

TOPOTECAN- topotecan injection, solution, concentrate
Mylan Institutional LLC

HIGHLIGHTS OF PRESCRIBING INFORMATION

These highlights do not include all the information needed to use TOPOTECAN INJECTION safely and effectively. See full prescribing information for TOPOTECAN INJECTION.

TOPOTECAN injection, for intravenous use

Initial U.S. Approval: 1996

WARNING: BONE MARROW SUPPRESSION

See full prescribing information for complete boxed warning.

Topotecan injection can cause severe myelosuppression. Administer only to patients with baseline neutrophil counts greater than or equal to 1,500 cells/mm³ and platelet count greater than or equal to 100,000/mm³. Monitor blood cell counts. (5.1)

----- **INDICATIONS AND USAGE** -----

Topotecan Injection is a topoisomerase inhibitor indicated for:

- small cell lung cancer platinum-sensitive disease in patients who progressed after first-line chemotherapy. (1.1)

----- **DOSAGE AND ADMINISTRATION** -----

- 1.5 mg/m² by intravenous infusion over 30 minutes daily for 5 consecutive days, starting on day 1 of a 21-day course. (2.1, 2.2)
- Renal impairment: Dose reduce topotecan injection in patients with moderate renal impairment (20 to 39 mL/min). (2.2)

----- **DOSAGE FORMS AND STRENGTHS** -----

- Injection: 4 mg/4 mL (1 mg/mL, topotecan free base equivalent) solution in single dose vial (3)

----- **CONTRAINDICATIONS** -----

- History of severe hypersensitivity reactions to topotecan. (4)

----- **WARNINGS AND PRECAUTIONS** -----

- Bone marrow suppression: Administer topotecan injection only to patients with adequate bone marrow reserves. Monitor peripheral blood counts and adjust the dose as needed. (2.2, 5.1)
- Neutropenic enterocolitis: Fatal typhlitis can occur. (5.2)
- Interstitial lung disease (ILD): Fatal cases have occurred. Permanently discontinue for confirmed ILD. (5.3)
- Embryofetal toxicity: Can cause fetal harm. Advise women of potential risk to the fetus. (5.4, 8.1, 8.3)
- Extravasation and tissue injury: Severe cases have been reported. If extravasation occurs, immediately stop administration and institute recommended management procedures. (5.5)

----- **ADVERSE REACTIONS** -----

Small cell lung cancer:

- The most common hematologic adverse reactions were: neutropenia (Grade 4: 70%), anemia (Grade 3/4: 42%), thrombocytopenia (Grade 4: 29%), and febrile neutropenia (28%). (6.1)
- The most common (>5%) non-hematologic adverse reactions (all grades) were: asthenia, dyspnea, nausea, pneumonia, abdominal pain, and fatigue. (6.1)

To report SUSPECTED ADVERSE REACTIONS, contact Mylan Pharmaceuticals Inc. at 1-877-446-3679 (1-877-4-INFO-RX) or FDA at 1-800-FDA-1088 or www.fda.gov/medwatch.

----- **DRUG INTERACTIONS** -----

- Do not initiate G-CSF until 24 hours after completion of treatment with topotecan injection. Concomitant administration can prolong duration of neutropenia. (7)

- Lactation: Discontinue breastfeeding. (8.2)

See 17 for PATIENT COUNSELING INFORMATION.

Revised: 11/2017

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FULL PRESCRIBING INFORMATION

WARNING: BONE MARROW SUPPRESSION

Topotecan injection can cause severe myelosuppression. Administer only to patients with baseline neutrophil counts of greater than or equal to 1,500 cells/mm³ and platelet counts greater than or equal to 100,000 cells/mm³. Monitor blood cell counts [see *Warnings and Precautions (5.1)*].

1 INDICATIONS AND USAGE

Topotecan injection is indicated for the treatment of patients with small cell lung cancer with platinum-sensitive disease who progressed at least 60 days after initiation of first-line chemotherapy.

2 DOSAGE AND ADMINISTRATION

Verify dose using body surface area prior to dispensing. Recommended dosage should generally not exceed 4 mg intravenously [see *Overdosage (10)*].

2.1 Small Cell Lung Cancer

Recommended Dose and Schedule

The recommended dose of topotecan injection is 1.5 mg/m² by intravenous infusion over 30 minutes daily for 5 consecutive days, starting on day 1 of a 21-day course.

2.2 Dose Modifications

Hematologic Toxicities

Dose reduce topotecan injection to 1.25 mg/m² for:

- neutrophil counts of less than 500 cells/mm³, or administer granulocyte-colony stimulating factor (G-CSF) starting no sooner than 24 hours following the last dose of topotecan injection.
- platelet counts less than 25,000 cells/mm³ during previous cycle.

For combination use with cisplatin, dose reduce topotecan injection to 0.60 mg/m² (and further to 0.45 mg/m² if necessary) for:

- febrile neutropenia (defined as neutrophil counts less than 1,000 cells/mm³ with temperature of greater than or equal to 38°C (100.4°F), or administer G-CSF starting no sooner than 24 hours following the last dose of topotecan injection.
- platelet counts less than 25,000 cells/mm³ during previous cycle.

Renal Impairment

*For single-agent use, dose reduce topotecan injection to 0.75 mg/m² in patients with moderate renal impairment (creatinine clearance [Clcr] = 20 to 39 mL/min). Insufficient data are available in patients with severe renal impairment (Clcr less than 20 mL/min) to provide a dosage recommendation for topotecan injection [see *Use in Specific Populations (8.6)*, *Clinical Pharmacology (12.3)*].*

2.3 Preparation and Intravenous Administration

Topotecan injection is a cytotoxic drug. Follow applicable special handling and disposable procedures.¹

Preparation and Administration

The appropriate volume of topotecan injection is diluted in a minimum of 50 mL of 0.9% Sodium Chloride Injection, USP or 5% Dextrose Injection, USP prior to administration. Infuse over 30 minutes.

Stability

Topotecan injection diluted for infusion is stable between 20° and 25°C (68° and 77°F) in ambient lighting conditions for 24 hours.

Each vial of topotecan injection is intended for single use only. Any unused drug remaining after injection must be discarded.

3 DOSAGE FORMS AND STRENGTHS

Injection: 4 mg/4 mL (1 mg/mL, topotecan free base equivalent) clear, yellow to yellow-green solution in single dose vial for intravenous infusion only following dilution.

4 CONTRAINDICATIONS

Topotecan injection is contraindicated in patients who have a history of severe hypersensitivity reactions to topotecan.

5 WARNINGS AND PRECAUTIONS

5.1 Bone Marrow Suppression

Bone marrow suppression (primarily neutropenia) is the dose-limiting toxicity of topotecan. Neutropenia is not cumulative over time. Severe myelotoxicity has been reported when topotecan is used in combination with cisplatin [see *Drug Interactions (7)*].

- The following data on myelosuppression are based on an integrated safety database from 8 trials (N = 879) using topotecan at 1.5 mg/m² by intravenous infusion over 30 minutes daily for 5 consecutive days, starting on Day 1 of a 21-day course in patients with ovarian cancer and small cell lung cancer and from one trial in patients with cervical cancer (N = 147) using topotecan 0.75 mg/m² by intravenous infusion over 30 minutes daily on days 1, 2, and 3 repeated every 21 days in combination with cisplatin 50 mg/m² on day 1.

Neutropenia

- Monotherapy: Grade 4 neutropenia (less than 500 cells/mm³) occurred in 78% of patients, with a median duration of 7 days and was most common during course 1 of treatment (58% of patients). Grade 4 neutropenia associated with infection occurred in 13% of patients and febrile neutropenia occurred in 5% of patients. Sepsis occurred in 4% of patients and was fatal in 1% of patients. Pancytopenia has been reported.
- Combination with cisplatin: Grade 4 neutropenia occurred in 48% of patients.

Thrombocytopenia

- Monotherapy: Grade 4 thrombocytopenia (less than 25,000/mm³) occurred in 27% of patients, with a median duration of 5 days.
- Combination with cisplatin: Grade 4 thrombocytopenia occurred in 7% of patients.

Anemia

- Monotherapy: Grade 3 or 4 anemia (less than 8 g/dL) occurred in 37% of patients.
- Combination with cisplatin: Grade 3 or Grade 4 anemia occurred in 40% of patients.

Administer topotecan injection only to patients with a baseline neutrophil count of greater than or equal to 1,500 cells/mm³ and a platelet count greater than or equal to 100,000/mm³. Monitor peripheral blood counts frequently during treatment with topotecan injection. Refer to Section 2.4 for dose modification guidelines for hematological toxicities in subsequent courses. Do not treat patients with subsequent courses of topotecan injection until neutrophils recover to greater than 1,000 cells/mm³, platelets recover to greater than 100,000 cells/mm³, and hemoglobin levels recover to 9.0 g/dL (with transfusion if necessary).

5.2 Neutropenic Enterocolitis

Topotecan can cause fatal typhlitis (neutropenic enterocolitis). Consider the possibility of typhlitis in patients presenting with fever, neutropenia, and abdominal pain.

5.3 Interstitial Lung Disease

Interstitial lung disease (ILD), including fatalities, has occurred with topotecan. Underlying risk factors include history of ILD, pulmonary fibrosis, lung cancer, thoracic radiation, and use of pneumotoxic drugs and/or colony stimulating factors. Monitor patients for pulmonary symptoms indicative of ILD (e.g., cough, fever, dyspnea, and/or hypoxia), and discontinue topotecan injection if a new diagnosis of ILD is confirmed.

5.4 Embryofetal Toxicity

Based on animal data, topotecan injection can cause fetal harm when administered to a pregnant woman.

Topotecan caused embryoletality, fetotoxicity, and teratogenicity in rats and rabbits when administered during organogenesis. Advise females of reproductive potential to use effective contraception during treatment and for at least 1 month after the last dose of topotecan. Advise women of the potential risk to a fetus [see *Use in Specific Populations (8.1, 8.3)*].

5.5 Extravasation and Tissue Injury

Extravasation with topotecan has been observed; severe cases have been reported. If signs or symptoms of extravasation occur, immediately stop administration of topotecan and institute recommended management procedures [see *Adverse Reactions (6)*].

6 ADVERSE REACTIONS

The following serious adverse reactions are described below and elsewhere in the labeling:

- Bone Marrow Suppression [see *Warnings and Precautions (5.1)*]
- Neutropenic Enterocolitis [see *Warnings and Precautions (5.2)*]
- Interstitial Lung Disease [see *Warnings and Precautions (5.3)*]
- Extravasation and Tissue Injury [see *Warnings and Precautions (5.5)*]

6.1 Clinical Trials Experience

Because clinical trials are conducted under widely varying conditions, adverse reaction rates observed in the clinical trials of a drug cannot be directly compared with rates in the clinical trials of another drug and may not reflect the rates observed in practice.

Small Cell Lung Cancer

Table 1 shows the Grade 3/4 hematologic and major non-hematologic adverse reactions in the topotecan/CAV (cyclophosphamide-doxorubicin-vincristine) comparator trial in small cell lung cancer.

Table 1. Adverse Reactions Experienced by ≥5% of Small Cell Lung Cancer Patients Randomized to Receive Topotecan or CAV

Adverse Reaction	Topotecan (n = 107)	CAV (n = 104)
Hematologic Grade 3/4	%	%
Grade 4 neutropenia (<500 cells/mm ³)	70	72
Grade 3/4 anemia (Hgb <8 g/dL)	42	20
Grade 4 thrombocytopenia (<25,000 plts/mm ³)	29	5
Febrile neutropenia	28	26
Non-hematologic Grade 3/4	%	%
Infections and infestations		
Sepsis ^a	5	5
Respiratory, thoracic, and mediastinal disorders		
Dyspnea	9	14
Pneumonia	8	6
Gastrointestinal disorders		
Abdominal pain	6	4
Nausea	8	6
General disorders and administrative site conditions		
Fatigue	6	10
Asthenia	9	7
Pain ^b	5	7

^a Death related to sepsis occurred in 3% of patients receiving topotecan and 1% of patients receiving CAV.

^b Pain includes body pain, skeletal pain, and back pain.

Hepatobiliary Disorders in Small Cell Lung Cancer Patients Receiving Topotecan: Based on 426 patients with small cell lung cancer treated with topotecan, Grade 1 transient elevations in hepatic enzymes occurred in 8% of patients. Grade 3/4 elevations occurred in 4%. Grade 3/4 elevated bilirubin occurred in less than 2% of patients.

6.2 Postmarketing Experience

The following reactions have been identified during postmarketing use of topotecan. Because they are reported voluntarily from a population of unknown size, estimates of frequency cannot be made. These reactions have been chosen for inclusion due to a combination of their seriousness, frequency of reporting, or potential causal connection to topotecan.

Blood and Lymphatic System Disorders

Severe bleeding (in association with thrombocytopenia) [see *Warnings and Precautions (5.1)*].

Immune System Disorders

Allergic manifestations, anaphylactoid reactions.

Gastrointestinal Disorders

Abdominal pain potentially associated with neutropenic enterocolitis [see *Warnings and Precautions (5.2)*].

Pulmonary Disorders

Interstitial lung disease [see *Warnings and Precautions (5.3)*].

Skin and Subcutaneous Tissue Disorders

Angioedema, severe dermatitis, severe pruritus.

General Disorders and Administration Site Conditions

Extravasation [see *Warnings and Precautions (5.5)*].

7 DRUG INTERACTIONS

7.1 G-CSF

Concomitant administration with G-CSF can prolong the duration of neutropenia. If G-CSF is used, it should be started no sooner than 24 hours following the last dose of topotecan injection.

8 USE IN SPECIFIC POPULATIONS

8.1 Pregnancy:

Teratogenic Effects

Risk Summary

Based on animal data, topotecan can cause fetal harm when administered to a pregnant woman. Topotecan caused embryoletality, fetotoxicity, and teratogenicity in rats and rabbits when administered during organogenesis at doses similar to the clinical dose [see *Data*]. There are no available human data informing the drug-associated risk. Advise pregnant women of the potential risk to a fetus. The background risk of major birth defects and miscarriage for the indicated populations are unknown; however, the background risk in the US general population of major birth defects is 2% to 4% and of miscarriage is 15% to 20% of clinically recognized pregnancies.

Data

Animal Data: In rabbits, a dose of 0.10 mg/kg/day (about equal to the clinical dose on a mg/m² basis) given on Days 6 through 20 of gestation caused maternal toxicity, embryoletality, and reduced fetal body weight. In the rat, a dose of 0.23 mg/kg/day (about equal to the clinical dose on a mg/m² basis) given for 14 days before mating through gestation Day 6 caused fetal resorption, microphthalmia, pre-implant loss, and mild maternal toxicity. Administration of an intravenous dose of 0.10 mg/kg/day (about half the clinical dose on a mg/m² basis) given to rats on Days 6 through 17 of gestation caused an increase in post-implantation mortality. This dose also caused an increase in total fetal malformations. The most frequent malformations were of the eye (microphthalmia, anophthalmia, rosette formation of the retina, coloboma of the retina, ectopic orbit), brain (dilated lateral and third ventricles), skull, and vertebrae.

8.2 Lactation

Risk Summary

It is not known whether this drug is present in human milk; however, topotecan is excreted in rat milk at high concentrations [see *Data*]. Because many drugs are present in human milk and because of the potential for serious adverse reactions in nursing infants with topotecan, advise nursing mothers to discontinue breastfeeding during treatment with topotecan.

Data

Animal Data: Following intravenous administration of topotecan to lactating rats at a dose of 4.72 mg/m² (about twice the clinical dose on a mg/m² basis), topotecan was excreted into milk at concentrations up

to 48-fold higher than those in plasma.

8.3 Females and Males of Reproductive Potential

Contraception

Females: Advise female patients of reproductive potential to use effective contraception during treatment with topotecan and for one month after the last dose. Advise females to contact their healthcare provider if they become pregnant, or if pregnancy is suspected, while taking topotecan [see *Use in Specific Populations (8.1)*].

Males: Topotecan may damage spermatozoa, resulting in possible genetic and fetal abnormalities. Advise males with a female sexual partner of reproductive potential to use effective contraception during and for three months after treatment with topotecan [see *Nonclinical Toxicology (13.1)*].

Infertility

Females: Topotecan may have both acute and long-term effects on fertility [see *Nonclinical Toxicology (13.1)*].

Males: Effects on spermatogenesis have been observed in animals administered topotecan. Advise males of the potential risk for impaired fertility and to seek counseling on fertility and family planning options prior to starting treatment [see *Nonclinical Toxicology (13.1)*].

8.4 Pediatric Use

Safety and effectiveness in pediatric patients have not been established.

8.5 Geriatric Use

Of the 879 patients in a combined experience of topotecan which included patients with small cell lung cancer in clinical trials of topotecan, 32% (n = 281) were aged 65 years and older, while 3.8% (n = 33) were aged 75 years and older.

No overall differences in effectiveness or safety were observed between these patients and younger adult patients, and other reported clinical experience has not identified differences in responses between the elderly and younger adult patients.

8.6 Renal Impairment

The systemic exposure to both topotecan lactone and total topotecan increased in patients with moderate renal impairment (Clcr = 20 to 39 mL/min) compared with patients with normal renal function (Clcr greater than 60 mL/min). Reduce the dose of topotecan in patients with moderate renal impairment (Clcr = 20 to 39 mL/min). No dosage adjustment of topotecan is recommended for patients with mild renal impairment (Clcr = 40 to 60 mL/min) [see *Dosage and Administration (2.2)*, *Clinical Pharmacology (12.3)*].

Insufficient data are available in patients with severe renal impairment (Clcr less than 20 mL/min) to provide a dosage recommendation for topotecan.

10 OVERDOSAGE

Overdoses (up to 10-fold of the prescribed dose) occurred in patients treated with intravenous topotecan. The primary complication of overdosage is bone marrow suppression. The observed signs and symptoms of overdose are consistent with the known adverse reactions associated with topotecan injection [see *Adverse Reactions (6.1, 6.2)*]. In addition, elevated hepatic enzymes and mucositis have been reported following overdose.

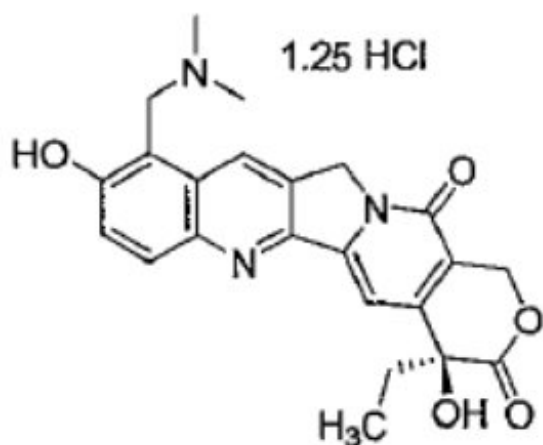
One patient received a single dose of 40 mg/m² of intravenous topotecan and developed gastrointestinal toxicity, skin toxicity, and myelosuppression leading to septic shock. Another patient received a single dose of 35 mg/m² and experienced severe, reversible neutropenia.

There is no known antidote for overdose with topotecan injection. If an overdose is suspected, monitor the patient closely for bone marrow suppression and institute supportive-care measures (such as the prophylactic use of G-CSF and antibiotic therapy) as appropriate.

11 DESCRIPTION

Topotecan is a semi-synthetic derivative of camptothecin and is an anti-tumor drug with topoisomerase I-inhibitory activity.

The chemical name for topotecan hydrochloride is (S)-10-[(dimethylamino)methyl]-4-ethyl-4,9-dihydroxy-1*H*-pyrano[3',4':6,7]indolizino[1,2-*b*]quinoline-3,14-(4*H*,12*H*)-dione 1.25 hydrochloride. It has the molecular formula C₂₃H₂₃N₃O₅·1.25 HCl and a molecular weight of 467.02. Topotecan hydrochloride is soluble in water and melts with decomposition at 213°C to 218°C. As formulated in topotecan injection, topotecan hydrochloride has the following structural formula:



Topotecan Injection is supplied as a sterile, non-pyrogenic, clear, yellow to yellow-green solution at a topotecan free base concentration of 4 mg/4 mL (1 mg/mL) available in single dose vials. Each mL of topotecan injection contains topotecan hydrochloride equivalent to 1 mg of topotecan as free base, 5 mg tartaric acid, NF and water for injection, USP. Hydrochloric acid and/or sodium hydroxide may be used for pH adjustment to pH 2.6 to 3.2.

The solution must be diluted before administration by intravenous infusion.

12 CLINICAL PHARMACOLOGY

12.1 Mechanism of Action

Topoisomerase I relieves torsional strain in DNA by inducing reversible single-strand breaks. Topotecan binds to the topoisomerase I-DNA complex and prevents re-ligation of these single-strand breaks. The cytotoxicity of topotecan is thought to be due to double-strand DNA damage produced during DNA synthesis, when replication enzymes interact with the ternary complex formed by topotecan, topoisomerase I, and DNA. Mammalian cells cannot efficiently repair these double-strand breaks.

12.3 Pharmacokinetics

Following administration of topotecan injection at doses of 0.5 to 1.5 mg/m² administered as a 30-minute infusion to cancer patients, topotecan exhibited multiexponential pharmacokinetics with a terminal half-

life of 2 to 3 hours. Total exposure (AUC) is approximately dose-proportional.

Distribution

Binding of topotecan to plasma proteins is approximately 35%.

Metabolism

Topotecan undergoes a reversible pH-dependent hydrolysis of its lactone moiety; it is the lactone form that is pharmacologically active. At pH ≤ 4 , the lactone is exclusively present, whereas the ring-opened hydroxy-acid form predominates at physiologic pH. *In vitro* studies in human liver microsomes indicate topotecan is metabolized to an N-demethylated metabolite. The mean metabolite: parent AUC ratio was about 3% for total topotecan and topotecan lactone following IV administration.

Excretion

Renal clearance is the primary route of topotecan elimination.

In a mass balance/excretion trial in 4 patients with solid tumors, the overall recovery of total topotecan and its N-desmethyl metabolite in urine and feces over 9 days averaged $73.4\% \pm 2.3\%$ of the administered IV dose. Mean values of $50.8\% \pm 2.9\%$ as total topotecan and $3.1\% \pm 1.0\%$ as N-desmethyl topotecan were excreted in the urine following IV administration. Fecal elimination of total topotecan accounted for $17.9\% \pm 3.6\%$ while fecal elimination of N-desmethyl topotecan was $1.7\% \pm 0.6\%$. An O-glucuronidation metabolite of topotecan and N-desmethyl topotecan has been identified in the urine.

Specific Populations

Gender: Plasma clearance of topotecan lactone in male patients was approximately 24% higher than that in female patients, largely reflecting difference in body size.

Age: Population pharmacokinetic analysis in female patients did not identify age as a significant factor. Decreased renal clearance, which is common in the elderly, is a more important determinant of topotecan clearance [see *Dosage and Administration (2.2)*, *Use in Specific Populations (8.5)*].

Renal Impairment: In patients with mild renal impairment (Clcr = 40 to 60 mL/min), plasma clearance of topotecan lactone was decreased by 33% compared with patients with normal renal function (Clcr greater than 60 mL/min). In patients with moderate renal impairment (Clcr = 20 to 39 mL/min), plasma clearance of topotecan lactone was reduced by 65% compared with patients with normal renal function. Dosage adjustment is recommended for patients with moderate renal impairment. No dosage adjustment is required in patients with mild renal impairment [see *Dosage and Administration (2.2)*, *Use in Specific Populations (8.6)*].

Hepatic Impairment: Plasma clearance of topotecan lactone in patients with hepatic impairment serum bilirubin levels between 1.7 and 15.0 mg/dL was decreased by 33% compared with patients with normal hepatic function (serum bilirubin levels less than 1.7 mg/dL).

Drug Interactions

Effects of Topotecan on Drug-Metabolizing Enzymes: *In vitro* inhibition studies using marker substrates for human P450 CYP1A2, CYP2A6, CYP2C8/9, CYP2C19, CYP2D6, CYP2E, CYP3A, or CYP4A or dihydropyrimidine dehydrogenase indicate that the activities of these enzymes were not altered by topotecan.

Cisplatin: Administration of cisplatin (60 or 75 mg/m² on Day 1) before topotecan (0.75 mg/m²/day on Days 1 to 5) in 9 patients with ovarian cancer had no significant effect on the C_{max} and AUC of total topotecan.

Topotecan (0.3 mg/m² intravenous daily on Days 2 to 6) had no effect on the pharmacokinetics of free platinum in 15 patients with ovarian cancer who were administered cisplatin 50 mg/m² (n = 9) or 75 mg/m² (n = 6) on Day 2 after paclitaxel 110 mg/m² on Day 1. Topotecan (0.75 mg/m² intravenous daily on Days 1 to 5) had no effect on dose-normalized (60 mg/m²) C_{max} values of free platinum in 13 patients

with ovarian cancer who were administered 60 mg/m² (n = 10) or 75 mg/m² (n = 3) cisplatin on Day 1.

13 NONCLINICAL TOXICOLOGY

13.1 Carcinogenesis, Mutagenesis, Impairment of Fertility

Carcinogenicity testing of topotecan has not been performed. Topotecan is known to be genotoxic to mammalian cells and is a probable carcinogen. Topotecan was mutagenic to L5178Y mouse lymphoma cells and clastogenic to cultured human lymphocytes with and without metabolic activation. It was also clastogenic to mouse bone marrow. Topotecan did not cause mutations in bacterial cells.

Topotecan given to female rats prior to mating at a dose of 1.4 mg/m² intravenous (about equal to the clinical dose on a mg/m² basis) caused superovulation possibly related to inhibition of follicular atresia. This dose given to pregnant female rats also caused increased pre-implantation loss. Studies in dogs given 0.4 mg/m² intravenous (about 0.25 times the clinical dose on a mg/m² basis) of topotecan daily for a month suggest that treatment may cause an increase in the incidence of multinucleated spermatogonial giant cells in the testes. Topotecan may impair fertility in women and men.

14 CLINICAL STUDIES

14.1 Small Cell Lung Cancer

Another formulation of topotecan was studied in 426 patients with recurrent or progressive small cell lung cancer in 1 randomized, comparative trial and in 3 single-arm trials.

Randomized Comparative Trial

In a randomized, comparative, Phase 3 trial, 107 patients were treated with topotecan (1.5 mg/m²/day × 5 days starting on Day 1 of a 21-day course) and 104 patients were treated with CAV (1,000 mg/m² cyclophosphamide, 45 mg/m² doxorubicin, 2 mg vincristine administered sequentially on Day 1 of a 21day course). All patients were considered sensitive to first-line chemotherapy (responders who then subsequently progressed greater than or equal to 60 days after completion of first-line therapy). A total of 77% of patients treated with topotecan and 79% of patients treated with CAV received platinum/etoposide with or without other agents as first-line chemotherapy. The efficacy outcome measures were response rate and duration of response.

The results of the trial did not show statistically significant improvements in response rates, response duration, time to progression, and overall survival as shown in Table 2.

Table 2. Efficacy of Topotecan versus CAV (cyclophosphamide-doxorubicin-vincristine) in Small Cell Lung Cancer Patients Sensitive to First-Line Chemotherapy

Parameter	Topotecan (n=107)	CAV (n=104)
Overall response rate (95% CI)	24% (16% to 32%)	18% (11% to 26%)
Complete response rate	0%	1%
Partial response rate	24%	17%
Response duration ^a (months) Median (95% CI)	3.3 (3.0 to 4.1)	3.5 (3.0 to 5.3)
Time to progression (months) Median (95% CI)	3.1 (2.6 to 4.1)	2.8 (2.5 to 3.2)
HR (Topotecan:CAV) (95% CI)	0.92 (0.69 to 1.22)	
Survival (months) Median (95% CI)	5.8 (4.7 to 6.8)	5.7 (5.0 to 7.0)
HR (Topotecan:CAV) (95% CI)	1.04 (0.78 to 1.39)	

HR = hazard-ratio; CI = confidence interval.

^a The calculation for duration of response was based on the interval between first response and time to progression.

The time to response was similar in both arms: topotecan median of 6 weeks (range: 2.4 to 15.7) versus CAV median 6 weeks (range: 5.1 to 18.1).

Changes on a disease-related symptom scale in patients who received topotecan or who received CAV are presented in Table 3. It should be noted that not all patients had all symptoms, nor did all patients respond to all questions. Each symptom was rated on a 4-category scale with an improvement defined as a change in 1 category from baseline sustained over 2 courses. Limitations in interpretation of the rating scale and responses preclude formal statistical analysis.

Table 3. Percentage of Patients with Symptom Improvement^a: Topotecan versus CAV in Patients with Small Cell Lung Cancer

Symptom	Topotecan (n=107)		CAV (n=104)	
	n ^b	(%)	n ^b	(%)
Shortness of breath	68	(28)	61	(7)
Interference with daily activity	67	(27)	63	(11)
Fatigue	70	(23)	65	(9)
Hoarseness	40	(33)	38	(13)
Cough	69	(25)	61	(15)
Insomnia	57	(33)	53	(19)
Anorexia	56	(32)	57	(16)
Chest pain	44	(25)	41	(17)
Hemoptysis	15	(27)	12	(33)

^a Defined as improvement sustained over at least 2 courses compared with baseline.

^b Number of patients with baseline and at least 1 post-baseline assessment.

Single-Arm Trials

Topotecan was also studied in 3 open-label, non-comparative trials in a total of 319 patients with recurrent or progressive small cell lung cancer after treatment with first-line chemotherapy. In all 3 trials, patients were stratified as either sensitive (responders who then subsequently progressed greater than or equal to 90 days after completion of first-line therapy) or refractory (no response to first-line chemotherapy or who responded to first-line therapy and then progressed within 90 days of completing first-line therapy). Response rates ranged from 11% to 31% for sensitive patients and 2% to 7% for refractory patients. Median time to progression and median survival were similar in all 3 trials and the comparative trial.

15 REFERENCES

1. "OSHA Hazardous Drugs." OSHA. <http://www.osha.gov/SLTC/hazardousdrugs/index.html>.

16 HOW SUPPLIED/STORAGE AND HANDLING

16.1 How Supplied

Topotecan Injection is supplied in 4 mg/4 mL (1 mg/mL, topotecan free base equivalent) single-dose vials. Each vial contains 4 mL of the sterile, clear, yellow to yellow-green solution.

NDC 67457-662-05 (Package of 1 Single-Dose Vial)

16.2 Storage and Handling

Store the vials protected from light in the original cartons, refrigerated between 2° and 8°C (36° and 46°F). Topotecan injection diluted for infusion is stable between 20° and 25°C (68° and 77°F) in ambient lighting conditions for 24 hours.

Handle and dispose of topotecan injection consistent with recommendations for the handling and disposal of hazardous drugs¹.

17 PATIENT COUNSELING INFORMATION

- **Bone Marrow Suppression**

Inform patients that topotecan decreases blood cell counts such as white blood cells, platelets, and red blood cells. Advise patients to notify their healthcare provider promptly for fever, other signs of infection (e.g., chills, cough, or burning pain on urination), or bleeding. Inform patients that frequent blood tests will be performed while taking topotecan injection to monitor for the occurrence of bone marrow suppression.

- **Embryofetal Toxicity**

Advise patients to contact their healthcare provider if they become pregnant, or if pregnancy is suspected during treatment with topotecan. Advise females of reproductive potential to use effective contraception during treatment and for 1 month after the last dose of topotecan. Advise males with a female sexual partner of reproductive potential to use effective contraception during treatment and for 3 months after the last dose of topotecan [*see Warnings and Precautions (5.4), Use in Specific Populations (8.1, 8.3)*].

- **Lactation**

Advise nursing mothers to discontinue breastfeeding during treatment with topotecan [*see Use in Specific Populations (8.2)*].

- **Infertility**

Advise male and female patients of the potential risk for impaired fertility and possible family planning options [*see Use in Specific Populations (8.3)*].

- **Asthenia and Fatigue**

Advise patients that topotecan may cause asthenia or fatigue. These symptoms may impair the ability to safely drive or operate machinery.

Manufactured for:

Mylan Institutional LLC

Rockford, IL 61103 U.S.A.

Manufactured by:

Mylan Laboratories Limited

Bangalore, India

JULY 2017

PACKAGE/LABEL PRINCIPAL DISPLAY PANEL

NDC 67457-662-05

Topotecan Injection

4 mg/4 mL (1 mg/mL)

Must Dilute Before Intravenous Infusion

CAUTION: CYTOTOXIC AGENT

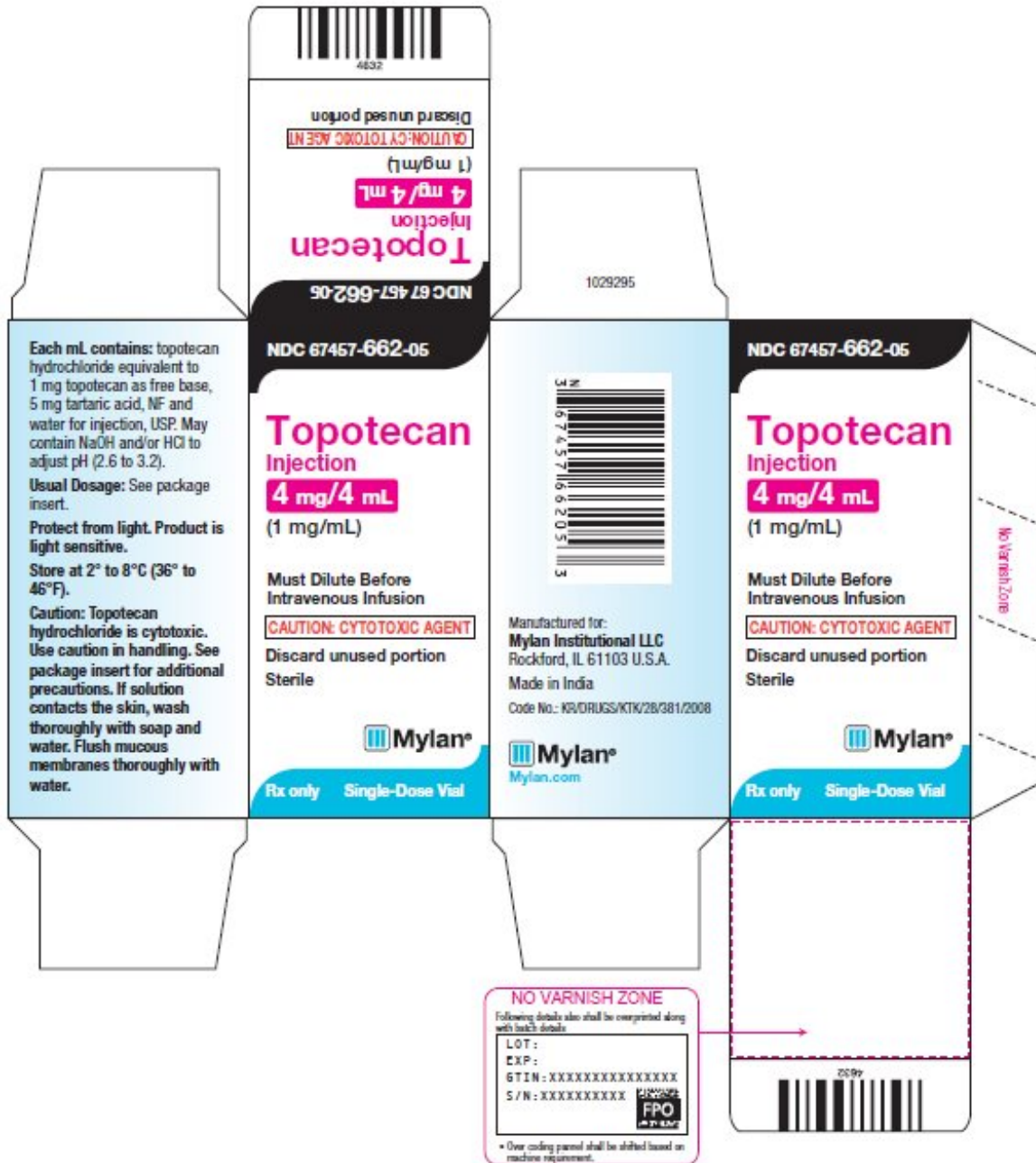
Discard unused portion

Sterile

Mylan

Rx only

Single-Dose Vial



TOPOTECAN

topotecan injection, solution, concentrate

Product Information

Product Type	HUMAN PRESCRIPTION DRUG	Item Code (Source)	NDC:67457-662
Route of Administration	INTRAVENOUS		

Active Ingredient/Active Moiety

Ingredient Name	Basis of Strength	Strength
TOPOTECAN HYDROCHLORIDE (UNII: 956S425ZCY) (TOPOTECAN - UNII:7M7YKX2N15)	TOPOTECAN	1 mg in 1 mL

Inactive Ingredients

Ingredient Name	Strength
TARTARIC ACID (UNII: W4888I119H)	5 mg in 1 mL
HYDROCHLORIC ACID (UNII: QTT17582CB)	
SODIUM HYDROXIDE (UNII: 55X04QC32I)	
WATER (UNII: 059QF0KO0R)	

Packaging

#	Item Code	Package Description	Marketing Start Date	Marketing End Date
1	NDC:67457-662-05	1 in 1 CARTON	04/09/2018	
1		4 mL in 1 VIAL, SINGLE-DOSE; Type 0: Not a Combination Product		

Marketing Information

Marketing Category	Application Number or Monograph Citation	Marketing Start Date	Marketing End Date
ANDA	ANDA206074	04/09/2018	

Labeler - Mylan Institutional LLC (790384502)

Revised: 11/2017

Mylan Institutional LLC