects did not result in clinically meaningful changes in ECG, heart rate, or blood pressure beyond those changes induced by diltiazem alone.

Paroxetine: Coadministration of once daily doses of aprepitant, as a tablet formulation comparable to 85 mg or 170 mg of the capsule formulation, with paroxetine 20 mg once daily, resulted in a decrease in AUC by approximately 25% and C_{max} by approximately 20% of both aprepitant and paroxetine.

TOXICOLOGY

Animal Toxicology

Acute Toxicity

The approximate oral LD₅₀ of aprepitant was >2000 mg/kg in female mice and rats. The approximate intraperitoneal LD₅₀ of aprepitant was >800 mg/kg, but <2000 mg/kg in female rats and >2000 mg/kg in female mice.

Chronic Toxicity

The toxicity potential of aprepitant was evaluated in a series of repeated-dose oral toxicity studies in rats and in dogs for up to 1 year.

In rats, oral administration of aprepitant for 6 months at doses up to the maximum feasible dose of 1000 mg/kg twice daily (approximately equivalent to [females] or lower than [males] the adult human dose based on systemic exposure) produced increased hepatic weights that correlated with hepatocellular hypertrophy, increased thyroidal weights that correlated with thyroid follicular cell hypertrophy and/or hyperplasia, and pituitary cell vacuolation. These findings are a species-specific consequence of hepatic CYP enzyme induction in the rat, and are consistent with changes observed in rats with other structurally and pharmacologically dissimilar compounds that have been shown to induce hepatic CYP enzymes.

In dogs administered aprepitant orally for 9 months at doses ≥ 5 mg/kg twice daily (greater than or equal to 13 times the adult human dose based on systemic exposure), toxicity was characterized by slight increases in serum alkaline phosphatase activity and decreases in the albumin/globulin ratio. Significantly decreased body weight gain, testicular degeneration, and prostatic atrophy were observed at doses ≥ 25 mg/kg twice daily (greater than or equal to 31 times the adult human dose based on systemic exposure). A slight increase in hepatic weights with no histologic correlate was seen at 500 mg/kg twice daily (70 times the adult human dose based on systemic exposure). No toxicity was observed in dogs administered 32 mg/kg/day (6 times the adult human dose based on systemic exposure) for 1 year.

Carcinogenesis

Carcinogenicity studies were conducted in mice and rats for approximately 2 years. In mice, aprepitant was not carcinogenic at doses up to 500 mg/kg/day (approximately 2 times the adult human dose based on systemic exposure). Rats developed hepatocellular adenomas at a dose of 25 mg/kg twice daily (females) and 125 mg/kg twice daily (females and males), thyroid follicular cell adenomas at a dose of 125 mg/kg twice daily (females and males), and thyroid follicular cell carcinomas at a dose of 125 mg/kg twice daily (males). Systemic exposures at these doses in rats were approximately equivalent to or lower than exposures in humans at the recommended dose. Tumors of these types are a species-specific consequence of hepatic CYP enzyme induction in the rat, and are consistent with changes observed in rats with other structurally and pharmacologically dissimilar compounds that have been shown to induce hepatic CYP enzymes.

Mutagenesis

Aprepitant was neither mutagenic nor genotoxic in assays conducted to detect mutagenicity, DNA strand breaks, and chromosomal aberrations. Aprepitant was negative in the *in vitro* microbial and TK6 human lymphoblastoid cell mutagenesis assays, the *in vitro* alkaline elution/rat hepatocyte DNA strand break test, the *in vitro* chromosomal aberration assay in Chinese hamster ovary cells, and the *in vivo* mouse micronucleus assay in bone marrow.

Reproduction

Aprepitant administered to female rats at doses up to the maximum feasible dose of 1000 mg/kg twice daily (approximately equivalent to the adult human dose based on systemic exposure) had no effects on mating performance, fertility, or embryonic/fetal survival.

Administration of aprepitant to male rats at doses up to the maximum feasible dose of 1000 mg/kg twice daily (lower than the adult human dose based on systemic exposure) produced no effects on mating performance, fertility, embryonic/fetal survival, sperm count and motility, testicular weights, or the microscopic appearance of the testes and epididymides.

Development

In rats and rabbits administered oral doses of aprepitant up to 1000 mg/kg twice daily and 25 mg/kg/day, respectively (up to 1.5 times the systemic exposure at the adult human dose), there was no evidence of developmental toxicity as assessed by embryonic/fetal survival, fetal body weight, and fetal external, visceral, and skeletal morphology. Placental transfer of aprepitant occurred in rats and rabbits at these doses. Concentrations of aprepitant in fetal plasma were approximately 27% and 56% of maternal plasma concentrations in rats and rabbits, respectively.

Significant concentrations of aprepitant were observed in the milk of lactating rats administered 1000 mg/kg twice daily. At this dose, the mean milk drug concentration was 90% of the mean maternal plasma concentration.

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PART III: CONSUMER INFORMATION**EMEND[®]
aprepitant capsules**

This leaflet is part III of a three-part "Product Monograph" published when EMEND[®] was approved for sale in Canada and is designed specifically for Consumers. This leaflet is a summary and will not tell you everything about EMEND[®]. Contact your physician or pharmacist if you have any questions about the drug.

Please read this leaflet carefully before you start to take your medicine, even if you have just refilled your prescription. Some of the information in the previous leaflet may have changed.

Remember that your physician has prescribed this medicine only for you. Never give it to anyone else.

ABOUT THIS MEDICATION**What the medication is used for:**

EMEND[®], in combination with 5-HT₃ antagonists and dexamethasone, is indicated for the prevention of nausea and vomiting associated with your cancer chemotherapy treatment.

What it does:

EMEND[®] is a member of a new class of medicines called neurokinin 1 (NK₁) receptor antagonists. EMEND[®] works by blocking neurokinin, a substance in the brain that causes nausea and vomiting.

When it should not be used:

Do not take EMEND[®] if you are allergic to any of its ingredients.

Do not take EMEND[®] with pimozide, terfenadine, astemizole, or cisapride. Taking EMEND[®] with these medications could result in **serious or life-threatening problems**.

What the medicinal ingredient is:

Aprepitant

What the important non-medicinal ingredients are:

Gelatin, hydroxypropyl cellulose, microcrystalline cellulose sodium lauryl sulfate, sucrose and titanium dioxide. The 125 mg capsule shell also contains red ferric oxide and yellow ferric oxide.

What dosage forms it comes in:

Each capsule contains 80 mg or 125 mg of aprepitant.

WARNINGS AND PRECAUTIONS**Serious Warnings and Precautions**

Drug interactions with:

- Medicines that are likely to be broken down mainly by the liver
- Warfarin
- Hormonal contraception (birth control medicines)

BEFORE you use EMEND[®] talk to your physician or pharmacist if:

- you have any past or present medical problems
- you have liver problems
- you have any allergies
- you drive a car or operate machinery
- you are pregnant or plan to become pregnant
- you are breast-feeding or plan to breast-feed

Use in children

EMEND[®] should not be given to children under 18 years of age.

Use in the elderly

No dosage adjustment is necessary.

INTERACTIONS WITH THIS MEDICATION

Tell your physician about all medicines that you are taking or plan to take, even those you can get without a prescription or herbal products.

Your physician may check that your medicines are working properly together if you are taking other medicines such as:

- anti-anxiety drugs (such as alprazolam, midazolam)
- birth control medicines (which may not work as well)
- ketoconazole (an antifungal)
- rifampin (an antibiotic)
- paroxetine (a medicine used to treat a certain type of depression)
- diltiazem (a medicine used to treat high blood pressure)
- dexamethasone, methylprednisolone (steroid medicines used for a variety of conditions)
- warfarin (a blood thinner)
- tolbutamide (a medicine used to treat diabetes)
- phenytoin (a medicine used to treat seizures)
- some chemotherapy medications such as ifosfamide

PROPER USE OF THIS MEDICATION**Usual dose:**

Take EMEND[®] exactly as your physician has prescribed. The recommended dose of EMEND[®] is one 125 mg capsule by mouth 1 hour before you start your chemotherapy treatment on Day 1 **and** one 80 mg capsule by mouth each morning for the 2 days following your chemotherapy treatment.

EMEND[®] may be taken with or without food.

Overdose:

If you take more than the prescribed dosage, contact your physician immediately.

Missed Dose:

Try to take EMEND[®] as prescribed. However, if you miss a dose, contact your physician for further instructions.

SIDE EFFECTS AND WHAT TO DO ABOUT THEM

Any medicine may have unintended or undesirable effects, so-called side effects.

Like all prescription drugs, EMEND[®] may cause side effects.

The most common side effects included diarrhea, stomach pain, upset stomach, vomiting, dizziness, hiccups, fatigue, weakness, constipation, headache, hair loss, and loss of appetite.

Other side effects may also occur rarely, which include: anxiousness, fever with increased risk of infection, dry mouth, conjunctivitis (eye discharge and itching), excessive sweating, flushing, painful burning urination, muscle cramp or pain, taste disturbance, ringing in the ear (tinnitus), and low blood pressure.

The following side effects have been reported in general use with EMEND[®]: Allergic reactions, which may be serious, and may include hives, rash and itching and cause difficulty in breathing or swallowing. If you have an allergic reaction, stop taking EMEND[®] and call your physician right away.

Ask your physician or pharmacist for more information. Both have a more complete list of side effects. Tell your physician or pharmacist promptly about these or any other unusual symptoms.

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

Symptoms / Effects		Talk with your physician or pharmacist		Stop taking drug and call your physician or pharmacist
		Only if severe	In all cases	
Uncommon	Allergic reactions/ Angioedema (swelling of the face, eyes, lips, tongue, throat, difficulty in breathing or swallowing)			√
Uncommon	Stevens-Johnson syndrome/toxic epidermal necrolysis (severe skin reactions, blistering)			✓
Uncommon	Urticaria (severe rash, itching, swelling of the hands and feet)			✓

This is not a complete list of side effects. For any unexpected effects while taking EMEND[®], contact your physician or pharmacist.

HOW TO STORE IT

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

Keep EMEND[®] and all medicines safely away from children.

REPORTING SIDE EFFECTS

You can help improve the safe use of health products for Canadians by reporting serious and unexpected side effects to Health Canada. Your report may help to identify new side effects and change the product safety information.

3 ways to report:

- Online at [MedEffect](#);
 - By calling 1-866-234-2345 (toll-free);
 - By completing a Consumer Side Effect Reporting Form and sending it by:
 - Fax to 1-866-678-6789 (toll-free), or
 - Mail to:
 - Canada Vigilance Program
 - Health Canada, Postal Locator
 - 1908C
 - Ottawa, ON
 - K1A 0K9
- Postage paid labels and the Consumer Side Effect Reporting Form are available at [MedEffect](#).

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

MORE INFORMATION**If you want more information about EMEND[®]:**

- Talk to your healthcare professional
- Find the full product monograph that is prepared for healthcare professionals and includes this Consumer Information by visiting the [Health Canada website](#) or Merck Canada web site www.merck.ca or by calling Merck Canada at 1-800-567-2594

This leaflet was prepared by Merck Canada Inc.

Last revised: March 05, 2018

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