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. Doseresponse relationships and their importance, basic components of tests generating doseresponse 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. Biomagnification. 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'.

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