

## UNIT – 4

### Chemotherapy

#### 1. Chemotherapy of Urinary Tract Infections and Sexually Transmitted Diseases:

##### 1. Urinary Tract Infections (UTIs):

- **Common Pathogens:** Escherichia coli, Klebsiella, Proteus.
- **Antibiotics:** Nitrofurantoin, Trimethoprim-sulfamethoxazole, Ciprofloxacin.
- **Key Considerations:** Empiric therapy based on local resistance patterns.

##### 2. Sexually Transmitted Diseases (STDs):

- **Chlamydia Trachomatis:**
  - **Treatment:** Azithromycin, Doxycycline.
- **Neisseria Gonorrhoeae:**
  - **Treatment:** Ceftriaxone, Azithromycin.
- **Treponema Pallidum (Syphilis):**
  - **Treatment:** Penicillin.

#### m. Chemotherapy of Malignancy:

##### 1. Alkylating Agents (e.g., Cyclophosphamide):

- **Mechanism:** Cross-links DNA, inhibiting cell division.
- **Usage:** Various malignancies, including lymphomas and breast cancer.

##### 2. Antimetabolites (e.g., Methotrexate):

- **Mechanism:** Inhibits DNA synthesis by mimicking folic acid.
- **Usage:** Leukemias, lymphomas, and solid tumors.

##### 3. Antitumor Antibiotics (e.g., Doxorubicin):

- **Mechanism:** Inhibits DNA and RNA synthesis by intercalation.
- **Usage:** Breast cancer, lymphomas.

##### 4. Microtubule Inhibitors (e.g., Paclitaxel):

- **Mechanism:** Stabilizes microtubules, inhibiting mitosis.
- **Usage:** Ovarian, breast, and lung cancers.

##### 5. Targeted Therapies (e.g., Imatinib):

- **Mechanism:** Inhibits specific signaling pathways in cancer cells.
- **Usage:** Chronic myeloid leukemia (CML), gastrointestinal stromal tumors (GISTs).

## 6. Hormone Therapies (e.g., Tamoxifen):

- **Mechanism:** Blocks hormone receptors in hormone-sensitive cancers.
- **Usage:** Breast cancer.

## 7. Immunotherapies (e.g., Checkpoint Inhibitors):

- **Mechanism:** Enhances the immune response against cancer cells.
- **Usage:** Melanoma, lung cancer.

## 8. Stem Cell Transplantation:

- **Autologous:** Uses the patient's own stem cells.
- **Allogeneic:** Uses donor stem cells.

## 9. Supportive Care:

- **Antiemetics (e.g., Ondansetron):** Manage chemotherapy-induced nausea.
- **Hematopoietic Growth Factors (e.g., Filgrastim):** Stimulate blood cell production.

## 4. Immunopharmacology:

### a. Immunostimulants:

#### 1. Interferons (e.g., Interferon- $\alpha$ ):

- **Mechanism:** Boost antiviral and antitumor immune responses.
- **Usage:** Hepatitis, certain cancers.

#### 2. Interleukins (e.g., Interleukin-2):

- **Mechanism:** Activates immune cells, promoting antitumor responses.
- **Usage:** Renal cell carcinoma, melanoma.

#### 3. Vaccines:

- **Prophylactic Vaccines:** Prevent infectious diseases (e.g., Hepatitis B).
- **Therapeutic Vaccines:** Treat existing conditions (e.g., Cancer vaccines).

### b. Immunosuppressants:

#### 1. Corticosteroids (e.g., Prednisone):

- **Mechanism:** Inhibit inflammatory and immune responses.
- **Usage:** Autoimmune disorders, transplant recipients.

#### 2. Calcineurin Inhibitors (e.g., Cyclosporine):

- **Mechanism:** Inhibit T-cell activation.
- **Usage:** Organ transplant recipients.

### 3. **Biologics (e.g., Tumor Necrosis Factor Inhibitors):**

- **Mechanism:** Target specific components of the immune system.
- **Usage:** Rheumatoid arthritis, inflammatory bowel disease.

### **Protein Drugs, Monoclonal Antibodies, Target Drugs to Antigen, Biosimilars:**

#### 1. **Protein Drugs:**

- **Definition:** Biologically derived drugs, often recombinant proteins.
- **Examples:** Insulin, erythropoietin.

#### 2. **Monoclonal Antibodies (mAbs):**

- **Mechanism:** Bind specifically to target antigens, modulating immune responses.
- **Examples:** Rituximab (targets CD20 in B cells), Trastuzumab (targets HER2 in breast cancer).

#### 3. **Targeted Drugs to Antigen:**

- **Example:** Tyrosine kinase inhibitors like Imatinib targeting specific cancer-related kinases.

#### 4. **Biosimilars:**

- **Definition:** Biologic products highly similar to an approved reference product.
- **Regulation:** Rigorous evaluation for similarity and efficacy.

These detailed notes cover the chemotherapy of urinary tract infections and sexually transmitted diseases, the chemotherapy of malignancy, and key aspects of immunopharmacology, including immunostimulants, immunosuppressants, protein drugs, monoclonal antibodies, targeting drugs to antigens, and biosimilars.