Animals and animal cells in Research technology

SHIVAJI UNIVERSITY KOLHAPUR

Laboratory animals in methodology research Paper I Laboratory Animals in Biotechnology

I Animal Care and Management of Laboratory Animals

- Rat
- Mouse
- Rabbit
- Guinea pig
- i) Animal House Necessities Design and maintenance:
 - Infrastructure, Cages, Conditions and other requirements for Maintenance, Biology of four laboratory animals
- ii) Breeding cycles and breeding and maintenance
- iii) Nutritional requirements for normal breeding and maintenance
 - Modifications for nutritional experimental work (at least two examples Viz protein deficient diet and supplementation)

II Animal ethics and associated laws and issues

III Physiological models and their use in drug testing

- A. Testing for Endocrinological and Reproductive Biological studies
 - *In vivo* studies of estrous cycle, implantation, pregnancy
 - Gonadectomy, Adrenalectomy, Hypophysectomy, and Sham operated rats
 - Harmonal supplementation studies
- B. For liver toxicity (acute, chronic, cirrhosis)
 - Drug induced liver toxicity
 - CCl4 model, paracetamol model, cirrhosis model
- C. Aging Models:
 - Drug induced models (Galactosamine)
 - Naturally aged animals
- D. Models for diabetis
 - Physiological models
- E. Hyper cholesterolemia Models
 - Thyroidectomized rat
 - Drug induced (sodium cholate) rats
- F. Models to study immunological phenomena

- Paw oedema
- Granulomata
- Hypersensitivity models
- Surgical models
 - Thymectomy
 - Spleenectomy
- G. Other animal models
 - Angiogenesis in chick
 - Chick as developmental model

III New Trends in Animal Experimental Biology

- i) Cloned animals and their use :
 - Preparation of the cloned animals and maintenance
- ii) Genetically engineered animals and their use
 - To develop and maintain
 - Transgenic animals
 - Knock out animals.

SHIVAJI UNIVERSITY KOLHAPUR

Animal Biotechnology

Paper II Animal Cells in Biotechnology

I Equipments and Materials for animal Cell Culture Technology

- Basic Aseptic Techniques
- Design of Tissue Culture Laboratory
- Equipments : Laminar Flow Hoods, CO2 incubator, Open and closed cultures, Microscopes, centrifuge, Refrigerators and Freezers, pipetting aids, Miscellaneous small items of Equipments, Materials, filters, Miscellaneous Items.

II. Characters of cells :

- Cells in primary culture
- Established Cell lines
- Tumor/cancer originated cells

III Nutritional Requirements of Cells and growth media

- Basal salt solution (BSS)
- Minimum Essential Medium
- Serum dependent defined media
- Serum independent defined media Cell specific media

IV. Basic Techniques of mammalian cell culture

- Primary Cell culture Isolation and separation of cells, viable cell count, maintenance of cell culture
- Types of cell cultures
 - a. Monolayer
 - b. Suspension
 - c. Clone culture
 - d. Mass culture-microcarrier culture (monolayer)
 - e. Stem cell culture

V. Biology and Characterization of cultured cells

- Contamination Testing of Culture
- Viability measurement and cytotoxicity

- Measurement of growth parameters
- Cell cycle analysis and Synchronization of cultures

VI Cell surgery Methods

- Preparation of anucleated cells and polykaryon cells
- Preparation of ghost RBCs.
- Preparation of mini cells, microcells
- Surgical manipulation of *in vitro* fertilization

VII Cell Fusion Methods

- Fusogens :
 - Virus induced'
 - Chemical induced
 - Liposome induced (Preparation of liposomes and use)
- Hybridoma cell preparations and their properties
- Use of Hybridoma technology: eg. M AB and other related techniques
- Mini cells, micro cells and anucleated cells in fusion and their application.

VIII. Tissue Engineering :

- Capillary culture Units
- Techniques for culturing differentiated cells : Reconstituted basement membrane rafts, feeder layers.

IX. Applications of Animal Cell Culture

- Evaluation of Chemical carcinogenicity, Cell malignancy Testing
- Toxicity Testing, Karyotyping and cytogenetic characterization

Practicals based on

Paper I Laboratory Animals in Biotechnology

- 1. Handling and feeding of the animals
- 2. To study estrous cycle and breeding
- 3. Gonadoctomy and Steroidal hormone supplementation study
- 4. CCl4 toxicity in vivo and in vitro
- 5. Paracetamol toxicity in vivo and in vitro
- 6. Studies of drug induced and natural ageing
- 7. Study of Diabetes Models
- 8. Study of Surgical and drug induced hypercholesterolemia in rat
- 9. Studies of Paw Edema in rat
- 10. Studies of granulomata in rat
- 11. Studies of Hypersensitivity models
- 12. Spleenectomy
- 13. Study of Angiogenesis in chick
- 14.Study of brain development in chick

Practicals based on

Paper II

Animal Cells in Biotechnology

- 1. Preparation of glass wares for cell culture
- 2. Isolation of cells by enzyme digestion
- 3. Separation of cells by suitable methods
- 4. Viable cell count
- 5. Primary cell culture and its maintenance
- 6. Measurements of growth parameters
- 7. Cell cycle analysis
- 8. Karyotype studies

OR

In lieu of practical project.

Reference:

1. Bruce Albert et al "Molecular Biology of the Cell"

2. Cell and Tissue Culture

3. Methods in enzymology (Cell culture) Rrelated websites on internate