

## Pharmaceutical Sciences Contents, Free Sample and References

### Course 1 (PSC-1) – 44 pages

Overview of viruses

Cancer-causing viruses

Viral infections

Overview of fungi

Fungal infections

Overview of parasites

Parasitic infections

Overview of bacteria

Bacterial infections

Sexually transmitted diseases

Biotechnology

Pharmacogenomics and gene therapy

### Course 2 (PSC-2) – 41 pages

Biotechnology drugs also called biologics

Indication of different biologics

Immunization

Types of Vaccine

Vaccination schedule

Travel vaccination

Pharmaceutical analysis. Examples:

- Chromatography (HPLC, GC, TLC)
- Mass spectrometry
- Immunoassays

**Course 3 (PSC-3) – 53 pages**

Pharmacodynamics

Pharmacokinetics

Drug receptor binding

Physicochemical properties of drugs

Stereochemistry

Routes of drug administration

Drug absorption

Binding of drugs to plasma proteins

Volume of drug distribution

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Drug dosage

Biopharmaceutics and drug delivery systems

Drug formulations

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**Course 4 (PSC-4) – 57 pages**

Toxicology

Drug dose-toxicity relationship

Drug dose-response relationship

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Factors influencing toxicity

Toxicity testing

Mechanisms of common poisons

Poisoning treatment options

Clinical biochemistry

Therapeutic drug monitoring (TDM)

Carbohydrate metabolism disorders

Lipid metabolism disorders

Clinical biomarkers. Examples:

- Enzyme biomarkers
- Tumor biomarkers
- Cardiac biomarkers
- Kidney biomarkers
- Creatinine and creatine
- Antibodies

Overview of common laboratory tests including INR, TIBC, CBC, PTT

Nutrition

Nutrition assessment

**Free Sample**

**From PSC-3**

Mucosal drug administration. Mucosal drug delivery includes buccal, sublingual, pulmonary, nasal, ocular, rectal and vaginal administration.

- Buccal and sublingual mucosae in the oral cavity provide an easily accessible surface area for drug absorption. Buccal mucosa (cheeks) has limited permeability which translates in slow drug absorption.
- In sublingual administration the drug is placed under the tongue. Drugs are absorbed directly into the small blood vessels that lie beneath the tongue. The sublingual route is especially good for nitroglycerin used to relieve angina. Sublingual drug administration is characterized by fast absorption, drug stability and elimination of the first-pass effect. However, only **small amounts** of drug can be delivered, and the unpleasant taste of the drug is experienced.

- Pulmonary and nasal mucosae. Pulmonary delivery is characterized by the absorption of drug through the lungs. Drugs given by inhalation through the mouth must be atomized into smaller particles than those given by the nasal route, so that the drug can pass through the trachea and into the lungs. Inside the lungs, they are absorbed into the bloodstream. **The respiratory tract provides a large surface area for drug absorption making inhalation a convenient way for drug delivery.** Drugs administered by inhalation **by-pass the digestive enzymes of the liver and the GIT** and absorption is fast and effective due to a rich blood supply.

### From PSC-4

### Carcinogenicity

Carcinogenicity is a complex multistage process of abnormal cell growth and differentiation which can lead to cancer. At least two stages are recognized. They are initiation in which a normal cell undergoes irreversible changes due to mutation and promotion in which initiated cells are stimulated to progress to cancer. Chemicals can act as initiators or promoters.

A tumor (neoplasm) is simply an uncontrolled growth of cells. Benign tumors grow at the site of origin; do not invade adjacent tissues or metastasize; and generally, are treatable. Malignant tumors (cancer) invade adjacent tissues or migrate to distant sites (**metastasis**). They are more difficult to treat and often cause death.

### Developmental toxicity

Developmental Toxicity pertains to adverse toxic effects to the developing embryo or fetus. This can result from toxicant exposure to either parent before conception or to the mother and her developing embryo-fetus. Chemicals cause developmental toxicity by two methods. They can act directly on cells of the embryo causing cell death or cell damage, leading to abnormal organ development. A chemical might also induce a mutation in a parent's germ cell which is transmitted to the fertilized ovum. The three basic types of developmental toxicity are:

- Embryo lethality: Failure to conceive, spontaneous abortion or still birth.
- Embryotoxicity: Growth retardation or delayed organs development
- Teratogenicity: Birth defects such as cleft palate, missing limbs ...

### Genetic toxicity

Genetic Toxicity results from damage to DNA and altered genetic expression. This process is known as **mutagenesis**. The genetic change is referred to as a mutation and the agent causing the change as a **mutagen**. If the mutation occurs in a germ cell the effect is heritable. There is no effect on the exposed person; rather the effect is passed on to future generations. If the mutation occurs in a somatic cell, it can cause altered cell growth (e.g. cancer) or cell death (e.g. teratogenesis) in the exposed person.

There are three types of genetic change:

- Gene mutation: Change in DNA sequence
- Chromosome alteration: Change in chromosome structure
- Aneuploidy: Decrease in the number of chromosomes
- Polyploidy: Increase in the number of chromosomes

### References and Websites

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- Tietz Fundamental of Clinical Chemistry and Molecular Diagnostics, 2018
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