



Chemotherapy

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Objectives:

At the end of this learning session, the participants will be able to:

- ❖ explain what chemotherapy is.
- ❖ discuss the action of chemotherapy according to its classification.
- ❖ explain basic principles in chemotherapy preparation and administration
- ❖ discuss the nursing responsibilities during chemotherapy administration

What is Chemotherapy?

It is the use of any drug to treat any disease. But to most people, the word chemotherapy means drugs used for cancer treatment. It's often shortened to "chemo."

(American Cancer Society , 2016)



It is the use of **chemical agents** in the treatment or control of disease (as cancer) or mental illness (Merriam-Webster, 2016)

drug treatment that uses **powerful chemicals** to kill fast-growing cells in your body (*Mayo Clinic , 2016*)

Palliation

Cure

Control

Prevention

**Goals of
Treatment**

When is Chemotherapy used?

A. Before surgery

(neoadjuvant chemotherapy)

It is used to try to shrink the tumor so it can be removed with less extensive surgery

Advantages:

- 1) By giving chemo before tumor removal, doctors can evaluate how the cancer responds to treatment and can make treatment changes as needed.
- 2) It can kill cancer cells that might have already spread but cannot be seen.
- 3) It can lower the risk of cancer recurrence.

When is Chemotherapy used?

B. After surgery

(adjuvant chemotherapy)

It is used to try to kill cancer cells that might have been left behind when tumor was removed or those that might have spread but cannot be seen.

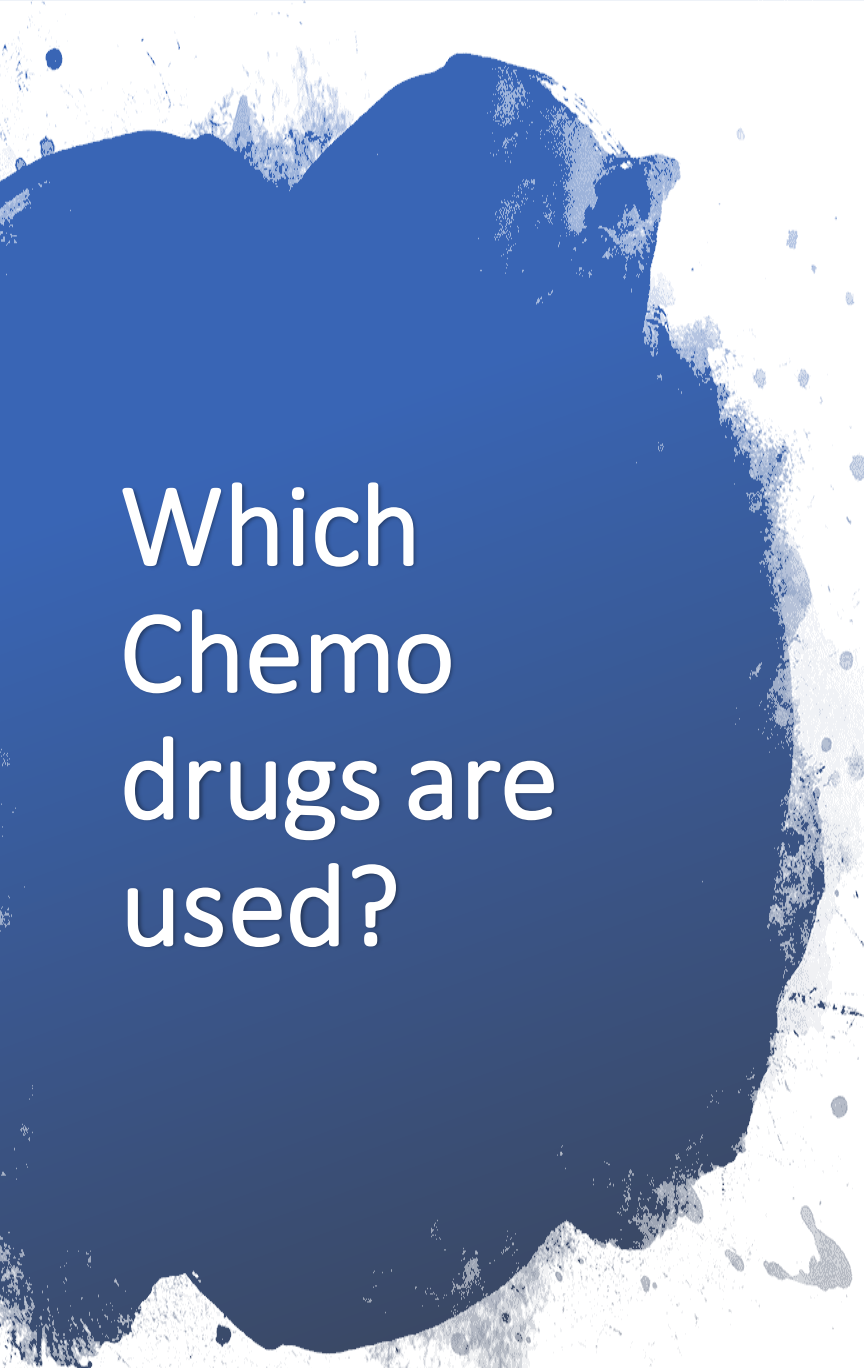
Advantages:

- 1) It can prevent formation of new tumors
- 2) It can lower the risk of cancer recurrence.

When is Chemotherapy used?

C. Advanced Cancer

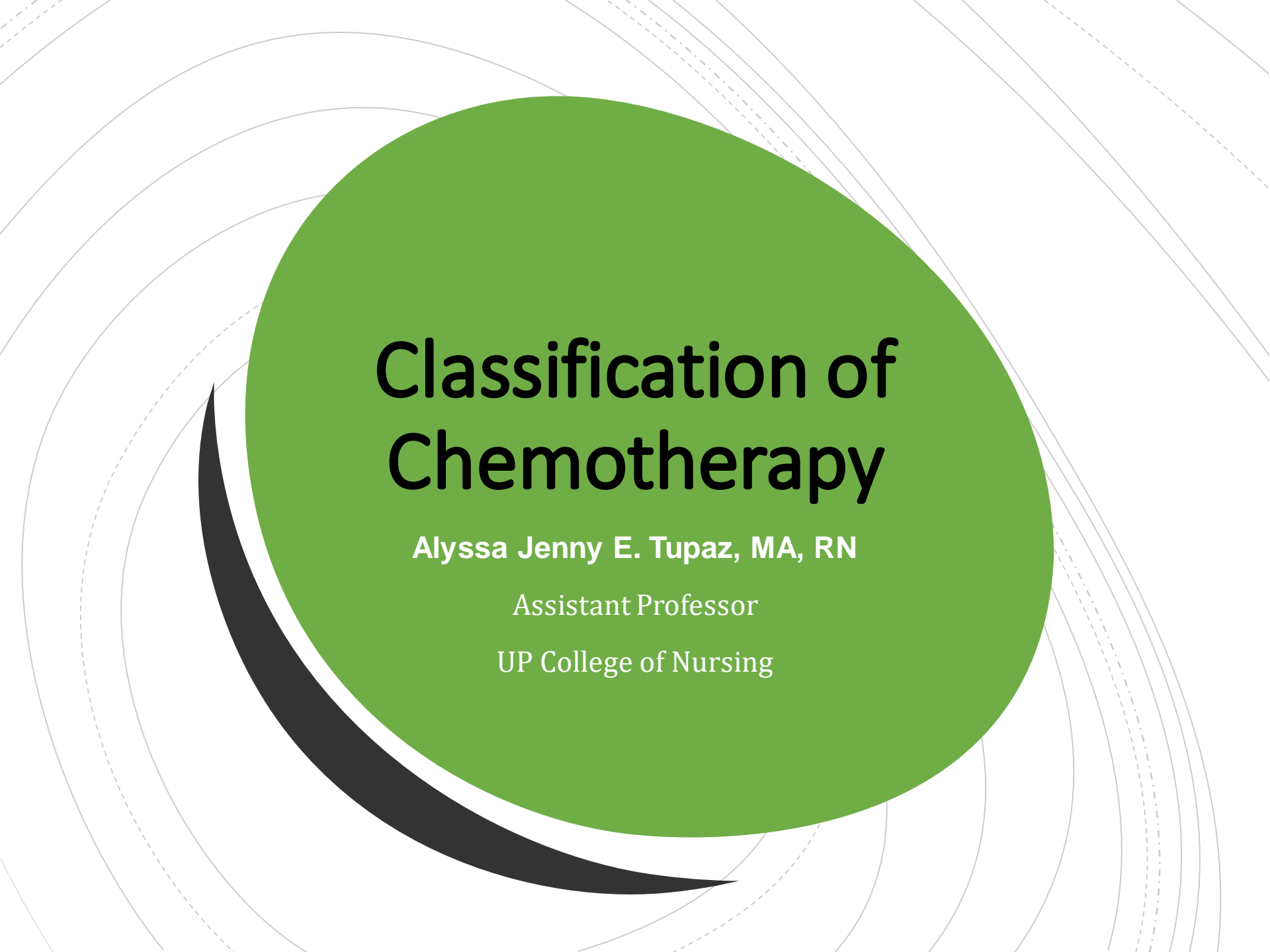
It is used as the main treatment for patients whose cancer has already metastasized.



Which
Chemo
drugs are
used?

**Treatment of choice
depends on:**

- **the patient**
- **the type of cancer**
- **gene expression**
- **tumor characteristics**
- **timing of
administration**



Classification of Chemotherapy

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Classification of Chemotherapy

• A. Cellular Activity

1. Cell-cycle specific

- - also called cell-cycle dependent
- - exert their influence during a specific phase of the cell cycle.
- - effective on cells that are actively growing and dividing

2. Cell-cycle nonspecific

- - also called cell-cycle independent
- - effective on cancer cells on any phase of the cell cycle.

Classification of Chemotherapy

B. Function

1. **Alkylating Agents** (Cyclophosphamide)
2. **Antimetabolites** (5-Fluorouracil, Capecytabine)
3. **Anthracyclines** (Doxorubicin, Epirubicin)
4. **Plant Alkaloids** (Taxanes: Docetaxel, Paclitaxel)
5. **Platinum Compounds** (Cisplatin, Carboplatin)
6. **Hormonal Agents** (Tamoxifen)

ALKYLATING AGENTS

Cell cycle NONSPECIFIC

- most effective in the G0 phase

Action: cause cross-linking of DNA strands, abnormal base pairing, or DNA strand breaks → prevents cells from dividing

- can cross the blood-brain barrier (Nitrosureas)

Adverse Reactions: depends on the drug, dose, intensity, and route

Bone marrow suppression (low RBC, WBC, PC)

GI disturbances (anorexia, nausea & vomiting, diarrhea, mucositis)

alopecia

fatigue

ALKYLATING AGENTS

CYCLOPHOSPHAMIDE (Cytoxan)

- analogue of nitrogen mustard
- oral or IV

Nursing considerations: The patient should be well-hydrated to prevent hemorrhagic cystitis

- – MESNA (2-mercaptoethane sulphonate sodium) → cytoprotectant



ANTI- METABOLITES

Cell cycle SPECIFIC

(S phase)

Action: interfere with DNA and RNA synthesis mimicking the essential **structure** of essential metabolites

Adverse Reactions: skin color changes (avoid sun exposure), sore mouth, difficulty in swallowing

ANTI-METABOLITES

Deceiving the cells into
Incorporating agent

Metabolic Pathway

FALSE Genetic Message
will be transmitted

Blocking enzymes

Blocking synthesis of
essential compounds

No RNA and DNA
synthesis

ANTIMETABOLITES



- **5-FLUOROURACIL (5-FU)**
- - IV, Topical
- - Nursing considerations: Take note of common side effects like anorexia, nausea, vomiting, diarrhea, alopecia, photosensitivity, and hyperpigmentation.
 - *STOMATITIS – early sign of toxicity*



ANTHRACYCLINES/ ANTITUMOR ANTIBIOTICS


- Most are **Cell cycle NONSPECIFIC**
- except for Bleomycin which has a major effect on G2

Action: synthesized from microorganisms

- - binds with DNA to inhibit DNA and RNA synthesis

Adverse Reactions:

- arrhythmias, fever and chills, hair loss



ANTHRACYCLINES/ ANTITUMOR ANTIBIOTICS

DOXORUBICIN (ADRIAMYCIN)

- IV; a vesicant

Nursing considerations: The patient must have 2D echo prior to treatment



- Advise patient that the drug may cause reddish discoloration of urine 24-48 hrs after administration
- Calcium channel blockers may increase risk of cardiac toxicity
- Green tea may enhance antitumor effects

PLANT ALKALOIDS

Cell cycle SPECIFIC – affect the M phase

Action: forms a stable complex by binding to DNA and enzymes → interferes in the replication or transcription

Adverse Reactions: fever, chills, dizziness from any position, numbness in fingers and toes



PLANT ALKALOIDS

DOCETAXEL

- IV

Nursing considerations:

- 1) Administer Corticosteroid premedication as prescribed to reduce severity of fluid retention and allergic reactions.
- 2) Watch out for common side effects such as low WBC, low RBC, fluid retention, peripheral neuropathy, nausea & vomiting, mouth sores, hair loss, fatigue

PACLITAXEL

- IV; irritant

Nursing considerations:

- 1) Administer premedication as prescribed to reduce severity of allergic reactions.
- 2) Watch out for common side effects such as low WBC, low RBC, peripheral neuropathy, nausea & vomiting, mouth sores, hair loss, fatigue, and hypersensitivity reaction (fever, chills, flushing, dyspnea)



PLATINUM COMPOUNDS

Cell cycle NONSPECIFIC

Action: Inhibits DNA replication and transcription

Adverse Reactions: Elevated Bilirubin levels and BUN, Tinnitus, Hearing Loss, Liver abnormalities

• Give through IV ONLY



PLATINUM COMPOUNDS



CISPLATIN

- Nursing considerations:

Ensure adequate hydration. Watch out for nausea, vomiting, peripheral neuropathy, stomatitis, tinnitus, blurred vision.

- Ototoxicity occurs in 30% of clients

CARBOPLATIN

- Nursing considerations: Watch out for low blood counts, nausea & vomiting, taste changes, hair loss, weakness, and abnormal serum electrolytes



HORMONAL AGENTS

Cell cycle NONSPECIFIC

Action: changes the environment in which the tumor originate and grows.

They only work for hormone receptor-positive tumors

Some breast cancer cells need estrogen and/or progesterone to grow. These cancer cells have special proteins inside, called **hormone receptors**. When hormones attach to hormone receptors, the cancer cells with these receptors grow.

Hormone receptor status - determined by testing the tumor tissue removed during a biopsy.

HORMONAL AGENTS

Hormone receptor-positive tumors

(estrogen receptor-positive (ER-positive)
progesterone receptor-positive (PR-positive)) tumors
- express /have a lot of hormone receptors.

Hormone receptor-negative

(estrogen receptor-negative (ER-negative)
progesterone receptor-negative (PR- negative)) tumors
- do not express (have few or no) hormone receptors.

***Most (about 70 %) breast cancers are hormone receptor-positive. Among older women, this percentage is even higher.



HORMONAL AGENTS

Tamoxifen
Tablets BP

30 Tablets in blisters of 10



SEX HORMONES

- used to slow the growth of hormone dependent tumors

Examples:

Tamoxifen (attach to the hormone receptor and block estrogen)

Aromatase Inhibitors (lower the estrogen levels in the body)

Nursing considerations: Watch out for:

- fluid retention, thrombotic (clot) disorders, mood swings, weight changes, appearance of secondary
- sexual characteristics

RECAP:

Cellular Activity

1. Cell cycle specific

2. Cell cycle non-specific

RECAP:



B. Function (3A2PH)



1. Alkylating Agents (WARFREAK)

2. Antimetabolites (MAPAGPANGGAP)



3. Anthracyclines (HEARTBREAKER)



4. Plant Alkaloids
(HALAMANG MAPARAAN)



5. Platinum Compounds (ONE & ONLY)



6. Hormonal Agents
(MOOD SWINGS)

TARGETED THERAPY

- a type of treatment that targets a cancer's specific genes, proteins, or the tissue environment that contributes to cancer growth and survival.
- block the growth and spread of cancer by interfering with specific molecules("molecular targets") that are involved in the growth, progression, and spread of cancer



TARGETED THERAPY

STANDARD THERAPY

Acts on specific molecular targets associated with cancer cells

Acts on ALL rapidly dividing cells (normal and cancerous)

Chosen as treatment because it was designed to interact with a certain target

Chosen because they kill cancer cells

cytostatic

cytotoxic

TARGETED THERAPY for Breast Cancer

- **HER2 (human epidermal growth factor receptor 2)**
 - a protein that appears on the surface of some breast cancer cells. It is also called **HER2/neu or ErbB2**.
 - an important part of the pathway for cell growth and survival.
- **HER2-positive breast cancers**
 - can benefit from anti-HER2 drugs, such as
- **Trastuzumab (Herceptin)**

TARGETED THERAPY for Breast Cancer

Trastuzumab / Pertuzumab

- **Monoclonal antibody**
- **Action:** These are proteins that bind to cancer-cell specific targets called antigens to induce an immunologic response against the cancer cell.
- **Adverse Reactions:**
- Fever, chills, pain, weakness, nausea, vomiting, diarrhea, headache, difficulty of breathing, rashes

TARGETED THERAPY

Limitations of Targeted therapy:

Cancer cells become resistant.



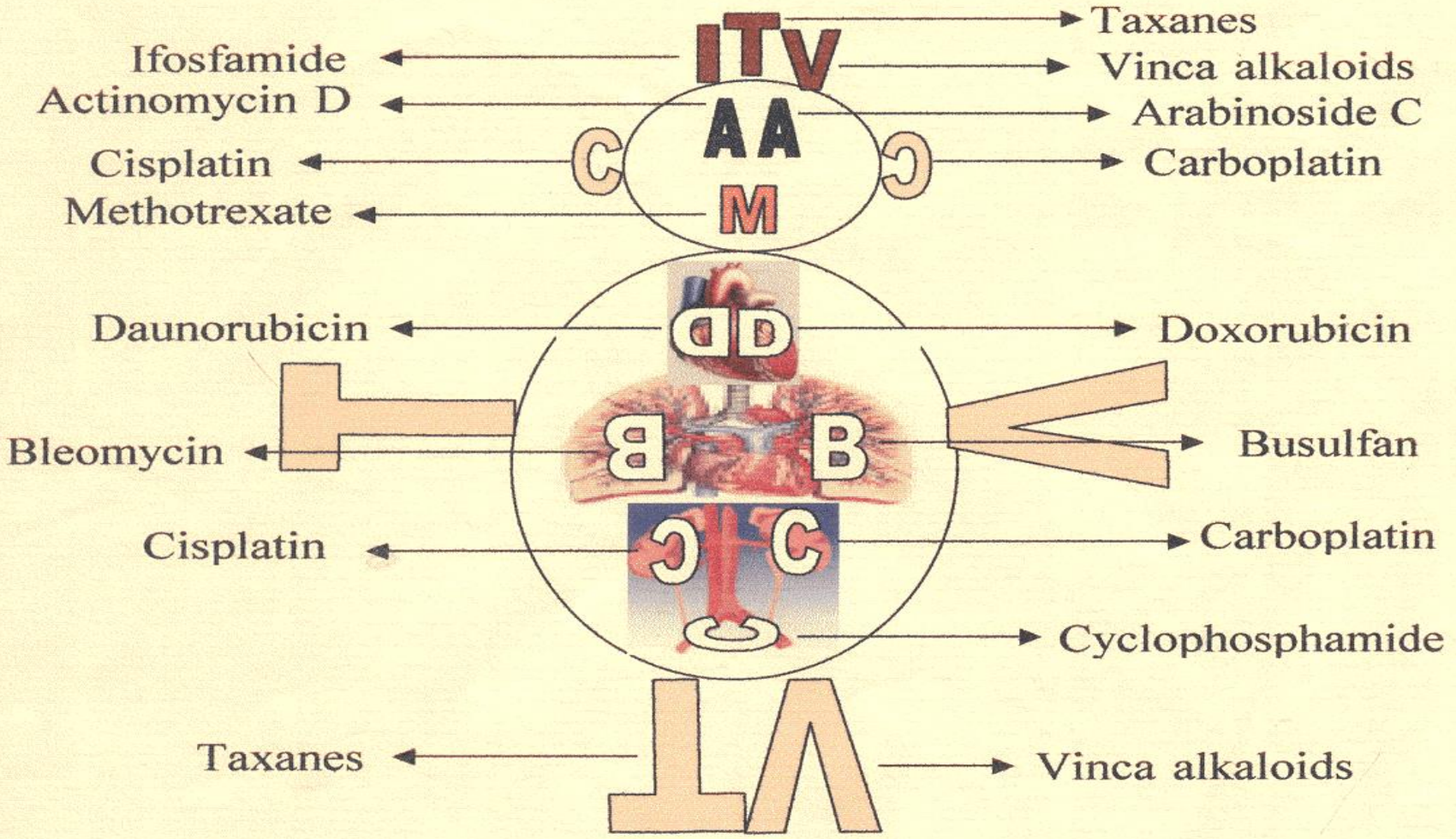
Target cells mutate



Tumor finds another pathway that doesn't depend on the target for growth

***For these reasons, target therapies may work best in combination.

Mr. CHEMO MAN



(courtesy of: Makati Medical Center)

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Some of the slides were taken from the lectures for the Basic chemotherapy course

Delos Reyes, C.S. (2016). Nursing Care and Patient Education for Patients Undergoing Chemotherapy. Slide presentation.

Nario, J.J. (2017). Introduction to Chemotherapy. Slide presentation.

Sandoval, S. (2014). Chemotherapy Drug Preparation and Administration. Slide presentation

Tupaz, A.J. (2018). Common Chemotherapeutic Agents and Mechanisms of Action. Slide presentation

References

American Cancer Society. (2017). Chemotherapy for Breast Cancer. Retrieved from <https://www.cancer.org/cancer/breast-cancer/treatment/chemotherapy-for-breast-cancer.html>

Chemocare. Retrieved from <http://chemocare.com/default.aspx>

The Susan G. Komen Breast Cancer Foundation, Inc. (2018). Chemotherapy Drugs. Retrieved from <https://ww5.komen.org/BreastCancer/TheChemotherapyDrugs.html>

The Susan G. Komen Breast Cancer Foundation, Inc. (2018). Tumor Characteristics. Retrieved from <https://ww5.komen.org/BreastCancer/TumorCharacteristics.html#her2>

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