

Class	Chemo drug	Mechanism	Toxicity & side effects	Resisitance	Metabolism	Indication	Related drugs
DNA damaging agents (cycle-specific)	Mechlorethamine	Nitrogen mustard (DNA alkylator) Mono-adducts & crosslinks	Bone marrow (nadir 2-3 wks) Extravasation injury	Increased repair Increased scavengers Decreased uptake	Rapid via decomposition or metabolism	HD NHL	
	Cyclophosphamide (cytoxan, CTX)	Nitrogen mustard (DNA alkylator) Mono-adducts & crosslinks Activated by <i>P450</i>	Bone marrow (nadir 2-3 wks) <i>Hemorrhagic cystitis (acrolein in bladder)</i>	Same	Same	Lymphoma Breast cancer Marrow ablation	Ifosfamide: take w/ MESNA for hemor cystitis
	Nitrosureas (BCNU, CCNU)	DNA alkylator Mono-adducts & crosslinks	Bone marrow (nadir 4-6 wks)	Same	Same	<i>CNS tumors</i> (crosses BBB)	
	Cis-platinum	Not an DNA alkylator Mono-adducts & crosslinks	Renal Nausea & vomiting <i>No bone marrow</i>		Renal	Germ cell cancers (testicular, ovarian)	Carboplatin: marrow toxicity
Anti-metabolites (S phase)	Methotrexate (MTX)	Folate analog DHFR inhibition (reversible), decreasing dTMP Increased uracil in RNA	Marrow Renal GI mucositis <i>Ascites, pleural effusion</i>	Increased DHFR Altered DHFR Decreased uptake <i>Decreased polyglutamylation</i>	Renal	ALL NHL Osteosarcoma	<i>Leukovorin</i> : reduced folate for normal cells
	Flyorouracil (FU) 5-fluoro-deoxyuridine (FdUrd)	Uracil analog TS inhibition (via FdUMP-TS-reduced folate, irreversible) RNA synthesis inhibition via FUTP (FU only)	Marrow (bolus) Mucositis ( continuous infusion) Biliary sclerosis (hepatic infusion) Hand-foot syndrome (capecitabine)	Decreased anabolism Increased TS	Rapid metabolic (saturable)	Solid tumors (colorectal, hepatic, breast)	<i>Leukovorin</i> : for ternary complex Oral: ftorafur, ethnyluracil, capecitabine
	Cytosine arabinoside (Ara-C)	Cytosine analog <i>Anabolism to Ara-CTP</i> DNA incorporation DNA chain elong termination DNA polymerase inhibition	Bone marrow	Decreased anabolism Increased degradation	Rapid metabolic	AML	
	Gemcitabine	Cytosine analog <i>Anabolism to dFd-CTP</i> DNA incorporation RNA reductase inhibition	Bone marrow Flu-like symptoms (take tylenol)	Unclear		Pancreatic cancer Non-small cell lung cancer (w/ cis-plat) <i>Radiation sensitizer</i>	
	6-Mercaptopurine (6-MP) 6-Thioguanine (6-TG)	Purine analog Anabolism via phosphorylation DNA & RNA incorporation Purine synthesis inhibition	Bone marrow <i>Hyperuricemia (tumor lysis syndrome)</i>	Decreased anabolism Increased degradative enzymes		Acute leukemia	Allopurinol: inhibits uric acid production, potentiates 6-MP
	Natural products	Vinca alkaloids	Microtubule destabilization	Vincristine: neuropathy Vinblastin: bone marrow Vinorelbine: bone marrow	MDR	Hepatic metab Biliary excret	Bunch
Paclitaxel (taxanes)		Microtubule stabilization	Neutropenia <i>Hypersensitivity (from cremaphor)</i>	MDR	Hepatic		Cremophor EL vehicle (absorp) Docetaxel
Etoposide (VP-16) Teniposide (VM-26)		Binds transient cleavable complex formed by <i>topoisomerase II</i> , causing ds-DNA breaks	Bone marrow	MDR	Renal	Bunch	
Anthracyclines (doxorubicin or adriamycin)		<i>Topoisomerase II inhibition</i> Oxygen free radical generation DNA intercalation Changes in membrane fluidity	<i>Cardiomyopathy</i> Bone marrow Extravasation injury Cardiac arrythmia <i>Red urine</i>	MDR	Hepatic metab Biliary excret	Leukemia Solid tumors	
Topotecan		Topoisomerase I inhibition (ss-DNA break)	Bone marrow	MDR	Renal	Ovarian cancer (refractory)	
Irinotecan		Topoisomerase I inhibition (ss-DNA break)	<i>Parasympathomimetic syndrome</i> (salivation, nausea, diarrhea)	MDR	Biliary (SN-38)	Colorectal cancer (refractory)	
Bleomycin		Binds DNA, chelates iron and creates free radicals, causing DNA strand breaks	<i>Pulmonary fibrosis</i> <i>Anaphylaxis (5%)</i> <i>No bone marrow</i>	MDR	Renal	Resticular Head & neck cancers Lymphoma	