Classification of Chemotherapeutic drugs

Chemotherapy drugs are usually divided into several classes. Different types of drugs in each class are grouped based on their action, structure or source. Some drugs seem to fit into more than one class. Others don't fit into any class.

Alkylating drugs

The category name indicates the drug's action. Alkylating drugs affect cells so the DNA isn't copied, or replicated, properly. Cancer cells are more sensitive to DNA damage because they reproduce quickly, which means they don't have time to repair the damaged DNA.

Most alkylating drugs are cell cycle–specific drugs, but not phase-specific drugs. Some are cell cycle–non-specific.

Antimetabolites

The category name indicates the drug's action. Antimetabolites act as a substitute for the metabolites that are used in normal metabolism. Antimetabolites affect cancer cells more than normal cells because cancer cells divide more quickly.

Antimetabolites are cell cycle–specific. Many are also phase-specific.

Natural products

The category name reflects the source of the drug.

Most antibiotics, or anthracyclines, are made from bacteria. They don't act in the same way as antibiotics used to treat infection. Some antibiotics are covered in a fatty coating and they are called liposomal therapy.

Mitotic inhibitors are another type of natural product. They interfere with mitosis, or cell division. Some mitotic inhibitors are developed from the periwinkle plant.

Taxanes also interfere with mitosis. They are developed from certain types of yew trees.

Topoisomerase inhibitors are made from a Chinese tree These drugs interfere with certain enzymes A protein that speeds up certain chemical reactions in the body., which affects the growth of cancer cells or makes them die.

Miscellaneous

The drugs in this category are grouped together because they don't fit easily into other categories.

Targeted Therapy

Targeted therapy is the foundation of precision medicine. It is a type of cancer treatment that targets the changes in cancer cells that help them grow, divide, and spread. As researchers

learn more about the cell changes that drive cancer, they are better able to design promising therapies that target these changes or block their effects.

Types of Targeted Therapy

Most targeted therapies are either small-molecule drugs or monoclonal antibodies.

Small-molecule drugs are small enough to enter cells easily, so they are used for targets that are inside cells.

Monoclonal antibodies are drugs that are not able to enter cells easily. Instead, they attach to specific targets on the outer surface of cancer cells.

How Targeted Therapy Works Against Cancer

Most targeted therapies help treat cancer by interfering with specific proteins that help tumors grow and spread throughout the body. They treat cancer in many different ways. They can:

- **Help the immune system destroy cancer cells.** One reason that cancer cells thrive is because they are able to hide from your immune system. Certain targeted therapies can mark cancer cells so it is easier for the immune system to find and destroy them. Other targeted therapies help boost your immune system to work better against cancer.
- **Stop cancer cells from growing.** Healthy cells in your body usually divide to make new cells only when they receive strong signals to do so. These signals bind to proteins on the cell surface, telling the cells to divide. This process helps new cells form only as your body needs them. But, some cancer cells have changes in the proteins on their surface that tell them to divide whether or not signals are present. Some targeted therapies interfere with these proteins, preventing them from telling the cells to divide. This process helps slow cancer's uncontrolled growth.
- **Stop signals that help form blood vessels.** Tumors need to form new blood vessels to grow beyond a certain size. These new blood vessels form in response to signals from the tumor. Some targeted therapies are designed to interfere with these signals to prevent a blood supply from forming. Without a blood supply, tumors stay small. Or, if a tumor already has a blood supply, these treatments can cause blood vessels to die, which causes the tumor to shrink.
- **Deliver cell-killing substances to cancer cells.** Some monoclonal antibodies are combined with toxins, chemotherapy drugs, and radiation. Once these monoclonal antibodies attach to targets on the surface of cancer cells, the cells take up the cell-killing substances, causing them to die. Cells that don't have the target will not be harmed.
- **Cause cancer cell death.** Healthy cells die in an orderly manner when they become damaged or are no longer needed. But, cancer cells have ways of avoiding this dying process. Some targeted therapies can cause cancer cells to go through this process of cell death.
- **Starve cancer of the hormones it needs to grow.** Some breast and prostate cancers require certain hormones to grow. Hormone therapies are a type of targeted therapy that can work

in two ways. Some hormone therapies prevent your body from making specific hormones. Others prevent the hormones from acting on your cells, including cancer cells.