

CELL BIOLOGY LABORATORY

Research Area:

It is now the well identified field of prime interest with technology development towards bioengineering of epidermis and composite skin for various clinical applications as the basic focus of this laboratory. Because in today's open market economy development of various patentable medical technologies keeping in mind both common man's reach and sustainability in the existing market is very much required. An innovative and cost-effective process of growing human epidermis *in vitro* has been identified and a patent filed from this laboratory. The process not only was proven to stimulate the proliferation of epidermal stem cells but could also be extended to other stem cells as well. Scaling up the production of fool-proof attenuated feeders using Bio-reactor process is being considered. The preliminary clinical application of the cultured epidermis in burns patients yielded very encouraging results. Currently efforts are on to extend and upgrade the laboratory towards bringing out a specialized Pharmaceutical-grade GMP facility suitable for the complex long-term culture technique of growing cultured epithelial autografts enabling larger trials in burns patients.

Additionally, the laboratory is involved with collaborative technological strategies towards development of simpler but efficient expansion of epidermal keratinocyte stem cells using a novel synthetic hydrogel developed by Japanese scientists. Further research assignment involved validation of a guinea pig model for preclinical evaluation of treatment modalities in vitiligo. The other focuses of the investigating team are towards understanding the molecular mechanisms underlying the developed techniques.



Staff of Cell Biology Lab:

Dr. Lakshmana K. Yerneni, Ph.D

Scientist 'D'

Mr. Bijender Kumar (ITI)

Technician 'B'

Mrs. Charanjeet Kaur

Attendant

Mr. Rishi Man Chugh, M.Sc.

Senior Research Fellow (ICMR)

Mr. Madhusudan Chaturvedi M.Sc.

Doctoral Fellow (NTS)

Mr. Dharmender Singh

Lab Attendant (Project)

Technical capabilities at Cell Biology Lab:

Cell and Molecular Biology –

- Cell and Tissue culture, Colony forming assay and plating efficiency of keratinocytes, Karyotyping, Histological, and Immunofluorescent Immunohistochemical methods
- 3-D dermal equivalent using scaffolds & Bioengineered models of skin
- Microbial culture methods and detection of Mycoplasma in cell culture
- In Vitro quantification assays for cell proliferation by BrdU labeling and Cells expressing specific marker using Image analysis software
- Quantification of biomolecules by spectrophotometry
- Electron Microscopy - Scanning and Transmission
- PAGE & SDS-PAGE, PCR & agarose gel electrophoresis, RT-PCR & Western Blot

Small animals experimentation –

- Drug Toxicity evaluation in mice
- Pigmentation & depigmentation (vitiligo) experiments in guinea pigs
- Induction of melanoma in C57 mice using B16 murine melanoma cells

Awards:

1. Received Shri Shyam Lal Saxena Memorial Award (2006) in the field of **Bio-Medical Engineering** by the National Academy of Medical Sciences (NAMS, India).
2. Awarded WHO In-country Fellowship in the field of study of 'Research Methodology' at the **National Institute of Cholera and Enteric Diseases**, Kolkata between 8th and 21st November 2004.

Extra-Mural Research Projects Sanctioned to date:

1. *In vitro* cultivation of differentiated epidermis from human keratinocytes suitable for autologous grafting in burns patients. (2000)
2. Clinical application of autologous cultured human epidermis in burns patients. (2004)
3. Cell culture contamination with mycoplasma in basic and applied biomedical research. (2005)
4. Investigation into the utility of a patented synthetic thermo-reversible hydrogel polymer as supportive matrix towards the development of 3-D composite skin for application in wound healing and other dermatological disorders. (2007)
5. A novel arithmetic approach for fool-proof production of growth arrest in 3T3 cells suitable for human epidermal culture (Sanctioned 2010).

Patent: (Filed)

Yerneni LK and Ashok Kumar (2009) A culture system for the growth of stem cells. Indian Patent filed. File No. 2086/DEL / 2009.