

POSTGRADUATE COURSES OFFERED BY DIVISION OF VETERINARY PHARMACOLOGY AND TOXICOLOGY

MVSc

GENERAL PHARMACOLOGY (VPT 601) 2+0

Theory

History and scope of pharmacology, Principles of drug absorption, distribution, metabolism and elimination. Drug bioavailability and routes of administration. Important pharmacokinetic parameters and their clinical significance. Pharmacodynamics: mechanism of action and the relationship between drug concentration and effect; signal transduction mechanism and drug receptors for physiological regulatory molecules. Quantization of drug-receptor interactions and elicited effects. Competitive and non-competitive antagonism. Factors affecting drug response. Adverse drug reactions.

AUTONOMIC AND AUTACOID PHARMACOLOGY (VPT 602)2+1

Theory

Anatomical and physiological considerations of autonomic nervous system (ANS). Neurohumoral transmission in ANS. Pharmacology of cholinergic agonists and antagonists. Pharmacology of adrenergic agonists and antagonists. Ganglionic stimulants and blockers. Autacoids: Histamine, serotonin, kinins, eicosanoids and platelet activating factor.

Practical

Pharmacological experiments on intact and isolated preparations for studying the effects of various prototype drugs on vascular, intestinal, respiratory, urinary and reproductive smooth muscles, autonomic ganglia, skeletal muscles; blood pressure, ECG, heart etc.

CNS PHARMACOLOGY (VPT 603) 2+1

Theory

Anatomical and physiological considerations of central nervous system (CNS); neurohumoral transmission in CNS. Historical development, theories, principles and stages of general anesthesia. Pharmacology of anaesthetics, sedatives, hypnotics, neuroleptics, antiepileptics. CNS stimulants, analeptics, opioid agonists and antagonists; non-steroidal anti-inflammatory agents, central and peripheral muscle relaxants, local anaesthetics, therapeutic gases. euthanizing agents. Doping.

Practical

Study of pharmacodynamics of prototype drugs of each group in experimental animals.

DIGESTIVE AND RESPIRATORY PHARMACOLOGY (604) 2+0

Theory

Pharmacology of drugs acting on gastrointestinal tract. Appetite stimulants, emetics and anti-emetics. Anti-ulcer drugs, modulators of gastric and intestinal motility and secretions. Gastrointestinal protectants and adsorbents, laxatives and cathartics. Agents promoting digestive functions; bile acids and pancreatic enzymes, drugs affecting liver; rumen pharmacology. Pharmacology of drugs acting on respiratory system: pathogenesis of inflammatory respiratory diseases. Bronchodilators, antitussives, mucolytics, expectorants, decongestants. Drugs used in treatment of asthma.

CARDIOVASCULAR AND RENAL PHARMACOLOGY (VPT-605) 2+0

Theory

Pharmacology of cardiac glycosides. Antiarrhythmic, antihypertensive and antihyperlipidaemic drugs. Drugs affecting vasomotor and cardiorespiratory reflex mechanisms and haemopoietic system. Coagulants and anticoagulants, thrombolytic agents. Pharmacology of drugs affecting renal functions and fluid-electrolyte balance. Fluid and electrolyte therapy, diuretics, antidiuretics, uricosuric drugs.

ENDOCRINE AND REPRODUCTIVE PHARMACOLOGY (VPT-606) 2+0

Theory

Pharmacology of drugs affecting endocrine functions of pituitary, thyroid, adrenals and pancreas. Hormonal regulation of calcium and phosphorus homeostasis. Pharmacology of drugs affecting male reproductive organs, spermatogenesis. Pharmacology of drugs affecting female reproductive organs, ovulation, oestrus, conception, gestation and lactation. Oxytocic and tocolytic drugs.

CHEMOTHERAPY (VPT-607) 2+1

Theory

General consideration and principles of chemotherapy, classification of chemotherapeutic agents; development of microbial resistance to antimicrobials, combination therapy. Systemic and gut acting sulfonamides, diaminopyrimidines, quinolones sulfones, nitrofurans. Penicillins, cephalosporins, beta-lactam antibiotics. Chloramphenicol, tetracyclines, macrolides, polymyxins, polypeptides. Aminoglycosides and other antibiotics. Anti-protozoans, anthelmintics, ectoparasiticides. Antituberculosis, antifungal, antiviral and antineoplastic drugs.

Practical

General methods for assay of chemotherapeutic agents, antibiotic sensitivity tests, estimation of sulfonamides, penicillins, oxytetracyclines, trimethoprim and nitrofurans in biological fluids to study their kinetics and bioavailability.

TOXICOLOGY OF XENOBIOTICS (VPT-608) 2+1

Theory

Principles and scope of toxicology, sources of poisoning. General modes of action of poisons, detoxification, factors affecting toxicity, general principles of diagnosis and treatment of poisonings. Toxicology of metals, agrochemicals, solvents and vapors, feed additives. Toxic effects of radiations and radioactive chemicals, genetic and developmental toxicology; forensic and regulatory aspects of toxicology.

Practical

Extraction, separation and detection of common poisons in toxicological specimens, study of toxicity and antidotal treatment in animals, designing of animal toxicity experiments and general toxicity tests.

TOXICOLOGY OF PLANTS AND TOXINS (VPT-609) 2+0

Theory

Classification, identification and chemical constituents of poisonous plants. Plants containing cyanide, nitrate/nitrite, oxalate, lectins and cardiotoxic glycosides. Plants producing lathyrism, thiamine deficiency and photosensitization. Toxicology of mycotoxins: aflatoxins, rubratoxins, ochratoxins, trichothecenes, tremorgens and ergot. Animal bites and stings: snake venom, scorpion, spider and insect stings and toad poisoning. Bacterial toxins: botulism.

PHARMACOLOGICAL TECHNIQUES (VPT-610) 1+1

Theory

Principles of drug action and bioassay. Dose response curves and their analysis. Techniques for setting up isolated and intact preparations. Organization of screening programme of drugs; multidimensional screening procedures and gross observational methods.

Practical

Setting up of isolated and intact preparations, recording of BP in dog/rat, recording of ECG in rat, experiments on drug potentiation, antagonism and tachyphylaxis. Construction of dose-response plots, calculation of EC₅₀, dissociation rate constants, potency ratio, pA_x, pD_x and pD'_x values. Specific tests for evaluation of tranquillizing, hypnotic, analgesic, anticonvulsant, general and local anesthetic, muscle relaxant, antiinflammatory, antipyretic, antiarrhythmic, antihypertensive, antihyperglycemic and anticholesterimic activities. Determination of potency ratio, median effective, toxic or lethal doses. Bioassay techniques.

TECHNIQUES IN TOXICOLOGY (VPT-611) 1+1

Animal models in toxicological studies. Animal toxicity tests for acute, sub-acute and chronic toxicity. Specific toxicity tests for neurotoxicity, immunotoxicity, developmental, behavioural, reproductive and inhalation toxicity, mutagenicity, carcinogenicity. Animal toxicological tests for the study of metabolism, synergism and antagonism.

Practical

Tests for acute, sub-acute and chronic toxicity, protocols and various specific toxicity tests. Assay for marker enzymes, analysis of toxicant residues in biological materials.

ETHNOPHARMACOLOGY (VPT-612) 2+0

Theory

Historical aspects: Traditional Indian remedies and regional folklore in disease cure. Classification, identification and chemical constituents of medicinal plants. Extraction, distillation, evaporation and other processes used in purification and preparation of active constituents from medicinal plants. Standardization and clinical validation of bioactive molecules from vegetable sources. Therapeutic and adverse effects of potential herbal drugs. Indigenous drugs used as carminatives, antiseptics, antimicrobials, analgesics, and anti-inflammatory agents. Alternate systems of medicine in animals.

PhD COURSES

ADVANCES IN NEUROPHARMACOLOGY (VPT-701) 2+0

Theory

Definition, classification of receptors, molecular structure of receptors. G-protein coupled, ligand gated-ion channel and tyrosine kinase-linked receptors. Ligand binding study of receptors. Signal transduction system: introduction to signal transduction, receptor linked to ion channels. G-proteins, second messengers: phospholipases, phosphokinases, intracellular calcium, protein kinase-C, IP₃, diacylglycerol and cyclic nucleotides. Signal transduction through protein tyrosine kinases. Receptors as pharmaceutical targets.

AUTACOID PHARMACOLOGY (VPT-702) 1+0

Theory

Pharmacodynamics of histamine and antihistamines. Pharmacodynamics of serotonin and its antagonists; eicosanoids, bradykinin, angiotensin, kallikrein and other kinins. Platelet-activating factors, slow reacting substances. Putative neurohumoral transmission-purine nucleotides, peptides, amino acids and nitric oxide.

PHARMACOLOGY OF HERBAL DRUGS (VPT-703) 2+1

Theory

Historical aspect, chemical constituents of medicinal plants and their classification. Identification, collection, preservation, purification, isolation, standardization and clinical validation of bioactive molecules from vegetable sources. Characterization of pharmacological, therapeutic and toxic effects of potential herbal drugs. Strategies for development of herbal drugs.

Practical

Extraction, detection, isolation and purifications of active chemical constituents from plant sources. Pharmacological effects of herbal drugs on intact and isolated preparations.

DRUG METABOLISM (VPT-704) 2+0

Theory

Mechanisms and processes of drug biotransformation. Synthetic and non-synthetic pathways of drug metabolism. Chemical, biological, genetic and environmental factors. Species variations affecting drug biotransformation mechanisms. Hepatic microsomal and non-microsomal enzyme systems. Enzyme induction and inhibition.

MOLECULAR PHARMACOLOGY (VPT-705) 2+0

Theory

Physicochemical properties of drugs, forces involved in binding of drugs to receptors. Receptor conformation and configuration and structure activity relationship. Theories of

drug receptor interactions; analysis of dose response relationship and molecular mechanisms of drug actions. Methods of identification, isolation and characterization of receptors.

PHARMACOKINETICS (VPT-706) 2+1

Theory

Routes of drug administration, factors modifying drug delivery; absorption, distribution, biotransformation and elimination. Kinetics following single and multiple dosage; compartmental models of drug distribution, bioavailability, volume of distribution and protein binding of drugs. Rates of absorption, distribution and elimination; absorption and elimination half-lives and rate of transfer of drugs between compartments. Renal clearance, dosage regimen; non-compartmental pharmacokinetic modeling. Application of pharmacokinetic principles in therapeutics.

Practical

Analysis of pharmacokinetic data and determination of different pharmacokinetic parameters and bioavailability of drugs in normal and diseased animal models.

PHARMACOGENOMICS (VPT-707) 2+0

Theory

Introduction, species variations affecting drug responses, increased and decreased responsiveness to drug effects/toxicities & novel drug effects. Genetic polymorphism. Gene therapy: gene transfer technology, viral vectors, natural delivery strategies. Drugs & gene therapy of inherited diseases, genetic repair and inactivation strategies; synthesis of therapeutic proteins and cancer gene therapy. Role of bioinformatics in pharmacogenomics.

IMMUNOPHARMACOLOGY (VPT 708) 1+0

Theory

General aspect of immune system, chemical mediators of immune system. Pharmacological control of immune responses. Immunomodulators; immunostimulants, immunosuppressant and tolerogens; immunological basis of drug allergy and drug tolerance. Interaction of nervous system, endocrine system and immune system, immunotoxic effects of environmental and other pollutants. Xenobiotic-induced immune dysfunctions and immune deficiencies; autoimmune reactions to xenobiotics, immunoregulants and their therapeutic applications in asthma, arthritis, cancer, dermatology and organ transplant etc.

MOLECULAR TOXICOLOGY (VPT-709) 2+0

Theory

Cellular, subcellular and molecular targets of toxicity; mechanisms of toxicities. Factors affecting toxicity, interactions of toxicants with target molecules. Cellular dysfunctions, repair and dysrepair. Target organ directed toxicological effects of xenobiotics, detoxification, risk assessment. Mechanism of chemical mutagenesis, carcinogenesis, teratogenesis and radiation toxicity.

CLINICAL PHARMACOLOGY (VPT-710) 1+1

Theory

Scope of clinical pharmacology. Drug discovery and clinical trials. Pharmacovigilance. Pharmacoepidemiology and pharmacoconomics. PK-PD relationship and its applications. Drug interactions and adverse drug reactions. Therapeutic drug monitoring. Rationale of drug use, drug regulations and acts.

Practical

Study on drug interactions and drug levels in diseased conditions. Study on plasma drug concentration-time profile and establishment of various pharmacokinetic parameters. Dosage adjustment in diseased conditions. Clinical trials of various drugs.

CLINICAL TOXICOLOGY (VPT-711) 2+1

Theory

Scope of clinical toxicology. Toxicological investigation and management of poisonings. Target organ directed toxicity, Antidotal therapy. Clinical aspect of poisoning due to specific toxicants viz. metals, pesticides, mycotoxins, animal and bacterial toxins, solvents and vapours, drugs and other food/feed contaminants. Forensic and analytical toxicology.

Practical

Demonstration of poisonings and their antidotal treatment; use of biomarkers in the assessment of toxicity. GLP evaluation, analysis of poisons in biological samples

ECOTOXICOLOGY (VPT-712) 2+0

Theory

Basic principles of ecotoxicology. Sources of contamination and effects of pollutants on eco-health. Chemical contamination of air, water, soil and food by major agricultural and industrial chemicals – pesticides, hydrocarbons and metals. Fate of chemicals in the environment and target species. Marine and wildlife as monitors of environmental quality. Contamination control and approaches to rehabilitating damaged ecosystems.

REGULATORY TOXICOLOGY (VPT-713) 2+1

Theory

Principles of risk assessment. Test protocols for toxicity studies. Interaction between toxicology and industry. Compounds under regulatory legislation demands. Regulatory essential dose levels in chemical risk assessment (NOEL, NOAEL, LOEL, LOAEL & AOEL).

Risk assessment in practice. Classification and marking/branding of chemicals. Monitoring/surveillance of chemicals. Exposure assessment and modeling. Quality control in safety research (GLP). Operation of product register.

Practical

Good laboratory practice in toxicological research. Screening procedures in regulatory toxicology. Mandatory toxicity testing protocols. Determination of ADI, NOEL, NOAEL, LOEL, LOAEL and AOEL.

SPECIAL PROBLEM (VPT-790) 0+2

Short research problem(s) involving contemporary issues and research techniques.