* Cancer Chemotherapy is use of drugs in cancer management.
* Since neoplastic(cancer) cells resemble to normal cells in many respect; drugs used to kill tumor cells, MAY ALSO KILL NORMAL CELLS.
* Since most anti-cancer agents act on RAPIDLY-DIVIDING CELLS, normal cells with QUICK TURNOVER are most susceptible to toxicity lead to side- effects like: a. Bone marrow suppression b. Alopecia c. Mucositis, etc.
* Newer drugs target “specific steps in cell cycle” devoid of above adverse effects.
* Anti-cancer agents are classified into the following headings: A. ALKYLATING AGENTS B. PLATINUM COMPOUNDS C. ANTI-METABOLITES D. NATURAL PRODUCTS E. HORMONES & RELATED AGENTS.
* As we know, there are 4 phases of cell-cycle: a. G1 Phase b. S Phase c. G2 Phase d. M phase. Anti-cancer agents act on different stages of cell-cycle.
* **ALKYLATING AGENTS**

Alkylating agents are classified as:

A. NITROGEN MUSTARDS(Mechlorethamine, cyclophosphamide, ifosfamide, melphalan, chlorambucil)

B. ETHYLENIMINES(Thio-TEPA, Hexamethylmelamine(altretamine)

C. ALKYL SULFONATES(Busulfan)

D. NITROSOUREAS(Carmustine, lomustine, streptozocin)

E. TRIAZINES(Procarbazine, dacarbazine, temozolomide)

All alkylating agents & related drugs (procarbazine, dacarbazine & platinum compounds) are CCNS drugs thus, they act on resting, as well as dividing cells Drugs alkylate nucleophilic groups on DNA bases(N7 of guanine) leads to: a. Cross-linkage of bases b. Abnormal base-pairing c. DNA-strand breakage.

Major ADRs include: a. GI distress. b. Bone marrow suppression c. Alopecia d. Secondary leukemiase. Sterility

* **PLATINUM COMPOUNDS**

Include CISPLATIN, CARBOPLATIN & OXALIPLATIN

Although they are not ‘alkylating agents’ they possess similar MOA as that of alkylating agents. Only difference is that platinum compounds use “PLATINUM” instead of “ALKYL GROUP” to form DNA dimers.

ADRs: They are the drugs that cause MAXIMUM EMESIS issues! Other effects of platinum compounds include: a. Mild bone marrow toxicity b. Ototoxicity c. Neurotoxicity d. Nephrotoxicity • CISPLATIN is most nephrotoxic • CARBOPLATIN is most HEMOTOXIC(causes maximum bone marrow toxicity)

* **ANTI-METABOLITES**

ANTI-METABOLITES are classified as: A. PYRIMIDINE ANALOGS: 5-FU, Cytarabine, Gemcitabine B. PURINE ANALOGS: 6-MP, 6-thioguanine, pentostatin, cladribine C. FOLIC ACID ANALOGS: MTX, Pemetrexed, Pralatrexate.

Since these drugs act in the S-PHASE of cell-cycle they are CCS DRUGS, meaning that they act ONLY AGAINST DIVIDING CELLS!

Possess IMMUNOSUPPPRESSIVE properties, other than that of ANTINEOPLASTIC EFFECTS

* **MITOTIC SPINDLE INHIBITORS**

Include:

A. VINCA ALKALOIDS(Vincristine, vinblastine, vinorelbine)

VINCA ALKALOIDS: - Drugs inhibit formation of mitotic spindle ◊ inhibit microtubule polymerization - Effective in M-phase of cell-cycle - Can cause SIADH - Vinblastine causes bone marrow toxicity - Although vincristine is “marrow-sparing” it can cause “neurotoxicity” (peripheral neuropathy)

B. TAXANES(Paclitaxel, docetaxel, cabazitaxel) and other compounds

PACLITAXEL &DOCETAXEL prevent disassembly of microtubules ◊ interfere with mitotic spindle formation - Paclitaxel causes hypersensitivity reactions - Docetaxe is devoid of above adverse effect - Since paclitaxel has risks of hypersensitivity reactions protein-bound paclitaxel(Nab-paclitaxel) is used - Both paclitaxel & docetaxel can cause bone marrow& neurotoxicity

* **TOPOISOMERASE INHIBITORS**

Includes: A. CAMPTOTHECINS: Irinotecan, topotecan

B. EPIPODOPHYLLOTOXINS: Etoposide, teniposide

C. ANTITUMOR ANTIBIOTICS: Doxorubicin, daunorubicin, mitoxantrone, epirubicin, dactinomycin, bleomycin, mitomycin.