## ZOH452: TOXICOLOGY AND CANCER BIOLOGY

**Teaching Hours 10/Unit**

## COURSE OUTCOME

1. Course focuses on different toxins of animal and also of microbial origin.
2. Understanding the mode of action of chemicals, toxins and fundamentals of toxicological assays.
3. Students are trained in forensic toxicological techniques. They are made aware of drug abuse and its ill effects..
4. They get basic knowledge on mutations, genotoxicity, carcinogens and carcinogenesis.
5. Advanced cancer treatment modalities are discussed.
6. Course helps students to get into various toxicological labs as drug inspectors, quality controllers and even as oncologists.

**UNITI**

Introduction- Definitions, What toxicologist study? Major subdivisions of toxicology. Dose-response relationships and their importance, basic components of tests generating dose-response data, Frequency response and cumulative response. Factors influencing toxicity- Route of administration, host factors-species, strain, age and sex, Biological factors- Accumulation and storage of chemicals in the organism. Biotransformation reactions. Role and mechanisms of xenobiotic metabolizing enzymes.

**UNITII**

Toxicological testing methods-Acute and chronic toxicity tests, $LD_{50,}$ $LC_{50}$ and $ED_{50.}$Teratogenicity testing. Reproductive toxicology– Effect of xenobiotics on male and female reproductive organs/cells in mammals. Organ/tissues specific toxicity. Toxicity of metals (Lead, Mercury, Arsenic, Cadmium). Pesticide toxicity- Acute and Chronic effects of organophosphate, Organo-chlorine and Carbamate insecticides, Toxicity of pyrethroids. Bio-magnification. Natural toxins- Import microbial, plant and animal toxins. Treatment of toxicity- Antidotal therapy.

**UNITIII**

Foundations of Forensic Toxicology- classification of poisons, sign and symptoms of common poisons, antidotes, collection of samples. Drugs: Drugs of abuse, classification and identification. Narco analysis and brain mapping. Explosives: Classification, composition and characteristics of explosives, pyrotechinques, IEDs, explosion process and affects, types of hazards, effect of blast waves on structure Courtroom Testimony, Investigation of Toxicity-Related Death/Injury, Documentation Practices, Considerations for Forensic Toxicological Analysis, Drug Concentrations and Distribution.

**UNIT IV**

Mutagenesis and genetic toxicology- Test systems of genotoxicity testing, Genotoxicty testing in mammals –Bone marrow chromosomal aberration, Micronucleus test, sperm abnormality assay, comet assay. Occupational and environmental exposure -Endosulphan tragedy. What is cancer?, classification of human cancers, Growth characteristics of cancer cells, tumor angiogenesis. Tumor staging. Causes of cancers-chemical carcinogenesis; Steps involved in chemical carcinogenesis. Radiation carcinogenesis-ionizing radiation, UV radiation.

**UNITV**

Oncogenes-Functional class of oncogenes (proto-oncogenes), Mechanisms of carcinogenic transformations by oncogenes. Viral oncogenes. Tumor suppressor genes- mechanisms of tumor suppressor in cancer induction (P53). Patient – tumor interactions- Pain, nutritional effects, hematological effects, fever and infection hormonal effects, neurological and dermatological effects. Tumor immunology-mechanisms of immune response to cancer, natural killer cells, 'Danger theory'.

**REFERENCES**


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