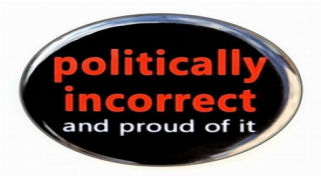


Etienne van Rattingen

A lie doesn't become truth, wrong doesn't become right and evil doesn't become good just because it's accepted by a majority. — *Rick Warren*

Chemo is destroying DNA

And, they know it

Dear

Please read thoroughly below. I wish u may find your answer

Different types of chemotherapy drugs

Chemotherapy drugs can be divided into several groups based on factors such as how they work, their chemical structure, and their relationship to another drug. Because some drugs act in more than one way, they may belong to more than one group.

Knowing how the drug works is important in predicting side effects. This helps oncologists decide which drugs are likely to work well together. If more than one drug will be used, this information also helps them plan exactly when each of the drugs should be given (in which order and how often).

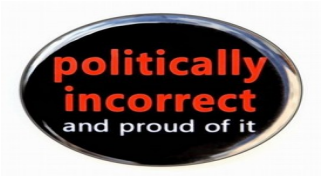
Alkylating agents

Alkylating agents directly damage DNA to prevent the cancer cell from reproducing. As a class of drugs, these agents are not phase-specific; in other words, they work in all phases of the cell cycle. Alkylating agents are used to treat many different cancers, including leukemia, lymphoma, Hodgkin disease, multiple myeloma, and sarcoma, as well as cancers of the lung, breast, and ovary.

Because these drugs damage DNA, they can cause long-term damage to the bone marrow. In rare cases, this can eventually lead to acute leukemia. The risk of leukemia from alkylating agents is "dose-dependent," meaning that the risk is small with lower doses, but goes up as the total amount of the drug used gets higher. The risk of leukemia after getting alkylating agents is highest about 5 to 10 years after treatment.

There are different classes of alkylating agents, including:

• Nitrogen mustards: such as mechlorethamine (nitrogen mustard), chlorambucil, cyclophosphamide (Cytoxan®), ifosfamide, and melphalan



Etienne van Rattingen

• Nitrosoureas: which include streptozocin, carmustine (BCNU), and lomustine

• Alkyl sulfonates: busulfan

• Triazines: dacarbazine (DTIC) and temozolomide (Temodar®)

• Ethylenimines: thiotepa and altretamine (hexamethylmelamine)

The platinum drugs (cisplatin, carboplatin, and oxalaplatin) are sometimes grouped with alkylating agents because they kill cells in a similar way. These drugs are less likely than the alkylating agents to cause leukemia later on.

Antimetabolites

Antimetabolites are a class of drugs that interfere with DNA and RNA growth by substituting for the normal building blocks of RNA and DNA. These agents damage cells during the S phase. They are commonly used to treat leukemias, cancers of the breast, ovary, and the intestinal tract, as well as other types of cancer.

Examples of antimetabolites include:

• 5-fluorouracil (5-FU) 6-mercaptopurine (6-MP)

• Capecitabine (Xeloda®) Cladribine Clofarabine

• Cytarabine (Ara-C®) Floxuridine Fludarabine

• Gemcitabine (Gemzar®) Hydroxyurea Methotrexate

• Pemetrexed (Alimta®) Pentostatin Thioguanine

Anti-tumor antibiotics

Anthracyclines

Anthracyclines are anti-tumor antibiotics that interfere with enzymes involved in DNA replication. These drugs work in all phases of the cell cycle. They are widely used for a variety of cancers. A major consideration when giving these drugs is that they can permanently damage the heart if given in high doses. For this reason, lifetime dose limits are often placed on these drugs.

Examples of anthracyclines include:

• Daunorubicin Doxorubicin (Adriamycin®) Epirubicin Idarubicin

Other anti-tumor antibiotics

Anti-tumor antibiotics that are not anthracyclines include:

• Actinomycin-D Bleomycin Mitomycin-C

Mitoxantrone is an anti-tumor antibiotic that is similar to doxorubicin in many ways, including the potential for damaging the heart. This drug also acts as a topoisomerase II inhibitor (see below), and can lead to treatment-related leukemia. Mitoxantrone is used to treat prostate cancer, breast cancer, lymphoma, and leukemia.

Topoisomerase inhibitors

These drugs interfere with enzymes called topoisomerases, which help separate the strands of DNA so they can be copied. They are used to treat certain leukemias, as well as lung, ovarian, gastrointestinal, and other cancers.

Examples of topoisomerase I inhibitors include topotecan and irinotecan (CPT-11).

Examples of topoisomerase II inhibitors include etoposide (VP-16) and teniposide. Mitoxantrone also inhibits topoisomerase II.

Treatment with topoisomerase II inhibitors increases the risk of a second cancer — acute myelogenous leukemia (AML). With this type of drug, a secondary leukemia can be seen as early as 2 to 3 years after the drug is given.

Mitotic inhibitors

Mitotic inhibitors are often plant alkaloids and other compounds derived from natural products. They can stop mitosis or inhibit enzymes from making proteins needed for cell reproduction.

These drugs work during the M phase of the cell cycle but can damage cells in all phases. They are used to treat many different types of cancer including breast, lung, myelomas, lymphomas, and leukemias. These drugs are known for their potential to cause peripheral nerve damage, which can be a dose-limiting side effect.

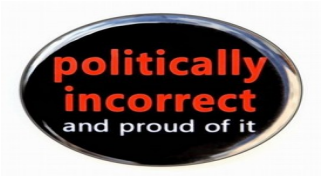
Examples of mitotic inhibitors include:

• Taxanes: paclitaxel (Taxol®) and docetaxel (Taxotere®)

• Epothilones: ixabepilone (Ixempra®)

• Vinca alkaloids: vinblastine (Velban®), vincristine (Oncovin®), and vinorelbine (Navelbine®)

• Estramustine (Emcyt®)



Etienne van Rattingen

Corticosteroids

Steroids are natural hormones and hormone-like drugs that are useful in treating some types of cancer (lymphoma, leukemias, and multiple myeloma), as well as other illnesses. **When these drugs are used to kill cancer cells or slow their growth, they are considered chemotherapy drugs.**

Corticosteroids are also commonly used as anti-emetics to help prevent nausea and vomiting caused by chemotherapy. They are used before chemotherapy to help prevent severe allergic reactions (hypersensitivity reactions), too. When a corticosteroid is used to prevent vomiting or allergic reactions, it's not considered chemotherapy.

Examples include prednisone, methylprednisolone (Solumedrol®), and dexamethasone (Decadron®).

Miscellaneous chemotherapy drugs

Some chemotherapy drugs act in slightly different ways and do not fit well into any of the other categories.

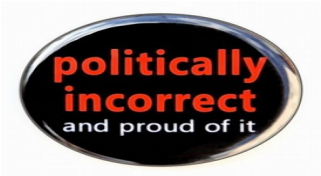
Examples include drugs like L-asparaginase, which is an enzyme, and the proteosome inhibitor bortezomib (Velcade®).

Other types of cancer drugs

Other drugs and biological treatments are used to treat cancer, but are not usually considered chemotherapy. **While chemotherapy drugs take advantage of the fact that cancer cells divide rapidly**, these other drugs target different properties that set cancer cells apart from normal cells. They often have less serious side effects than those commonly caused by chemotherapy drugs because they are targeted to work mainly on cancer cells, not normal, healthy cells. Many are used along with chemotherapy.

Targeted therapies

As researchers have learned more about the inner workings of cancer cells, they have begun to create new drugs that attack cancer cells more specifically than traditional chemotherapy drugs. Most attack cells with mutant versions of certain genes, or cells that express too many copies of a particular gene. These drugs can be used as part of the main treatment, or they may be used after treatment to maintain remission or decrease the chance of recurrence.



Etienne van Rattingen

Examples of targeted therapies include imatinib (Gleevec®), gefitinib (Iressa®), sunitinib (Sutent®) and bortezomib (Velcade®). Targeted therapies are a huge research focus and probably many more will be developed in the future.

Differentiating agents

These drugs act on the cancer cells to make them mature into normal cells. Examples include the retinoids, tretinoin (ATRA or Atralin®) and bexarotene (Targretin®), as well as arsenic trioxide (Arsenox®).

Hormone therapy

Drugs in this category are sex hormones, or hormone-like drugs, that change the action or production of female or male hormones. They are used to slow the growth of breast, prostate, and endometrial (uterine) cancers, which normally grow in response to natural hormones in the body. These cancer treatment hormones do not work in the same ways as standard chemotherapy drugs, but rather by preventing the cancer cell from using the hormone it needs to grow, or by preventing the body from making the hormones.

Examples include:

• The anti-estrogens: fulvestrant (Faslodex®), tamoxifen, and toremifene (Fareston®)

• Aromatase inhibitors: anastrozole (Arimidex®), exemestane (Aromasin®), and letrozole (Femara®)

• Progestins:megestrol acetate (Megace®)

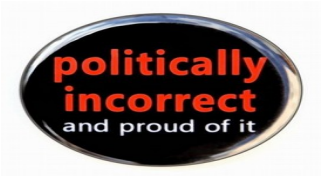
• Estrogens

• Anti-androgens: bicalutamide (Casodex®), flutamide (Eulexin®), and nilutamide (Nilandron®)

• Gonadotropin-releasing hormone (GnRH), also known as luteinizing hormone-releasing hormone (LHRH) agonists or analogs: leuprolide (Lupron®) and goserelin (Zoladex®)

Immunotherapy

Some drugs are given to people with cancer to stimulate their natural immune systems to recognize and attack cancer cells. These drugs offer a unique method of treatment, and are often considered to be separate from chemotherapy. Compared with other forms of cancer treatment such as surgery, radiation therapy, or chemotherapy, immunotherapy is still fairly new.



Etienne van Rattingen

There are different types of immunotherapy. Active immunotherapies stimulate the body's own immune system to fight the disease. Passive immunotherapies do not rely on the body to attack the disease; instead, they use immune system components (such as antibodies) created outside the body.

Types of immunotherapies and some examples include:

• Monoclonal antibody therapy (passive immunotherapies), such as rituximab (Rituxan®) and alemtuzumab (Campath®)

• Non-specific immunotherapies and adjuvants (other substances or cells that boost the immune response), such as BCG, interleukin-2 (IL-2), and interferon-alfa

• Immunomodulating drugs, for instance, thalidomide and lenalidomide (Revlimid®)

Sibtain Afzal

King Saud University

Dear

Most of chemotherapy types change DNA structure by indirect ways such as inhibition of DNA repairing enzymes or switch off others.

I suggest that you have to detect your interested cancer kind then look for its available chemotherapy drugs as well as their mechanisms.

For example, Cytarabine, which is a chemo for acute myeloid leukaemia, **stops DNA repairing.**

Therefore, DNA structure effected by increasing of mutations. I hope this will help you.

Mohammed Ibrahim Alasseiri

University of Tabuk