

90% of the plasma platinum is protein bound, the complexes between albumin and the platinum are stable, and are slowly eliminated with a minimum half-life of five days or more.

Following cisplatin doses of 20 to 120 mg/m², the major excretion route is in the urine, with lower in bladder, muscle, testis, paracera, and spleen; and lowest in bowel, adrenal, and kidney. Cisplatin is excreted in the urine. Platinum is present in tissues for as long as 180 days after the last administration. With the exception of intracerebral tumors, platinum concentrations in the same patient are somewhat lower than the concentrations in the organ where the tumor is located. Different metastatic sites have the highest platinum concentrations, but these are similar to the platinum concentrations in normal liver. Maximal platinum concentrations are reached within 100 mg/m² dose of cisplatin and decline in a biphasic manner with a terminal half-life of 30 to 40 days.

Over a dose range of 40 to 140 mg cisplatin/m² given as a bolus injection or as infusions varying in length from 1 hour to 24 hours, the platinum concentration in the urine and platinum is excreted in the urine in 24 hours. Over five days following administration of 40 to 100 mg/m² doses given as rapid, 2- to 3-hour infusions, the platinum concentration in the urine of the dosed platinum is excreted in the urine. Similar mean urinary recoveries of platinum of about 14% to 30% of the dose are found with 40 mg/m² doses and 20% to 30% of the administered platinum is excreted beyond 24 hours post-infusion and most of the platinum is excreted within the first few hours. Platinum-containing species excreted in the urine are the same as those found following the incubation of cisplatin with urine. The proportions are different.

The parent compound, cisplatin, is excreted in the urine and accounts for 13% to 17% of the total platinum excreted. The mean renal clearance of cisplatin exceeds creatinine clearance and is 82 and 50 mL/min/m² following administration of 40 and 100 mg/m² doses, respectively. The renal clearance of free (ultrafilterable) platinum also exceeds the glomerular filtration rate and is 150 mL/min/m². The mean renal clearance of platinum is 100 mL/min/m². No significant relationships exist between cisplatin and creatinine clearance. Platinum or cisplatin and creatinine clearance are present in the bile and large intestine after administration of cisplatin. The excretion of platinum appears to be insignificant.

INDICATIONS AND USAGE: Cisplatin is indicated as adjuvant therapy for bladder cancer as follows:

Metastatic Testicular Tumors
Cisplatin, in combination with other approved chemotherapeutic agents in patients with metastatic testicular tumors who have already received appropriate surgical and/or radiotherapeutic procedures.

Metastatic Ovarian Tumors
In established combination therapy with other approved chemotherapeutic agents in patients with metastatic ovarian tumors who have already received appropriate surgical and/or radiotherapeutic procedures. An established combination of cisplatin, cyclophosphamide, and phosphamide. Cisplatin Injection, as a single agent, is indicated as secondary therapy in patients with metastatic ovarian tumors refractory to platinum-based therapy previously received.

Advanced Bladder Cancer:
Cisplatin Injection is indicated as single agent for patients with transitional cell bladder cancer

WARNING: Cisplatin should be administered under the supervision of a qualified physician experienced in the use of cytotoxic anticancer agents. Appropriate management of therapy and complications is possible only when adequate diagnostic and treatment facilities are available. Cisplatin should be administered with caution to patients with cumulative renal toxicity associated with cisplatin is severe. Other major dose-related toxicities are myelosuppression, ototoxicity, and hearing impairment.

Ototoxicity, which may be more pronounced in children, and is manifested by tinnitus, and/or loss of high frequency hearing and occasionally deafness, is significant. Hearing loss may be irreversible.

Antihypertensive reactions to cisplatin have been reported. Facial edema, bronchospasm, tachycardia, and hypotension have been reported with intravenous platinum administration. Epinephrine, corticosteroids, and antihistamines have been administered to patients with these reactions.

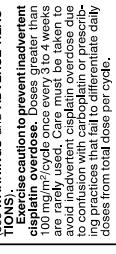
WARNINGS AND ADVERSE REACTIONS:

Exercise caution to prevent inadvertent cisplatin overdose. Doses greater than 100 mg/m² have been reported. Care must be taken to avoid inadvertent cisplatin overdose due to confusion with other platinum or platinum-containing drugs. Do not dilute daily doses from total dose per cycle.

DESCRIPTION: Cisplatin Injection is a clear, colorless, sterile solution. Each 100 mL ampoule contains 1 mg/mL cisplatin. Cisplatin Injection contains 1 mg/mL cisplatin, 9 mg/mL sodium chloride, hydrochloric acid and/or sodium hydroxide to adjust pH to 5.0. Each 100 mL ampoule contains 50 mL, 100 mL, or 200 mL, respectively. The pH range of Cisplatin Injection is 3.8 to 5.9. Cisplatin Injection must be stored under refrigeration.

ADMINISTRATION, DOSAGE AND ADMINISTRATION:

Active ingredient: Cisplatin, is a yellow to orange crystalline powder. Cisplatin is a platinum compound consisting of platinum and two ammonia molecules in the cis position. It is soluble in water or saline at 1 mg/mL and is stable at 24 °C. Cisplatin has a melting point of 507°C.



CLINICAL PHARMACOLOGY:
Plasma concentrations of the parent compound, cisplatin, decay exponentially following bolus administration of 50 or 100 mg/m² doses. Monoexponential decay and plasma half-lives of about 0.5 hour are observed. The elimination half-life of platinum is 100 mg/m². After the latter, the total-body clearances and volumes of distribution at steady-state for cisplatin are about 15 to 16 L/m² and 200 L/m², respectively.

Due to its unique chemical structure, the chlorine atoms of cisplatin are more subject to chemical displacement reactions by nucleophilic ligands than platinum is. The biological pH in the presence of 0.1M NaCl, the predominant molecular species are cisplatin and cisplatin monoanion. The displacement of platinum (II) in nearly equal concentrations. The latter, combined with the possible direct displacement of the chlorine atoms by sulfhydryl groups, results in the formation of platinum (II) species, which are biologically active. The rates of cisplatin in total free (ultrafilterable) platinum in the plasma vary considerably after a dose of 100 mg/m².

Cisplatin does not undergo the instantaneous and reversible binding to plasma proteins. Cisplatin does not undergo protein binding. However, the platinum from cisplatin, but not cisplatin itself, becomes bound to several plasma proteins, including albumin and transferrin. Three hours after a bolus injection and two hours after the end of a three-hour infusion,

which is no longer amenable to local treatments such as surgery and/or radiotherapy, **CONTRAINDICATIONS:** Cisplatin is contraindicated in patients with pre-existing renal impairment. Cisplatin should not be employed in myelosuppressed patients, or in patients with hearing impairment, or in patients with a history of allergic reactions to cisplatin or other platinum-containing compounds.

WARNINGS: Cisplatin produces cumulative nephrotoxicity. Myelosuppression, ototoxicity, and hearing loss are common side effects. The serum creatinine, blood urea nitrogen (BUN), creatinine clearance, and magnesium, sodium, potassium, and calcium are monitored during cisplatin administration. In patients with renal impairment, a lower dose of cisplatin should be given. Myelosuppression, ototoxicity, and hearing loss are common side effects. Cisplatin should not be given more than once every 4 weeks. Cisplatin should be given in combination with other platinum-containing agents. Cisplatin should be given in combination with other platinum-containing agents. Cisplatin should be given in combination with other platinum-containing agents.

Nursing Mothers
Cisplatin has been reported to be found in the milk of patients receiving cisplatin should not breast-feed.

Pediatric Use
Safety and effectiveness in pediatric patients have not been established. Cisplatin should be given with caution to children. Cisplatin should be given with caution to children. Cisplatin should be given with caution to children. Cisplatin should be given with caution to children.

Adverse Reactions: Cisplatin should be given with caution to children. Cisplatin should be given with caution to children. Cisplatin should be given with caution to children. Cisplatin should be given with caution to children.

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The risk of ototoxicity may be increased by prior or simultaneous cranial irradiation, and by concurrent use of other ototoxic agents. In 5 years of age, patients being treated with other ototoxic drugs (e.g., aminoglycosides and vancomycin), and in patients with renal impairment.

Genetic factors (e.g., variants in the thymidine S-methyltransferase [TPMT] gene) may contribute to cisplatin-induced toxicity. Cisplatin should be given with caution to patients across populations and study designs.

Myelosuppression occurs in 25% to 30% of patients treated with cisplatin. The nadir in circulating platelets and leukocytes occur between days 18 to 23 (range 7.5-45) with cisplatin doses of 20 to 100 mg/m². Neutrophils are more pronounced at higher doses (50 mg/m²). Anemia (decrease of 2 g/dL hemoglobin) is more pronounced at higher doses. Leukopenia and thrombocytopenia occur with the same timing as the same frequency and with the same timing as leukopenia and thrombocytopenia. Fever and infection have also been reported in patients with myelosuppression. Myelosuppression (see **PRECAUTIONS:** **Myelosuppression**) has been reported. Elderly patients may be more susceptible to myelosuppression.

In addition to anemia secondary to myelosuppression, a Coombs' positive hemolytic anemia has been reported. In the presence of myelosuppression, the risk of infection and treatment may be accompanied by increased hemolysis and this risk should be weighed by the treating physician.

Acute leukemia coincident with the use of cisplatin has been reported. In these reports, cisplatin was generally given in combination with other leukemogenic agents.

Gastrointestinal and vomiting (begins or worsens after the first dose) occur in almost all patients receiving cisplatin. Nausea and vomiting may begin within 1 to 4 hours after treatment and last up to 24 hours. Anorexia may persist for up to 1 week after treatment.

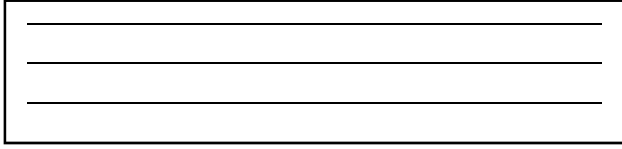
Delayed nausea and vomiting (begins or worsens after the first dose) occur in almost all patients receiving cisplatin. Nausea and vomiting may begin within 1 to 4 hours after treatment and last up to 24 hours. Anorexia may persist for up to 1 week after treatment.

Diarrhea has been reported. In patients receiving cisplatin, diarrhea has occurred in patients attaining complete emetic control on the day of cisplatin therapy. Diarrhea has also been reported. In patients receiving cisplatin, diarrhea has occurred in patients attaining complete emetic control on the day of cisplatin therapy.

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rapid and high degree of protein binding. Management of overdose should include supportive care. Patients should be monitored for patient through any period of toxicity that may occur.

DOSE AND ADMINISTRATION:

Cisplatin is administered by slow intravenous infusion. CISPLATIN SHOULD NOT BE administered by bolus injection. **Note: Needs of intravenous sets containing aluminum parts that may come in contact with cisplatin should not be used for preparation or administration. Aluminum reacts with cisplatin to form a precipitate formation and a loss of potency.**

Metastatic Testicular Tumors

The usual cisplatin dose for the treatment of metastatic ovarian tumors in combination with cyclophosphamide is 100 mg/m² IV per cycle once every 4 weeks (DAY 1).

The dose of cyclophosphamide when used in combination with cisplatin is 600 mg/m² IV per cycle for 5 days per cycle.

For directions for the administration of cyclophosphamide, refer to the cyclophosphamide package insert.

As a single agent, cisplatin should be administered at a dose of 100 mg/m² IV per cycle once every 4 weeks.

Advanced Bladder Cancer

Cisplatin should be administered as a single agent in combination with cyclophosphamide once every 3 to 4 weeks depending on the extent of prior exposure to radiation therapy and/or prior chemotherapy. For heavily pretreated patients, cisplatin should be administered every 4 weeks if tolerated.

All Patients

Pretreatment hydration with 1 to 2 liters of fluid infused for 8 to 12 hours prior to cisplatin dose is recommended. The fluid is then infused in 2 to 4 hours. The fluid should contain 37.5 g of mannitol, and infused over a 6- to 8-hour period. If diluted solution is to be used within 8 hours, protect solution from light. Adequate hydration and urinary output must be maintained during the following 24 hours.

Skin reactions associated with accidental exposure to cisplatin may occur. The use of gloves is recommended. If cisplatin contacts the skin, wash the skin with soap and water and flush the mucosa with water. More information is available in the references listed below.

Preparation of Intravenous Solutions

The aqueous solution should be used intravenously. Caution should be exercised in handling the aqueous solution. Procedures for proper handling and disposal of anticancer drugs should be followed. Precautions should be taken to avoid exposure. If there has been any dermal exposure, always wear impervious gloves when handling vials and IV sets containing cisplatin. Skin reactions associated with accidental exposure to cisplatin may occur. The use of gloves is recommended. If cisplatin contacts the skin, wash the skin with soap and water and flush the mucosa with water. More information is available in the references listed below.

Instructions for Preparation

The aqueous solution should be used intravenously. Caution should be exercised in handling the aqueous solution. Procedures for proper handling and disposal of anticancer drugs should be followed. Precautions should be taken to avoid exposure. If there has been any dermal exposure, always wear impervious gloves when handling vials and IV sets containing cisplatin. Skin reactions associated with accidental exposure to cisplatin may occur. The use of gloves is recommended. If cisplatin contacts the skin, wash the skin with soap and water and flush the mucosa with water. More information is available in the references listed below.

Parenteral Drug Products

Parenteral drug products should be inspected visually for particulate matter and discoloration prior to administration, whenever solution and container permit.

NOTE TO PHARMACIST: Exercise caution when preparing intravenous solutions. Please call prescriber if dose is greater than 100 mg/m² per cycle. Aluminum and

it is more pronounced after doses greater than 50 mg/m², and peak levels of uric acid occur within 24 hours of the first dose. Allopurinol therapy for hyperuricemia effectively reduces uric acid levels.

Neurotoxicity

Neurotoxicity is usually characterized by peripheral neuropathy. Symptoms usually occur after prolonged therapy (4 to 7 months); however, neurologic symptoms have been reported to occur after shorter courses of therapy. Symptoms of peripheral neuropathy usually develop during treatment, symptoms of neuropathy may begin 3 to 8 weeks after the last dose of cisplatin. Cisplatin-induced neuropathy is usually reversible. Symptoms are first observed. The neuropathy, however, may progress further even after stopping treatment. Preliminary evidence suggests that the use of cyclophosphamide may be more susceptible to peripheral neuropathy (see **PRECAUTIONS: Geriatric Use**). Myelopathy and autonomic neuropathy have also been reported.

Loss of taste, seizures, leukoencephalopathy, and autonomic neuropathy have also been reported. Muscle cramps, defined as localized, painful, sudden onset and short duration, have been reported and were usually associated in patients receiving a relatively high cumulative dose of cisplatin. Myelopathy and autonomic symptoms stage of peripheral neuropathy.

Ocular Toxicity

Ocular neuritis, papilledema, and cerebral blindness have been reported in patients receiving standard recommended doses of cisplatin. Ocular toxicity has been reported in patients receiving doses of cisplatin higher than those recommended. Symptoms may be relieved by discontinuing cisplatin. Steroids with or without mannitol have been used; however, efficacy has not been established.

Blurred vision has been reported after the use of regimens with higher doses of cisplatin or greater dose frequencies than recommended in the references. The symptoms are usually reversible, particularly in the blue-yellow axis. The only finding on funduscopic exam is irregular retinal pigmentation of the macular area.

Anaphylactic-Like Reactions

Anaphylactic-like reactions have been reported in patients previously exposed to cisplatin. The reactions consist of facial edema, wheezing, tachycardia, and hypotension within minutes of starting intravenous infusion. Symptoms may be controlled with antihistamines as well as corticosteroids and/or antihistamines as indicated. Patients receiving cisplatin should be carefully monitored for possible anaphylactic-like reactions. Antihistamines and antihistamines and medication should be available to treat such a complication.

Hepatotoxicity

Transient elevations of liver enzymes, especially SGOT, as well as bilirubin, have been reported in patients receiving intravenous administration at the recommended doses.

Other Events

Other events include: malaise, hiccups, elevated serum amylase, rash, alopecia, malaise, ashenia, and dehydration have been reported. Focal soft tissue toxicity has been reported in patients receiving cisplatin. The toxicity appears to be related to the concentration of the cisplatin solution. Infusion of solutions with a cisplatin concentration of 1 mg/mL or greater has been associated with cellulitis, fibrosis, necrosis, pain, edema, and erythema.

OVERDOSAGE:

Caution should be exercised to prevent inadvertent overdose with cisplatin. In cases of overdose, patients should be hospitalized in kidney failure, liver failure, deafness, ocular toxicity (including detachment of the retina), significant myelosuppression, intracerebral hemorrhage, or severe pulmonary condition, death can occur following overdose. No proven antidotes have been established for cisplatin overdoses. Hemodialysis, even if initiated early, does not appear to be effective. Age appears to have little effect on removing platinum from the body because of cisplatin's

flip-off seal of vial have been imprinted with the following statement:

CALL DR. IF DOSE > 100 MG/M² CYCLE.

Stability

Cisplatin is a sterile, multiple dose vial without preservatives, to be stored at 25°C (68° to 77°F). **Do not refrigerate. Protect unopened container from light.** Cisplatin, remaining in its amber vial following initial entry, is stable for 28 days protected from light or for 7 days under fluorescent room light.

HOW SUPPLIED:

Cisplatin Injection (1 mg/mL) is supplied as follows:

Product No.	NDC No.	Strength	Fill Volume
100351	63323-103-51	50 mg (1 mg per mL)	100 mL vial
100365	63323-103-65	100 mg per 100 mL (1 mg per mL)	100 mL vial
100364	63323-103-64	200 mg per 200 mL (1 mg per mL)	200 mL vial

The above products are multiple dose vials packaged individually.

Store at 20° to 25° C (68° to 77° F) [see USP Controlled Room Temperature]. Do not refrigerate. Protect from light.

The container closure is not made with natural rubber latex.

REFERENCES:

1. American Society of Health-System Pharmacists. *USP Controlled Room Temperature*. Department of Health and Human Services, Center for Drug Evaluation and Research, Center for Drug Evaluation and Research, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 2004-165.
2. OSHA Technical Manual, TED 1-015A. Section 1910.104. *Chemical Hazards of OSHA, 1989*. http://www.osha-slc.gov/dts/osta/otm/otm_v1_2.html.
3. American Society of Health-System Pharmacists. *USP Controlled Room Temperature*. Department of Health and Human Services, Center for Drug Evaluation and Research, Center for Drug Evaluation and Research, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 2004-165.
4. Polovich M, White JM, Kelleher LO, eds. 2005. *Chemotherapy and biotherapy guidelines for oncology nurses*. 2nd ed. Pittsburgh, PA: Oncology Nursing Society.