

Antineoplastic Agents Cancer Chemotherapy

What is cancer?

Cancer is a disorder of cellular growth, life span and death. It involves a group of cells that multiply faster than normal cells. These new cells lose normal cell functions and when they spread to tissues away from the original location, the process is called metastases. Cancer can happen anywhere in or on the body - anywhere you have cells. Traditional cancer treatment includes surgery, chemotherapy and radiation therapy.

The most common cancers in males are prostate cancer, followed by lung and bronchus cancer. In females, the most common cancers are breast cancer, followed by lung and bronchus cancer as well.

Normal cells and cancer cells go through the same steps of division known as the cell cycle. We're all made up of cells and we humans have a life span, so too do the cells. They have a resting phase, a mitosis (cell division/reproduction - daughter cells) phase and all the steps in between.

Antineoplastic drugs are either cell-cycle specific which means they work during specific stages of the cancer cell cycle or cell-cycle nonspecific, meaning they work throughout the entire cell cycle. Chemotherapy is using chemicals (medication) to treat tumors. Chemotherapy is most effective when the cancer cells are reproducing at a fast rate and that's when the tumor is small and cell-cycle specific drugs work best. As the tumor gets larger, the cancer cells are more likely to be in the resting stage of the cell cycle and during these times, cell cycle - nonspecific drugs are the best choice. Combination therapy uses both types of drugs and are more successful with treatment.

When cancer therapy is unsuccessful and nothing else can be done, treatment is switched to palliation - to alleviate symptoms and help the patient be as comfortable as possible.

Analogy of cell cycle phases: Like humans, cells go through a routine.

- Cell cycle specific -

- Cell cycle non-specific -

Antineoplastic Drugs

1. Alkylating Agents: cell cycle nonspecific - are reactive chemical compounds that bond with DNA molecules, preventing the separation of double-coiled DNA strands needed for cellular division.
2. Antimetabolites: cell cycle specific - inhibits enzymes in the pathways of DNA and RNA synthesis. (Fluorouracil / Adrucil - category X topical)
3. Natural Products: cell cycle specific – all made from the periwinkle plant; blocks the formation of the mitotic spindle during mitosis, stopping cell division.
4. Antineoplastic Antibiotics: cell cycle nonspecific - binds to DNA and inhibits DNA or RNA synthesis which stops protein synthesis and prevents cell replication.
5. Hormones: suppresses mitosis in lymphocytes, thus they are good for treating lymphomas and acute leukemia; reduces edema secondary to radiation therapy (goserelin acetate / Zoladex category X)

ANTINEOPLASTIC DRUGS: CANCER CHEMOTHERAPEUTIC AGENTS

Generic	Brand	Route	Side Effects
CLASS: ALKYLATING AGENTS			
busulfan	Busulfex, Myleran	IV, PO	weakness, fatigue, seizures, cataracts, cheilosis, dry mouth, anorexia, NV, amenorrhea, azoospermia, leukopenia, thrombocytopenia severe pancytopenia, jaundice, hyperuricemia, irreversible pulmonary fibrosis, alopecia, transient hyperpigmentation, rash, urticaria, anhidrosis, gynecomastia.
carboplatin	Paraplatin	IV	asthenia, dizziness, confusion, peripheral neuropathy, heart failure, embolism, ototoxicity, NV, diarrhea, constipation, stomatitis, thrombocytopenia, leukopenia, bone marrow suppression, alopecia, pain, anaphylaxis
carmustine (BCNU)	BiCNU, Gliadel Wafer	IV	ataxia, drowsiness, ocular toxicity, nausea within 2-6 hrs., vomiting, stomatitis, renal failure, azotemia, bone marrow suppression, leukopenia, thrombocytopenia, hepatotoxicity, pulmonary fibrosis, hyperpigmentation, intense pain from venous spasm, secondary malignancies
cisplatin	Platinol-AQ	IV	peripheral neuritis, seizures, tinnitus, hearing loss, optic neuritis, loss of taste, nausea, vomiting 1-4 hrs. after dose, lasting 24+ hrs., renal toxicity, leukopenia, thrombocytopenia, hypokalemia, hypocalcemia
ifosamide	Iflex	IV	somnolence, confusion, coma, seizures, hallucinations, depressive psychosis, NV, hematuria, nephrotoxicity, leukopenia, thrombocytopenia, alopecia, infection, phlebitis
CLASS: ANTIMETABOLITES			
capecitabine	Xeloda	PO	dizziness, fatigue, headache, insomnia, paresthesia, edema, eye irritation, diarrhea, NV, stomatitis, intestinal obstruction, constipation, neutropenia, thrombocytopenia, dehydration, limb pain, dermatitis, nail disorder, pyrexia
fluorouracil (5-fluorouracil, 5-FU)	Adrucil, Efudex, Fluoroplex	IV, topical	confusion, euphoria, headache, weakness, malaise, myocardial ischemia, angina, epistaxis, visual changes, GI ulcer, NV, diarrhea, GI bleeding, leukopenia, thrombocytopenia, dermatitis, scaling, nail changes, rash of hands & feet, pain, burning, soreness, swelling w/ topical use

ANTINEOPLASTIC DRUGS: CANCER CHEMOTHERAPEUTIC AGENTS

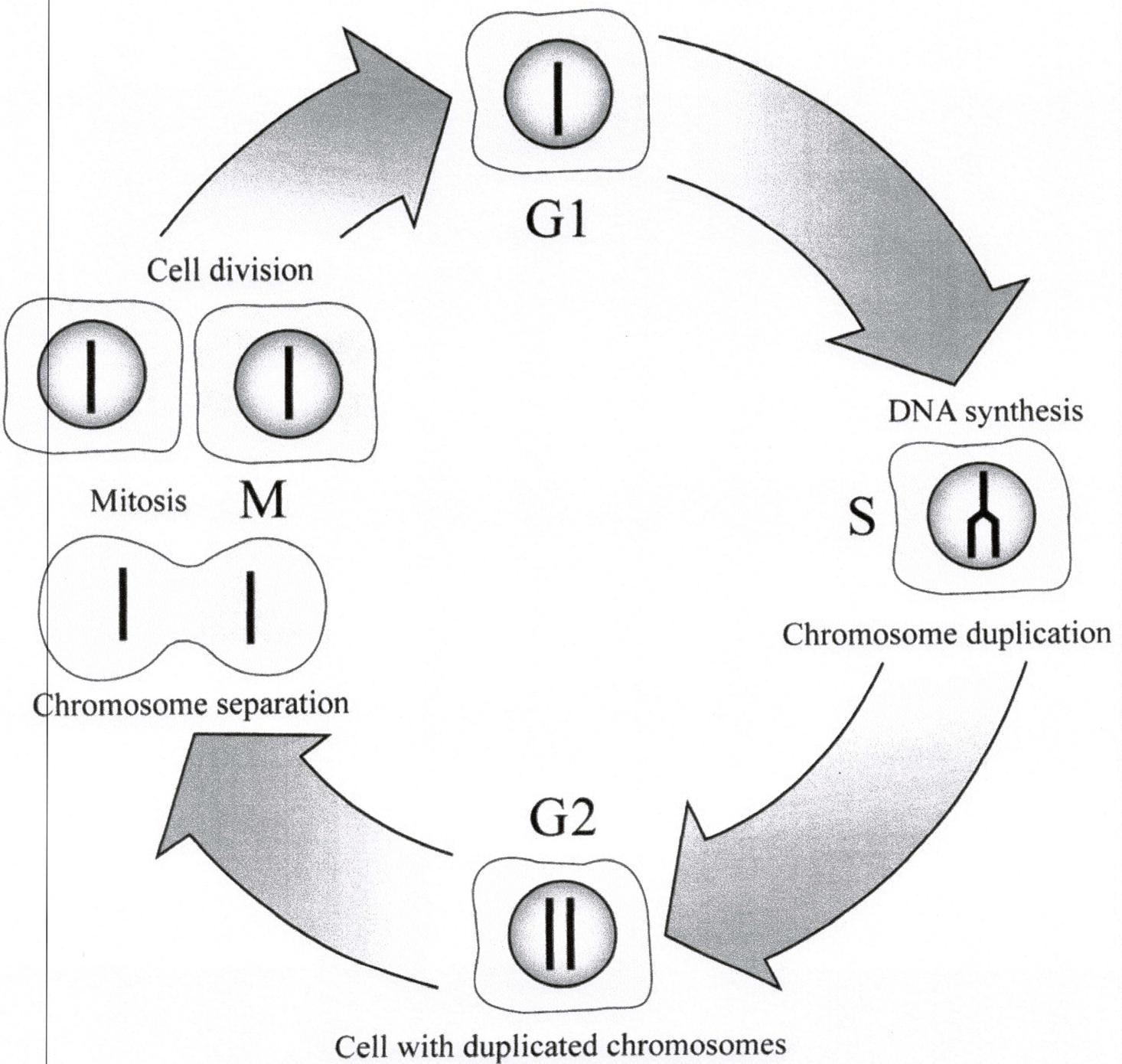
Generic	Brand	Route	Side Effects
CLASS: NATURAL PRODUCTS			
docetaxel	Taxotere	IV	asthenia, paresthesia, fluid retention, hypotension, chest tightness, stomatitis, NV, diarrhea, neutropenia, leukopenia, thrombocytopenia, back pain, dyspnea, pulmonary edema, alopecia, nail pigmentation, nail pain, rash
etoposide	VePesid, Toposar	IV, PO	peripheral neuropathy, hypotension, NV, anorexia, diarrhea, stomatitis, leukopenia, neutropenia, thrombocytopenia, hepatotoxicity, rash
paclitaxel	Taxol	IV	peripheral neuropathy, asthenia, bradycardia, hypotension, abnormal ECG, NV, diarrhea, mucostitis, neutropenia, leukopenia, thrombocytopenia, bleeding, arthralgia, myalgia
CLASS: ANTIBIOTIC ANTINEOPLASTICS			
daunorubicin HCL	Cerubidine	IV	irreversible cardiomyopathy, NV, diarrhea, stomatitis, red urine, bone marrow suppression, hepatotoxicity, hyperuricemia, skin darkening, skin peeling
epirubicin HCL	Ellence	IV	lethargy, cardiomyopathy, heart failure, conjunctivitis, keratitis, NV, diarrhea, anorexia, amenorrhea, red urine, leukopenia, neutropenia, thrombocytopenia, alopecia, rash, infection, hot flashes
mitomycin C	Mutamycin	IV	headache, confusion, drowsiness, fatigue, blurred vision, NV, anorexia, diarrhea, renal toxicity, thrombocytopenia, leukopenia, interstitial pneumonitis, pulmonary edema, dyspnea, pruritis, purple bands on nails
CLASS: HORMONES			
anastrozole	Arimidex	PO	headache, asthenia, dizziness, depression, paresthesia, chest pain, edema, pharyngitis, NV, diarrhea, constipation, abdominal pain, dry mouth, vaginal hemorrhage, vaginal dryness, pelvic pain, weight gain, bone pain, back pain, dyspnea, increased cough, alopecia, rash, sweating

ANTINEOPLASTIC DRUGS: CANCER CHEMOTHERAPEUTIC AGENTS

CLASS: HORMONES (continued)			
goserelin acetate	Zoladex	SC (implant)	lethargy, pain, dizziness, insomnia, anxiety, depression, headache, chills, edema, heart failure, arrhythmias, hypertension, MI, chest pain, vasodilation, NV, diarrhea, constipation, ulcer anorexia, sexual dysfunction, impotence, urinary obstruction, vaginitis UTI, amenorrhea, hypercalcemia, hyperglycemia, weight gain, back pain, COPD, infection, acne, rash
tamoxifen citrate	Novaldex	PO	confusion, weakness, headache, sleepiness, fluid retention, thromboembolism, cataracts, retinopathy, NV, diarrhea, vaginal discharge, vaginal bleeding, irregular menses, amenorrhea, leukopenia, thrombocytopenia, fatty liver, hepatic necrosis, weight +/-, rash

The Cell Cycle

Cell with chromosomes in the nucleus



Module 9 Antineoplastics

Dosage Calculations

1. Naproxen 750 mg is ordered for Mrs. Baron's rheumatoid arthritis.

Supply: Naproxen 250 mg/10mL

How much will you administer per dose?

2. M.D. orders potassium chloride 40mEq PO qd.

Supply: potassium chloride 10mEq/15mL

How much will you administer per dose?

3. Order: paroxetine HCL 20mg PO QD for depression.

Supply: paroxetine HCL 0.01g per 5mL

How much will the nurse administer per dose?

4. Little Timmy Tommyson needs paracetamol for his fever. Timmy weighs 25 Kg, the normal adult dose is 1,000mg.

What is a safe dose to administer to little Timmy Tommyson?

5. Keflex is ordered for an 8 year old girl weighing 75 pounds. The normal adult dose is 500mg.

How much can you safely administer?