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Antineoplastic drugs and chemotherapy- A review

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Abstract
Antineoplastic chemotherapy drugs are type of medication that doctors use to treat cancer. Doctors recommend the drugs according to type and stage of cancer, the potential risk and other treatment they have received for other factors. Many different types of chemotherapy or chemo drugs are used to treat cancer-either alone or in combination with other drugs or treatment. This type of article explores the different types of Antineoplastic drugs, their uses, side effects and risks, efficacy and alternatives.

Keywords: chemotherapy, cancer, antineoplastic

Introduction

Every time any new cell is formed it goes through usual process to become fully mature cells. The process involves in series of phases and is called the cell cycle. Chemotherapy drugs target at different phases of cell cycle. Cancer cells tend to form new cells more quickly than normal cells and this make them a better target for chemotherapy drugs.

Chemo drugs cannot tell difference between healthy and cancer cells. It means that normal cells are damage with cancer cells and cause side effects.

Nowadays most normal cells will recover from the effects of chemo. But cancer cells are mutated and they usually do not recover from effect of chemo.

Classification of antineoplastic drugs

1. Alkylating agents

- Alkylating drugs act directly on cell DNA. They damage DNA to prevent cells from multiplying. These drugs work in all phases of cell cycle.
- They are used to treat much different cancer such as, lung, breast and ovary as well as leukemia, sarcoma.
- Because these drugs damage DNA, they can affect the cells of the bone marrow which make new blood cells.

Examples of alkylating agents

- Busulfan
- Lomustine
- Carmustin
- Chlorambucil
- Melphalan
- Altretamine
- Oxaliplatin
- Temozolomide
- thiotepa

2. Antimetabolites

- This is types of drugs that inhibit the enzyme production necessary for DNA and RNA synthesis.
- When this happened the DNA cannot make copies of itself and cell cannot reproduces. They affect DNA synthesis and therefore interfere with cell division and tumor growth.
- They are commonly used to treat leukemia's cancers of breast ovary and intestinal tract.

Antimetabolites include three types of drugs

1. Antifolate => methotrexate, pralatrexate
2. Purine analogs => azathioprine, fludarabine
3. Pyrimidine analogs => 5- Fluroracil, cytarabine

Examples of Antimetabolites include

- 5-fluroracil
- 6-mercaptopurine
- Methotrexate
- pentostatin
- pralatrexate
- capecitabine
- cladribine
- decitabine

3. Topoisomerase inhibitors

- These drugs are also called as plant alkaloids. They interfere with enzyme called topoisimerase which help to separate the DNA strand so they can be copied.
- They are used to treat certain leukemia as well as lung ovaries Gastrointestinal and pancreatic cancer.
- Topoisomerase are grouped according to type of enzyme they affects

3.1 Topoisomerase I inhibitor also called camptothecins

- Irinotecan
- Irinotecan liposomal
- Topotecan

3.2 Topoisomerase II Inhibitors

- Etoposide
- Mitoxantrone
- Teniposide

4. Mitotic inhibitors

- Mitotic inhibitors are also called Plant alkaloids. They are compound derived from natural products, such as plants.
- They work by stopping cell from dividing to form new cells, but can damage cells in all phases.

Examples of mitotic inhibitors

1. Taxenes

- Cabazitaxel
- Docetaxel
- Paclitaxel

2. Vinca alkaloids

- Vincristine
- Vinblastine
- Vincristine liposomal

4.2 USES

- Antineoplastic chemotherapy drugs target cancerous cells by attacking the life cycle of a cell.
- Cell goes to different phases as they grow and multiply.
- In some of the cases these drugs may be main form of treatment. These drugs can

Treat

- Hodgkin lymphoma
- Burkett's lymphoma
- Leukemia
- Small lung cancer cells
- Testicular cancer

Doctors recommend different therapies or combination of treatment with chemotherapy such as

1. **Primary chemotherapy**
   When chemotherapy forms the main treatment for cancer.

2. **Combination therapy**
   When chemotherapy combines with other therapies to form cancer treatment.

3. **Adjuvant chemotherapy**

A person receives adjuvant chemotherapy after primary treatment.

4. **Non adjuvant chemotherapy**

When doctors use chemotherapy to shrink cancer before using other treatment.

Side effects and risks

As chemotherapy cannot distinguish between cancerous cell and healthy cells, they can attack others cells in body. This can lead to several side effects.

Side effects can include

- Bone marrow suppression
- Anemia
- Hair loss
- Nausea, vomiting
- Loss of appetite
- Diarrhea and constipation
- Dry mouth
- Change in mood
- Nerve damage
- Taste changes
- Mouth sores
- Allergic reaction

Long term effects from antineoplastic drugs include

- Damage of bone marrow
- Liver and kidney damage
- Damage to lungs
- Damage and risk for heart
- Temporary or permanent infertility
- Hearing impairment

How effective they are

- The efficacy of chemotherapy drugs will depend on type and stage of person's cancer.
- Chemotherapy drugs are generally effective but exact effectiveness is difficult to determine.
- Person's overall health may also play a role in the treatment effective.
- Those-person who are healthier respond better to chemotherapy treatment.

Alternatives

If person does not wish to undergo chemotherapy doctors may recommend alternatives such as

- Immunotherapy
- Targeted therapy
- Hormone therapy
- Radiation therapy
- Laser therapy
- Photodynamic therapy

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Conclusion

Doctors recommend antineoplastic chemotherapy drugs alone or in combination with other therapies to treat cancer exact treatment will vary in each case, but some people may require week or even months of chemotherapy.

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