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PHARMACOLOGY - III

UNIT 2

TOPIC :

- **Chemotherapy**
 - a. General principles of chemotherapy.



General Principles of Chemotherapy

- Chemotherapy means the use of chemical substances (drugs) to destroy or inhibit the growth of microorganisms or abnormal cells causing disease.
- It is mainly used for:
 - Infectious diseases
 - Cancer treatment
- The term Chemotherapy was introduced by Paul Ehrlich.
- Chemotherapy is the treatment of diseases using chemical agents that selectively destroy microorganisms or cancer cells without causing serious damage to normal body tissues.

Goal of Chemotherapy

- Destroy disease-causing organisms
- Inhibit growth of microbes or cancer cells
- Produce maximum therapeutic effect
- Cause minimum harm to host cells

General Principles of Chemotherapy

1. Selective toxicity
 - Drug should kill microorganisms without harming host cells.
2. Proper diagnosis
 - Correct identification of disease is necessary before treatment.
3. Use of appropriate drug
 - Drug should be effective against specific microorganism.
4. Adequate dose and duration
 - Correct dose and proper treatment duration are important.
5. Combination therapy
 - Sometimes two or more drugs are used together for better effect.
6. Prevention of resistance
 - Irrational use of drugs may cause drug resistance.
7. Monitoring of adverse effects
 - Patient should be monitored for toxicity and side effects.

Classification of Chemotherapeutic Agents

A. Antibacterial Agents

1. Cell Wall Synthesis Inhibitors

- Penicillins
- Cephalosporins
- Vancomycin

2. Protein Synthesis Inhibitors

- Tetracyclines
- Aminoglycosides
- Macrolides

3. Nucleic Acid Synthesis Inhibitors

- Fluoroquinolones
- Rifampicin
- Metronidazole

4. Antimetabolites

- Sulfonamides
- Trimethoprim

5. Cell Membrane Disruptors

- Polymyxins

B. Antiviral Agents

- Anti-HIV: Zidovudine, Nevirapine
- Anti-herpes: Acyclovir
- Anti-influenza: Oseltamivir

C. Antifungal Agents

Polyenes

- Amphotericin B
- Nystatin

Azoles

- Ketoconazole
- Fluconazole

Echinocandins

- Caspofungin

D. Antiprotozoal Agents

- Antimalarials: Chloroquine, Artemisinin
- Anti-amoebic: Metronidazole
- Anti-leishmanial: Sodium stibogluconate

E. Anthelmintic Agents

- Albendazole
- Mebendazole
- Ivermectin

F. Anticancer Drugs

Alkylating Agents

- Cyclophosphamide

Antimetabolites

- Methotrexate
- 5-Fluorouracil

Mitotic Inhibitors

- Vincristine
- Paclitaxel

Topoisomerase Inhibitors

- Etoposide

General Mechanism of Chemotherapy

Chemotherapeutic agents act by targeting important processes inside microorganisms or cancer cells.

Main mechanisms:

- Inhibition of cell wall synthesis
- Inhibition of protein synthesis
- Inhibition of DNA/RNA synthesis
- Disruption of cell membrane
- Inhibition of metabolic pathways

Result:

- Growth inhibition
- Destruction of microorganisms
- Death of cancer cells

Advantages of Chemotherapy

- Effective treatment of infections
- Controls spread of diseases
- Useful in cancer therapy
- Reduces mortality

Disadvantages

- Side effects
- Drug resistance
- Toxicity to normal cells
- Allergic reactions