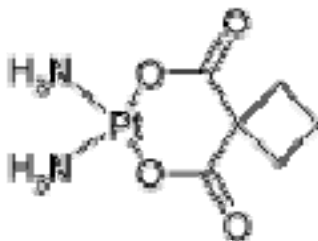


# Carboplatin Ebewe®

## NAME OF THE MEDICINE

Carboplatin Ebewe

Carboplatin is a colourless crystalline powder that is sparingly soluble in water.



Molecular formula: C<sub>6</sub>H<sub>12</sub>N<sub>2</sub>O<sub>4</sub> Pt

Molecular weight: 371.26

CAS: 41575-94-4

## DESCRIPTION

Carboplatin Ebewe is sterile, isotonic, preservative-free solution containing carboplatin 10mg/mL in water for injections BP.

## PHARMACOLOGY

Carboplatin is an inorganic heavy metal complex containing a central atom of platinum. It is an analogue of cisplatin. Carboplatin has biochemical properties similar to those of cisplatin. It is believed to bind to DNA to produce intrastrand and interstrand (predominantly) crosslinks which modify structure and inhibit DNA synthesis.

### Pharmacokinetics

After a one hour infusion of the drug (dose range 20 to 520 mg/m<sup>2</sup>) plasma levels of total platinum and ultrafilterable (free) platinum decay biphasically following first order kinetics. For ultrafilterable platinum, reported values for the initial phase of the half-life ( $t_{\alpha 1/2}$ ) are about 90 minutes and in the later phase the half-life ( $t_{\beta 1/2}$ ) is about six hours. Total platinum elimination has a similar initial half-life, while in the later phase the half-life of total platinum may be greater than 24 hours. Carboplatin is a stable molecule. All free platinum is in the form of carboplatin in the first four hours.

65% of the carboplatin dose is eliminated in the urine within 24 hours of administration, with 32% of the dose being excreted as unchanged drug. Most of the drug is excreted in the first six hours.

Initially, protein binding is low. During the first four hours after administration 0 to 29% of carboplatin is protein bound. By 24 hours, 85 to 89% is protein bound. Excretion of carboplatin is by glomerular filtration. Patients with poor renal function have a higher area under curve for total platinum, and a reduction in dosage is recommended.

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## INDICATIONS

Carboplatin is indicated for the treatment of:

- Treatment of advanced stage ovarian cancer of epithelial origin
- Small cell lung carcinoma
- Carcinoma of the head and neck
- Carcinoma of the testis
- Paediatric cerebral tumours
- Soft tissue sarcoma
- Neuroblastoma.

## CONTRAINDICATIONS

Carboplatin is contraindicated in patients who:

- Have severe myelosuppression
- Have pre-existing severe renal impairment (dose adjustment may allow use in the presence of mild renal impairment, see Dosage and Administration)
- Have history of severe allergic reactions to carboplatin, other platinum containing compounds or mannitol
- Severe bleeding
- Are pregnant or are breast feeding

## PRECAUTIONS

**Carboplatin should be administered only under constant supervision by doctors experienced in therapy with cytotoxic agents and only when potential benefits of carboplatin therapy outweigh the possible risks. Appropriate facilities should be available for adequate management of complications should they arise.**

**Myelosuppression.** Carboplatin should be administered with caution to patients with significant bleeding or with bone marrow depression.

Myelosuppression associated with carboplatin is closely related to the renal clearance of the drug; therefore patients with impaired renal function are more susceptible.

Myelosuppression, particularly thrombocytopenia (reduction in platelet count), will also be more severe in patients receiving concomitant therapy with other nephrotoxic drugs such as aminoglycoside antibiotics. Toxicity is more likely to be prolonged and more severe in patients who have undergone previous chemotherapy, are more advanced in age, or who are debilitated. Dosage reductions may be necessary in these cases.

The nadir for platelets (peak detrimental effect) is usually between days 14 to 21 following initial treatment and days 14 to 28 for white blood cells. Minimum counts should be  $50,000/\text{mm}^3$  for platelets and  $2,000/\text{mm}^3$  for white blood cells.

If counts fall below this level, therapy should be suspended until recovery is complete, usually five to six weeks. Supportive transfusional therapy may be necessary in severe cases.

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It is important, therefore, that the assessment of renal function and peripheral blood counts (including white blood cells, platelets and haemoglobin) be made prior to, during and following treatment with carboplatin. In order to ensure that the peak detrimental effect on blood cells has occurred, repeat courses of treatment with carboplatin should not be given more frequently than monthly under normal circumstances.

**Nephrotoxicity.** Renal toxicity is not usually dose limiting. Unlike cisplatin therapy, pretreatment and post-treatment hydration is not necessary, although some patients may show a decrease in creatinine clearance. Renal impairment is more likely to be seen in patients who have previously experienced nephrotoxicity as a result of chemotherapy.

**Neurotoxicity/Ototoxicity.** Neurological evaluations and auditory monitoring should be performed regularly during and after carboplatin therapy. Neurotoxicity and ototoxicity are more likely to be seen in patients who have received cisplatin previously.

Ototoxicity is cumulative, and frequency and severity of hearing disorder increases with high dose regimens and repeated doses, or prior treatment with cisplatin.

**Impaired renal function.** Renal function should be assessed prior to and during therapy. See also Precautions, Myelosuppression.

**Gastrointestinal:** Carboplatin can induce emesis. The incidence and severity of emesis may be reduced by pretreatment with antiemetics or by carboplatin administration as a continuous IV infusion over 24 hours, or as IV administration of divided doses over 5 consecutive days rather than as a single infusion. Selective inhibitors of type 3 (5-HT<sub>3</sub>), serotonergic receptors (e.g., ondansetron) or substituted benzamides (e.g. metoclopramide) may be particularly effective antiemetics and combination therapy may be considered for patients experiencing severe or refractory emetogenic effects.

**Hypersensitivity Reactions.** As in the case of other platinum complexed compounds, allergic reactions to carboplatin have been reported. Patients should be monitored for possible anaphylactoid reactions and appropriate equipment and medication should be readily available to treat such reactions (e.g., antihistamines, corticosteroids, adrenaline, oxygen) whenever carboplatin is administered. Symptoms include rash, urticaria, erythema, pruritus, bronchospasm and hypotension. These reactions may occur within minutes of administration.

**Immunosuppressant Effects/Increased Susceptibility to Infections:** Administration of live or live-attenuated vaccines in patients immunocompromised by chemotherapeutic agents, including carboplatin, may result in serious or fatal infections. Vaccination with a live vaccine should be avoided in patients receiving carboplatin. Killed or inactivated vaccines may be administered; however the response to such vaccines may be diminished.

**Carcinogenesis, mutagenesis, impairment of fertility.** Animal studies demonstrate that carboplatin is mutagenic and teratogenic. Patients should be advised of its mutagenic potential and should use effective contraception for an adequate duration of time after ceasing therapy.

The carcinogenic potential of carboplatin has not been studied, however, compounds with a similar mechanism of action have been reported to be carcinogenic.

**Infectious disease.** Carboplatin should be administered with caution to patients with herpes zoster, existing or recent chicken pox, or recent exposure to chicken pox, due to

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the risk of severe generalised disease. It should also be administered with caution to patients with other infections.

**Dental Procedures:** The myelosuppressive effects of carboplatin may adversely affect dental procedures, resulting in an increased incidence of microbial infection, delayed healing and gingival bleeding. Where possible, dental work should not be used (see Interactions) completed prior to carboplatin therapy, or deferred until blood counts return to normal. Patients should be instructed on proper dental hygiene during treatment, including caution in the use of toothbrushes, toothpicks and dental floss.

**Use in the elderly.** Carboplatin induced peripheral neuropathy appears to be more common in those over 65 years of age than in younger patients. Elderly patients may have decreased renal and haemopoietic function, and may be more susceptible to other effects of the drug.

**Use in pregnancy (Category D).** Carboplatin has been shown to be embryotoxic and mutagenic. Use in pregnancy is not recommended. Women of childbearing potential should use adequate contraception. If the patient becomes pregnant while being treated with carboplatin, she should be advised of the potential hazard to the fetus.

**Use in lactation.** It is not known whether carboplatin is excreted in breast milk. To avoid possible harmful effects in the infant, breastfeeding should be discontinued during carboplatin therapy.

**Incompatibilities.** Carboplatin interacts with aluminium containing components of needles, syringes, catheters and intravenous administration sets to form a black precipitate so these items should not be used for the administration of carboplatin injections.

**Interactions with other medicines.** Concurrent therapy with nephrotoxic drugs may increase or exacerbate renal toxicity due to carboplatin induced changes in renal clearance. Patients receiving aminoglycoside antibiotics or other nephrotoxic drugs should not be treated with carboplatin.

Combination therapy with other myelosuppressive drugs may require modification of the dose or timing of carboplatin therapy to minimise additive myelosuppressive effects. Dosage reduction is recommended if carboplatin is administered concurrently with radiation therapy.

In patients who have previously received cisplatin, neurotoxicity such as paraesthesias, decreased deep tendon reflexes and ototoxicity are more likely to be seen. The frequency and severity of hearing disorder increases with prior treatment with cisplatin (as cisplatin is also ototoxic). Paraesthesias present prior to treatment, especially if caused by cisplatin, may persist or worsen during carboplatin therapy.

In patients receiving carboplatin concomitantly with paclitaxel, myalgias and arthralgias commonly occur. Fatigue has also been reported in patients receiving this combination.

Pain, most likely related to tumour size, and asthenia occur frequently in patients receiving carboplatin in conjunction with cyclophosphamide. Visual disturbances have been reported in patients receiving usual dosages of carboplatin in conjunction with cyclophosphamide.

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Live or killed virus vaccines should not be given during carboplatin therapy, or for three months to one year after carboplatin is discontinued. The immunosuppressive effect of carboplatin may potentiate viral replication and increase the adverse effects of live virus vaccines, and decrease the patient's antibody response to live or killed virus vaccines. In addition, immunisation with oral polio virus vaccine should be postponed in people who are in close contact with the patient, particularly family members.

An increased incidence of emesis has been reported when carboplatin and other emetogenic drugs are given concurrently or carboplatin is administered to patients who previously received emetogenic therapy.

Vaccination with a live vaccine should be avoided in patients receiving carboplatin.

### **Effects on ability to drive or operate machinery.**

The effect of carboplatin on the ability to drive or use machinery has not been systematically evaluated.

## **ADVERSE EFFECTS**

**Myelosuppression.** Haematological toxicity is the most common dose limiting toxicity, with leucopenia in 55% of patients, thrombocytopenia in 62% of patients, anaemia in up to 59% of patients and neutropenia. When used as single therapy toxicity is not usually cumulative and is reversible, although transfusional therapy may be necessary in severe cases.

Myelosuppression is dose related, and appears to be most common and more severe in patients who have received prior antineoplastic therapy (especially cisplatin), those who have received or who are currently receiving other myelosuppressive drugs or radiation therapy, and those with renal impairment. Transfusional support has been required in about one-fifth of patients.

**Neoplasms – benign, malignant and unspecified.** There have been rare reports of acute myelogenous leukaemias and myelodysplastic syndromes arising in patients who have been treated with carboplatin, mostly when given in combination with other potentially leukemogenic agents.

**Gastrointestinal.** Nausea and vomiting (53%), nausea only (25%), diarrhoea (6%), constipation (3%). Nausea and vomiting generally are delayed 6 to 12 hours after administration of carboplatin and disappear within 24 hours, but may persist for up to three days in some patients. Vomiting may be delayed for 24 hours or longer after treatment in some patients. Nausea and vomiting are readily controlled (or may be prevented) with antiemetic medication. Gastrointestinal pain, mucositis and stomatitis have also been reported.

**Renal.** Decrease in creatinine clearance (25%); increases in uric acid (25%), blood urea nitrogen (16%) and serum creatinine (7%). Acute renal failure has been reported rarely. Nephrotoxicity manifests as reduced creatinine clearance, elevated serum creatinine blood urea nitrogen and uric acid levels. Acute renal failure has been reported rarely. Haemolytic uraemic syndrome. Risk of carboplatin-induced nephrotoxicity (e.g. impaired creatinine clearance) becomes more prominent at relatively high dosages or in patients previously treated with cisplatin.

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**Biochemistry.** Decreases in serum magnesium (37%), potassium (16%) and, rarely, calcium (5%). Carboplatin may also cause decreases in serum sodium levels. These changes have not been severe enough to cause clinical symptoms.

**Neurotoxicity.** Peripheral neuropathy (6%) which was mild and dysgeusia (< 1%). Paraesthesiae present prior to treatment, especially if caused by cisplatin, may persist or worsen during carboplatin therapy (see Interactions). Central neurotoxicity has also been reported, although this may be related to concomitant antiemetic therapy. Fatigue has been reported in patients receiving carboplatin concomitantly with paclitaxel. In the majority of patients, neurotoxicity manifests mainly as paraesthesias and decreased deep tendon reflexes. The effect, more common in patients over 65 years of age, appears to be cumulative, occurring mainly in patients receiving prolonged therapy and/or in those who have received prior cisplatin therapy. Central nervous system effects may also occur. Pre-existing paraesthesias (especially those related to previous cisplatin treatment) may worsen during carboplatin therapy.

**Ototoxicity.** Subclinical decrease in hearing acuity as determined by audiogram, in the high frequency (4,000 to 8,000 Hz) range (15%); clinical ototoxicity, usually manifested as tinnitus (1%). Pre-existing hearing impairment may persist or worsen with carboplatin therapy. In patients who developed hearing loss as a result of cisplatin therapy, the impairment may persist or worsen.

**Hepatic.** Mild and usually transient elevations of serum alkaline phosphatase, aspartate aminotransferase or bilirubin concentrations may occur. Substantial abnormalities in liver function test have been reported in patients treated with carboplatin at high doses and autologous bone marrow transplantation. Increases in liver enzymes have been transient in the majority of cases. Alkaline phosphatase (ALP) (30%), aspartate aminotransferase (AST) (15%), bilirubin (4%).

**Allergic reactions.** In less than 2% of patients reactions similar to those seen after cisplatin have been observed. Erythematous rash, fever, pruritus may occur (less than 2% of patients). These include anaphylaxis/anaphylactoid reactions, hypotension, bronchospasm and pyrexia. Hypersensitivity reactions may occur within a few minutes after IV administration of carboplatin. Perioral tingling, urticaria, bronchospasm, hypotension and hypoxia have been observed. Anaphylaxis and anaphylactoid reactions have also occurred, while exfoliative dermatitis has been reported rarely. In a few cases, no cross reactivity was present. The frequency of allergic reactions is higher in patients who receive carboplatin in conjunction with other antineoplastic agents.

**Ocular effects.** Blurred vision may occur rarely. Visual disturbances have been reported in patients receiving usual dosages of carboplatin in conjunction with cyclophosphamide (see Interactions). Loss of vision has been reported rarely in patients receiving carboplatin in doses higher than those usually recommended; improvement and/or total recovery of vision occurred within weeks after the drug was discontinued. Visual abnormalities, such as transient sight loss (which can be complete for light and colours) or other disturbances may occur in patients treated with carboplatin. Improvement and/or total recovery of vision usually occurs within weeks after the drug is discontinued. Cortical blindness has been reported in patients with impaired renal function receiving high dose carboplatin.

**Cardiac disorders.** Cardiac failure, ischaemic coronary artery disorders (e.g., myocardial infarction, cardiac arrest, angina, myocardial ischaemia).

**Vascular disorders.** Cerebrovascular events.

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**Skin and subcutaneous tissue disorders.** Exfoliative dermatitis may rarely occur. Erythematous rash, pruritus, urticaria and alopecia have also been reported in association with carboplatin.

**Musculoskeletal and connective tissue disorders.** Myalgia/arthralgia.

**Metabolism and nutrition disorders.** Electrolyte abnormalities (hypokalaemia, hypocalcaemia, hyponatraemia and/or hypomagnesaemia).

**Other.** Alopecia (2%) Asthenia, flu-like syndrome (1%), reaction at injection site (< 1%). Taste abnormalities, and adverse respiratory and genitourinary effects have also been reported. Haemolytic uraemic syndrome has occurred rarely. Pain, most likely related to tumour size, and asthenia occur frequently in patients receiving carboplatin in conjunction with cyclophosphamide. Myalgias and arthralgias commonly occur in patients receiving carboplatin together with paclitaxel (see Interactions).

## DOSAGE AND ADMINISTRATION

**Product is for single use in one patient only. Contains no antimicrobial agent. Discard any unused residue.**

**Adults.** The recommended dose of carboplatin in previously untreated adults with normal renal function is 400 mg/ m<sup>2</sup> given as a single intravenous infusion over 15 to 60 minutes. Therapy should not be repeated until four weeks after the previous carboplatin course.

It is recommended that, according to clinical circumstances, the initial dosage may require reduction by 20 to 25% in patients with risk factors such as increasing age, previous myelosuppressive therapy and poor performance status.

Dosage modification may be required when carboplatin is used in combination with other myelosuppressive drugs or radiation therapy, to minimise additive myelosuppressive effects.

Determination of haematological nadir by weekly blood counts during initial courses is recommended for future dosage adjustment and scheduling of carboplatin.

**Impaired renal function.** In patients with initial impaired renal function, reduction of dosage of carboplatin may be required. Haematological nadirs and renal function should be monitored in these circumstances.

A suggested dosage schedule in patients with impaired renal function based on creatinine clearance is as follows:

<b><i>Creatinine clearance</i></b>	<b><i>Carboplatin dose</i></b>
> 40 mL/minute	400 mg/m <sup>2</sup>
20 to 39 mL/minute	250 mg/m <sup>2</sup>
0 to 19 mL/minute	150 mg/m <sup>2</sup>

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**Use in children.** Sufficient usage of carboplatin in children has not occurred to allow specific dosage recommendations to be made. Doctors are advised to refer to recently published literature for information on the current dosing regimens for particular tumours.

**Preparation of carboplatin solution.** Equipment containing aluminium components should be avoided (see Interactions under Precautions).

Carboplatin Injection is a ready to use solution containing carboplatin 10 mg/mL in Water for Injections BP. The injections may be further diluted in glucose 5% intravenous infusion. To reduce microbiological hazard, use as soon as practicable after preparation. If storage is necessary, hold at 2 to 8 °C for not more than 24 hours.

**Handling guidelines.** Carboplatin should be prepared for administration only by professionals who have been trained in the safe use of the preparation.

Operations such as transfer to syringes should be carried out only in the designated area.

The personnel carrying out these procedures should be adequately protected with clothing, gloves and eye shield.

Pregnant personnel are advised not to handle chemotherapeutic agents.

**Contamination.** In the event of contact with the skin or eyes, the affected area should be washed with copious amounts of water or normal saline. A bland cream may be used to treat transient stinging of the skin. Medical advice should be sought if the eyes are affected.

In the event of spillage, operators should put on gloves and mop up the spilled material with a sponge kept in the area for that purpose. Rinse the area twice with water. Put all solutions and sponges into a plastic bag and then seal it. The bag should be prominently labelled with the words 'Cytotoxic Waste' or similar.

**Disposal.** Syringes, containers, absorbent materials, solution and any other material which has come into contact with carboplatin should be placed in a thick plastic bag or other impervious container and incinerated at 1,000 deg. C or more.

**Compatibilities.** Carboplatin has been found to be stable for 24 hours when admixed with glucose 5% in water.

These products contain no antimicrobial agent. However, in order to reduce microbiological contamination hazard, infusion should be commenced as soon as practicable after preparation. Infusion should be completed within 24 hours of preparation and any residue discarded.

## OVERDOSAGE

There are no known antidotes for carboplatin overdose, thus every possible measure should be taken to avoid an overdose; this includes full awareness of the potential danger of an overdose, careful calculation of the dose to be administered and availability of adequate diagnostic and treatment facilities. Acute overdose with carboplatin may result in an enhancement of its expected toxic effects (e.g. severe myelosuppression, intractable nausea and vomiting, severe neurosensory toxicities, liver failure, kidney failure, etc.) Death may follow. Haemodialysis is the only effective, even then partially, up to 3 hours after administration because of the rapid and extensive binding of platinum to plasma

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proteins. Signs and symptoms of overdose should be managed with supportive measures.

The patient may need to be sustained through complications relating to myelosuppression, renal and hepatic impairment. Diarrhoea and alopecia may develop.

In case of overdose, immediately contact the Poisons Information Centre (in Australia, call 131126; in New Zealand call 0800 764 766) for advice.

### **PRESENTATION**

50 mg in 5 mL glass vials: 1's

150 mg in 15 mL glass vials: 1's

450 mg in 45 mL glass vials: 1's

1000 mg in 100 mL glass vials: 1's

### **STORAGE**

Store below 25°C. Do not Freeze. Protect from light.

### **MEDICINE CLASSIFICATION**

Prescription Medicine

### **NAME AND ADDRESS OF SPONSOR**

Pharmaco (NZ) Ltd  
4 Fisher Crescent  
Mt. Wellington  
Auckland

(Distributor on behalf of Sandoz Pty Ltd)

### **DATE OF PREPARATION**

22 June 2011