# Computer Assisted Learning in Practical Pharmacology for 2nd MBBS Students:

Curriculum of Pharmacology forms an integral part of medical education. It encompasses pharmacological actions, their mechanisms, indications, adverse effects, interactions and contraindications of drugs. In the past laboratory based practical classes showing drug effects on tissues or whole animal have been main method in curriculum of practical Pharmacology for 2nd MBBS. Animal experiments have become difficult due to problems of availability, procurement, cost, maintenance, use of animals and ethics regulations. Guidelines by Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA) and Medical Council of India (MCI), suggest '3 R' i.e. Reduction , Refinement and Replacement in animal experiments, with the 4th 'R'(Rehabilitation) added as an added measure for animal care. Using animals in research and experimentation has been debated and protested at different levels. Practical training with animal experiments were felt unnecessary by medical students and faculty as their learning objectives primarily focus on observational, analytical and interpretative skills, which are components of the cognitive but not psychomotor domain.

Recent years have seen revolution in training in practical pharmacology for undergraduates (UG). Innovative teaching approaches such as small group discussions, role plays, audio-visual aids and Computer Assisted Learning (CAL) have been adopted. The proposed new curriculum of MCI "Vision-2015" for undergraduates has suggested simulation labs for Pharmacology in UG curriculum. The required knowledge and skills should be imparted by using CAL, which is mandatory equipment. A welcome change in MCI recommendation insists that computerized learning should be an alternative to live animal experiments. This integrated multimedia software performs as animal simulators which closely mimics reality. It has computer based packages, focusing on interactive instructions in a specific subject area with a collection of animal experiments. One such CAL software from **Ex Pharm Series** is a good alternative. It has been found to be a good tool for experimental Pharmacology. Typically these techniques can fulfill the learning objectives of students to a greater extent to overcome the barriers.

**What is Experimental Pharmacology Series (Ex Pharm Series)**

This is a computer assisted learning package containing various programs which simulate animal experiments in Pharmacology. These programs can be used to demonstrate drug on different animals systems. The package is user friendly, highly interactive and full of animated sequences which make simulation appear realistic. The current version of Experimental Pharmacology Series (Ex-Pharm series) Software consists of following computer simulated experiments:

**Experiments List:**

1. Experiment on effects of various drugs ( Mydriatic, Miotic and Local Anaesthetic) on rabbit's eye.
   - Epinephrine
   - Atropine
   - Ephedrine
   - Physostigmine
   - Lignocaine

2. Study of Analgesic activity with the help of "Tail Flick Apparatus" (Analgesiometer).

3. Study of Antihistaminic drugs/Anti allergic drugs by mast cell stabilization method with the help of “Histamine Chamber”

4. Study of Muscle Relaxant activity with the help of "Rota-Rod Apparatus".

5. Study of CNS Depressents & Stimulants Using "Actophotometer".

6. Study of Analgesic activity with the help of "Hot Plate Apparatus" (Analgesiometer).

7. Effect of Different Drugs (Including Saline Purgatives) on Cilliary Motility of Frog Oesophagus.

8. Study of Drugs acting on CNS (Including Anxiolytic Activity) using following modules
   - Elevated Plus Maze Method
   - Pole Climbing Method

9. Study of anticonvulsant activity using "Electro Covulsiometer".

10.Experiment on Effect of various drugs on Isolated Frog's Heart. (DRC- Dose Response Curve)
   - Epinephrine
   - Norepinephrine
   - Isopreneline
   - Calcium Chloride
   - Prapanolol
   - Actyelcholine
   - Potassium chloride
   - Atropine sulphate

11. Experiment on Bioassay of Histamine on the Ileum of Guinea Pig.

12. Simulation of pupil control
   - Simulation of the effects of the physiological stimuli and drugs on the papillary reflexes.
   - Simulation of the control in patient with partial parasymathectomy.

13. Experiments on Lagendorff's Apparatus
- Effect of coronary vasodilators on isolated heart

- Effect of parasympathomimetics.

14. Test for pyrogens using rabbits.

15. Experiments on effect of different drugs on Dog BP & Heart Rate.
- The Effect Of Epinephrine, Acetylinecholine, Atropine On The Arterial Pressure (Dog-Blood Pressure).
- Simultaneous analysis of effect of different drugs on Dog Heart Rate and Blood Pressure.

16. Effect of drugs on isolated guinea pig ileum (in-vitro).

17. To Study Respiratory depression effect on rabbit.

18. Experiments on oedema formation in rabbit skin

19. Experiments on colonic motility in rat in vitro.

20. Experiments on thyroid and antithyroid drugs

- The effect of thyroxin, TSH, propylthiouracil, on metabolism.

21. Experiments on blood sugar

- The effect of insulin (hypoglycemic activity) and alloxan on blood glucose.

22. Bioassay of Acetylcholine on the isolated rectus abdominis muscle of frog
- By Matching Method
- By Interpolation Method
- By 3 Point Method
- By 4 Point Method

23. Bioassay of oxytocin on the isolated rat uterine horn by following methods
- By Matching Method
- By Interpolation Method
- By 3 Point Method
- By 4 Point Method

24. Bioassay of serotonin on the isolated rat fundus strip by following methods
- By Matching Method
- By Interpolation Method
- By 3 Point Method
- By 4 Point Method

25. To record the dose response curve and to determine the PD2 value for acetylcholine on frog rectus abdominis muscle.

26. Study of anti-inflammatory activity using carrageenan induced paw oedema method

27. To study PTZ induced convulsions in mice

28. Study of diuretic activity using metabolic cage

29. To study analgesic activity by writhing test.

30. Study of anti ulcer activity - using pylorus ligation method.

CAL (Computer Assisted Learning) is good replacement to live animal experiments for 2nd MBBS students. It helps the students to understand concepts of drug actions, ADR and their choice. It is an interesting study tool equally acceptable to students & faculty. It reinforces lectures and provides an enriching experience of learning.