chapter 55

Antineoplastic Drugs

Key Terms

alopecia
anemia
anorexia
antineoplastic drugs
bone marrow suppression
chemotherapy
extravasation
leukopenia
oral mucositis
stomatitis
thrombocytopenia
vesicant

Chapter Objectives

On completion of this chapter, the student will:

- List the types of drugs used in the treatment of neoplastic diseases.
- Discuss the uses, general drug actions, general adverse reactions, contraindications, precautions, and interactions of the antineoplastic drugs.
- Discuss important preadministration and ongoing assessment activities the nurse should perform on the patient taking antineoplastic drugs.
- List some nursing diagnoses particular to a patient taking antineoplastic drugs.
- Discuss ways to promote an optimal response to therapy, how to manage common adverse reactions, and important points to keep in mind when educating patients about the use of an antineoplastic drug.

Antineoplastic drugs are used in the treatment of malignant diseases (cancer). These drugs can be used for cure, control, or palliative (relief of symptoms) therapy. Although these drugs may not always lead to a complete cure of the malignancy, they often slow the rate of tumor growth and delay metastasis (spreading of the cancer to other sites). Use of these drugs is one of the tools in the treatment of cancer. The term **chemotherapy** is often used to refer to therapy with antineoplastic drugs.

Many antineoplastic drugs are available to treat malignancies. The antineoplastic drugs covered in this chapter include the alkylating drugs, antibiotics, antimetabolites, hormones, mitotic inhibitors, and selected miscellaneous drugs. Many antineoplastic drugs not specifically discussed in this chapter are listed in the Summary Drug Table: Antineoplastic Drugs.

ACTIONS

Generally, most antineoplastic drugs affect cells that rapidly proliferate (divide and reproduce). Malignant neoplasms or cancerous tumors usually consist of rapidly proliferating aberrant (abnormal) cells. Cancer cells have no biological feedback controls that stop their aberrant growth or proliferation. Cancer cells are more sensitive to antineoplastic drugs when the cells are in the process of growing and dividing. Chemotherapy is administered at the time the cell population is dividing as part of a strategy to optimize cell death.

However, the normal cells that line the oral cavity and gastrointestinal tract, and cells of the gonads, bone marrow, hair follicles, and lymph tissue are also rapidly dividing cells and are usually affected by these drugs. Thus, antineoplastic drugs may affect normal as well as malignant (cancerous) cells.

Chemotherapy is administered in a series of cycles to allow for recovery of the normal cells and to destroy more of the malignant cells (Fig. 55-1). According to the cell kill theory, a drug regimen is intended to kill 90% of the cancer cells during the first course of treatment. The second course, according to this theory, targets the remaining cancer cells and reduces those cells by 90%. Further courses of chemotherapy continue to reduce the number of cancer cells, until all cells are killed. This theory is the rationale for using repeated doses of chemotherapy with several antineoplastic drugs. Every malignant cell must be destroyed for the cancer to be

SUMMARY DRUG TABLE ANTINEOPLASTIC DRUGS

GENERIC NAME	TRADE NAME*	USES	ADVERSE REACTIONS	DOSAGE RANGES
Alkylating Drugs				
busulfan *byoo-sul'-fan*	Busulfex, Myleran	Chronic myelogenous leukemia	Leukopenia, anemia, cataracts, anxiety, skin rash, thrombocytopenia, fever, anorexia, nausea, vomiting, diarrhea, stomatitis, constipation, tachycardia, hypertension, insomnia, dizziness	1–12 mg/d PO; 0.8 mg/kg IV
chlorambucil *klor-am'-byoo-sill*	Leukeran	Chronic lymphocytic leukemia, malignant lymphomas, Hodgkin's disease	Bone marrow depression, hyperuricemia, nausea, vomiting, diarrhea, hepatotoxicity, tremors	0.03–0.2 mg/kg/d PO
cyclophosphamide *sye-klo-foss'-fam-ide*	Cytoxan, Neosar	Malignant lymphomas, Hodgkin's disease, multiple myeloma, leukemia, carcinoma of the ovary and breast, neuroblastoma, retinoblastoma	Leukopenia, thrombocytopenia, anemia, anorexia, nausea, vomiting, diarrhea, cystitis, alopecia	Initial dose: 40–50 mg/kg IV; maintenance doses: 1–5 mg/kg/d PO; 3–15 mg/kg IV
ifosfamide *eye-fos'-fam-ide*	Ifex	Testicular cancer	Hemorrhagic cystitis, mental confusion, coma, alopecia, nausea, vomiting, anorexia, diarrhea, hematuria	1.2 g/m^2/d IV
lomustine *loe-mus'-teen*	CeeNu	Brain tumors, Hodgkin's disease	Nausea, vomiting, diarrhea, thrombocytopenia, leukopenia, alopecia, anemia, stomatitis	100–300 mg/m^2 PO
mechlorethamine *me-klor-eth'-a-meen*	Mustargen	Hodgkin's disease, lymphosarcoma, bronchogenic carcinoma, leukemia, mycosis fungoides	Nausea, vomiting, jaundice, alopecia, lymphocytopenia, granulocytopenia, thrombocytopenia, skin rash, diarrhea	0.4 mg/kg IV as a total dose for a course of therapy, which may be given as a single dose or divided dose
melphalan *mel'-fa-lan*	Alkeran	Multiple myeloma, carcinoma of the ovary	Nausea, vomiting, bone marrow depression, skin rash, alopecia, diarrhea	6 mg/d PO; 16 mg/m^2 IV
thiotepa *thye-oh-tep'-a*	Thioplex, *generic*	Carcinoma of the breast, ovary, bladder, Hodgkin's disease, lymphosarcomas, intracavity effusions due to localized metastatic disease	Nausea, vomiting, pain at injection site, bone marrow depression, dermatitis, dysuria	0.3–0.4 mg/kg IV; dosage is higher for intracavity or intratumor administration; bladder instillation: 60 mg retained for 2 h
Antibiotics				
bleomycin sulfate *blee-oh-my'-sin*	Blenoxane	Carcinoma of the head and neck, lymphomas, testicular carcinoma	Pneumonitis, pulmonary fibrosis, erythema, rash, fever, chills, vomiting	0.25–0.5 U/kg IV, IM, SC
dactinomycin *dak-ti-no-my'-sin*	Cosmegen	Wilms' tumor, choriocarcinoma, Ewing's sarcoma, testicular carcinoma	Anorexia, alopecia, bone marrow depression, nausea, vomiting	Up to 15 mcg/kg/d IV; may also be given by isolation perfusion at 0.035–0.05 mg/kg
daunorubicin citrate liposomal *daw-noe-roo'-bi-sin*	DaunoXome	Kaposi's sarcoma	Fatigue, headache, diarrhea, nausea, cough, fever	40 mg/m^2 IV

SUMMARY DRUG TABLE ANTINEOPLASTIC DRUGS (*Continued*)

GENERIC NAME	TRADE NAME*	USES	ADVERSE REACTIONS	DOSAGE RANGES
daunorubicin HCl *daw-noe-roo'-bi-sin*	*Generic*	Leukemia	Bone marrow depression, alopecia, acute nausea and vomiting, fever, chills	25–45 mg/m^2/d IV
doxorubicin HCl *dox-oh-roo'-by-sin*	Adriamycin, Rubex	Acute leukemia, neuroblastoma, soft tissue and bone sarcomas, carcinomas of the breast, ovary, bladder, lymphomas, Wilms' tumor	Alopecia, acute nausea and vomiting, mucositis, chills, bone marrow depression, fever	25–75 mg/m^2/d IV
epirubicin *ep-ee-roo'-by-sin*	Ellence	Breast cancer	Alopecia, local toxicity, rash, itching, amenorrhea, hot flashes, nausea, vomiting, mucositis, leukopenia, neutropenia, anemia, thrombocytopenia, infection, lethargy, conjunctivitis	100–120 mg/m^2 IV
idarubicin HCl *eye-da-roo'-by-sin*	Idamycin	Leukemia	Congestive heart failure, arrhythmias, chest pain, myocardial infarction, nausea, vomiting, alopecia	12 mg/m^2 daily x 3 d IV
mitomycin *mye-toe-my'-sin*	Mutamycin	Adenocarcinoma of the stomach, pancreas	Bone marrow depression, anorexia, nausea, vomiting, headache, blurred vision, fever	10–20 mg/m^2/d IV
plicamycin *plye-ka-my'-sin*	Mithracin	Malignant tumors of the testes, hypercalcemia, and hypercalciuria associated with neoplasms	Hemorrhagic syndrome (epistaxis, hematemesis, widespread hemorrhage in the GI tract, generalized advanced bleeding), vomiting, diarrhea, anorexia, nausea, stomatitis	Testicular tumors: 25–30 mcg/kg/d IV; hypercalcemia, hypercalciuria: 25 mcg/kg/d IV for 3–4 d
valrubicin *val-roo'-by-sin*	ValStar	Bladder cancer	Bladder discomfort, dysuria, urinary frequency, urinary tract infection	800 mg intravesically weekly for 6 wk
Antimetabolites				
capecitabine *kap-ah-seat'-ah-bean*	Xeloda	Breast cancer	Dermatitis, diarrhea, nausea, vomiting, leukopenia, granulocytopenia, thrombocytopenia, hand and foot syndrome, stomatitis, abdominal pain, constipation, dyspnea, anemia, hyperbilirubinemia, fatigue, weakness, anorexia	2500 mg/m^2/d PO
cladribine *kla'-dri-bean*	Leustatin	Hairy cell leukemia	Neutropenia, fever, infection, fatigue, nausea, headache, rash, injection site reactions, nephrotoxicity, neurotoxicity	0.09 mg/kg/d IV
cytarabine *sye-tare'-a-bean*	Cytosar-U, *generic*	Acute myelocytic or lymphocytic leukemia	Bone marrow depression, nausea, vomiting, diarrhea, anorexia	100–200 mg/m^2/d IV, SC
fludarabine *floo-dar'-a-bean*	Fludara	Chronic lymphocytic leukemia	Bone marrow depression, fever, chills, infection, nausea, vomiting, rash, diarrhea	25 mg/m^2 IV
fluorouracil (5-FU) *flure-oh-yoor'-a-sill*	Adrucil, *generic*	Carcinoma of the breast, stomach, pancreas, colon, and rectum	Diarrhea, anorexia, nausea, vomiting, alopecia, bone marrow depression, angina, stomatitis	3–12 mg/kg/d IV

(*continued*)

SUMMARY DRUG TABLE ANTINEOPLASTIC DRUGS (*Continued*)

GENERIC NAME	TRADE NAME*	USES	ADVERSE REACTIONS	DOSAGE RANGES
gemcitabine HCl *jem-site'-ah-ben*	Gemzar	Pancreatic cancer, non–small-cell lung cancer	Anemia, proteinuria, nausea, vomiting, fever, rash, leukopenia, neutropenia, thrombocytopenia, diarrhea, constipation, alopecia	1000–1250 mg/m^2 IV
mercaptopurine (6-mercaptopurine, 6-MP) *mer-kap-toe-pyoor'-een*	Purinethol	Acute lymphatic leukemia, acute or chronic myelogenous leukemia	Bone marrow depression, hyperuricemia, hepatotoxicity, skin rash	2.5–5 mg/kg/d PO; do not exceed 5 mg/kg/d
methotrexate *meth-o-trex'-ate*	Rheumatrex, *generic,* Dose Pack	Lymphosarcoma, severe psoriasis, cancer of the head, neck, breast, lung, rheumatoid arthritis (RA)	Ulcerative stomatitis, nausea, rash, pruritus, renal failure, bone marrow depression, fatigue, fever, chills	Antineoplastic dosages vary widely depending on type of tumor; psoriasis: 10–50 mg/wk IV, IM, PO; RA: dose pack directed
pentostatin *pen'-toe-stat-in*	Nipent	Alpha-interferon-refractory hairy cell leukemia	Bone marrow depression, anemia, nausea, vomiting, diarrhea, rash, fever	4 mg/m^2 IV every other week
thioguanine (TG) *thye-oh-gwon'-een*	*generic*	Acute leukemias	Bone marrow depression, hepatic toxicity, nausea, vomiting, stomatitis, hyperuricemia	2–3 mg/kg/d PO
Mitotic Inhibitors (Antimitotic Agents)				
docetaxel *dohs-eh-tax'-el*	Taxotere	Breast cancer, non–small-cell lung cancer	Nausea, skin rash, pruritus, stomatitis, vomiting, anemia, leukopenia, neutropenia, arthralgia, alopecia, asthenia, fever, infections	60–100 mg/m^2 IV
paclitaxel *pass-leh-tax'-ell*	Taxol	Ovarian cancer, breast cancer, AIDS-related Kaposi's sarcoma	Diarrhea, nausea, vomiting, flushing, myalgia, arthralgia, fever, peripheral neuropathy, opportunistic infections	135–175 mg/m^2 IV
vinblastine sulfate (VLB; LCR) *vin-blas'-teen*	Velban, *generic*	Hodgkin's disease, lymphocytic lymphoma, histiocytic lymphoma, mycosis fungoides, testicular cancer, Kaposi's sarcoma, breast cancer	Leukopenia, nausea, vomiting, paresthesias, malaise, weakness, mental depression, headache, hypertension, alopecia, diarrhea, constipation	3.7–18.4 mg/m^2 IV
vincristine sulfate (VCR; LRC) *vin-kris'-teen*	Oncovin, Vincasar PFS, *generic*	Acute leukemia, combination therapy for various cancers	Same as vinblastine	1.4 mg/m^2 IV
Hormones				
Androgens				
testolactone *tess-toe-lak'-tone*	Teslac	Palliative treatment of advanced disseminated metastatic breast carcinoma in postmenopausal women and premenopausal women whose ovarian function has been terminated	Paresthesia, glossitis, anorexia, nausea, vomiting, maculopapular erythema, aches, edema of the extremities, nail growth disturbances, increase in blood pressure, virilization	250 mg QID PO

SUMMARY DRUG TABLE ANTINEOPLASTIC DRUGS (*Continued*)

GENERIC NAME	TRADE NAME*	USES	ADVERSE REACTIONS	DOSAGE RANGES
Antiandrogens				
bicalutamide *bye-cal-loo'-ta-mide*	Casodex	Prostate cancer	Hot flushes, hypertension, dizziness, paresthesia, insomnia, rash, constipation, nausea, diarrhea, nocturia, hematuria, peripheral edema, bone pain, dyspnea, general pain, back pain, asthenia, infection	50 mg once daily PO
flutamide *flu'-ta-mide*	Eulexin	Early stage and metastatic prostate cancer	Hot flashes, loss of libido, impotence, diarrhea, nausea, vomiting, gynecomastia	125 mg PO TID at 8-h intervals PO (up to 750 mg/d)
nilutamide *nah-loo'-ta-mide*	Nilandron	Metastatic prostate cancer	Pain, headache, asthenia, abdominal pain, chest pain, flu symptoms, fever, liver toxicity, insomnia, nausea, constipation, testicular atrophy, dyspnea, pain, asthenia	150–300 mg/d PO
Progestins				
medroxyprogesterone *me-drox'-ee-proe-jess'-te-rone*	Depo-Provera	Endometrial or renal cancer	Breakthrough bleeding, spotting, change in menstrual flow, amenorrhea, rash with or without pruritus, acne, fluid retention, edema, increase or decrease in weight, sudden, partial, or complete loss of vision, migraine, nausea	400–1000 mg IM per week; if disease stabilizes 400 mg/month IM
megestrol acetate *me-jess'-trole*	Megace, *generic*	Breast or endometrial cancer	Same as medroxyprogesterone	Breast cancer: 160 mg/d PO; endometrial cancer: 40–320 mg/d in divided doses PO
Estrogens				
diethylstilbestrol diphosphate *dye-eth-il-stil-bess'-trole*	Stilphostrol	Inoperable prostatic carcinoma	Headache, dizziness, intolerance to contact lens, edema, thromboembolism, hypertension, nausea, weight changes, testicular atrophy, acne, breast tenderness, gynecomastia	Oral: 50–200 mg TID PO (not to exceed 1 g/d) Parenteral: 0.5–1 g/d IV
estramustine phosphate sodium	Emcyt	Metastic or progressive prostatic carcinoma	Same as diethylstilbestrol and diarrhea, vomiting, decreased libido, sodium and water retention, skin rash	10–16 mg/kg/d PO in 3–4 divided doses
estradiol and nitrogen mustard *ess-tra-muss'-teen*				
Antiestrogens				
tamoxifen citrate *ta-mox'-i-fen*	Nolvadex, *generic*	Breast cancer in menopausal women, preventative therapy for women at high risk for breast cancer	Fluid retension, vaginal discharge, nausea, vomiting, hypercalcemia, ophthalmic changes, hot flashes, vaginal bleeding and discharge	20–40 mg/d
toremifene citrate *tore-em'-ah-feen*	Fareston	Breast cancer	Hot flushes, nausea, vomiting, vaginal bleeding, vaginal discharge, menstrual irregularities, skin rash	60 mg once daily PO

(*continued*)

SUMMARY DRUG TABLE ANTINEOPLASTIC DRUGS (*Continued*)

GENERIC NAME	TRADE NAME*	USES	ADVERSE REACTIONS	DOSAGE RANGES
Gonadotropin-Releasing Hormone Analogs				
goserelin acetate *goe'-se-rel-in*	Zoladex	Prostate cancer, endometriosis, advanced breast cancer, emdometrial thinning	Lethargy, dizziness, insomnia, anorexia, nausea, sexual dysfunction, headache, emotional lability, depression, sweating, acne, breast atrophy, peripheral edema, lower urinary tract symptoms, hot flashes, pain, edema, upper respiratory tract infection, rash	3.6 mg SC q28d or 10.8 mg q3 months into the upper abdominal wall
leuprolide acetate *loo-proe'-lide*	Lupron, Lupron Depot	Advanced prostatic carcinoma, endrometriosis, central precocious puberty, uterine leiomyomata	Edema, headache, dizziness, bone pain, nausea, vomiting, anorexia, ECG changes, hypertension	1 mg SC daily; Depot: 7.5–30 mg IM; endometriosis: Depot, 3.75 IM monthly; uterine leiomyomata: 3.75 IM monthly
triptorelin pamoate *trip-toe-rell'-in*	Trelstar Depot	Advanced prostate cancer	Hot flushes, skeletal pain, injection site pain, hypertension, headache, insomnia, dizziness, vomiting, diarrhea, impotence	3.75 mg IM
Aromastase Inhibitors				
anastrazole *an-ahs'-troh-zol*	Arimidex	Advanced breast cancer	Vasodilation, headache, dizziness, insomnia, GI disturbances, nausea, constipation, diarrhea, cough, increased dyspnea, hot flushes, asthenia, pain, back pain, peripheral edema, bone pain	1 mg once daily
exemestane *ex-ah'-mess-tane*	Aromasin	Advanced breast cancer	Depression, insomnia, anxiety, dizziness, nausea, vomiting, abdominal pain, anorexia, constipation, diarrhea, dyspnea, fatigue, hot flashes, pain, peripheral edema	25 mg/d PO
letrozole *le'-tro-zol*	Femara	Advanced breast cancer	Same as for anastrazole	2.5 mg once daily PO
Miscellaneous Anticancer Drugs				
Epipodophyllotoxins				
etoposide *e-toe-poe'-side*	Toposar, VePesid, *generic*	Testicular cancer, small-cell lung cancer	Nausea, vomiting, anorexia, diarrhea, constipation, alopecia, granulocytopenia	Testicular cancer: 50–100 mg/m^2/d IV; small-cell lung cancer: 35–50 mg/m^2/d IV (oral dose is 2 times the IV dose rounded to the nearest 50 mg)
teniposide (VM-26) *teh-nip-oh-side*	Vumon	Leukemia	Nausea, vomiting, anorexia, diarrhea, constipation, alopecia, rash, leukopenia, thrombocytopenia, anemia	165–250 mg/m^2 IV
Enzymes				
asparaginase *a-spare'-a-gi-nase*	Elspar	Leukemia	Hypersensitivity reactions (rash, urticaria, arthralgia, respiratory distress, acute anaphylaxis), depression, somnolence, fatigue, coma, anorexia, nausea, vomiting	200–1000 IU/kg/d IV; 6000 IU/m^2/d IM

SUMMARY DRUG TABLE ANTINEOPLASTIC DRUGS (*Continued*)

GENERIC NAME	TRADE NAME*	USES	ADVERSE REACTIONS	DOSAGE RANGES
pegaspargase (PEG-asparaginase) *peg-ass-par'-jase*	Oncaspar	Acute lymphoblastic leukemia	Nausea, vomiting, fever, malaise, dyspnea, diarrhea, hypotension	2500 mg/m^2 IM or IV
Platinum Coordination Complex				
carboplatin *kar'-boe-pla-tin*	Paraplatin	Advanced ovarian cancer	Peripheral neuritis; vomiting; nausea; abdominal pain; diarrhea; constipation; decreased serum sodium, magnesium, calcium, and potassium; increased blood urea nitrogen; visual disturbances; ototoxicity	360 mg/m^2 IV
cisplatin *sis'-pla-tin*	Platinol-AQ	Metastatic testicular tumors, advanced bladder cancer, ovarian tumors	Ototoxicity, peripheral neuropathies, nausea, vomiting, anorexia, bone marrow suppression, nephrotoxicity	20–70 mg/m^2 IV
Anthracenedione				
mitoxantrone HCl *mye-toe-zan'-trone*	Novantrone	Acute leukemias, bone pain in advanced prostatic cancer	Nausea, vomiting, diarrhea, headache, seizures, abdominal pain, mucositis, congestive heart failure, bone marrow depression	12 mg/m^2 IV
Substituted Ureas				
hydroxyurea *hye-drox-ee-yoor-ee'-ah*	Droxia, Hydrea	Melanoma, chronic myelocytic leukemia, ovarian cancer	Headache, dizziness, stomatitis, anorexia, nausea, vomiting, diarrhea, constipation, bone marrow depression, impaired renal tubular function, rash, mucositis, fever, chills, malaise	20–80 mg/kg PO
Methylhydrazine Derivatives				
procarbazine HCl *proe-kar'-ba-zeen*	Matulane	Hodgkin's disease	Leukopenia, anemia, nausea, vomiting, anorexia, thrombocytopenia	1–6 mg/kg PO
Cytoprotective Agents				
amifostine *am-ih-foss'-teen*	Ethyol	Renal toxicity associated with repeated administration of cisplatin in patients with advanced ovarian cancer	Nausea, vomiting, hypotension, fever, chills, dyspnea, skin rash, urticaria	910 mg/m^2 IV QID
dexrazoxane *dex-ray-zox'-ane*	Zinecard	Cardiomyopathy associated with doxorubicin administration in women with metastatic breast cancer	Alopecia, nausea, vomiting, fatigue, malaise, anorexia, stomatitis, fever, infection, diarrhea, neurotoxicity	500 mg/m^2 IV
DNA Topoisomerase Inhibitors				
irinotecan HCl *eh-rin-oh'-te-kan*	Camptosar	Metastatic carcinoma of the colon or rectum	Dizziness, somnolence, confusion, vasodilation, hypotension, thrombophlebitis, diarrhea, nausea, vomiting, abdominal pain, anorexia, constipation, mucositis, dyspnea, asthenia, pain, fever	125 mg/m^2 IV
topotecan HCl *toe-poh'-te-kan*	Hycamtin	Ovarian cancer, small-cell lung cancer	Alopecia, rash, nausea, vomiting, diarrhea, constipation, abdominal pain, stomatitis, anorexia, dyspnea, headache, fatigue, fever, pain, asthenia, bone marrow depression	1.5 mg/m^2 IV

(*continued*)

SUMMARY DRUG TABLE ANTINEOPLASTIC DRUGS (*Continued*)

GENERIC NAME	TRADE NAME*	USES	ADVERSE REACTIONS	DOSAGE RANGES
Biological Response Modifiers				
aldesleukin *al-dess-loo'-kin* (interleukin-2; IL-2)	Proleukin	Metastatic renal-cell carcinoma	Nausea, diarrhea, stomatitis, hypotension, anorexia, bone marrow depression, pulmonary congestion, dyspnea, oliguria	600,000 IU/kg IV q8h
BCG, intravesical	Pacis, TheraCys, TICE BCG	Carcinoma in situ of the bladder	Dysuria, urinary frequency, cystitis, hematuria, urinary incontinence	120 mg instilled in the bladder once a week for 6 wk
denileukin diftitox *deh-nih-loo'-kin diff'-tih-tox*	Ontak	Cutaneous T-cell lymphoma	Hypotension, vasodilation, tachycardia, dizziness, paresthesia, rash, pruritus, nausea, vomiting, anorexia, diarrhea	9–18 μg/kg/d IV
levamisole (HCl) *lev-am'-ih-sole*	Ergamisol	Combination therapy in patients with Dukes stage C colon cancer	Nausea, vomiting, diarrhea, stomatitis, anorexia	50 mg q8h PO
Retinoids				
tretinoin *tret'-i-noyn*	Vesanoid	Acute promylelocytic leukemia	Headache, fever, weakness, fatigue, skin/mucous membrane dryness, increased sweating, visual disturbances, ocular disturbances, alopecia, bone pain	45 mg/m^2/d PO
Rexinoids				
bexarotene *bex-air'-oh-teen*	Targretin	Cutaneous T-cell lymphoma	Elevated blood lipids, hypothyroidism, headache, asthenia, rash, leukopenia, anemia, nausea, infection, peripheral edema, abdominal pain, dry skin	300 mg/m^2/d PO
Monoclonal Antibodies				
alemtuzumab *ay-lem-tuh'-zoo-mab*	Campath	B-cell chronic lymphocytic leukemia	Hypotension, headache, dizziness, rash, bone marrow suppression, fever, chills, asthenia, nausea, vomiting, diarrhea, stomatitis, fatigue	3–30 mg IV
gemtuzumab ozogamicin *gem-too'-zoo-mab oh-zoh-gam'-ih-sin*	Mylotarg	Acute myeloid leukemia	Chills, fever, nausea, vomiting, headache, hypotension, hypertension, hypoxia, dyspnea, bone marrow depression	9 mg/m^2 IV
rituximab *rih-tuck-sih-mab*	Rituxan	Non-Hodgkin's lymphoma	Infusion reactions, hypotension, dizziness, anxiety, night sweats, rash, pruritus, nausea, diarrhea, vomiting, bone marrow depression	375 mg/m^2 IV
ibritumomab tiuxetan *ib-ri-tu'-moe-mab tie-ux-eh'-tan*	Zevalin	Non-Hodgkin's lymphoma	Infections, allergic reactions (bronchospasms and angiooedema), bone marrow depression, hemorrhage, anemia, nausea, vomiting, abdominal pain, diarrhea, increased cough, dyspnea, dizziness, arthralgia, anorexia, ecchymosis	250 mg/m^2 IV
trastuzumab *trass-to-zoo'-mab*	Herceptin	Breast cancer	Anemia, leukopenia, diarrhea, infection, nausea, vomiting, pain, headache, dizziness, dyspnea, hypotension, rash, asthenia, infusion reactions, pulmonary adverse effects	2–4 mg/kg IV

SUMMARY DRUG TABLE ANTINEOPLASTIC DRUGS (*Continued*)

GENERIC NAME	TRADE NAME*	USES	ADVERSE REACTIONS	DOSAGE RANGES
Unclassified Antineoplastics				
imatinib mesylate *eh-mat'-eh-nib*	Gleevec	Chronic myeloid leukemia, gastrointestinal stromal tumors, acute lymphocytic leukemia	Gastric irritation, arthralgia, muscle cramps, hemorrhage, pyrexia, weakness, epistaxis, fatigue, ecchymosis, fluid retention, night sweats	400–800 mg/d PO
porfimer sodium *poor-fi'-mer*	Photofrin	Esophageal cancer	Atrial fibrillation, insomnia, constipation, nausea, abdominal pain, vomiting, pleural effusion, dyspnea, pneumonia, pharyngitis, anemia, fever, chest pain, pain, photosensitivity	2 mg/kg IV
mitotane *mye'-toe-tane*	Lysodren	Adrenal cortical carcinoma	Leukocytosis, GI symptoms (nausea, vomiting, diarrhea, abdominal pain), fatigue, edema, hyperglycemia, dyspnea, cough, rash, or itching, headaches, dizziness	2–16 g/d PO

*The term *generic* indicates the drug is available in generic form.

cured. Each cycle of treatment with the antineoplastic drugs kills some, but by no means all, of the malignant cells. Therefore, repeated courses of chemotherapy are used to kill more and more of the malignant cells, until theoretically none are left.

Alkylating Drugs

Alkylating drugs interfere with the process of cell division of malignant and normal cells. The drug binds with DNA, causing breaks and preventing DNA replication.

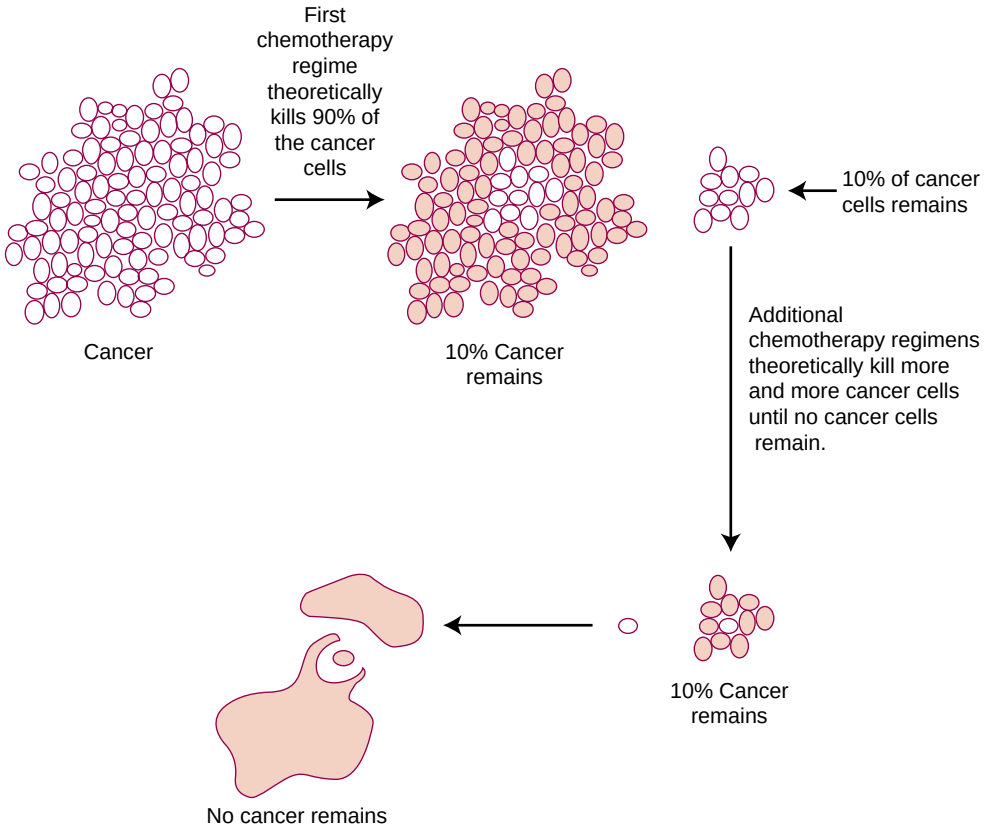

FIGURE 55-1. Cell kill theory describing activity of repeated chemotherapy regimens.

The malignant cells appear to be more susceptible to the effects of the alkylating drugs. Examples of alkylating drugs include busulfan (Myleran, Busulfex) and chlorambucil (Leukeran).

Antineoplastic Antibiotics

The antineoplastic antibiotics, unlike their anti-infection antibiotic relatives, do not have anti-infective (against infection) ability. Their action is similar to the alkylating drugs. Antineoplastic antibiotics appear to interfere with DNA and RNA synthesis and therefore delay or inhibit cell division, including the reproducing ability of malignant cells. Examples of antineoplastic antibiotics include bleomycin (Blenoxane), doxorubicin (Adriamycin), and plicamycin (Mithracin).

Antimetabolites

The antimetabolites interfere with various metabolic functions of cells, thereby disrupting normal cell functions. They inactivate enzymes or alter the structure of DNA, changing the DNA's ability to replicate. These drugs are most effective in the treatment of rapidly dividing neoplastic cells. Examples of the antimetabolites include methotrexate and fluorouracil (Adrucil).

Hormones

The exact method of antineoplastic action of hormones is unclear. These drugs also appear to counteract the effect of male or female hormones in hormone-dependent tumors (see Chap. 52). They appear to alter the hormonal environment of the cell. Examples of hormones used as neoplastic drugs include the androgen testolactone (Teslac), conjugate estrogens (see Chap. 52), and the progestin megestrol (Megace).

Gonadotropin-releasing hormone analogs, for example, goserelin (Zoladex), appear to act by inhibiting the anterior pituitary secretion of gonadotropins, thus suppressing the release of pituitary gonadotropins. These drugs primarily decrease serum testosterone levels and therefore are used in the treatment of advanced prostatic carcinomas.

Mitotic Inhibitors

Mitotic inhibitors (antimitotics) interfere with or stop cell division. Examples of mitotic inhibitors include paclitaxel (Taxol) and vincristine (Oncovin).

Miscellaneous Antineoplastic Drugs

The mechanism of action of this unrelated group of drugs is not entirely clear. Examples of miscellaneous antineoplastics include cisplatin (Platinol) and hydroxyurea (Hydrea).

USES

Antineoplastic drugs may be given alone or in combination with other antineoplastic drugs. In many instances, a combination of these drugs produces better results than the use of a single antineoplastic drug.

Although many antineoplastic drugs share a similar activity (ie, they interfere in some way with cell division), their uses are not necessarily similar. The more common uses of specific antineoplastic drugs are given in the Summary Drug Table.

ADVERSE REACTIONS

Antineoplastic drugs often produce a wide variety of adverse reactions. Some of these reactions are dose dependent; that is, their occurrence is more common or their intensity is more severe when higher doses are used. Other adverse reactions occur primarily because of the effect the drug has on many cells of the body. Because the antineoplastic drugs affect both cancer cells and rapidly proliferating normal cells (ie, cells in the bone marrow, gastrointestinal tract, reproductive tract, and the hair follicles), adverse reactions occur as the result of the action on these cells. Adverse reactions common to many of the antineoplastic drugs include bone marrow suppression, nausea, vomiting, stomatitis, diarrhea, and hair loss.

Some adverse reactions are desirable, for example, the depressing effect of certain antineoplastic drugs on the bone marrow because this adverse drug reaction is essential in the treatment of the leukemias. Other adverse reactions are not desirable, for example, severe vomiting or diarrhea.

Antineoplastic drugs are potentially toxic and their administration is often associated with many serious adverse reactions. At times, some of these adverse effects are allowed because the only alternative is to stop treatment of the malignancy. A treatment plan is developed that will prevent, lessen, or treat most or all of the symptoms of a specific adverse reaction. An example of prevention is giving an antiemetic before administering an antineoplastic drug known to cause severe nausea and vomiting. An example of treatment of the symptoms of an adverse reaction is the administration of an antiemetic and intravenous (IV) fluids and electrolytes when severe vomiting occurs.

Adverse reactions seen with the administration of these drugs may range from very mild to life threatening. Some of these reactions, such as the loss of hair (**alopecia**), may have little effect on the physical status of the patient but may definitely have a serious effect on the patient's mental health. Because nursing is concerned with the whole patient, these physically altering reactions that can have a profound effect on the patient must be considered when planning nursing management.

Some of the adverse reactions seen with antineoplastic drugs are listed in the Summary Drug Table: Antineoplastic Drugs. Appropriate references should be consulted when administering these drugs because there are a variety of uses, dose ranges, and, in some instances, many adverse reactions.

CONTRAINDICATIONS, PRECAUTIONS, AND INTERACTIONS

The information discussed in this section is general, and the contraindications, precautions, and interactions for each antineoplastic drug vary. The nurse should consult appropriate sources before administering any antineoplastic drug.

The antineoplastic drugs are contraindicated in patients with leukopenia, thrombocytopenia, anemia, serious infections, serious renal disease, or known hypersensitivity to the drug and during pregnancy (see Display 55-1 for pregnancy classifications of selected antineoplastic drugs).

Antineoplastic drugs are used cautiously in patients with renal or hepatic impairment, active infection, or other debilitating illnesses, or in those who have recently completed treatment with other antineoplastic drugs or radiation therapy.

The following sections give selected interactions of the alkylating drugs, antimetabolites, antibiotics, hormones, miotic inhibitors, and miscellaneous antineoplastic drugs. The nurse should consult appropriate sources for a more complete listing of interactions before any antineoplastic drug is administered.

DISPLAY 55-1 ● Pregnancy Classification for Selected Antineoplastic Drugs

PREGNANCY CATEGORY C		
cyclophosphamide	asparaginase	pegaspargase
levamisole	dacarbazine	dactinomycin
PREGNANCY CATEGORY D		
busulfan	idarubicin	vincristine
cladribine	mitomycin	anastrozole
chlorambucil	fluorouracil	mitoxantrone
cisplatin	toremifene	pentostatin
ifosfamide	hydroxyurea	teniposide
mechlorethamine	mercaptopurine	vinblastine
melphalan	thioguanine	bleomycin
procarbazine	mitoxantrone	epirubicin
thiotepa	flutamide	doxorubicin
daunorubicin	megestrol	teniposide
tamoxifen	etoposide	
PREGNANCY CATEGORY X		
diethylstilbestrol	bicalutamide	goserelin
methotrexate	plicamycin	triptorelin

Alkylating Drugs

The alkylating drugs may antagonize the effects of antigout drugs by increasing serum uric acid levels. Dosage adjustment of the antigout drug may be needed. If cisplatin is used concurrently with aminoglycosides, there may be an increase in nephrotoxicity and ototoxicity. When cisplatin is used concurrently with loop diuretics, there is an increased risk of ototoxicity. Administering live viral vaccines with cyclophosphamide may decrease the antibody response of the vaccine.

Antimetabolites

Antimetabolite drugs may antagonize the effects of antigout drugs by increasing the serum uric acid concentration. Toxicity from methotrexate may be increased by other nephrotoxic drugs. When the antimetabolites are administered with other antineoplastic drugs, bone marrow suppression is additive. Vitamin preparations containing folic acid may decrease the effects of methotrexate. Alcohol ingestion while taking methotrexate may increase the risk of hepatotoxicity. Concurrent use of methotrexate and the nonsteroidal anti-inflammatory drugs (NSAIDs) may cause severe methotrexate toxicity. Fluorouracil is not compatible with the diazepam, doxorubicin, and methotrexate. Food decreases the absorption of fluorouracil. Live viral vaccines should not be administered if the patient is receiving fluorouracil because a decrease in antibody production may occur, causing the vaccine to be ineffective. Severe cardiomyopathy with left ventricular failure has occurred when fluorouracil and cisplatin are given together.

Antineoplastic Antibiotics

Plasma digoxin levels may decrease when the drug is administered with bleomycin. When bleomycin is used with cisplatin, there is an increased risk of bleomycin toxicity. Pulmonary toxicity may occur when bleomycin is administered with other antineoplastic drugs. Plicamycin, mitomycin, mitoxantrone, and dactinomycin have an additive bone marrow depressant effect when administered with other antineoplastic drugs. In addition, mitomycin, mitoxantrone, and dactinomycin decrease antibody response to live virus vaccines. Dactinomycin potentiates or reactivates skin or gastrointestinal reactions of radiation therapy. There is an increased risk of bleeding when plicamycin is administered with aspirin, warfarin, heparin, and the NSAIDs.

Hormones

Bicalutamide may increase the effect of oral anticoagulants. Flutamide enhances the action of leuprolide. Additive antineoplastic effects may occur when leuprolide is administered with megestrol or flutamide. Estrogens decrease the effectiveness of tamoxifen.

Miotic Inhibitors

Additive bone marrow depressive effects occur when the miotic inhibitor drugs are administered with other antineoplastic drugs or radiation therapy. Administration of vincristine with digoxin results in a decreased therapeutic effect of the digoxin and decreased plasma digoxin levels. There is a decrease in serum concentrations of phenytoin when administered with vinblastine.

Miscellaneous Antineoplastic Drugs

When asparaginase is administered to a patient with diabetes, the risk for hyperglycemia is increased; a dosage adjustment of the oral antidiabetic drug may be necessary. Glucocorticoids decrease the effectiveness of aldesleukin. When aldesleukin is administered with antihypertensive drugs, there is an additive hypotensive effect. Etoposide may decrease the immune response to live viral vaccines.

There is an increased risk for bone marrow suppression when levamisole or hydroxyurea are administered with other antineoplastic drugs. Use of levamisole with phenytoin increases the risk of phenytoin toxicity. Pegaspargase may alter drug response of the anticoagulants. When procarbazine is administered with other central nervous system (CNS) depressants, such as alcohol, antidepressants, antihistamines, opiates, or the sedatives, an additive CNS effect may be seen. Procarbazine may potentiate hypoglycemia when administered with insulin or oral antidiabetic drugs.

Herbal Alert: Green Tea

Green tea and black teas come from the same plant. The difference is in the processing. Green tea is simply dried tea leaves, whereas black tea is fermented, giving it the dark color, the stronger flavor, and the lowest amount of tannins and polyphenols. The beneficial effects of green tea lie in the polyphenols, or flavonoids, that have antioxidant properties. Antioxidants are thought to play a major role in preventing disease (eg, colon cancer) and reducing the effects of aging. Green tea polyphenols are powerful antioxidants. The polyphenols are thought to act by inhibiting the reactions of free radicals within the body that are thought to play a role in aging. The benefits of green tea include an overall sense of well-being, cancer prevention, dental health, and maintenance of heart and liver health. Green tea taken as directed is safe and well tolerated. It contains as much as 50 mg of caffeine per cup. Decaffeinated green tea retains all of the polyphenol content. The recommended dosage is 2 to 5 cups a day. Standardized green tea extracts vary in strength, so dosages may need to be adjusted. The recommeded dosage is 250 to 400 mg/d of extract standardized to 90% polyphenols. Because green tea contains caffeine, nervousness, restlessness, insomnia, and gastrointestinal upset may occur. Green tea should be avoided during pregnancy because of its caffeine content. Patients with hypertension, cardiac conditions, anxiety, insomnia, diabetes, and ulcers should use green tea with caution.

NURSING PROCESS

The Patient Receiving an Antineoplastic Drug

ASSESSMENT

Preadministration Assessment

The extent of the preadministration assessment depends on the type of malignancy and the patient's general physical condition. The initial assessment of the patient scheduled for chemotherapy may include:

- The type and location of the neoplastic lesion (as stated on the patient's chart)
- The stage of the disease, for example, early, metastatic, terminal
- The patient's general physical condition
- The patient's emotional response to the disease
- The anxiety or fears the patient may have regarding chemotherapy treatments
- Previous or concurrent treatments (if any), such as surgery, radiation therapy, other antineoplastic drugs
- Other current nonmalignant disease or disorder, for example, congestive heart failure or peptic ulcer, that may or may not be related to the malignant disease
- The patient's knowledge or understanding of the proposed chemotherapy regimen
- Other factors, such as the patient's age, financial problems that may be associated with a long-term illness, family cooperation and interest in the patient, and the adequacy of health insurance coverage (which may be of great concern to the patient)

Immediately before administering the first dose of an antineoplastic drug, the nurse takes the patient's vital signs. The nurse obtains a current weight because the dose of some antineoplastic drugs is based on the patient's weight in kilograms or pounds. The dosages of some antineoplastic drugs also may be based on body surface measurements and are stated as a specific amount of drug per square meter (m^2) of body surface. Additional physical assessments may be necessary for certain antineoplastic drugs.

A few antineoplastic drugs require treatment measures before administration. An example of preadministration treatment is hydration of the patient with 1 to 2 liters of IV fluid infused before administration of cisplatin (Platinol) or administration of an antiemetic before the administration of mechlorethamine. These measures are ordered by the primary health care provider and, in some instances, may vary slightly from the manufacturer's recommendations.

When an antineoplastic drug has a depressing effect on the bone marrow, laboratory tests, such as a complete blood count, are ordered to determine the effect of

the previous drug dosage. Before the first dose of the drug is administered, pretreatment laboratory tests provide baseline data for future reference.

Ongoing Assessment

The patient who is acutely ill with many physical problems requires different ongoing assessment activities than does one who is ambulating and able to participate in the activities of daily living. Once the patient's general condition is assessed and needs identified, the nurse develops a care plan to meet those needs. Patients receiving chemotherapy can be at different stages of their disease; therefore, nurses must individualize the nursing care of each patient based on the patient's needs and not only on the type of drug administered.

In general, after the administration of an antineoplastic drug, the nurse bases the ongoing assessment on the following factors:

- The patient's general condition
- The patient's individual response to the drug
- Adverse reactions that may occur
- Guidelines established by the primary health care provider or hospital
- Results of periodic laboratory tests

Different types of laboratory tests may be used to monitor the patient's response to therapy. Some of these tests, for example, a complete blood count, may be used to determine the response of the bone marrow to an antineoplastic drug. Other tests, for example, liver function tests, may be used to detect liver toxicity, which may be an adverse reaction that can be seen with the administration of some of these drugs. Abnormal laboratory tests may also require a change in the nursing care plan. For example, a significant drop in the platelet count may result in bleeding episodes and require measures, such as prolonged pressure on injection sites, to prevent bleeding or bruising episodes.

The nurse reviews the results of all laboratory tests at the time they are reported. The primary health care provider is notified of the results before the administration of successive doses of an antineoplastic drug. If these tests indicate a severe depressant effect on the bone marrow or other test abnormalities, the primary health care provider may reduce the next drug dose or temporarily stop chemotherapy to allow the affected body systems to recover.

NURSING DIAGNOSES

The nursing diagnoses for the patient with a malignancy are usually extensive and are based on many factors, such as the patient's physical and emotional condition, the adverse reactions resulting from antineoplastic drug therapy, and the stage of the disease.

Nursing Diagnoses Checklist

- ☑ **Disturbed Body Image** related to adverse reactions of antineoplastic drugs (eg, alopecia, weight loss)
- ☑ **Imbalanced Nutrition: Less than Body Requirements** related to adverse drug reactions of antineoplastic drugs (eg, nausea, vomiting, anorexia)
- ☑ **Risk for Infection** related to adverse drug reactions of antineoplastic drugs (eg, bone marrow suppression)
- ☑ **Impaired Oral Mucous Membranes** related to adverse drug effects of the antineoplastic drugs (eg, stomatitis)
- ☑ **Diarrhea** related to adverse reactions of the antineoplastic drugs
- ☑ **Impaired Tissue Integrity** related to adverse reactions of the antineoplastic drugs (extravasation)
- ☑ **Anxiety** related to diagnosis, necessary treatment measures, the occurrence of adverse reactions, other factors

Drug-specific nursing diagnoses are highlighted in the Nursing Diagnoses Checklist. Other nursing diagnoses applicable to these drugs are discussed in depth in Chapter 4.

PLANNING

The expected outcomes of the patient may include an optimal response to therapy, management of common adverse reactions, a reduction in anxiety, and an understanding of the prescribed treatment modalities.

IMPLEMENTATION

Promoting an Optimal Response to Therapy

Care of the patient receiving an antineoplastic drug depends on factors such as the drug or combination of drugs given, the dosage of the drugs, the route of administration, the patient's physical response to therapy, the response of the tumor to chemotherapy, and the type and severity of adverse reactions. Some drugs may be administered by various routes, depending on the cancer being treated. For example, thiotepa may be administered by the intravenous route for breast cancer, intravesical route for superficial bladder cancer, intrapleural route for malignant pleural effusions, and by the intraperitoneal route for ovarian cancer.

Most hospitals and clinics require that nurses receive specialized training and standardized educational preparation before they are permitted to administer antineoplastic drugs. The Oncology Nursing Society has developed guidelines and educational tools for credentialing nurses for certification in administering chemotherapy.

In some hospitals, policies are established to provide nursing personnel with specific guidelines for the assessment and care of patients receiving a single or

combination chemotherapeutic drug regimen. If guidelines are not provided, it is important for the nurse to review the drugs being given before their administration. The nurse consults appropriate references to obtain information regarding the preparation and administration of a particular drug, the average dose ranges, all the known adverse reactions, and the warnings and precautions given by the manufacturer.

ORAL ADMINISTRATION. A number of antineoplastic drugs are administered orally. The oral route is convenient, economical, noninvasive, and often less toxic. Most oral drugs are well absorbed when the gastrointestinal tract is functioning normally. Antineoplastic drugs such as melphalan, busulfan, and chlorambucil are usually given orally. (Melphalan and busulfan are also available as injectable products for specific indications.) Most oral drugs are administered by the patient in a home setting. The section on "Educating the Patient and Family" provides information to include in a teaching plan.

When an antineoplastic drug is administered orally, the nurse must handle the drug safely. Gloves are considered acceptable if physical contact with the tablet or capsule is necessary.

PARENTERAL ADMINISTRATION. Although some of these drugs are given orally, others are given by the parenteral route. Antineoplastic drugs may be administered subcutaneously, intramuscularly, and intravenously. When giving these drugs IM, the nurse gives the injection into the large muscles using the Z-tract method (see Chap. 2) because administration can cause stinging or burning. When the SC method of administration is used, the injection should contain no more than 3 mL, and injections are given in the usual SC injection sites (see Chap. 2). If the injections are given frequently, the sites should be rotated and charted appropriately.

Goserelin (Zoladex), a hormonal antineoplastic drug used to treat breast cancer, is administered subcutaneously in an unusual way. The drug is contained in a dry pellet that is implanted in the soft tissue of the abdomen, where it is gradually absorbed during a period of 1 to 3 months. After a local anesthetic, such as lidocaine, is administered, a large needle (usually 16 gauge) is used to insert the pellet.

It is most important to follow the directions of the manufacturer or primary health care provider regarding the type of solution to be used for dilution or administration. When preparing an antineoplastic drug for parenteral administration, the nurse wears disposable plastic gloves. Some of these drugs can be absorbed through the skin of the individual preparing these drugs. Because antineoplastic drugs are highly toxic and can have an effect on many organs and systems of the body, nurses must use measures to prevent absorption of the drug through the skin. It is important for the nurse to take precautions to prevent accidental spilling or spraying of the drug into the eyes or onto unprotected areas of the skin. The nurse thoroughly washes the hands before and after preparing and administering an antineoplastic drug. This is especially important when the drug is given by the parenteral route.

Special directions for administration, stated by either the primary health care provider or manufacturer, are also important. For example, cisplatin cannot be prepared or administered with needles or IV administration sets containing aluminum because aluminum reacts with cisplatin, causing formation of a precipitate and loss of potency.

ADMINISTERING ANTINEOPLASTIC DRUGS INTRAVENOUSLY. The intravenous route of drug delivery is the most common and most reliable method of drug delivery. Intravenous administration may be accomplished using a vascular access device, an Angiocath, or a butterfly needle. These devices have become a common method of drug delivery and depending on the patient's individual treatment regimen, may be inserted before therapy. Selection of the device depends on the type of therapy the patient is to receive, the condition of the veins, and how long the treatment regimen is to be continued. Instructions for monitoring the administration of intravenous antineoplastic drugs are given by the physician. Nurses who are certified in chemotherapy drug administration administer these drugs, but any nurse may be involved in monitoring patients receiving antineoplastic drugs.

Most antineoplastic drugs have specific recommended administration techniques. For example, an infusion pump is recommended for the administration of cisplatin, and plicamycin (Mithracin) is administered by slow IV infusion during a period of 4 to 6 hours. If administration guidelines are not provided by the primary health care provider or the hospital, the nurse checks with the appropriate authorities (physician, pharmacist) regarding the administration of a specific antineoplastic drug.

The nurse must read thoroughly the package insert supplied with the drug before the drug is prepared and administered. The manufacturer's recommendations may include information such as storage of the drug, reconstitution procedures, stability of the drug after reconstitution, the rate of administration, and the technique of administration.

Antineoplastic drugs are potentially toxic drugs that can cause a variety of effects during and after their administration. Display 55-2 summarizes important points to keep in mind when administering an antineoplastic drug.

DISPLAY 55-2 ● Important Points to Keep in Mind When Administering an Antineoplastic Drug

- Great care and accuracy are important in preparing and administering these drugs.
- Wear disposable plastic gloves when preparing any of these drugs for parenteral administration.
- Observe the patient closely before, during, and after the administration of an antineoplastic drug.
- Observe the IV site closely to detect any signs of **extravasation** (leakage into the surrounding tissues). Tissue necrosis can be a serious complication. Discontinue the infusion and notify the primary health care provider if discomfort, redness along the pathway of the vein, or infiltration occurs.
- Continually update nursing assessments, nursing diagnoses, and nursing care plans to meet the changing needs of the patient.
- Notify the primary health care provider of all changes in the patient's general condition, the appearance of adverse reactions, and changes in laboratory test results.
- Provide the patient and family with both physical and emotional support during treatment.

GUIDELINES ESTABLISHED BY THE PRIMARY HEALTH CARE PROVIDER OR HOSPITAL. During chemotherapy, the primary health care provider may write orders for certain nursing procedures, such as measuring fluid intake and output, monitoring the vital signs at specific intervals, and increasing the fluid intake to a certain amount. Even when orders are written, the nurse should increase the frequency of certain assessments, such as monitoring vital signs, if the patient's condition changes. Some hospitals have written guidelines for nursing management when the patient is receiving a specific antineoplastic drug. The nurse incorporates these guidelines into the nursing care plan with nursing observations and assessments geared to the individual. The nurse adds further assessments to the nursing care plan when the patient's condition changes.

Monitoring and Managing Adverse Drug Reactions

Not all patients have the same response to a specific antineoplastic drug. For example, an antineoplastic drug may cause vomiting, but the amount of fluid and electrolytes lost through vomiting may vary from patient to patient. One patient may require additional sips of water once nausea and vomiting have subsided, whereas another may require IV fluid and electrolyte replacement. Nursing management is geared not only to what may or what did happen, but also is based on the effects produced by a particular adverse reaction. In the example of the patient who is vomiting, it is important to accurately measure all fluid intake and all output from the gastrointestinal and urinary tracts, as well as to observe the patient for signs of dehydration and electrolyte imbalances. These measurements and observations aid the primary health care provider in determining if fluid replacement is necessary.

Knowing what adverse reactions may occur allows the nurse to prepare for any event that will happen. For example, a hemorrhagic syndrome may be seen with the administration of plicamycin. Knowing this, assessments for hemorrhage are incorporated in the nursing care plan. Another example is the development of hyperuricemia (elevated blood uric acid levels), which may be seen with drugs, such as melphalan (Alkeran) or mercaptopurine (Purinethol). When this adverse reaction is known to occur, fluid intake and output measurements, as well as encouragement to increase fluid intake to at least 2000 mL of oral fluid per day, are included in the nursing care plan. Other antineoplastic drugs are nephrotoxic. Therefore, blood urea nitrogen levels and serum creatinine are monitored closely during therapy.

Gerontologic Alert

Older adults are at increased risk for adverse reactions from the antineoplastic drugs because of the increased incidence of chronic disease, particularly renal impairment or cardiovascular disease. When renal impairment is present, a lower dosage of the antineoplastic may be indicated. Creatinine clearance is used to monitor renal function in the older adult. Blood creatinine levels are likely to be inaccurate because of a decreased muscle mass in the older adult.

MANAGING ALOPECIA. Alopecia (loss of hair) is a common adverse reaction associated with some of the antineoplastic drugs. Some drugs cause severe hair loss, whereas others cause gradual thinning. Examples of drugs commonly associated with severe hair loss are doxorubicin and vinblastine. Methotrexate, bleomycin, vincristine, and etoposide are associated with gradual hair loss.

If hair loss is associated with the antineoplastic drug being given, the nurse informs the patient that hair loss may occur. This problem occurs 10 to 21 days after the treatment cycle is completed. Hair loss is temporary, and hair will grow again when the drug therapy is completed. The nurse warns the patient that hair loss may occur suddenly and in large amounts. Although it is not life threatening, alopecia can lower self-esteem and serve as a reminder that the individual is undergoing treatment for cancer.

Depending on the patient, the nurse may need to make plans for the purchase of a wig or cap to disguise the hair loss until the hair grows back. Although this may seem to be a minor problem when compared with the serious reactions that may be seen during chemotherapy, the loss

of hair is a personal problem for most patients and requires significant nursing consideration.

MANAGING ANOREXIA. **Anorexia** (loss of appetite resulting in the inability to eat) is a common occurrence with the antineoplastic drugs. Is it not uncommon for the patient to report alterations in the sense of taste during the course of chemotherapy. The nurse assesses the nutritional status of the patient before and during treatment. Small, frequent meals (five to six meals daily) are usually better tolerated than are three large meals. Breakfast is often the best tolerated meal of the day. The nurse stresses the importance of eating meals high in nutritive value, particularly protein (eg, eggs, milk products, tuna, beans, peas, and lentils). Some patients are able to eat high-protein finger foods such as cheese or peanut butter and crackers. Nutritional supplements may also be prescribed. The nurse monitors the patient's body weight weekly (or more often if necessary) and reports any weight loss. If the patient continues to lose weight, a feeding tube may be used to administer a nutritionally complete liquid. While this is not ideal, the patient who is malnourished and weak may benefit from this intervention.

MANAGING BONE MARROW SUPPRESSION. **Bone marrow suppression** is a potentially dangerous adverse reaction resulting in decreased production of blood cells. Bone marrow suppression is manifested by abnormal laboratory test results and clinical evidence of leukopenia, thrombocytopenia, or anemia. For example, there is a decrease in the white blood cells or leukocytes **(leukopenia),** a decrease in the thrombocytes **(thrombocytopenia),** and a decrease in the red blood cells, resulting in anemia. Patients with leukopenia have a decreased resistance to infection, and the nurse must monitor them closely for any signs of infection.

Nursing Alert

The nurse should report any of the following signs of infection to the health care provider immediately: temperature of 100.4°F (38°C) or higher, cough, sore throat, chills, frequent urination, or a white blood cell count of less than 2500 mm^3.

Thrombocytopenia is characterized by a decrease in the platelet count (<100,000/mm^3). The nurse monitors patients with thrombocytopenia for bleeding tendencies and takes precautions to prevent bleeding. Injections are avoided but, if necessary, the nurse applies pressure to the injection site for 3 to 5 minutes to prevent bleeding into the tissue and the formation of a hematoma. The nurse informs the patient to avoid the use of electric razors, nail trimmers, dental floss, firm toothbrushes, or any sharp objects. The patient is monitored closely for easy bruising, skin lesions, and bleeding from any orifice (opening) of the body.

Nursing Alert

The nurse reports any of the following to the health care provider immediately: bleeding gums, easy bruising, petechiae (pinpoint hemorrhages), increased menstrual bleeding, tarry stools, bloody urine, or coffee-ground emesis.

Anemia occurs as the result of a decreased production of red blood cells in the bone marrow and is characterized by fatigue, dizziness, shortness of breath, and palpitations. On occasion, the administration of blood transfusions may be necessary to correct the anemia.

MANAGING NAUSEA AND VOMITING. Nausea and vomiting are common adverse reactions to the antineoplastic drugs. The primary health care provider may order an antiemetic about 30 minutes before treatment with the antineoplastic drug begins and continue the antiemetic for several days after administration of the chemotherapy. The nurse provides small, frequent meals to coincide with the patient's tolerance for food. Greasy or fatty foods and unpleasant sights, smells, and tastes are avoided. Cold foods, dry foods, and salty foods may be better tolerated. It is a good idea to provide diversional activities, such as music, television, and books. Relaxation, visualization, guided imagery, hypnosis, and other nonpharmacologic measures have been helpful to some patients.

MANAGING STOMATITIS. Because the cells in the mouth grow rapidly, they are particularly sensitive to the effects of the antineoplastic drugs. **Stomatitis** (inflammation of the mouth) or **oral mucositis** (inflammation of the oral mucous membranes) may occur 5 to 7 days after chemotherapy and continue up to 10 days after therapy. This adverse reaction is particularly uncomfortable because irritation of the oral mucous membranes affects the nutritional aspects of care. The patient must avoid any foods or products that are irritating to the mouth, such as alcoholic beverages, spices, strong mouthwashes, or toothpaste. The nurse provides soft or liquid food high in nutritive value. The oral cavity is inspected for increased irritation. The nurse reports any white patches on the tongue, throat, or gums; any burning sensation; and bleeding from the mouth or gums. Good mouth care is provided every 4 hours with normal saline or alcohol-free mouthwash. Lemon/glycerin swabs are avoided because they tend to irritate the oral mucosa and complicate stomatitis. The primary health care provider may order a topical

viscous anesthetic, such as lidocaine viscous, before meals to decrease discomfort when eating.

MANAGING DIARRHEA. Measures to manage diarrhea include a low-residue diet while the bowel rests. Electrolytes are monitored and supplemented as needed. Adequate hydration must be maintained; intravenous fluids may be necessary. If diarrhea is severe, therapy may be delayed or stopped or the dose decreased.

MAINTAINING TISSUE INTEGRITY. Some antineoplastic drugs are **vesicants** (ie, they cause tissue necrosis if they infiltrate or extravasate out of the blood vessel and into the soft tissue). If extravasation occurs, underlying tissue is damaged. The damage can be severe, causing physical deformity or loss of vascularity or tendon function. Examples of vesicant drugs are daunorubicin, doxorubicin, and vinblastine.

Nursing Alert

Patients at risk for extravasation are those unable to communicate to the nurse about the pain of extravasation, the elderly, debilitated or confused patient, and any patient with fragile veins.

When the patient is receiving a vesicant, the nurse monitors the IV site continuously and checks for blood return frequently (every 1–2 mL). Extravasation may occur without warning, or signs may be detected by an alert nurse. The earlier the extravasation is detected, the less likely soft-tissue damage will occur.

Nursing Alert

Signs of an extravasation include:
- *Swelling (most common)*
- *Stinging, burning, or pain at the injection site (not always present)*
- *Redness*
- *Lack of blood return (if this is the only symptom, the IV should be re-evaluated)*

A lack of blood return alone is not always indicative of an extravasation, and an extravasation can occur even if a blood return is present. If an extravasation is suspected, the infusion is stopped immediately and the extravasation reported to the primary health care provider.

If a vesicant is prescribed as an infusion, it is given through a central line only and checked every 1 to 2 hours. The nurse keeps an extravasation kit containing all materials necessary to manage an extravasation available, along with the extravasation policy and procedure guidelines.

Managing Anxiety

Patients and family members are usually devastated by the diagnosis of a malignancy. The emotional impact of the disease may be forgotten or put aside by members of the medical team as they plan and institute therapy to control the disease. Patients undergoing chemotherapy require a great deal of emotional support from all members of the medical team. Kindness and gentleness in giving care and an understanding of the strain placed on the patient and the family may help reduce some of the fear and anxiety experienced during treatment.

Educating the Patient and Family

When the patient is hospitalized, the nurse explains all treatments and possible adverse effects to the patient before the initiation of therapy. The primary health care provider usually discusses the proposed treatment and possible adverse drug reactions with the patient and family members. The nurse briefly reviews these explanations immediately before parenteral administration of a drug.

Some of these drugs are taken orally at home. The areas included in a patient and family teaching plan for this type of treatment regimen are based on the drug prescribed, the primary health care provider's explanation of the chemotherapy regimen and instructions for taking the drug, and the needs of the individual. Some hospitals or primary health care providers give printed instructions to the patient. The nurse reviews these instructions after the patient has read them and allows time for the patient or family member to ask questions. The patient has a right to know the dangers associated with these drugs and what adverse reactions may occur.

Some patients are given antineoplastic drugs in the medical office or outpatient clinic. Before the institution of therapy, the treatment regimen is explained thoroughly to the patient and family. In some instances, a drug to prevent nausea may be prescribed to be taken before administration of the drugs in the medical office or clinic. To obtain the best possible effects, the nurse stresses to the patient that the drug must be taken at the time specified by the primary health care provider. It is important for the patient to comply with the treatment regimen to maximize a therapeutic effect. Most patients are compliant with therapy; however, some patients might decide to omit a dose in order to feel better temporarily. The nurse must stress the importance of maintaining the dosing schedule exactly as prescribed. A calendar indicating the doses to take, dates the drug is to be taken, and space to record each dose is often given to the patient. The patient is instructed to bring the treatment calendar to each appointment, and the patient is questioned about any omitted or delayed doses. One course of therapy is generally prescribed at a time to avoid inadvertent overdosing that could be life threatening.

The nurse includes the following points in a patient and family teaching plan when oral therapy is prescribed:

- Take the drug only as directed on the prescription container. Unless otherwise indicated, take the drug on a empty stomach with water to enhance absorption. However, the patient should follow specific directions, such as "take on an empty stomach" or "take at the same time each day"; they are extremely important.
- Familiarize yourself with the brand or trade name and the generic name to avoid confusion.
- Never increase, decrease, or omit a dose unless advised to do so by the primary health care provider.
- If any problems (adverse reactions) occur, no matter how minor, contact the primary health care provider immediately.
- All recommendations given by the primary health care provider, such as increasing the fluid intake, eating, or avoiding certain foods are important.
- The effectiveness or action of the drug could be altered if these directions are ignored. Other recommendations, such as checking the mouth for sores, rinsing the mouth thoroughly after eating or drinking, or drinking extra fluids, are given to identify or minimize some of the effects these drugs have on the body. It is important to follow these recommendations.
- Keep all appointments for chemotherapy. These drugs must be given at certain intervals to be effective.
- Do not take any nonprescription drug unless the use of a specific drug has been approved by the primary health care provider.
- Avoid drinking alcoholic beverages unless the primary health care provider has approved their use.
- Always inform other physicians, dentists, and medical personnel of therapy with this drug.
- Keep all appointments for the laboratory tests ordered by the primary health care provider. If unable to keep a laboratory appointment, notify the primary health care provider immediately.

EVALUATION

- The therapeutic effect is achieved.
- Adverse reactions are identified, reported to the primary health care provider, and managed using nursing interventions.
- Anxiety is reduced.
- The patient verbalizes an understanding of the dosage regimen.
- The patient verbalizes an understanding of treatment modalities and the importance of continued follow-up care.
- The patient verbalizes the importance of complying with the prescribed therapeutic regimen.

● Critical Thinking Exercises

1. *Dennis, age 10 years, has leukemia and is to begin chemotherapy with chlorambucil (Leukeran). Discuss what information would be important to discuss with Dennis and his parents before beginning the treatment regimen.*
2. *Ms. Thompson has cancer of the lung and will begin a treatment regimen with methotrexate. Discuss important preadministration assessments you would perform before beginning therapy with methotrexate.*
3. *Patients with a malignant disease need special consideration, understanding, and emotional support. On occasion, these needs are unrecognized by members of the medical profession. Suppose you recently received a diagnosis of cancer. Discuss some of the feelings you would experience at this time. Describe what you would want the nurse to do for you at this time. Analyze your thoughts about your future. Discuss what you would want to know or not know. As you think about this or discuss these questions, remember that any patient may have these same emotional responses and may need the same things you would expect from the nurse or other members of the medical profession.*

● Review Questions

1. Which of the following findings would be most indicative to the nurse that the patient has thrombocytopenia?

   A. Nausea
   B. Blurred vision
   C. Headaches
   D. Easy bruising

2. Which of the following is the most common symptom of extravasation?

   A. Swelling around the injection site
   B. Redness along the vein and around the injection site
   C. Pain at the injection site
   D. Tenderness along the path of the vein

3. Which of the following adverse reactions to the antineoplastic drugs is most likely to affect the patient's mental health and self-esteem?

   A. Hematuria
   B. Alopecia
   C. Nausea
   D. Diarrhea

4. When assessing the patient for leukopenia the nurse _____.

   A. checks the patient every 8 hours for hematuria
   B. monitors the patient for fever, sore throat, chills

C. checks female patients for increased menstrual bleeding
D. reports a WBC count of 5000 mm^3

5. Which of the following interventions would be most helpful for a patient with stomatitis?

A. Mouth care should be provided at least once daily.
B. Swab the mouth with lemon glycerin swabs every 4 hours.
C. Provide frequent mouth care with normal saline or alcohol-free mouthwash.
D. Use a hard bristle toothbrush to thoroughly cleanse the mouth and teeth of debris.

● *Medication Dosage Problems*

1. Chlorambucil (Leukeran) dosage is calculated based on the patient's body weight. Mrs. Garcia weighs 142 pounds. The prescribed dosage of chlorambucil is 0.2 mg/kg of body weight per day. What is the correct daily dosage for Mrs. Garcia?

2. A patient weighing 120 pounds is to receive bleomycin sulfate (Blenoxane) 0.25 units per kilogram of body weight. What is the correct dosage of bleomycin?