

## Chemotherapy Medications

### Alkylating Agents

The oldest type of chemotherapy. They work by binding the DNA strands together so they cannot untwist and therefore cannot divide and replicate. They also release enzymes that destroy the cell. This type of drug can destroy bone marrow in the process, which can cause leukemia years later.

Used to treat leukemia, lymphoma, Hodgkin's disease, multiple myeloma, sarcoma, breast cancer, lung cancer, and ovarian cancers

Medicine	Types of cancers it treats	Side effects	Toxicities
Cyclophosphamide	Breast cancer, lymphoma and ovarian carcinoma. It is an oral chemotherapy drug but can also be given intravenously.	Nausea, vomiting, hair loss, fertility problems, lungs damage, heart problems, decreased blood cell count, etc. May cause hemorrhagic cystitis. Patients must take Mesna as well to protect the bladder.	Hemorrhagic cystitis, myelosuppression, nausea/vomiting
Ifosfamide	Testicular cancer, soft tissue sarcoma, osteosarcoma, bladder cancer, small cell lung cancer, cervical cancer, and ovarian cancer.	May cause hemorrhagic cystitis. Patients must take Mesna as well to protect the bladder.	Neurotoxicity, myelosuppression, nephrotoxicity, hemorrhagic cystitis
Melphalan			
Temozolomide			
Mustargen (mechlorethamine)			
Busulfex (busulfan)			Myelosuppression (bone marrow suppression) nausea/vomiting
Leukeran (chlorambucil)			Myelosuppression

Heavy Metal Compounds are a type of alkylating agent. They also inhibit DNA translation and replication. Platinum drugs such as these have a lower risk of causing leukemia:

Medicine	Types of cancers it treats	Side effects	Toxicities
Paraplatin (carboplatin)	Cancer of the head, neck, lung and ovary. It	Its possible side effects are hair loss, nausea, vomiting,	Myelosuppression

	is given intravenously.	diarrhea, confusion, decreased blood cell count, etc.	
Platinol (cisplatin)	Cancer of the testicles, bladder and ovary. It is given intravenously.	Its possible side effects are allergic reaction, decrease in blood cell count, ringing in ears, nausea, vomiting, kidney damage, etc. Renal and ototoxicity (ear toxicity).	Neurotoxicity, peripheral neuropathy, nephrotoxicity, ototoxicity, nausea/vomiting
Eloxatin (oxaliplatin)			Peripheral neuropathy, nausea and vomiting

## Antimetabolites

These work by inserting themselves into the DNA strand, making it defective, or by impeding the production of enzymes required for DNA and RNA replication and protein synthesis.

Used to treat leukemia, breast cancer, ovarian cancer, intestinal cancer

Medicine	Types of cancers it treats	Side effects	Toxicities
5-fluorouracil	Cancer of the breast, stomach, head, neck. It is also among the chemotherapy drugs for colon cancer. It is given intravenously.	Its common side effects are photo sensitivity, mouth ulcer, dry skin, diarrhea, decreased blood cell count, etc.	Mucositis, diarrhea, myelosuppression
6-mercaptopurine			
Cytarabine			Myelosuppression, hepatotoxicity, neurotoxicity, nausea/vomiting
Gemcitabine	Cancer of the breast, lungs and pancreas. It is among the chemotherapy drugs for ovarian cancer. It is given intravenously.	Its side effects are nausea, vomiting, fever, rash, decreased blood cell count, flu like symptoms etc.	Myelosuppression, hepatotoxicity, neurotoxicity, nausea/vomiting
Trexall (methotrexate)	Cancer of the lung, blood, bone, breast and lymph system. It can be given intravenously (IV), intrathecally (into the spinal column) or orally.	Its possible side effects are dizziness, headache, skin rash, photo sensitivity, nausea, vomiting, hair loss, kidney and liver damage, decreased blood cell count,	Mucositis, hepatotoxicity, myelosuppression, neurotoxicity, nephrotoxicity

		etc.	
Leustatin (cladribine)			Immunosuppression
Fludara (fludarabine)			Myelosuppression, immunosuppression

## Anthracycline chemotherapy (Antibiotics)

These drugs attack the enzymes inside cancer cells' DNA that help them divide and grow. They also can incorporate themselves into the DNA strand, preventing DNA and RNA synthesis.

These drugs can lead to the creation of free radicals.

Used to treat many types of cancer. High doses of anti-tumor antibiotics can damage your heart or lungs, so these are given in short timeframes. Side effect is cardiac toxicity, so Dexrazoxane is often prescribed as a cardioprotective agent.

Medicine	Types of cancers it treats	Side effects	Toxicities
Actinomycin-D			
Bleomycin			Dermal toxicities, reversible and nonreversible pulmonary fibrosis, nausea/vomiting
Daunorubicin			Myelosuppression, cardiotoxicity
Doxorubicin (Adriamycin)	Multiple myeloma, lymphoma and breast cancer. It is given intravenously.	Mouth ulcer, nausea, vomiting, hair loss, heart damage, decreased blood cell count, etc are some of the side effects of this drug.	Doxorubicin is the most common chemotherapy drug to cause significant cardiotoxicity. It can lead to cardiomyopathy with heart failure. Alopecia
Epirubicin			Myelosuppression, cardiotoxicity
Idarubicin			Myelosuppression, cardiotoxicity
Mithracin (plicamycin)			

## Plant Alkaloids/Mitotic inhibitors

Plant Alkaloid agents, nitrogen based. These stop cell division by interfering with the formation of the mitotic spindle during mitosis. They can also stop your body from making the proteins that cancer cells need to grow.

Used to treat breast cancer, lung cancer, myeloma, leukemia, and lymphoma

Medicine	Types of cancers it treats	Side effects	Toxicities
Actinomycin-D			
Bleomycin			Dermal toxicities, reversible and nonreversible pulmonary fibrosis, nausea/vomiting
Daunorubicin			Myelosuppression, cardiotoxicity
Doxorubicin (Adriamycin)	Multiple myeloma, lymphoma and breast cancer. It is given intravenously.	Mouth ulcer, nausea, vomiting, hair loss, heart damage, decreased blood cell count, etc are some of the side effects of this drug.	Doxorubicin is the most common chemotherapy drug to cause significant cardiotoxicity. It can lead to cardiomyopathy with heart failure. Alopecia
Epirubicin			Myelosuppression, cardiotoxicity
Idarubicin			Myelosuppression, cardiotoxicity
Mithracin (plicamycin)			

## Biologic Response Modifier Agents

These help the body's own ability to respond to neoplasms. These help facilitate the patient's immune response, so they are not cytotoxic.

Used to treat leukemia, breast cancer, ovarian cancer, intestine cancer

Medicine	Types of cancers it treats	Side effects	Toxicities
Proleukin (aldesleukin)			
Avastin (bevacizumab)			Hypertension, bleeding, thrombotic events
Intron-A (interferon alfa-2b)			Flu-like symptoms, depression, anxiety, myelosuppression

## Topoisomerase Inhibitors

These drugs attack the enzymes inside cancer cells' DNA that help them divide and grow.

Some may raise your odds of getting a second cancer later in life.

Used to treat some types of leukemia, lung cancer, ovarian cancer, intestinal cancer, etc.

Medicine	Types of cancers it treats	Side effects	Toxicities
Etoposide (VePesid)	Cancers of the testicles, lung, leukemia and lymphoma. It can be given intravenously or orally.	Its side effects may be hair loss, nausea, vomiting, allergic reactions, low blood pressure, decreased appetite, decreased blood cell count, mouth ulcer, symptoms of flu, etc.	
Irinotecan			
Teniposide			
Topotecan			

## Hormones

Used to lessen the growth of certain hormone-dependent cancers

Medicine	Types of cancers it treats	Side effects	Toxicities
Nolvadex (tamoxifen citrate)			
Lupron (leuprolide acetate)			
Casodex (bicalutamide)			

## Steroids

These act like your body's own hormones. They treat cancer as well as help prevent nausea and vomiting after a round of chemo. They can also prevent allergic reactions to some drugs.

Medicine	Types of cancers it treats	Side effects	Toxicities
Prednisone			
Methylprednisolone			
Dexamethasone			

## Resources

1. Goodman, C; Fuller, Kenda. Pathology: Implications for the Physical Therapist. Elsevier Saunders. St Louis, MO. 2015.
2. Giles, S. PT Exam. Scorebuilders. 2018.
3. Chemotherapy Drugs and Drugs often Used During Chemotherapy. Cleveland Clinic Cancer. <https://www.chemocare.com/chemotherapy/drug-info/default.aspx> 2020.
4. The Ultimate Guide to Oncology Pharmacy for the Non-Oncologist. Brandon Dyson <https://www.tldrpharmacy.com/content/the-ultimate-guide-to-oncology-pharmacy-for-the-non-oncologist> 2020.
5. Common Chemotherapy Drugs. <https://healthhearty.com/common-chemotherapy-drugs> 2020.
6. Chemotherapy: How the Drugs That Treat Cancer Work. <https://www.webmd.com/cancer/facing-chemotherapy-17/ready/how-chemo-works> 2020.
7. These Common Breast Cancer Medications Have Surprisingly Dangerous Side Effects. Sheiresa Ngo. <https://www.cheatsheet.com/health-fitness/common-breast-cancer-medications-surprisingly-dangerous-side-effects.html/> 2020.