BRANCH –VI M.D. (PHARMACOLOGY)

GUIDELINES FOR COMPETENCY BASED POST GRADUATE TRAINING PROGRAMME

FOR M.D. PHARMACOLOGY

Preamble :-

Programme Objectives :-

The purpose of this programme is to standardize Pharmacology teaching at Post Graduate level through out the country so that it will benefit achieving uniformity in undergraduate teaching as well. Accordingly, the training in M.D. Pharmacology should be distinctive from that of M.Sc., Ph.D., (Pharmacology), where the approach to the subject is primarily experimental.

A candidate upon successfully qualifying in the M.D. (Pharmacology) examination should be able to:

1) Teach Pharmacology and Therapeutics to students of medical and allied disciplines.
2) Independently plan and undertake research related to drugs (basic as well as Clinical Pharmacology) and communicate the findings in conferences / journals.
3) Set up therapeutic drug monitoring, ADR monitoring, therapeutic audit and drug information services.
4) Plan and conduct toxicity studies and clinical trials.
5) Educate the public about use and misuse of drugs.
6) Supervise breeding and upkeep of small laboratory animals.
7) Act as medical advisor in a pharmaceutical house.

Specific Learning Objectives :-

1) Demonstrate sound knowledge of general pharmacological principles, systemic pharamacology and rational use of drugs.
2) Plan and conduct lecture, demonstration, practical and tutorial classes for students of medical and allied disciplines.
3) Understand the principles of essential drug concept and rational use of drugs including rational pharmacotherapy.
4) Carry out screening of drugs for pharmacological and toxicological profile.
5) Carry out drug related literature search, formulate a research project and undertake he same. Apply appropriate statistical methods for summarizing and analyzing data.
6) Present research findings in conferences (oral / poster sessions), Communicate research / educational papers in peer reviewed journals, Critioally review and comment on research papers.
7) Measure drug levels in blood and other biological fluids using suitable chemical assay method and interpret the same in therapeutic / toxicological context.

8) Monitor adverse drug reactions. Carry out therapeutic audit and provide drug information service to doctors / public.
9) Use computer and IT tools for teaching, research and presentation / publication of data.
10) Demonstrate knowledge of National Health Policy, essential drug concept / lists and supervise drug management in a hospital.
11) Demonstrate knowledge of drug rules and regulations existing in the country.

Post Graduate Training:

Based on the available facilities, Department can prepare a list of postgraduate experiments pertaining to basic and applied Pharmacology. Active learning should form the mainstay of postgraduate training. There should be lectures for postgraduates (at least 20 per year) along with seminars, symposia, group-discussions, journal clubs. The postgraduate students should regularly go on the ward rounds of various clinical departments and lean cases of interest for discussion with the Pharmacology faculty. Each college should have a medical education unit to generate teaching resource material for U.G. and evolving problem solving modules.

Post-Graduate Examinations :-

The Post-graduate examinations should be in 3 parts:

1) **Thesis, to be submitted by each candidate at least 6 months before the date of commencement of the theory examination.**
2) **Theory: There shall be four theory papers – as given separately.**
3) **Practicals and Viva/Oral.**

Course Content :-

General Pharmacology :

History of Pharmacology, Pharmacokinetics, Phamacodynamics, Adverse Drug Reactions, Drug Interactions, Pediatric Pharmacology, Geriatric Pharmacology, Drugs in Pregnancy and Lactation. Dosage calculation in special situations, Factors modifying drug action, Pharmacokinetics, Drug delivery systems and Fixed dose combinations, Gene therapy, Sources of drugs. Principles of Toxicology, Principles of prescription writing.

Systemic Pharmacology, Chemotherapy and Therapeutics:

Pharmacology of drugs acting on automatic, peripheral and central nervous systems; cardiovascular, endocrine, respiratory, renal, gasterointestinal and haemopoietic systems and treatment of diseases affecting these systems; Pharmacology of anti-microbial and anti-parasitic drugs and treatment of infective diseases; cancer chemotherapy, immuno-pharmacology and ocular Pharmacology. Dermatological pharmacology vitamins, Heavy metals and antagonists, Miscellaneous.

Experimental Pharmacology, Bioassay:

Experimental methodologies involved in the discovery of drugs (in vivo, in vitro ex vivo). Animal handling and animal care. Methods of anaesthetizing animals and methods of euthanasia. Restraining and blood collection methods. Drug screening methods involved in the evaluation of anti-ulcer, antidepressant, anti-anginal, anti-hypertensive, anti-arrhythmic, anti-cataract, anti-platelet, anticancer, anti-inflammatory, anti-diarrheal, anti-epileptic, analgesic, anti-throid, antipyretic, anti-glaucoma, anti-hyperlipidemic, anti-asthmatic drugs and cough suppressants. Drug screening methods used in screening anti-fungal, anthelmintic, antibacterial and antiviral agents. Drug screening methods for heart failure, posterior pituitary, adrenal, steroid (gluco & mineralo), testicular, parathyroid, ovarian, thyroid hormones, Methods involved in testing teratogenicity, carcinogenicity and organ toxicities in animals. Bio-assay and dose response relationship.

Clinical Pharmacology and Biostatistics:

Principles of therapeutics, Individualisation of drug therapy, Drug regulatory systems, Placebo, Drug development, Pharmacoeconomics, Pharmacoepidemiology, Therapeutic drug monitoring, Ethics of clinical trial, Ethical committee, Drug utilization studies, Essential drug concept and rational drug use. Patient compliance.

Practical Training:-

Experimental Method Discussion:

A. Screening and Evaluation of Drug Activities including Animal Models for Study of following Actions:

1) Analgesic.
2) Antiinflammatory.
3) Antipyretic; pyrogen testing.
4) Anticonvulsant.
5) Antianxiety.
6) Antipyschotic.
7) Antidepressant.
8) Antiparkinsonian.
9) Sedative, hyponotics.
10) Actihypertensive.
11) Antianginal.
12) Antiarrhythmic.
13) Skeletal muscle relaxant.
14) Local anaesthetic.
15) Antihistaminics, Antiallergic.
16) Antisecretory & drugs for peptic ulcer.
17) Antiemetic.
18) Hypoglycaemic.
19) Antifertility.
20) Anticancer.
21) Diuretic.
22) Animalarial.
23) Antitubercular.
24) Antidiabetic.
25) Antiatherosclerotic.
26) Bronchodilator & anti-asthmatic drugs.

- -

B. Bioassay of :

1) Acetylcholine.
2) Adrenaline / noradrenaline.
3) Histamine.
4) 5- Hydroxytryptamine.
5) Insulin.
6) Antibiotics.
7) Digoxin.
8) Glucocorticoids

- -

C. Quantitative study of agonists and antagonists on isolated tissues.

D. Measurement of blood pressure in conscious and anaestherized animals.

- -

EXPERIMENTAL PHARMACOLOGY EXERCISES:-

1) Frog’s rectus abdominis muscle : dose response curve (DRC) and cumulative DRC of acetylcholine; potentiation of ACh by physostigmine and antagonism by tubocurarine / pancuronium.

2) Study of drug action on perfused frog’s heart.

3) Dose-response curve of histamine on isolated guineapig ileum, Cumulative dose response curve of histamine in isolated guinea pig tracheal chain.

4) Bioassay of histamine on guineapig ileum by matching method, 3 point method and 4 point (Latin square design) method.

5) Bioassay of ACh on frog’s rectus abdominis muscle.

6) Determination of EC50 and pD2 values of histamine and ACh on guineapig ileum and frog rectus abdominis muscles.

7) Bio-assay on estrogen primed rat uterus.

8) Demonstration of muscarinic and nicotinic actions of ACh and carbachol on the B.P. and respiration.

9) Study of local anaethetics by rabbit comea guineapig intradermal wheal, frog lumbar plexus.

10) Study of analgesic activity of drugs using rat tail-hotwire method, hot plate method, acetic acid induced writhing.

11) Study of analgesic activity of drugs against carraginin induced rat paw oedema.

12) Antagonism of histamine aerosol induced bronchospasm by anti-histaminics.

13) Effect of psychopharmacological drugs on conditioned avoidance response (Cook's pole climbing).

14) Effect of psychopharmacological agents on foot shock induced aggression in rats.

15) Effect of psychopharmacological agents on elevated plus maze.

16) Effect of drugs on spontaneous motor activity of mice, photoactometer.

17) Study of anorectic activity of amphetamine in mice.

18) Potentiation of barbiturate sleeping time.

19) Study of miotics and mydriatics on rabbit's eye.

Minor Procedures:

(i) Rat tail vein injection.

(ii) Administration of drugs to rats by gastric cannulla.

(iii) Collection of blood from rat tail.

(iv) Collection of blood by Cardiac puncture in rat.

(v) Injection of drugs through marginal ear vein of rabbits.

(vi) Intraperitoneal and subcutaneous injection to rats and mice.

Chemical Pharmacology Exercises :

1) Identification of unknown compounds by using chemical tests.

2) Estimation of drug levels using colorimetry, spectrophotometry, fluorimetry, flame photometry, high performance liquid chromatography (HPLC), enzyme linked immunoassay.

Clinical Pharmacology Exercises:

1) Training at poison information center.
2) Molarity calculations and preparations of reagents.

SCHEME OF TRAINING :-

I Year:

Duration	Department (Forenoon: 10-1 p.m.)	Department (Afternoon: 2-4.30 p.m.)
	Pharmacology.	Pharmacology.

a) Getting acquainted with the Department.
b) Attending all the classes.

Introduction to Dissertation including statistical classes.

Visits to Pharmaceutical Industries and Toxicology centres.

12^{th} month Selection & Planning of Dissertation.
Submitting the topic to the University.

II & III yr. will be spent by the student in the Department of Pharmacology wherein:

a) The Practical Training as specified by the M.C.I. will be given, depending upon the availability of animals & other facilities.

b) The student will acquire skills-

i) To conduct practical classes for the U.Gs.
ii) To take lectures for the U.Gs.
iii) To plan an undergraduate teaching programme & to set questions including MCQs.

c) The student will participate & contribute to other academic activities of the Department like Journal clubs, Seminars and CME programmes. Students will be, in addition, encouraged to attend conferences, workshops and present papers in scientific sessions.

PATTERN OF EXAMINATION: *

FOUR PAPERS – 100 Marks each 3 Hours duration each

Theory	**Title**	**Duration**	**Marks**
Paper -I	General Pharmacology Experimental Pharmacology Bioassay.	3 hrs.	100
Paper - II	Systematic Pharmacology Including Recent Advances.	3 hrs.	100
Paper - III	Clinical Pharmacology and Pharmacotherapeutics Including Recent Advances.	3 hrs.	100
Paper -IV	Applied Pharmacology, Forensic Pharmacology	3 hrs.	100
		Total	400

Distribution of Marks: **

2 Essays	2 x 20 = 40 Marks
10 Short Notes	10 x 6 = 60 Marks
	Total 100 Marks

*** 30 th SAB held on 28-12-2005 – March 2006 Examination onwards.**
**** 32 th SAB held on 21-12-2006 – March 2008 Examination onwards.**

SCHEME OF PRACTICAL EXAMINATION:

	Title	Duration	Marks
Practical-I	Isolated Tissue Experiment (Bioassay)	4 hrs.	80
Practical-II	A) Isolated Heart Experiments/ Evaluation of analgesic or Anti-inflammatory effect Local Anaesthetic or any other Evaluation Method.	3hrs.	50
	B) Simple Techniques: i) Involving small animals (Eg., Gastric feeding, taking Blood from small animals). (or) ii) Any other small procedures like giving anaesthesia to animals.	1 hr. 1 hr.	20
Practical-III	Toxicology Exercise: A) Identification of nature of One drug using chemical Methods. Example: Salicylates, Iron, Paracetamol, Sulphonamides, etc.	1 hr.	20
	B) Identify the nature of given Alkaloid using Biological methods.	2 hrs.	30
		Total Practical Marks	200
Pedagogy	(Maximum Marks)	50	
Oral/Viva		50	
	Total	100	

NOTE: No. of candidates to be examined 4 Per day for Practical / Viva

The given pattern of examination is a guideline. Depending upon the availability of animals and facilities, practical examination can be modified suitably.

DISSERTATION: **APPROVED / NOT APPROVED**
(No Marks)

** MARKS QUALIFYING FOR A PASS	MAXIMUM MARKS	QUALIFYING FOR A PASS 50% MARKS
Theory Examination	400	200
Practical Examination	200	100
Oral/Viva, Pedagogy (50+50)	100	No Minimum
Aggregate	700	350

****33th SAB held on 20-06-2007 - March 2008 Examination onwards.**

******