carmustine (kar-mus-tin)

BCNU, BiCNU, Gliadel

Antineoplastics

Pharmacologic: alkylating agents

Pregnancy Category D

Indications: Alone or with other treatments (surgery, radiation) in the management of: Brain tumors, Multiple myeloma, Hodgkin’s disease, Other lymphomas.

Action: inhibits DNA and RNA synthesis (cell-cycle phase– nonspecific).

Therapeutic Effects: Death of rapidly replicating cells, especially malignant ones.

Pharmacokinetics:

Absorption: Following IV administration, absorption is complete. Following implantation, action is primarily local.

Distribution: Highly lipid soluble; readily penetrates CSF. Enters breast milk.

Metabolism and Excretion: Rapidly metabolized. Some metabolites have anti-neoplastic activity.

Half-life: Biologic—15–30 min; chemical—5 min.

TIME/ACTION PROFILE (effect on platelet counts)

ROUTE ONSET PEAK DURATION

IV days 4–5 wk 6 wk

Contraindications/Precautions:

Contraindicated in: Hypersensitivity; Bone marrow depression with other antineoplastics or radiation therapy. Smoking ↑ risk of pulmonary toxicity. May ↓ antibody response to live-virus vaccines and ↑ risk of adverse reactions. Myelosuppression may be ↑ by anti-metabolites.

Route/Dosage:

IV (Adults and Children): 150–200 mg/m² single dose q 6–8 wk or 75–100 mg/m² days for 2 days q 6–8 wk or single 80–100 mg for 5 days q 6 wk.

Intracavitary (Adults): 1–2 mg/0.08 cm³ (6–8 implants) placed in cavity created during surgical resection of brain tumor.

NURSING IMPLICATIONS

Assessment:

● Monitor vital signs before and frequently during therapy.

● Monitor for bone marrow depression, effects for bleeding (bleeding gums, bruising, petechiae, guaiac stools, urine, and emesis) and avoid IM injections and taking rectal temperatures if platelet count is low. Apply pressure to venipuncture sites for 10 min. Assess for signs of infection during neutropenia. Lactation may occur; monitor for increased tongue, swelling, and softtissue hyposthesia.

● Monitor for respiratory status for dyspnea or cough. Obtain pulmonary function tests at baseline and frequently during therapy. Pulmonary toxicity usually occurs after high cumulative doses or several courses of therapy but may also occur following 1–2 courses of low doses. Symptoms may be rapid or gradual in onset; damage may be reversible or irreversible. Delayed pulmonary fibrosis may occur years after therapy. Notify health care professional promptly if symptoms occur.

● Monitor IV site closely. Carmustine is an irritant. Instruct patient to notify nurse immediately if discomfort occurs at IV site. Discontinue IV if symptoms occur. Notify health care professional if irritation occurs at IV site. Apply ice to site.

● Monitor intake and output, appetite, and nutritional intake. Assess for nausea and vomiting, which occur within 2 hr of administration and persist for 4–6 hr.

Adverse Reactions/ Side Effects:

Resp: PULMONARY FIBROSIS, pulmonary infiltrates.

GI: hepatotoxicity, nausea, vomiting, anorexia, diarrhea, esophagitis.

GU: renal failure.

Derm: alopecia.

Hemat: LEUKOPENIA, THROMBOCYTOPENIA, anemia.

Local: pain at IV site.

Interactions:

Drug-Drug: ↑ bone marrow depression with other antineoplastics or radiation therapy. Smoking ↓ risk of pulmonary toxicity. May ↓ antibody response to live-virus vaccines and ↑ risk of adverse reactions. Myelosuppression may be ↑ by anti-metabolites.

Other: May ↓ antibody response to live-virus vaccines and ↑ risk of adverse reactions. Myelosuppression may be ↑ by anti-metabolites.
minimization of an antimetic before and during therapy; and adhering diet as indic-
ated can help minimize and alter to balance and nutritional state.

**Lab Test Considerations:** Monitor CBC with differential and platelet count
before and weekly for at least 6 wk following each dose. The nadir of
thrombocytopenia occurs in 4–5 wk; the nadir of leukopenia in 4–6
wk. Recovery usually occurs in 6–7 wk but may take 10–12 wk after
prolonged therapy. Withhold dose and notify physician if platelet count
is <50,000/mm³ or white blood cell count is 100,000/mm³ or hemoglobin
is normally mild.

Monitor serum bilirubin, AST, ALT, and LDH before and periodically during ther-
apy. Monitor INR, serum creatinine, and serum electrolytes during and
periodically during therapy. Notify health care professional if BUN is elevated.

Potential Nursing Diagnoses

**Risk for Injury (Side Effects)**

Dysrhythmia

Implementation

- **High Alert:** Orders for carmustine require the signature of a second practitioner
  before administration and are to be administered by a pharmacist or qualified nurse
  only.

- **High Alert:** Disturbed body image (Side Effects)

- **High Alert:** Risk for injury (Side Effects)

- **Potential Nursing Diagnoses**

- **High Alert:** Monitor serum creatinine, AST, ALT, and alkaline phosphatase
  before and periodically during therapy. Notify health care professional if BUN is elevated.

- **Additive Incompatibility:** allopurinol, sodium bicarbonate.

**IV Administration**

- **pH:** 5.4–6.8

- **Solution:** Solution should be prepared in a biologic cabinet. Wear gloves, gown, and mask
  while handling medication. Do not reconstitute in designated containers. Contact
  with skin may cause transient hypopigmentation.

- **Y-Site Incompatibility:** Dextrose 5% W.V. (D5W), lactated Ringer’s solution (LRS),
  0.9% NaCl, saline, and water for injection. Concentration: 0.3 mg/mL.

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Patient/Family Teaching

- Instruct patient to notify health care professional if fever; chills; sore throat; signs of infection; lower back or side pain, difficult or painful urination; bleeding gums; bruising; petechiae; or blood in urine, stool, or emesis occurs. Cautions patient to avoid crowds and persons with known infections. Instruct patient to use soft toothbrush and electric razor. Patients should be cautioned not to drink alcoholic beverages or to take products containing aspirin or NSAIDs.

- Instruct patient to notify health care professional if shortness of breath or increased cough occurs. Encourage patient not to smoke, because smokers are at greater risk for pulmonary toxicity.

- Instruct patient to inspect oral mucosa for redness and ulceration. If mouth sores occur, advise patient to use sponge brush and rinse mouth with water after eating and drinking. Stomatitis may require treatment with opioid analgesics.

- Discuss with patient the possibility of hair loss. Explore coping strategies.

- Advise patient of the need for contraception and to avoid breast feeding during therapy.

- Instruct patient not to receive any vaccinations without advice of health care professional.

- Emphasize need for periodic lab tests to monitor for side effects.

Evaluation/Desired Outcomes

- Decrease in size and spread of tumor.

- Improvement in hematologic parameters in non-solid cancers.

Why was this drug prescribed for your patient?