PRODUCT MONOGRAPH

[Pr] Paclitaxel Injection

Paclitaxel 6 mg/mL

Sterile

Must be diluted before administration

House Standard

Antineoplastic Agent

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[Pr] Paclitaxel Injection

Paclitaxel 6 mg/mL

Sterile

THERAPEUTIC CLASSIFICATION

Antineoplastic Agent

Paclitaxel Injection should be administered under the supervision of a physician experienced in the use of cancer chemotherapeutic agents.

Patients receiving Paclitaxel Injection should be pretreated with corticosteroids, antihistamines, and H2 antagonists (such as dexamethasone, diphenhydramine and cimetidine or ranitidine) to minimize hypersensitivity reactions (see DOSAGE AND AMINISTRATION). Severe hypersensitivity reactions characterized by dyspnea and hypotension requiring treatment, angioedema, and generalized urticaria have occurred in patients receiving paclitaxel. These reactions are probably histamine mediated. Rare fatal reactions have occurred in patients despite pretreatment. Patients who experience severe hypersensitivity reactions to Paclitaxel Injection should not be rechallenged with the drug.

ACTIONS AND CLINICAL PHARMACOLOGY

Paclitaxel is a novel antimicrotubule agent that promotes the assembly of microtubules from tubulin dimers and stabilizes microtubules by preventing depolymerization.

In vitro, paclitaxel exhibits cytotoxic activity against a wide variety of both human and rodent tumour cell lines including leukemia, non-small cell lung carcinoma, small cell lung carcinoma, colon carcinoma, CNS carcinoma, melanoma, renal carcinoma, ovarian carcinoma and breast carcinoma (see PHARMACOLOGY).

The pharmacokinetics of paclitaxel have been evaluated over a wide range of doses, up to 300 mg/m^2 and infusion schedules ranging from 3 to 24 hours. Following intravenous administration of Paclitaxel, the drug exhibited a biphasic decline in plasma concentrations.
The initial rapid decline represents distribution to the peripheral compartment and elimination of the drug. The later phase is due, in part, to a relatively slow efflux of paclitaxel from the peripheral compartment. In patients treated with doses of 135 and 175 mg/m^2 given as 3 and 24 hour infusions, mean terminal half-life has ranged from 3 to 52.7 hours, and total body clearance has ranged from 11.6 to 24 L/h/m^2. Mean steady-state volume of distribution has ranged from 198 to 688 L/m^2 indicating extensive extravascular distribution and/or tissue binding.

Following 3 hour infusions of 175 mg/m^2 mean terminal half-life was estimated to be 9.9 hours; mean total body clearance was 12.4 L/h/m^2.

Variability in systemic paclitaxel exposure, as measured by $AUC_{0-\infty}$ for successive treatment courses was minimal; there was no evidence of accumulation of paclitaxel with multiple treatment courses.

The pharmacokinetics of paclitaxel have been shown to be non-linear. There is a disproportionately large increase in C_{max} and AUC with increasing dose, accompanied by an apparent dose-related decrease in total body clearance. These findings are most readily observed in patients in whom high plasma concentrations of paclitaxel are achieved. Saturable processes in distribution and elimination/metabolism may account for these findings.

In vitro studies of binding to human serum proteins, using paclitaxel concentrations ranging from 0.1 to 50 mcg/mL, indicated that on average 89% of drug is bound; the presence of cimetidine, ranitidine, dexamethasone, or diphenhydramine did not affect protein binding of paclitaxel.

In vitro studies with human liver microsomes and tissue slices showed that paclitaxel was metabolized primarily to 6α-hydroxypaclitaxel by the cytochrome P450 isoenzyme CYP2C8; and to two minor metabolites, 3-p-hydroxypaclitaxel and 6α, 3'-p-dihydroxypaclitaxel by CYP3A4. *In vitro*, the metabolism of paclitaxel to 6α-hydroxypaclitaxel was inhibited by a number of agents (see PRECAUTIONS, Drug Interactions). The effect of renal or hepatic dysfunction on the disposition of paclitaxel has not been investigated.

The disposition of paclitaxel has not been fully elucidated in humans. After intravenous administration of paclitaxel, mean values for cumulative urinary recovery of unchanged drug ranged from 1.3 to 12.7% of the dose, indicating extensive non-renal clearance. In five patients administered a 225 or 250 mg/m^2 dose of radiolabeled paclitaxel as a 3-hour infusion, 14% of the radioactivity was recovered in the urine and 71% was excreted in the feces in 120 hours. Total recovery of radioactivity ranged from 56% to 101% of the dose. Paclitaxel represented a mean of 5% of the administered radioactivity recovered in the feces while metabolites, primarily 6α- hydroxypaclitaxel, accounted for the balance.

INDICATIONS AND CLINICAL USE

Paclitaxel Injection is indicated, alone or in combination, for the treatment of carcinoma of the ovary, breast and lung,

Ovarian Carcinoma

- First-line treatment in combination with other chemotherapeutic agents.
- Second-line treatment of metastatic carcinoma of the ovary after failure of standard therapy.

Breast Carcinoma

- Adjuvant treatment of node-positive breast cancer administered sequentially to standard combination therapy. In the clinical trial, there was an overall favourable effect on disease free and overall survival in the total population of patients with receptor-positive and receptor- negative tumours, but the benefit has been specifically demonstrated by available data (median follow-up 30 months) only in the patients with estrogen and progesterone receptor-negative tumours. (See PHARMACOLOGY, Clinical Trials).
- Second-line treatment of metastatic carcinoma of the breast after failure of standard therapy.

Lung Carcinoma
- First-line treatment of advanced non-small cell lung cancer.

CONTRAINDICATIONS

Paclitaxel is contraindicated in patients who have a history of severe hypersensitivity reactions to paclitaxel or other drugs formulated in Cremophor EL (polyethoxylated castor oil).

Paclitaxel should not be used in patients with severe baseline neutropenia (<1500 cells/mm^3).

WARNINGS

Paclitaxel should be administered under the supervision of a physician experienced in the use of cancer chemotherapeutic agents.

Paclitaxel should be administered as a diluted infusion. Patients receiving paclitaxel should be pretreated with corticosteroids, antihistamines, and H_2 antagonists (such as dexamethasone, diphenhydramine and cimetidine or ranitidine) to minimize hypersensitivity reactions (see DOSAGE AND ADMINISTRATION). Anaphylaxis and severe hypersensitivity reactions characterized by dyspnea and hypotension requiring treatment, angioedema, or generalized urticaria have occurred in approximately 2% of patients receiving paclitaxel. These reactions are probably histamine-mediated. Rare fatal reactions have occurred in patients despite pre-treatment. In case of a severe hypersensitivity reaction, paclitaxel infusion should be discontinued immediately and the patient should not be rechallenged with the drug (see ADVERSE REACTIONS).

Paclitaxel should not be administered to patients with baseline neutrophil counts of less than 1500 cells/mm^3. Bone marrow suppression (primarily neutropenia) is dose and schedule dependent and is the dose-limiting toxicity within a regimen. Neutrophil nadirs occurred at a median of 11 days. Frequent monitoring of blood counts should be instituted during paclitaxel treatment. Patients should not be retreated with subsequent cycles of paclitaxel until neutrophils recover to a level >1500 cells/mm^3 and platelets recover to a level >100,000 cells/mm^3 (see DOSAGE AND ADMINISTRATION).

Severe cardiac conduction abnormalities have been reported in <1% of patients during paclitaxel therapy. If patients develop significant conduction abnormalities during administration, appropriate therapy should be administered and continuous electrocardiographic monitoring should be performed during subsequent therapy with paclitaxel (see ADVERSE REACTIONS).

Use in Pregnancy
Paclitaxel may cause fetal harm when administered to a pregnant woman. Paclitaxel has been shown to be embryotoxic and fetotoxic in rabbits and to decrease fertility in rats. There are no studies in pregnant women. Women of childbearing potential should be advised to avoid becoming pregnant during therapy with paclitaxel. If paclitaxel is used during pregnancy, or if the patient becomes pregnant while receiving this drug, the patient should be apprised of the potential hazard.

Nursing Mothers
It is not known whether paclitaxel is excreted in human milk. Breast feeding should be discontinued for the duration of paclitaxel therapy.

Use in Children
The safety and effectiveness of paclitaxel in pediatric patients have not been established. There have been reports of central nervous system (CNS) toxicity (rarely associated with death) in a clinical trial in pediatric patients in which paclitaxel was infused intravenously over 3 hours at doses ranging from 350 mg/m^2 to 420 mg/m^2. The toxicity is most likely attributable to the high dose of the ethanol component of the paclitaxel vehicle given over a short infusion time.

The use of concomitant antihistamines may intensify this effect. Although a direct effect of the paclitaxel itself cannot be discounted, the high doses used in this study (over twice the recommended adult dosage) must be considered in assessing the safety of paclitaxel for use in this population.

PRECAUTIONS

Contact of the undiluted concentrate with plasticized polyvinyl chloride (PVC) equipment or devices used to prepare solutions for infusion is not recommended. In order to minimize patient exposure to the plasticizer DEHP [di-(2-ethylhexyl)phthalate], which may be leached from PVC infusion bags or sets, diluted paclitaxel solutions should preferably be stored in bottles (glass, polypropylene) or plastic bags (polypropylene, polyolefin) and administered through polyethylene-lined administration sets.

Drug Interactions

Cisplatin:
In a Phase 1 trial in which paclitaxel was administered as a 24-hour infusion and cisplatin was administered as a 1 mg/min infusion, myelosuppression was more profound when paclitaxel was given after cisplatin than with the alternate sequence (i.e. paclitaxel before cisplatin).
When paclitaxel is given before cisplatin the safety profile of paclitaxel is consistent with that reported for single-agent use. Pharmacokinetic data from these patients demonstrated a decrease in paclitaxel clearance of approximately 33% when paclitaxel was administered following cisplatin.

Therefore, paclitaxel should be given before cisplatin when used in combination. Patients treated with paclitaxel and cisplatin may have an increased risk of renal failure during the combination therapy of paclitaxel and cisplatin in gynecological cancers as compared to cisplatin alone.

Cimetidine:
The effect of cimetidine premedication on the metabolism of paclitaxel has been investigated; the clearance of paclitaxel was not affected by cimetidine pretreatment.

Substrates, Inducers, Inhibitors of Cytochrome P450 2C8 and 3A4:
The metabolism of paclitaxel is catalyzed by cytochrome P450 isoenzymes CYP2C8 and CYP3A4. Caution should be exercised when administering paclitaxel concomitantly with known substrates, inducers or inhibitors of the cytochrome P450 isoenzymes CYP2C8 and CYP3A4. *In vitro*, the metabolism of paclitaxel to 6α-hydroxypaclitaxel was inhibited by a number of agents (ketoconazole, verapamil, diazepam, quinidine, dexamethasone, cyclosporine, teniposide, etoposide, and vincristine), but the concentrations used exceeded those found *in vivo* following normal therapeutic doses. Testosterone, 17 α-ethinyl estradiol, retinoic acid, montelukast and quercetin, a specific inhibitor of CYP2C8, also inhibited the formation of 6α- hydroxypaclitaxel *in vitro*. The pharmacokinetics of paclitaxel may also be altered *in vivo* as a result of interactions with compounds

that are substrates, inducers, or inhibitors of CYP2C8 and/or CYP3A4.

Potential interactions between paclitaxel, a substrate of CYP3A4, and protease inhibitors (ritonavir, saquinavir, indinavir, and nelfinavir), which are substrates and/or inhibitors of CYP3A4, have not been evaluated in clinical trials. Caution and close monitoring of liver function is required; further, no unapproved (e.g. investigational) protease inhibitor should be administered with paclitaxel.

Doxorubicin:
Sequence effects characterized by more profound neutropenic and stomatitis episodes, have been observed with combination use of paclitaxel and doxorubicin when paclitaxel was administered BEFORE doxorubicin and using longer than recommended infusion times (paclitaxel administered over 24 hours; doxorubicin administered over 48 hours). Plasma levels of doxorubicin (and its active metabolite doxorubicinol) may be increased when paclitaxel and doxorubicin are used in combination. However, data from a trial using bolus doxorubicin and 3-hour paclitaxel infusion found no sequence effects on the pattern of toxicity.

Hematology:
Paclitaxel should not be administered to patients with baseline neutrophil counts of less than 1500 cells/mm^3 (see WARNINGS, CONTRAINDICATIONS). In order to monitor the occurrence of myelotoxicity, it is recommended that frequent peripheral blood cell counts be performed on all patients receiving paclitaxel. Patients should not be retreated with subsequent cycles of paclitaxel until neutrophils recover to a level >1500 cells/ mm^3 and platelets recover to a level >100,000 cells/mm^3. In the case of severe neutropenia (<500 cells/mm^3) during a course of paclitaxel therapy, a 20% reduction in dose for subsequent courses of therapy is recommended.

Hypersensitivity Reactions:
Patients with a history of severe hypersensitivity reactions to products containing Cremophor[1] EL should not be treated with paclitaxel (see WARNINGS, CONTRAINDICATIONS). Minor symptoms such as flushing, skin reactions, dyspnea, hypotension or tachycardia do not require interruption of therapy. However, severe reactions, such as hypotension requiring treatment, dyspnea requiring bronchodilators, angioedema or generalized urticaria require immediate discontinuation of paclitaxel and aggressive symptomatic therapy. Patients who have developed severe hypersensitivity reactions should not be rechallenged with paclitaxel.

Cardiovascular:
Hypotension, hypertension and bradycardia have been observed during paclitaxel administration; patients are usually asymptomatic and generally do not require treatment. In severe cases, paclitaxel infusions may need to be interrupted or discontinued at the discretion of the treating physician. Frequent monitoring of vital signs, particularly during the first hour of paclitaxel infusion, is recommended. Continuous cardiac monitoring is not required except for patients who develop serious conduction abnormalities (see WARNINGS, ADVERSE REACTIONS). When paclitaxel is used in combination with doxorubicin for treatment of metastatic breast cancer, monitoring of cardiac function is recommended.

Nervous System:
Although the occurrence of peripheral neuropathy is frequent, the development of severe

[1] T.M. of B.A.S.F

symptomatology is unusual. A dose reduction of 20% is recommended for all subsequent courses of paclitaxel for severe neuropathy (see ADVERSE REACTIONS, DOSAGE AND ADMINISTRATION).

Paclitaxel Injection contains dehydrated ethanol, 0.497 mL/mL; consideration should be given to possible CNS and other effects of ethanol. Children may be more sensitive than the adults to the effects of ethanol (see WARNINGS, Use in Children).

Hepatic:
There is evidence that the toxicity of paclitaxel is enhanced in patients with elevated liver enzymes. Patients with hepatic impairment may be at increased risk of toxicity, particularly grade III-IV myelosuppression. Caution should be exercised when administering paclitaxel to patients with moderate to severe hepatic impairment. Patients should be monitored closely for the development of profound myelosuppression (see ADVERSE REACTIONS).

Injection Site Reaction:
Injection site reactions, including reactions secondary to extravasation, were usually mild and consisted of pain, erythema, tenderness, skin discolouration, or swelling at the injection site. These reactions have been observed more frequently with the 24-hour infusion than with the 3- hour infusion. Recurrence of skin reactions at a site of previous extravasation following administration of paclitaxel at a different site, i.e. "recall", has been reported rarely.

Rare reports of more severe events such as phlebitis, cellulitis, induration, skin exfoliation, necrosis and fibrosis have been received as part of the continuing surveillance of paclitaxel safety. In some cases the onset of the injection site reaction either occurred during a prolonged infusion or was delayed by a week to ten days.

A specific treatment for extravasation reactions is unknown at this time. Given the possibility of extravasation, it is advisable to closely monitor the infusion site for possible infiltration during drug administration.

Driving/Operating Machinery:
Since Paclitaxel Injection contains ethanol, consideration should be given to the possibility of CNS and other effects.

ADVERSE REACTIONS

The frequency and severity of adverse events are generally similar between patients receiving Paclitaxel for the treatment of ovarian, breast or non small-cell lung carcinoma.
The incidences of adverse reactions in the table that follows are derived from ten clinical trials in carcinoma of the ovary and of the breast involving 812 patients treated with single-agent paclitaxel at doses ranging from 135-300 mg/m^2/day and schedules of 3 or 24 hours. Data from a subset of 181 patients treated at the recommended dose of 175 mg/m^2 and a 3-hour infusion schedule is also included in the table.

	135-300 mg/m² % of Patients N=812	175 mg/m² % of Patients N=181
Bone Marrow		
Neutropenia <2000/mm³	90	87
<500/mm³	52	27
Leukopenia <4000/mm³	90	86
<1000/mm³	17	4
Thrombocytopenia <100,000/mm³	20	6
<50,000/mm³	7	1
Anemia <11 g/dL	78	62
<8 g/dL	16	6
Infections	30	18
Bleeding	14	9
Red cell transfusions	25	13
Red cell transfusions (normal baseline)	12	6
Platelet transfusions	2	0
Hypersensitivity Reactions		
All	41	40
Severe	2	1
Cardiovascular		
Bradycardia (first 3 hours of infusion)	3	3
Hypotension (first 3 hours of infusion)	12	11
Severe events	1	2
Abnormal ECG		
All patients	23	13
Patients with normal baseline	14	8
Peripheral Neuropathy		
Any symptoms	60	64
Severe symptoms	3	4
Myalgia/Arthralgia		
Any symptoms	60	54
Severe symptoms	8	12
Gastrointestinal		
Nausea and vomiting	52	44
Diarrhea	38	25
Mucositis	31	20
Alopecia	87	93
Hepatic (Patients with normal baseline)		
Bilirubin elevations	7	4
Alkaline phosphatase elevations	22	18
AST elevations	19	18
Injection Site Reactions	13	4

Safety referring to a large randomized trial of paclitaxel (135 mg/m² over 24 hours)/cisplatin (75 mg/m²) versus cyclophosphamide/cisplatin, including 410 patients (196 receiving paclitaxel), has been evaluated. The combination of paclitaxel with platinum agents has not resulted in any clinically relevant changes to the safety profile of the drug when used at the recommended dosage.

Safety data were collected for 3121 patients in the Phase III adjuvant breast carcinoma study. The adverse event profile for the patients who received paclitaxel subsequent to cyclophosphamide and doxorubicin was consistent with that seen in the pooled analysis of data from 812 patients treated with single-agent paclitaxel in 10 clinical studies.

Summary of 3-Hour Infusion Data at a Dose of 175 mg/m^2
Unless otherwise stated, the following safety data relate to 62 patients with ovarian cancer and 119 patients with breast cancer treated at a dose of 175 mg/m^2 and a 3-hour infusion schedule, in phase III clinical trials. All patients were premedicated to minimize hypersensitivity reactions. Data from these clinical trials demonstrate that paclitaxel given at this dose and schedule is well tolerated. Bone marrow suppression and peripheral neuropathy were the principle dose-related adverse effects associated with paclitaxel. Compared to 24-hour infusion schedules, neutropenia was less common when paclitaxel was given as a 3-hour infusion.
Neutropenia was generally rapidly reversible and did not worsen with cumulative exposure. The frequency of neurologic symptoms increases with repeated exposure.

None of the observed toxicities were influenced by age.

Adverse Experiences by Body System
Unless otherwise noted, the following discussion refers to the overall safety database of 812 patients with solid tumours treated with single-agent paclitaxel in 10 clinical studies. Toxicities that occurred with greater severity or frequency in previously untreated patients with ovarian carcinoma or NSCLC who received paclitaxel in combination with cisplatin or in patients with breast cancer who received paclitaxel after doxorubicin/cyclophosphamide in the adjuvant setting, and that occurred with a difference that was clinically significant in these populations are also described. In addition, rare events have been reported from post-marketing experience or from other clinical studies.

The frequency and severity of adverse events have been generally similar for all patients receiving paclitaxel.

Hematologic:
The most frequent significant undesirable effect of paclitaxel was bone marrow suppression. Neutropenia was dose and schedule dependent and was generally rapidly reversible. Severe neutropenia (<500 cells/mm^3) occurred in 27% of patients treated at a dose of 175 mg/m^2 but was not associated with febrile episodes. Only 1% of patients experienced severe neutropenia for 7 days or more. Neutropenia was not more frequent or severe in patients who received prior radiation therapy, nor did it appear to be affected by treatment duration or cumulative exposure.

When paclitaxel was administered to patients with ovarian carcinoma at a dose of 175 mg/m^2/3 hours in combination with cisplatin versus the control arm of cyclophosphamide plus cisplatin, the incidences of severe neutropenia and of febrile neutropenia were similar in the paclitaxel plus cisplatin arm and in the control arm.

When paclitaxel was administered in combination with cisplatin to patients with advanced NSCLC in the Eastern Cooperative Oncology Group (ECOG) study, the incidence of neutropenia (Grade IV) was 74% (paclitaxel 135 mg/m^2/24 hours plus cisplatin) and 65% (paclitaxel 250 mg/m^2/24 hours plus cisplatin and G-CSF) compared with 55% in patients who received cisplatin/etoposide. Considerably less Grade IV neutropenia was observed in the European Organization for Research and Treatment of Cancer (EORTC) (28%) and CA 139- 208 (45%) studies for paclitaxel 175 mg/m^2/3 hours plus cisplatin (without G-CSF).

Fever was frequent (12% of all treatment courses). Infectious episodes occurred in 30% of all patients and 9% of all courses; these episodes were fatal in 1% of all patients, and included sepsis, pneumonia and peritonitis. In the Phase 3 second-line ovarian study, infectious episodes were

reported in 20% of the patients given 135 mg/m^2 and 26% of the patients given 175 mg/m^2 by a 3-hour infusion. Urinary tract infections and upper respiratory tract infections were the most frequently reported infectious complications. The use of supportive therapy, including G-CSF, is recommended for patients who have experienced severe neutropenia (see DOSAGE AND ADMINISTRATION).

Twenty percent of the patients experienced a drop in their platelet count below 100,000 cells/mm^3 at least once while on treatment; 7% had a platelet count <50,000 cells/mm^3 at the time of their worst nadir. Bleeding episodes were reported in 4% of all courses and by 14% of all patients, but most of the hemorrhagic episodes were localized and the frequency of these events was unrelated to the paclitaxel dose and schedule. In the Phase III second-line ovarian cancer study, bleeding episodes were reported in 10% of the patients who received study medication; however, none of the patients treated with the 3-hour infusion received platelet transfusions. In the adjuvant breast carcinoma trial, the incidence of severe thrombocytopenia and platelet transfusions increased with higher doses of doxorubicin.

Anemia (Hb<11 g/dL) was observed in 78% of all patients and was severe (Hb<8 g/dL) in 16% of the cases. No consistent relationship between dose or schedule and the frequency of anemia was observed. Among all patients with normal baseline hemoglobin, 69% became anemic on study but only 7% had severe anemia. Red cell transfusions were required in 25% of all patients and in 12% of those with normal baseline hemoglobin levels.

Hypersensitivity Reactions (HSR):
All patients received premedication prior to paclitaxel (see WARNINGS section). The frequency and severity of HSR were not affected by the dose or schedule of paclitaxel administration. In the Phase III second-line ovarian study, the 3-hour infusion was not associated with a greater increase in HSR when compared to the 24-hour infusion.

Hypersensitivity reactions were observed in 20% of all courses and in 41% of all patients. These reactions were severe in less than 2% of the patients and 1% of the courses. No severe reactions were observed after course 3 and severe symptoms occurred generally within the first hour of paclitaxel infusion. The most frequent symptoms observed during these severe reactions were dyspnea, flushing, chest pain and tachycardia. Abdominal pain, pain in the extremities, diaphoresis, and hypertension are also noted.

The minor hypersensitivity reactions consisted mostly of flushing (28%), rash (12%), hypotension (4%), dyspnea (2%), tachycardia (2%) and hypertension (1%). The frequency of hypersensitivity reactions remained relatively stable during the entire treatment period.

Rare reports of chills and reports of back pain in association with hypersensitivity reactions have been received as part of the continuing surveillance of paclitaxel safety.

Cardiovascular:
Hypotension, during the first 3 hours of infusion, occurred in 12% of all patients and 3% of all courses administered. Bradycardia, during the first 3 hours of infusion, occurred in 3% of all patients and 1% of all courses. In the Phase III second-line ovarian study, neither dose nor schedule had an effect on the frequency of hypotension and bradycardia. These vital sign changes most often caused no symptoms and required neither specific therapy nor treatment discontinuation. The frequency of hypotension and bradycardia were not influenced by prior anthracycline therapy.

Significant cardiovascular events possibly related to single-agent paclitaxel occurred in approximately 1% of all patients. These events included syncope, rhythm abnormalities, hypertension and venous thrombosis. One of the patients with syncope treated with paclitaxel at 175 mg/m^2 over 24 hours had progressive hypotension and died. The arrhythmias included asymptomatic ventricular tachycardia, bigeminy and complete AV block requiring pacemaker placement. The incidence of Grade III or greater cardiovascular events was 13% (paclitaxel 135 mg/m^2/24 hours plus cisplatin), 12% (paclitaxel 250 mg/m^2/24 hours plus cisplatin and G- CSF), and 6% (paclitaxel 175 mg/m^2/3 hours plus cisplatin) when paclitaxel followed by cisplatin was administered to patients with advanced NSCLC; there was a similar incidence in the non paclitaxel control arms. The apparent increase in these cardiovascular events in patients with NSCLC compared to patients with breast or ovarian cancer is possibly related to the difference in cardiovascular risk factors among patients with lung cancer.

Electrocardiogram (ECG) abnormalities were common among patients at baseline. ECG abnormalities on study did not usually result in symptoms, were not dose-limiting, and required no intervention. ECG abnormalities were noted in 23% of all patients. Among patients with a normal ECG prior to study entry, 14% of all patients developed an abnormal tracing while on study. The most frequently reported ECG modifications were non-specific repolarization abnormalities, sinus bradycardia, sinus tachycardia and premature beats. Among patients with normal ECG at baseline, prior therapy with anthracyclines did not influence the frequency of ECG abnormalities.

Cases of myocardial infarction have been reported rarely. Congestive heart failure (cardiac dysfunction and reduction of left ventricular ejection fraction or ventricular failure) has been reported typically in patients who have received other chemotherapy, notably anthracyclines (see PRECAUTIONS, Drug Interactions).

Rare reports of atrial fibrillation and supraventricular tachycardia have been received as part of the continuing surveillance of paclitaxel safety.

Respiratory:
Rare reports of interstitial pneumonia, lung fibrosis and pulmonary embolism, have been received as part of the continuing surveillance of paclitaxel safety. Rare reports of radiation pneumonitis have been received in patients receiving concurrent radiotherapy.

Neurologic:
The frequency and severity of neurologic manifestations were influenced by prior and concomitant therapy with cisplatin. In general, the frequency and severity of neurologic manifestations were dose-dependent in patients receiving single-agent paclitaxel. Paresthesia commonly occurs in the form of hyperesthesia. Peripheral neuropathy was observed in 60% of all patients (3% severe) and in 52% (2% severe) of the patients without pre-existing neuropathy.

The frequency of peripheral neuropathy increased with cumulative dose. Neurologic symptoms were observed in 27% of the patients after the first course of treatment and in 34-51% from course 2 to 10. Peripheral neuropathy was the cause of paclitaxel discontinuation in 1% of all patients. Sensory symptoms have usually improved or resolved within several months of paclitaxel discontinuation. The incidence of neurologic symptoms did not increase in the subset of patients previously treated with cisplatin. Pre-existing neuropathies resulting from prior therapies are not a contraindication for paclitaxel therapy. In the Intergroup first-line ovarian carcinoma study, the regimen with paclitaxel

175 mg/m^2 by 3-hour infusion followed by cisplatin 75 mg/m^2 resulted in greater incidence and severity of neurotoxicity (reported as neuromotor or neurosensory events) than the regimen containing cyclophosphamide 750 mg/m^2 followed by cisplatin 75 mg/m^2, 87% (21% severe) versus 52% (2% severe), respectively. In the GOG first-line ovarian carcinoma study, the regimen with paclitaxel (135 mg/m^2 over 24 hours) followed by cisplatin (75 mg/m^2) resulted in an incidence of neurotoxicity (reported as peripheral neuropathy) that was similar to the regimen containing cyclophosphamide 750 mg/m^2 followed by cisplatin 75 mg/m^2, 25% (3% severe) versus 20% (0% severe), respectively. Cross-study comparison of neurotoxicity in Intergroup and GOG trials suggests that when paclitaxel is given in combination with cisplatin 75 mg/m^2, the incidence of severe neurotoxicity is more common at a paclitaxel dose of 175 mg/m^2 given by 3-hour infusion (21%) than at a dose of 135 mg/m^2 given by 24-hour infusion (3%). In patients with NSCLC, administration of paclitaxel followed by cisplatin resulted in greater incidence of severe neurotoxicity compared to the incidence in patients with ovarian or breast cancer treated with single-agent paclitaxel. Severe neurosensory symptoms were noted in 13% of NSCLC patients receiving paclitaxel 135 mg/m^2 by 24-hour infusion followed by cisplatin 75 mg/m^2 and 8% of NSCLC patients receiving cisplatin/etoposide.

Other than peripheral neuropathy, serious neurologic events following paclitaxel administration have been rare (<1%) and have included grand mal seizures, ataxia and encephalopathy.

Rare reports of autonomic neuropathy resulting in paralytic ileus and motor neuropathy with resultant minor distal weakness have been received as part of the continuing surveillance of paclitaxel safety. Optic nerve and/or visual disturbances (scintillating scotoma) have also been reported, particularly in patients who have received higher doses than those recommended.
These effects generally have been reversible. However, rare reports in the literature of abnormal visual evoked potentials in patients have suggested persistent optic nerve damage. Post-marketing reports of ototoxicity (hearing loss and tinnitus) have been received.

Arthralgia/Myalgia:
There was no consistent relationship between dose or schedule of paclitaxel and the frequency or severity of arthralgia/myalgia. Sixty percent of all patients treated in single-agent trials experienced arthralgia/myalgia; 8% experienced severe symptoms. The symptoms were usually transient, occurred two or three days after paclitaxel administration, and resolved within a few days. The frequency and severity of musculoskeletal symptoms remained unchanged throughout the treatment period.

Alopecia:
Alopecia was observed in almost all patients.

Gastrointestinal:
Nausea/vomiting, diarrhea and mucositis were reported by 52%, 38% and 31% of all patients, respectively. These manifestations were usually mild to moderate. Mucositis was schedule dependent and occurred more frequently with the 24-hour than with the 3-hour infusion.

In the first-line Phase III ovarian carcinoma study, the incidence of nausea and vomiting when paclitaxel was administered in combination with cisplatin appeared to be greater compared with the database for single-agent paclitaxel in ovarian and breast carcinoma. In the same study, diarrhea of any grade was reported more frequently (16%) compared to the control arm (8%) (p=0.008), but

there was no difference for severe diarrhea.

Rare reports of intestinal obstruction, intestinal perforation, pancreatitis, ischemic colitis, and dehydration have been received as part of the continuing surveillance of paclitaxel safety. Rare reports of neutropenic enterocolitis (typhlitis) despite the coadministration of G-CSF, were observed in patients treated with paclitaxel alone and in combination with other chemotherapeutic agents.

Hepatic:
No relationship was observed between liver function abnormalities and either dose or schedule of paclitaxel administration. Among patients with normal baseline liver function 7%, 22% and 19% had elevations in bilirubin, alkaline phosphatase and AST (SGOT), respectively. There is no evidence that paclitaxel when given as a 3-hour infusion to patients with mildly abnormal liver function causes exacerbation of abnormal liver function. Prolonged exposure to paclitaxel was not associated with cumulative hepatic toxicity.

Rare reports of hepatic necrosis and hepatic encephalopathy leading to death have been received as part of the continuing surveillance of paclitaxel safety.

Injection Site Reactions:
Injection site reactions, including reactions secondary to extravasation, were usually mild and consisted of pain, erythema, tenderness, skin discolouration, or swelling at the injection site. These reactions have been observed more frequently with the 24-hour infusion than with the 3- hour infusion. Recurrence of skin reactions at a site of previous extravasation following administration of paclitaxel at a different site, i.e. "recall" has been reported rarely.

Rare reports of more severe events such as phlebitis, cellulitis, induration, skin exfoliation, necrosis and fibrosis have been received as part of the continuing surveillance of paclitaxel safety. In some cases the onset of the injection site reaction either occurred during a prolonged infusion or was delayed by a week to ten days.

A specific treatment for extravasation reactions is unknown at this time. Given the possibility of extravasation, it is advisable to closely monitor the infusion site for possible infiltration during drug administration.

Other:
Transient skin changes due to paclitaxel-related hypersensitivity reactions have been observed, but no other skin toxicities were significantly associated with paclitaxel administration. Nail changes (changes in pigmentation or discolouration of nail bed) were uncommon (2%). Edema was reported in 21% of all patients (17% of those without baseline edema); only 1% had severe edema and none of these patients required treatment discontinuation. Edema was most commonly focal and disease-related. Edema was observed in 5% of all courses for patients with normal baseline and did not increase with time on study.

Rare reports of skin abnormalities related to radiation recall as well as reports of maculopapular rash, pruritus, Stevens-Johnson syndrome, and toxic epidermal necrolysis have been received as part of the continuing surveillance of paclitaxel safety.

Reports of asthenia and malaise have been received as part of the continuing surveillance of

paclitaxel safety. In the Phase III trial of paclitaxel 135 mg/m^2 over 24 hours in combination with cisplatin as first-line therapy of ovarian cancer, asthenia was reported in 17% of the patients, significantly greater than the 10% incidence observed in the control arm of cyclophosphamide/cisplatin.

Post-Marketing Adverse Drug Events

Unless otherwise indicated, the table below lists undesirable effects regardless of severity associated with the administration of single agent Paclitaxel (812 patients treated in clinical trials) or as reported in the post-marketing surveillance* of Paclitaxel.

The frequency of undesirable effects listed below is defined using the following convention: very common (≥ 1/10); common (≥ 1/100, < 1/10); uncommon (≥ 1/1000, < 1/100); rare (≥ 1/10,000, < 1/1000); very rare (< 1/10,000).

Infections and infestations:	Very common: infection Uncommon: septic shock Rare*: pneumonia, sepsis
Blood and the lymphatic system disorders:	Very common: myelosuppression, neutropenia, anemia, thrombocytopenia, leukopenia, fever, bleeding Rare: febrile neutropenia Very rare*: acute myeloid leukemia, myelodysplastic syndrome
Immune system disorders:	Very common: minor hypersensitivity reactions (mainly flushing and rash) Uncommon: significant hypersensitivity reactions requiring therapy (eg, hypotension, angioneurotic edema, respiratory distress, generalised urticaria, edema, back pain, chills) Rare*: anaphylactic reactions (with fatal outcome) Very rare*: anaphylactic shock
Metabolism and nutrition disorders:	Very rare*: anorexia
Psychiatric disorders:	Very rare*: confusional state
Nervous system disorders:	Very common: neurotoxicity (mainly: peripheral neuropathy)
	Rare*: motor neuropathy (with resultant minor distal weakness) Very rare*: autonomic neuropathy (resulting in paralytic ileus and orthostatic hypotension), grand mal seizures, convulsions, encephalopathy, dizziness, headache, ataxia
Eye disorders:	Very rare*: reversible optic nerve and/or visual disturbances (scintillating scotomata), particularly in patients who have received higher doses than recommended, photopsia, visual floaters
Ear and labyrinth disorders:	Very rare*: hearing loss, tinnitus, vertigo, ototoxicity
Cardiac disorders:	Very common: abnormal ECG Common: bradycardia Uncommon: cardiomyopathy, asymptomatic ventricular tachycardia, tachycardia with bigeminy, AV block and syncope, myocardial infarction. Very rare*: atrial fibrillation, supraventricular tachycardia
Vascular disorders:	Very common: hypotension Uncommon: hypertension, thrombosis, thrombophlebitis Very rare*: shock

Respiratory, thoracic and mediastinal disorders:	Rare*: dyspnea, pleural effusion, respiratory failure, interstitial pneumonia, lung fibrosis, pulmonary embolism Very rare*: cough
Gastrointestinal disorders:	Very common: nausea, vomiting, diarrhea, mucosal inflammation Rare*: bowel obstruction, bowel perforation, ischemic colitis, pancreatitis Very rare*: mesenteric thrombosis, pseudomembranous colitis, esophagitis, constipation, ascites
Hepato-biliary disorders:	Very rare*: hepatic necrosis (with fatal outcome), hepatic encephalopathy (with fatal outcome)
Renal disorders:	Unknown*: renal failure
Skin and subcutaneous tissue disorders:	Very common: alopecia Common: transient and mild nail and skin changes Rare*: pruritus, rash, erythema, phlebitis, cellulitis, skin exfoliation, necrosis and fibrosis, radiation recall Very rare*: Stevens-Johnson syndrome, epidermal necrolysis, erythema multiforme, exfoliative dermatitis, urticaria, onycholysis (patients on therapy should wear sun protection on hands and feet), scleroderma-like changes preceded by chronic edema
Musculoskeletal, connective tissue and bone disorders:	Very common: arthralgia, myalgia
General disorders and administration site conditions:	Common: injection site reactions (including localised edema, pain, erythema, induration, on occasion extravasation can result in cellulitis) Rare*: asthenia, malaise, pyrexia, dehydration, edema
Investigations:	Common: severe elevation in AST (SGOT), severe elevation in alkaline phosphatase Uncommon: severe elevation in bilirubin Rare*: Increase in blood creatinine

Reporting Side Effects

You can report any suspected side effects associated with the use of health products to Health Canada by:

- Visiting the Web page on Adverse Reaction Reporting (https://www.canada.ca/en/health-canada/services/drugs-health-products/medeffect-canada/adverse-reaction-reporting.html) for information on how to report online, by mail or by fax; or
- Calling toll-free at 1-866-234-2345.

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.

SYMPTOMS AND TREATMENT OF OVERDOSAGE

There is no known antidote for paclitaxel overdosage. The primary anticipated complications of overdosage would consist of bone marrow suppression, peripheral neurotoxicity and mucositis. Overdoses in pediatric patients may be associated with acute ethanol toxicity (see WARNINGS, Use in Children).

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

DOSAGE AND ADMINISTRATION

Note: Undiluted concentrate should not come in contact with plasticized PVC equipment. In order to minimize patient's exposure to the plasticizer DEHP [di-(2-ethylhexyl)phthalate], which may be leached from PVC infusion bags or sets, diluted Paclitaxel Injection solutions should preferably be stored in bottles (glass, polypropylene) or plastic bags (polypropylene, polyolefin) and administered through polyethylene-lined administration sets.

Paclitaxel Injection should be administered through an in-line filter with a microporous membrane not greater than 0.22 microns. Use of filter devices which incorporate short inlet and outlet PVC-coated tubing has not resulted in significant leaching of DEHP.

As with all parenteral drug products, injections/intravenous ad-mixtures should be inspected visually for clarity, particulate matter, precipitate, discoloration and leakage prior to administration whenever solution and container permit. Solutions showing haziness, particulate matter, precipitate, discoloration or leakage should not be used. Discard unused portion.

All patients should be premedicated prior to Paclitaxel Injection administration in order to reduce the risk of severe hypersensitivity reactions. Such premedication may consist of dexamethasone 20 mg orally (or its equivalent) approximately 12 and 6 hours before Paclitaxel Injection, diphenhydramine 50 mg IV (or its equivalent), 30 to 60 minutes prior to Paclitaxel Injection, and cimetidine (300 mg) or ranitidine (50 mg) IV 30 to 60 minutes before Paclitaxel Injection.

Unused portions of the dosage form should be discarded. Metastatic Carcinoma of the Ovary: The administration of Paclitaxel Injection at a dose of 175 mg/m^2 over 3 hours in combination with cisplatin 75 mg/m^2 every 3 weeks is recommended for the primary treatment of patients with advanced carcinoma of the ovary. Paclitaxel Injection should be given before cisplatin when used in combination.

In patients previously treated with chemotherapy, the recommended regimen is 175 mg/m^2 administered intravenously over 3 hours every 3 weeks.

Carcinoma of the Breast:
For the adjuvant treatment of node-positive breast cancer, the recommended regimen is Paclitaxel Injection, at a dose of 175 mg/m^2 intravenously over 3 hours every 3 weeks for four courses administered sequentially to standard combination therapy.

After failure of initial chemotherapy for metastatic disease or relapse within 6 months of adjuvant chemotherapy, Paclitaxel Injection at a dose of 175 mg/m^2 administered intravenously over 3 hours every 3 weeks has been shown to be effective.

Non-Small Cell Lung Carcinoma:
The recommended regimen, given every 3 weeks, is Paclitaxel Injection administered intravenously

over 3 hours at a dose of 175 mg/m^2 followed by cisplatin.

Single courses of Paclitaxel Injection should not be repeated until the neutrophil count is at least 1500 cells/mm^3 and the platelet count is at least 100,000 cells/mm^3. Patients who experience severe neutropenia (neutrophil <500 cells/mm^3) or severe peripheral neuropathy during Paclitaxel Injection therapy should have the dosage reduced by 20% for subsequent courses of Paclitaxel Injection.

Preparation and Administration Precautions:
Paclitaxel Injection is a cytotoxic anticancer drug and, as with other potentially toxic compounds, caution should be exercised in handling Paclitaxel Injection. The use of gloves is recommended. Following topical exposure, tingling, burning, redness have been observed. If Paclitaxel Injection solution contacts the skin, wash the skin immediately and thoroughly with soap and water.

If Paclitaxel Injection contacts mucous membranes, the membranes should be flushed thoroughly with water. Upon inhalation, dyspnea, chest pain, burning eyes, sore throat and nausea have been reported. Given the possibility of extravasation, it is advisable to closely monitor the infusion site for possible infiltration during drug administration (see PRECAUTIONS and ADVERSE REACTIONS, Injection Site Reaction).

Diluent	Container	Final Concentration (Range 0.3 to 1.2 mg/mL)	Storage Conditions and Stability
0.9% sodium chloride	Clear glass vials	**1.2 mg/mL:** using 250 mL of NaCl solution, remove 50 mL and add 50 mL of Paclitaxel Injection 6 mg/mL.	Between 15 and 30°C with light exposure and stable for 27 hours.
5% dextrose solution	Clear glass vials	**0.3 mg/mL:** using 250 mL of dextrose solution, remove 12.5 mL and add 12.5 mL of Paclitaxel Injection 6 mg/mL.	Between 15 and 30°C with light exposure and stable for 27 hours.
5% dextrose/ 0.9% sodium chloride solution	Polyolefin bags	**0.3 mg/mL:** using 250 mL of 5% dextrose / 0.9% sodium chloride solution, remove 12.5 mL and add 12.5 mL of Paclitaxel Injection 6 mg/mL. **1.2 mg/mL:** using 250 mL of 5% dextrose / 0.9% sodium chloride solution, remove 50 mL and add 50 mL of Paclitaxel Injection 6 mg/mL.	Between 15 and 30°C with light exposure and stable for 27 hours.

Preparation for Intravenous Administration:
Paclitaxel Injection must be diluted prior to infusion. Paclitaxel Injection should be diluted in Sodium Chloride Injection 0.9%, Dextrose Injection 5% or Dextrose 5% and Sodium Chloride Injection 0.9% to a final concentration of 0.3 to 1.2 mg/mL. The solutions are physically and chemically stable for up to 27 hours between 15 and 30°C and room lighting conditions; infusions should be completed within this time-frame. There have been rare reports of precipitation with longer than the recommended 3-hour infusion schedules.

Excessive agitation, vibration or shaking may induce precipitation and should be avoided. Infusion sets should be flushed thoroughly with a compatible diluent before use.

Data collected for the presence of the extractable plasticizer DEHP [di-(2-ethylhexyl) phthalate] show that levels increase with time and concentration when dilutions are prepared in PVC containers. Consequently, the use of plasticized PVC containers and administration sets is not recommended.

Paclitaxel Injection solutions should be prepared and stored in glass, polypropylene, or polyolefin containers. Non-PVC containing administration sets, such as those which are polyethylene-lined, should be used.

Devices with spikes should not be used with vials of Paclitaxel Injection since they can cause the stopper to collapse resulting in loss of sterile integrity of Paclitaxel Injection solution.

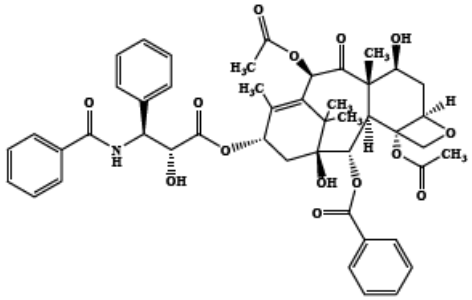
PHARMACEUTICAL INFORMATION

Drug Substance

Proper Name: Paclitaxel

Chemical Name: 4,10ß-Bis(acetyloxy)-13α-[[(2R, 3S)-3-benzamido-2-hydroxy-3-phenylpropanoyl]oxy]-1,7ßdihydroxy-9-oxo-5ß,20-epoxytax-11-en-2α-yl benzoate
5ß.20-Epoxy-1,7ß-Dihydroxy-9-Oxotax-11-Ene-2α,4,10ß,13α-Tetrayl 4,10-Diacetate 2-Benzoate 13- [(2R,3S)-3-(Benzoylamino)-2-Hydroxy-3-Phenylpropanoate
(or)
(2aR,4S, 4aS,6R, 9S, 11S, 12S, 12aR, 12bS)-1,2a,3,4,4a, 6,9,10,11,12,12a, 12b-Dodecahydro-4,6,9,11,12,12b-Hexahydroxy-4a,8,13,13-Tetramethyl-7,11-Methano-5H-Cyclodeca [3,4]-Benz [1,2,b]Oxet-5-One 6,12b-Diacetate, 12-Benzoate,9-Ester with (2R, 3S)-N-Benzoyl-3-Phenylisoserine.

Structural Formula:



Molecular Formula: $C_{47}H_{51}NO_{14}$

Molecular Weight: 853.91 g/mol

Description: White or almost white powder. Freely soluble in methylene chloride, soluble in methanol and practically insoluble in water.

COMPOSITION

Each mL of Paclitaxel Injection contains paclitaxel 6 mg, Anhydrous Citric Acid 2 mg, Macrogoglycerol ricinoleate 527 mg and Ethanol anhydrous 0.497 mL.

STABILITY AND STORAGE RECOMMENDATIONS

Paclitaxel Injection should be stored at room temperature (15-30ºC). Keep the vial in the outer carton, in order to protect from light. Retain in the original package and protect from light. Once punctured, the 5, 16.7 and 25 mL vials of Paclitaxel Injection are stable for 28 days at room temperature. The 50 mL Pharmacy Bulk Vial should be used within 24 hours after initial entry.

Solutions for infusion prepared as recommended may be stored at room temperature (only if necessary). However, the infusion should be initiated within 24 hours of reconstitution.

If unopened vials are refrigerated, a precipitate may form which redissolves with little or no agitation upon reaching room temperature. Product quality is not affected. If the solution remains cloudy or if an insoluble precipitate is noted, the vial should be discarded.

PREPARATION FOR INTRAVENOUS ADMINISTRATION

Contact of undiluted Paclitaxel Injection with plasticized PVC equipment or devices used to prepare solutions for infusion is not recommended (see DOSAGE AND ADMINISTRATION).

Prior to infusion, Paclitaxel Injection should be diluted in Sodium Chloride Injection 0.9%, Dextrose Injection 5% or Dextrose 5% and Sodium Chloride Injection 0.9% to a final concentration of 0.3 to 1.2 mg/mL.

As with all parenteral drug products, intravenous admixtures should be inspected visually for clarity, particulate matter, precipitate, discolouration and leakage prior to administration, whenever solution and container permit.

Paclitaxel Injection should be administered through an in-line filter with a microporous membrane not greater than 0.22 microns.

SPECIAL INSTRUCTIONS

Preparation of Paclitaxel Injection should be done in a vertical laminar flow hood (Biological Safety Cabinet - Class II).

Personnel preparing Paclitaxel Injection should wear PVC gloves, safety glasses, disposable gowns and masks.

All needles, syringes, vials and other materials which have come in contact with Paclitaxel Injection should be segregated and incinerated at 1000°C or more. Sealed containers may explode. Intact vials

should be returned to the manufacturer for destruction. Proper precautions should be taken in packaging these materials for transport.

Personnel regularly involved in the preparation and handling of Paclitaxel Injection should have biannual blood examinations.

Directions for Dispensing from Pharmacy Bulk Vials
The use of Pharmacy Bulk Vials is restricted to hospitals with a recognized intravenous admixture program. The Pharmacy Bulk Vial is intended for single puncture, multiple dispensing and for intravenous use only. Dispensing from the Pharmacy Bulk Vial should be completed within 24 hours after initial entry.

AVAILABILITY OF DOSAGE FORMS

Paclitaxel Injection is available in multidose vials of 5 mL, 16.7 mL and 25 mL and Pharmacy Bulk Vial of 50 mL containing respectively 30 mg, 100 mg, 150 mg and 300 mg paclitaxel at a concentration of 6 mg/mL.

The vial stopper is not made with natural rubber latex.

PHARMACOLOGY

In Vitro
Paclitaxel exhibits cytotoxic activity against a wide variety of both human and rodent tumour cell lines *in vitro* including leukemia, non-small cell lung carcinoma, small cell lung carcinoma, colon carcinoma, CNS carcinoma, melanoma, renal carcinoma, ovarian carcinoma and breast carcinoma at IC_{50} concentration (defined as the concentration required to inhibit cell proliferation to 50% of that of untreated control cells) in the nM range. Paclitaxel blocks cell replication in the late G2 and/or M phases of the cell cycle. Additionally, paclitaxel produces unusual cytoskeletons characterized by discrete bundles or microtubules and the formation of abnormal spindle asters during mitosis. As a consequence of the disruption of the microtubule cytoskeleton, paclitaxel inhibits a variety of cell functions including chemotaxis, migration, cell spreading, polarization, generation of hydrogen peroxide and killing of phagocytosed microorganisms.

In addition to its ability to induce microtubule polymerization, exposure of murine macrophages to paclitaxel results in the release of tumour necrosis factor- α (TNF-α) accompanied by down regulation of the receptor.

In Vivo
Paclitaxel has shown antitumour activity against many tumour models including leukemias and solid tumours and human solid xenografts. The table that follows summarizes paclitaxel's activity.

Tumour, Site	Form	Route	Activity
MURINE LEUKEMIAS			
L1210, IP	*	IP	Borderline → modest
P388, IP	*	IP	Mild
P1534, IP	*	IP	Mild → substantial
MURINE SOLID TUMOURS			
ADJ/PC 6, IP	*	IP	Mild
C26, IP	*	IP	Mild
B16, IP	*	IP	Moderate→potentially curative
M109, IP	*	IP	Moderate→potentially curative
M109, IP (staged)	**	IP	Moderate→ substantial
M109, SC	**	SC	Moderate
M109, SRC	**	SC	Moderate
HUMAN TUMOUR XENOGRAFTS			
CX-1, SRC	*	SC	Mild→substantial
LOX, IP	*	IP	Moderate→potentially curative
MX-1, SRC	*	SC	Potentially curative
A431, SRC	**	IV	Substantial
A2780, SRC	**	IV	Substantial
A2780, SC	**	IV	Moderate
H2981, SRC	**	IV	Substantial
HCT-116	**	IV	Moderate
L2987, SRC	**	IV	Moderate
LX-1, SRC	**	IV	Moderate

* Suspension in hydroxypropylcellulose
** Paclitaxel in ethanol/cremophor diluted with saline

CLINICAL TRIALS
Ovarian Carcinoma

Study Design	Treatments/Doses	No. of Patients	Population	Endpoints/Conclusion
First-Line Data: Phase 3 multicenter, randomized, controlled trial conducted by GOG, comparing therapy with paclitaxel (T) in combination with cisplatin (c) to cyclophosphamide (AC) in combination with cisplatin (c).	- 135 mg/m^2 of T over 24 hrs + 75 mg/m^2 of c - 750 mg/m^2 of AC + 75 mg/m^2 of c	410	Stage III or IV disease (>1 cm residual disease after staging laparotomy or distant metastases) with no prior chemotherapy.	Patients treated with T in combination with cisplatin has significantly longer time to progression (median 16.6 vs 13.0 months, p=0.0008) and nearly a year longer median survival time (p=0.0002) compared with standard therapy.
Second-Line Data: Phase 3 multicenter, bifactorial, randomized trial comparing two dosage regimens of paclitaxel (T) irrespective of the schedules and two schedules irrespective of dose.	-175 mg/m^2 of T over 24 hrs -175 mg/m^2 of T over 3 hrs - 135 mg/m^2 of T over 24 hrs - 135 mg/m^2 of T over 3 hrs	407	Patients (pts) who have failed initial or subsequent chemotherapy for metastatic carcinoma of the ovary.	Pts receiving the 175 mg/m^2 dose had a response rate (RR) similar to that for those receiving the 135 mg/m^2 dose: 18% vs 14% (p=0.28). No difference in RR was detected when comparing the 3-hr with the 24-hr infusion: 15% vs 17% (p=0.50). Pts receiving the 175 mg/m^2 dose of T had a longer time to progression (TTP) than those receiving the 135 mg/m^2 dose: median 4.2 vs 3.1 months (p=0.03). The median TTP for pts receiving the 3-hour vs the 24-hr infusion were 4 months vs 3.7 months, respectively. Median survival was 11.6 months in pts receiving the 175 mg/m^2 dose of T and 11 months in pts receiving the 135 mg/m^2 dose (p=0.92). Median survival was 11.7 months for pts receiving the 3-hr infusion of T and 11.2 months for pts receiving the 24-hr infusion (p=0.9l).

First-Line Data: The adverse event profile for patients receiving paclitaxel in combination with cisplatin was consistent with that seen in previous clinical studies (see ADVERSE REACTIONS).

Second-Line Data: In addition to the Phase 3 trial described above, data from five Phase 1 and 2 clinical studies as well as an interim analysis of data from more than 300 patients enrolled in a treatment referral center program were used in support of the use of paclitaxel in patients who have failed initial or subsequent chemotherapy for metastatic carcinoma of the ovary. Paclitaxel remained active in patients who had developed resistance to platinum- containing therapy (defined as tumour progression while on, or tumour relapse within 6 months from completion of, a platinum containing regimen) with response rates of 14% in the Phase 3 study and 31% in the Phase 1 & 2 clinical studies. The adverse event profile in this Phase 3 study was consistent with that seen in previous clinical studies (see ADVERSE REACTIONS).

The results of this randomized study support the use of paclitaxel at doses of 135 to 175 mg/m^2 administered by a 3-hour intravenous infusion. The same doses administered by 24- hour infusion were

more toxic.

Breast Carcinoma

Study Design	Treatments/Doses	No. of Patients	Population	Endpoints/Conclusion
Adjuvant Breast Carcinoma Study: Phase 3 multicenter, 3X2 factorial, randomized trial, conducted by CALGB, ECOG, NCCTG and SWOG, comparing adjuvant therapy with paclitaxel (T) to no further chemotherapy following four courses of doxorubicin (A) and cyclophosphamide (C)	600 mg/m^2 of C + A at doses of either: - 60 mg/m^2 (on day 1), - 75 mg/m^2 (in two divided doses on days 1 and 2), or - 90 mg/m^2 (in two divided doses on days 1 and 2 with prophylactic G-CSF support and ciprofloxacin) every 3 weeks for four courses and either: - 175 mg/m^2 of T over 3 hrs every 3 weeks for four additional courses or - no additional chemotherapy. Patients (pts) whose tumours were +ve were to receive subsequent tamoxifen (20 mg daily for 5 years); patients who received segmental mastectomies prior to study were to receive breast irradiation after recovery from treatment-related toxicities.	3170	Node-positive breast carcinoma following either mastectomy or segmental mastectomy and nodal dissections.	Median follow-up was 30.1 months. Of 2066 pts who were hormone receptor positive, 93% received tamoxifen. Based on a multivariate Cox model for disease-free survival, pts on AC+T had 22% risk reduction of disease recurrence compared to pts on AC (Hazard Ratio [HR] =0.78, 95% CI 0.67-0.91, p=0.0022) and 26% reduction in the risk of death (HR=0.74, 95% CI 0.60-0.92, p=0.0065). Increasing the dose of A higher than 60 mg/m^2 had no effect on either disease-free survival or overall survival. Subset analyses including number of positive lymph nodes, tumour size, hormone receptor status, and menopausal status showed a reduction in hazard similar to above for disease-free and overall survival in all larger subsets with one exception; pts with receptor-positive tumours had a smaller reduction in hazard (HR = 0.92) for disease-free survival with T than other groups.
After Failure of Initial Chemotherapy: Phase 3 multicenter, randomized trial comparing two dosage regimens of paclitaxel (T).	-175 mg/m^2 of T over 3 hrs -135 mg/m^2 of T over 3 hrs	471	Patients (pts) who failed chemotherapy either in the adjuvant (30%) or metastatic (39%) setting or both (31%). At study entry, 60% had symptomatic disease with impaired performance status and 73% had visceral metastases.	The overall response rate was 26% (95% CI: 22 to 30%), with 17 complete and 99 partial responses. The median duration of response, measured from the first day of treatment, was 8.1 months (range: 3.4-18.1 + months). Overall, the median time to progression was 3.5 months (range: 0.03-17.1 months). Median survival was 11.7 months (range: 0-18.9 months).

Adjuvant Breast Carcinoma Study: The adverse event profile for patients receiving paclitaxel subsequent to AC was consistent with that seen in previous clinical studies (see ADVERSE REACTIONS).

After Failure of Initial Chemotherapy: In addition to the Phase 3 trial described above, data from three Phase 2 clinical studies were used in support of the use of paclitaxel in patients with metastatic breast carcinoma. The adverse event profile for patients receiving paclitaxel

subsequent to AC was consistent with that seen in previous clinical studies (see ADVERSE REACTIONS).

Non-Small Cell Lung Carcinoma (NSCLC)

Study Design	Treatments/Doses	No. of Patients	Population	Endpoints/Conclusion
Phase 3 multicenter, open label, randomized trial conducted by ECOG, comparing two dosage regimens of paclitaxel (T) in combination with cisplatin (c) to cisplatin (c) followed by etoposide (VP).	135 mg/m^2 of T over 24 hrs + 75 mg/m2 of c 250 mg/m^2 of T over 24 hrs + 75 mg/m^2 of c with G-CSF support 75 mg/m^2 of c on day 1 followed by 100 mg/m^2 of VP on days 1, 2 and 3 (control)	599	Non-Small Cell Lung Cancer	There were statistically significant differences favouring each of the T plus c arms for response rate and time to tumour progression. There was no statistically significant difference in survival between either T plus c arm and the c plus VP arm. In this study, the Functional Assessment of Cancer Therapy- Lung (FACT-L) questionnaire had seven subscales that measured subjective assessment of treatment. Of the seven, the Lung Cancer Specific Symptoms subscale favoured T at 135 mg/m^2 of T as a 24-hr infusion + 75 mg/m^2 of c. For all other factors, there was no difference in the treatment groups.

The adverse event profile for patients who received paclitaxel in combination with cisplatin was consistent with that seen in previous clinical studies (see ADVERSE REACTIONS).

TOXICOLOGY

Acute Toxicity

Species/Strain	No./Sex/Group	Route	LD50 (mg/kg)
Rat/Sprague-Dawley	5 M/F (RF)[a] 10 M/F (L)[b]	IP IP	 34 (combined)
Rat/Sprague-Dawley	10 M/F	IP	M: 32 F: 36
Rat/Sprague-Dawley	5 M/F	IV	>85
Dog/Beagle	1 M/F	IV	>9

[a] Range-Finding phase
[b] Lethality phase

Signs of toxicity in rats were lethargy, rough coat, thinness, hunched posture, neck abscesses, soft stool, decreased body weight, squinted eyes, alopecia.

Signs of toxicity in dogs were decreased body weight.

Subacute Toxicity

Species/Strain	No./Group	Sex	Dose Range[a] mg/kg/day	Route	Duration	Drug-Related Findings
Mouse/CD2F1	5 5	M F	0, 1-15	IV	5 Days	No drug-related toxicities.
Mouse/CD2F1	5 5 15 15	M F M F	0, 1-15* 0, 21-43**	IP IP	5 Days 5 Days	**20 and 45 mg/kg/day:** Decreased body weight >10% **45 mg/kg/day**: Rough coat, thin/hunched posture. All died. **≥24 mg/kg/day**: Dose-related decreased body weight, rough coat, thin/hunched posture, ataxia, hypothermia, squinted eyes and dyspnea, deaths (74/88 M, 56/90 F).
Rat/Sprague-Dawley	5 5 10 10	M F M F	0, 5-45* 0, 5.3-14.2**	IP IP	5 Days 5 Days	**≥8.66 mg/kg/day:** Dose-related decreased body weight, rough coat, thin/hunched posture, stool changes, soiling, hypothermia, eye tearing and squinting, abscesses, deaths [(19/20 M, 18/20 F)*; (44/70 M at all doses, 26/40 F)**].
Mouse/CD2F1	10 10 10 10 10 10 10 10 10	M F M F M F M F	Negative[b] Control Vehicle Control 1/2 LD_{10} 10.79 13.05 LD_{10} 21.57 26.09 LD_{50} 25.50 29.52	IP	5 Days	**1/2 LD_{10}, LD_{10} and LD_{50} dose groups:** Necrosis of developing spermatocytes. Giant cell formation. **LD_{10} and LD_{50} dose groups:** Decrease in reticulocyte and neutrophil values. Lower liver and testicular weights. Moderate to severe thymic cortical lymphoid depletion. Necrosis or atrophy of small intestinal mucosa and crypt cell hypoplasia. Neurophilic hyperplasia, eosinopenia, lymphoid hypoplasia and atypical megakaryocytes, deaths (2/10 M, 8/10 F at LD_{10}; 8/10 M, 9/9 F at LD_{50}). **All dose groups:** Dose-related decreased body weight, lethargy, rapid respiration, rough coat, thin/hunched posture, hypothermia, squinted eyes with exudate.

Subacute Toxicity (cont'd)

Species/Strain	No./Group	Sex	Dose Range[a] mg/kg/day	Route	Duration	Drug-Related Findings
Rat/Sprague-Dawley	10 10 10 10 10 10 10 10 10 10	M F M F M F M F M F	Negative[b] control Vehicle Control 1/2 LD_{10} 2.55 4.29 LD_{10} 5.11 8.58 LD_{50} 7.47 9.99	IP	5 Days	**LD_{50} dose group:** Testicular necrosis, visceral peritoneum inflammation (F only), deaths (3/10 M, 3/10 F). **LD_{10} and LD_{50} dose groups:** Markedly decreased leukocyte and platelet counts. Weight loss, bone marrow hypoplasia, deaths (1/10 M, 3/10 F at LD_{10}). **All dose groups:** Dose-related thymic and splenic lymphoid depletion, rough coat, thin/hunched posture, lethargy, soft stool, neck abscesses. Decreased reticulocycte counts, white foci in submandibular lymph nodes and/or salivary glands.
Dog/Beagle	1 1	M F	0, 0.375, 0.75, 1.5, 3.0, 6.0	IV	5 Days	**All doses:** Decreased body weight. Increased ALT, cholesterol, triglycerides and total lipids. Intestinal hemorrhage or agonal changes. Lymphoid depletion of tonsils and/or bronchial lymph node. **≥1.5 mg/kg/day:** Marked decreases in leukocyte, reticulocyte, platelet, and erythrocyte counts. **≤1.5 mg/kg/day**: Moderate to severe bone marrow hematopoietic hypoplasia. **3.0 to 6.0 mg/kg/day:** Deaths (All).

* Range finding phase
** Lethality phase
a Paclitaxel dissolved in Cremophor[1] EL (50%): ethanol (50%) and then diluted with saline to provide dosing solutions
b Untreated

Chronic Toxicity

Species/Strain	No./ Group	Sex	Dose Range* (mg/kg/day)	Route	Duration	Drug-Related Findings
Rat/Sprague-Dawley	10 10 10 10 10 10	M F M F M F	Neg. Cont., saline Vehicle Control 1, 3.3, 10	IV	1 Month	**3.3 mg/kg/day:** Slight decreases in erythrocyte, neutrophil and platelet counts and hemoglobin and hematocrit values; moderate decreases in leukocyte counts. Increased splenic extramedullary hematopoiesis and bone marrow hypoplasia. Moderate to severe decrease in reticulocyte counts. Minimal increase in lymphocyte counts. **10 mg/kg/day:** Rough coat, alopecia, decreased body weight/weight gain and food and water intakes. Slight decreases in erythrocyte and neutrophil counts, hemoglobin and hemocrit values; moderate to severe decreases in reticulocyte count and slight increases in platelet and relative lymphocyte counts. Decreased weight of thymus, testes and seminal vesicles. Lower weights of testes and epididymides present at end of observation period. Microscopically, increased splenic extramedullary hematopoiesis and lymphoid depletion, thymic atrophy and lymphoid depletion, mandibular lymph node atrophy of lymph follicle, and lymphadenitis; bone marrow hypoplasia; hypospermatogenesis and atrophy of seminiferous tubules; glandular atrophy in seminal vesicle and prostate and giant cell formation in the epididymides.
Dog/Beagle	5 5 3 3 3 3 5 5	M F M F M F	Neg. Cont., saline Vehicle Control 0.3, 1 3	IV	1 Month	**0.3 and 1 mg/kg/day:** Reversible minimal decreases in bone marrow cellularity. **3 mg/kg/day:** Interdigital cysts, swollen infusion sites, and transient decreased weight gain and food intake. Decreased erythrocyte numbers, hemoglobin concentration and hemocrit (M/F) and decreased leucocyte (severe neutropenia) counts in individual females. Lymphoid depletion of spleen or lymph nodes, duodenal inflammation and crypt dilation, decreased bone marrow cellularity, skin lesions and giant cell formation in the testes and epididymides. Residual drug effects present in some lymphoid organs, duodenum, testes and skin at the end of recovery period.

* Paclitaxel in Cremophor EL: ethanol (50/50) diluted with saline for dosing solutions

Reproduction and Teratology

Species/Strain	No./ Group	Sex	Route	Dose* and Frequency	Drug-Related Findings
Segment I Rat/Sprague-Dawley	20 20 20	M F F	IV	0 (vehicle), 0 (saline) 0.1, 0.3, 1.0 mg/kg M: 63 days prior to mating and during mating F: During mating and through day 7 of gestation 0 (Non-treated)	Body weight gain and food intake were lower in F0 males and females Days 25-63 and Days 28-62, respectively, of premating period. Body weight gain and food intake were lower in F0 females during Days 2-20 of gestation at the high-dose level. Fertility indices in the F0 generation were lower at 1 mg/kg/day compared to saline and vehicle-control groups. Copulation indices were similar to control. Adrenal, uterine and ovarian weights lower in F0 dams compared to controls. Numbers of corpora lutea, implantations and live fetuses were decreased, and numbers of empty implantation sites and fetal deaths were increased at 1 mg/kg/day. The no-effect dose was 0.3 mg/kg/day in both F0 and F1 generations.
Segment II Rabbit/New Zealand White	20	F	IV	0 (saline), 0 (vehicle), 0.3, 1, 3 mg/kg, Days 6-18 of presumed gestation.	Twelve of 20 does given the high dose died or were sacrificed as moribund. Clinical signs of toxicity in the does that died included red excreta, stool consistency changes, decreased activity, food intake decreases and body weight loss. Liver and kidney weights were increased and ovary weights were decreased in the does given the high dose. Litter group mean values for corpora lutea, litter size, live fetuses and the number of does with viable fetuses in the high-dose group were reduced. Litter group mean values for resorption (total or early), percentage of dead or resorbed conceptuses and the number of does with all conceptuses dead or resorbed were increased in the high-dose group. In summary, paclitaxel at 3 mg/kg/day caused severe maternal toxicity (mortality, abortions, clinical signs and reduced organ weights, body weights and food consumption) and severe developmental toxicity (reduced corpora lutea, litter size and live fetuses and increased resorption). Paclitaxel doses as high as 1 mg/kg/day did not cause any maternal or fetal toxicity.

* Paclitaxel in Cremophor[1] EL: ethanol 50/50 diluted with saline for dosing solutions.

Mutagenicity and Genotoxicity

Paclitaxel was not mutagenic in the *Ames/Salmonella* and *Escherichia Coli WP2* reverse mutation assays but was found to be clastogenic, in the *in vitro* cytogenetics assay in primary human lymphocytes.

Paclitaxel was genotoxic *in vivo* on the mouse erythropoietic system in the mouse bone marrow erythrocyte micronucleus assay.

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If you want more information about Paclitaxel Injection:

- Talk to your healthcare professional
- Find the full product monograph that is prepared for healthcare professionals by visiting the Health Canada website: (https://www.canada.ca/en/health-canada/services/drugs-health-products/drug-products/drug-product-database.html); the manufacturer's website http://www.auropharma.ca, or by calling 1-855-648-6681.

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