Dr. L. SIVAKUMAR. M.Sc., Ph.D., DCA., PDF (USA).
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Curriculum Vitae and Research interests

Graduated from The University of Madras, Chennai, India in 2004. After graduation, joined as Post doctoral research associate in Hillman Cancer Center, University of Pittsburgh, Pennsylvannia, USA and, moved to Department of Medicine, University of Chicago, IL, USA in Oct 2005. In Aug. 2013 joined as Assistant professor in Periyar University, Salem in the Department of Environmental Science.

The long term goals of my research program are to (i) develop the transgenic *Caenorhabditis elegans* as a model system to rapidly assess the role of cancer specific gene mutations in the context of a whole organism (ii) understand the signaling cascades associated with the development of non small, small cell lung cancer and mesothelioma to allow the development of specific targeted inhibitors and diet-based preventive strategies; (iii) translate laboratory observations to the bedside and (iv) identify useful markers for various cancers including lung cancer that will allow precise early diagnosis and predict progression. To achieve these current research goals we identify and develop compounds targeting multiple signal transduction pathways (MSTP) using an integrated approach comprising of *in vitro* cell culture models and *in vivo* animal models includes whole animal imaging, genomics and proteomics, siRNA and miRNA technologies.

Studies from our previous laboratory showed (i) specific inhibitors inhibits the growth of lung cancer and mesothelioma cells through induction of apoptosis using cell culture models; (ii) prevents the development of pre-neoplastic lesions of mouse lung cancer model that represents various stages of human lung cancer development; (iii) understanding the structure activity relationship of these small molecules to increase their efficacy and longevity has led to the development of several analogues of specific inhibitors that target oncogenes including receptor and non-receptor tyrosine kinases mediated cell survival signaling pathway. Studies are in progress to understand the molecular events associated with deregulation of c-Met, EGFR, VEGFR, RON, KIF14, PAX, PKCβ and Akt signaling, interaction and mutation during the development of lung cancer and mesothelioma.

To achieve the above goals, we are interested in studying the small round worm, the nematode *C. elegans*, a simple organism in which apoptotic cells are easily recognizable, genetic manipulations are well-established and transgenic strains which carry extra copies of genes (overproducers) to study the receptor and non-receptor tyrosine kinase mutants structure and function which we found in non-small, small cell lung cancer cell lines and tissue biopsies. We also interested in screening the small molecule inhibitors and environmental pollutants by highthroughput fashion in *C. elegans*.

We defined several novel targets in oncology, and leads a strong clinical and research group and developing potential biomarkers that would be useful for early diagnosis, linkage to prognosis, and therapeutic monitoring in these diseases.

Positions:

2005 - 2010: Post Doctoral Research Associate, University of Chicago, USA.

2004 - 2005: Post Doctoral Research Associate, University of Pittsburgh Cancer Center, USA.

1999 - 2004: Research Fellow, Dr.ALM PGIBMS, University of Madras, India

Education:

1998 - 2004: PhD.* Pharmacology & Environmental Toxicology, Dr.ALM PGIBMS, University of Madras, Taramani, India

1996 - 1998: M.Sc. Zoology - The New College, Chennai, University of Madras, India

1992 - 1995: B.Sc. Zoology - Kongunadu Arts & Science College, Bharathiar University, India

*__Title of the Ph.D. Thesis:__

Anticancer and Antioxidant effects of *Solanum xanthocarpum* alone and in combination with Cisplatin in N-Nitrosodiethylamine induced Hepatocellular carcinoma in rats.

Awards/Honors:

- Dr. Indira Vasudevan Award for the best research paper in cancer and its prevention for the year 2003 instituted by Indian Association of Biomedical Scientists **(IABMS)** conference held in Defense Research and Development Organization **(DRDO)** campus, Delhi, India.
- Travel Grants have been awarded by the Journal of Thoracic Oncology in Chicago Multidisciplinary Symposium in Thoracic Oncology 2008, Chicago, USA.
- Recipient of Tamilnadu state Government Scholarship for the year 2002.
- Recipient of **UGC** herbal sciences project award in 2003.

Patent: Pending - International

High-throughput screen for modulators/small molecule inhibitors in *Caenorhabditis elegans.*

Projects Investigated:

11/2005 – 2010:

NIH - Role of c-Met in SCLC and potential for novel therapy (5RO1CA100750-06).

NIH - Studies of a novel therapeutic target in non-small cell lung cancer (5RO1CA125541-03).

NIH - Role of Paxillin in lung cancer (5RO1CA129501-02).

Lilly pharmaceuticals – Enzastaurin (LY317615) in thoracic malignancies – NSCLC, SCLC and MPM.

10/2004 – 11/2005:

NCI - Dietary agents on pancreatic cancer (USPHS RO1CA106953).

Membership in Professional Societies:

2004 – Present: Associate member in American Association for Cancer Research **(AACR)**

2004 – Present: American Association of Thoracic Oncology

2007 – Present: International Mesothelioma Interest Group **(IMIG)**

2006 – Present: Mesothelioma Applied Reasearch Foundation **(MARF)**

2006 – Present: MicroRNA club, University of Chicago, USA

2001 – 2005 : Indian Association of Biomedical Scientists **(IABMS)**

Member, Review Editor - Editor for the Special issue. Aayvagam an International Journal of Multidisciplinary Research, Salem-636011. ISSN (Online): 2321 – 5259, ISSN (Print): 2321 – 5739.

Teaching Graduate Courses: Taught Graduate Courses in Genetics, Biochemistry, Molecular Biology, Pharmacology and Toxicology; Dr. ALM PG IBMS, University of Madras: 2000 – 2003. Graduate and Undergraduate Courses in Biology, Molecular Biology, Ecological Engineering, Pharmacology, Genetics, Drug Delivery, Physiology and Cell Biology at University of Chicago, 2005-2009. Supervisor PSOMER summer student's research program for underrepresented minority communities: Pritzker School of Medicine, University of Chicago, Dept of Medicine, 2007-2010.

Publications:

1. Shahid S. Siddiqui*, Gias U. Ahmmad, **Sivakumar Loganathan**, Fathy M. El-Faskhany, Zeba K. Siddiqui, Faisal A. Allaf, Hanadi A. Lamfoon, Mohammad M. Beyari. Microtubule Based OSM3 Family Kinesin-2 Motors are Involved in Endocytosis in Endothelial Cells. **Clinical Medicine and Diagnostics** 2014, 4(1A): 8-14.

2. Shahid S. Siddiqui*, **Sivakumar Loganathan**, Fathy M. El-Faskhany, Faisal A. Allaf , Zeba K. Siddiqui, Hanadi Lamfon, Mohammad Beyari. Overexpression of Cytokinesis Mediating Kinesin Motor KIF14 in Recurring Head and Neck Cancer: Implications for Regulation by MicroRNAs. **Clinical Medicine and Diagnostics** 2014, 4(1A): 1-7.

3. Loganathan S, Kandala PK, Gupta P, Srivastava SK. Inhibition of EGFR-AKT Axis Results in theSuppression of Ovarian Tumors In Vitro and in Preclinical Mouse Model. **PLoS One.** 2012;7(8):e43577. Epub 2012 Aug 27.

4. Loganathan S, Kanteti R, Siddiqui SS, El-Hashani E, Tretiakova M, Vigneswaran H, Cervantes G, Natarajan V, Husain AN, Vokes EE, Kindler HL, Salgia R. Role of protein kinase C β and vascular endothelial growth factor receptor in malignant pleural mesothelioma: Therapeutic implications and the usefulness of *Caenorhabditis elegans* model organism. **J Carcinog. 2011 Mar 3;10:4.**

5. Kanteti R, Nallasura V, **Loganathan S**, Tretiakova M, Kroll T, Krishnaswamy S, Faoro L, Cagle P, Husain AN, Vokes EE, Lang D, Salgia R. PAX5 is expressed in small-cell lung cancer and positively regulates c-Met transcription. Lab Invest. 2009 Mar;89 (3):301-14.

6. Krishnaswamy S, Kanteti R, Duke-Cohan JS, **Loganathan S**, Liu W, Ma PC, Sattler M, Singleton PA, Ramnath N, Innocenti F, Nicolae DL, Ouyang Z, Liang J, Minna J, Kozloff MF, Ferguson MK, Natarajan V, Wang YC, Garcia JG, Vokes EE, Salgia R. Ethnic differences and functional analysis of MET mutations in lung cancer. **Clin Cancer Res**. 2009 Sep 15;15 (18):5714-23.

7. S Charoenthammaraksa, M Tretiakova, L Faoro, **S Loganathan**, R Salgia, T Krausz, AN Husain. Expression of Focal Adhesion Kinase (FAK), Phosphorylated Focal Adhesion Kinase (pFAK) and Paxillin in Malignant Pleural Mesothelioma (MPM). **LABORATORY INVESTIGATION**, 2009. Vol.89, Pages 350A-351A.

8. Faoro L**, Loganathan S**, Westerhoff M, Modi R, Husain AN, Tretiakova M, Seiwert T, Kindler HL, Vokes EE, Salgia R. Protein kinase C beta in malignant pleural mesothelioma. **Anticancer Drugs**. 2008 Oct;19 (9):841-8.

9. Siddiqui SS, **Loganathan S**, Krishnaswamy S, Faoro L, Jagadeeswaran R, Salgia R. *C. elegans* as a model organism for in vivo screening in cancer: effects of human c-Met in lung cancer affect *C. elegans* vulva phenotypes**. Cancer Biol Ther.** 2008 Jun; 7 (6):856-63. **(Equal first author and work was featured on the cover page of the journal).**

10. M Westerhoff, L Faoro, **S Loganathan**, R Salgia, T Krausz, AN Husain. Immunohistochemical (IHC) expression of c-Met receptor tyrosine kinase (c-Met) has prognostic significance and its activation is related to phosphorylated protein kinase c beta (p-PKC beta) in malignant mesothelioma (MM). **LABORATORY INVESTIGATION**, 2008 Vol. 88, Pages, 353A-353A.

11. Jagadeeswaran R, Surawska H, Krishnaswamy S, Janamanchi V, Mackinnon AC, Seiwert TY, **Loganathan S**, Kanteti R, Reichman T, Nallasura V, Schwartz S, Faoro L, Wang YC, Girard L, Tretiakova MS, Ahmed S, Zumba O, Soulii L, Bindokas VP, Szeto LL, Gordon GJ, Bueno R, Sugarbaker D, Lingen MW, Sattler M, Krausz T, Vigneswaran W, Natarajan V, Minna J, Vokes EE, Ferguson MK, Husain AN, Salgia R. Paxillin is a target for somatic mutations in lung cancer: implications for cell growth and invasion. **Cancer Res.** 2008 Jan 1; 68 (1):132-42.

12. Kanteti, Rajani; Nallasura, Vidya; Wang, Cindy; Hasan, Rabia; **Loganathan, Sivakumar**; Jagadeeswaran, Ramasamy; Husain, Aliya; Lang, Deborah; Salgia, Ravi. The role of Pax transcription factors in lung carcinogenesis: relationship to c-Met receptor tyrosine kinase: P2-126. **Journal of Thoracic Oncology**. 2 (8):S541, Aug 2007.

13. L Faoro, **S Loganathan**, A Husain, M Westerhoff, V Janamanchi, E Vokes, R Salgia. Expression of protein kinase C beta (PKCß) as a prognostic marker in non-small cell lung cancer (NSCLC) and mesothelioma. **ASCO Annual Meeting Proceedings** Vol.25, Issue 18, suppl. Pages 7656, 2007/6.

14. Jagadeeswaran, Ramasamy; Zumba, Osvaldo; Krishnaswamy, Soundararajan; Janamanchi, Varalakshmi; Seiwert, Tanguy Y; **Loganathan, Sivakumar**; Kanteti, Rajani; Nallasura, Vidya; Faoro, Leonardo; Vokes, Everett E.; Salgia, Ravi. Focal

adhesion paxillin induces nodular cell growth, invasion, and angiogenesis in lung cancer: P2-124. **Journal of Thoracic Oncology**. 2(8):S540, Aug. 2007.

15. Ramasamy Jagadeeswaran, Osvaldo Zumba, Soundararajan Krishnaswamy, Varalakshmi Janamanchi, Tanguy Y Seiwert, **Sivakumar Loganathan**, Rajani Kanteti, Vidya Nallasura, Leonardo Faoro, Everett E Vokes, Ravi Salgia. Focal adhesion paxillin induces nodular cell growth, invasion, and angiogenesis in lung cancer: **Journal of Thoracic Oncology**, 2007. Vol. 2, Issue 8, Pages S540.

16. M Westerhoff, L Faoro, **S Loganathan**, M Tretiakova, R Salgia, T Krausz, AN Husain. Immunohistochemical expression of protein kinase C (PKC) beta in non small cell lung cancer (NSCLC) and mesothelioma. **LABORATORY INVESTIGATION**, 2007. Vol. 87, Pages 334A-334A.

17. Rajani Kanteti, Vidya Nallasura, Cindy Wang, Rabia Hasan, **Sivakumar Loganathan**, Ramasamy Jagadeeswaran, Aliya Husain, Deborah Lang, Ravi Salgia. The role of pax transcription factors in lung carcinogenesis: relationship to c-Met receptor tyrosine kinase: **Journal of Thoracic Oncology**, 2007, P2-126.

18. Zhang R, **Loganathan S,** Humphreys I, Srivastava SK. Benzyl isothiocyanate-induced DNA damage causes G2/M cell cycle arrest and apoptosis in human pancreatic cancer cells. **J Nutr.** 2006 Nov; 136 (11):2728-34.

19. Ruifen Zhang, **Sivakumar Loganathan**, Jeffrey Richards, Sanjay K Srivastava. Role of Cdc25C phosphatase in benzyl isothiocyanate-mediated G2/M arrest in pancreatic cancer cells. **Proceedings of the American Association for Cancer Research**, 2006. Vol. 2006, Issue1, Pages 1313.

20. **Sivakumar Loganathan**, Ruifen Zhang, Jeffrey Richards, Sanjay K Srivastava. Role of reactive oxygen species in phenethyl isothiocyanate induced apoptosis in human ovarian cancer cells. **Proceedings of the American Association for Cancer Research**, 2006. Vol. 2006, Issue 1, Pages 1314.

21. **Sivakumar Loganathan**, Ian Humphreys, Sanjay K Srivastava. Antiproliferative effects of phenethyl isothiocyanate Against human ovarian cancer cells via inhibition of epidermal growth factor receptor. **Proceedings of the American Association for Cancer Research**, 2005. Vol. 2005, Issue1, Pages 1226.

22. Ian Humphreys, **Sivakumar Loganathan**, Sanjay K Srivastava. Capsaicin induces apoptosis in human pancreatic cancer cells by activating mitochondrial death pathway. **Proceedings of the American Association for Cancer Research**, 2005. Vol. 2005, Issue1, Pages
579.

23. Sivakumar L and M P Balasubramanian. Antioxidant Property of Arogyavardhini, an indigenous formulation on CCL_4 induced liver in albino rats. **J. Ecotoxicol. Environ. Monit**.13 (3) 215-218(2003).

24. Sivakumar L and M P Balasubramanian. Toxic and Sublethal effects of detergents on the freshwater fish *Oreochromis mossambicus*. **J. Ecotoxicol. Environ. Monit.**13 (4) 255-259 (2003).

Contributed Papers at National, International conferences & professional newsletters:

1. A study on growth of the earthworm *Lampito mauritii* in soil containing different wastes in National Seminar on Frontiers in Environmental Research and Applications (FERA 2014), FERA 2014, February 18, 2014 organized by the Department of Environmental Science, Periyar University, Salem.

2. Germline c- met Juxtamembrane domain mutations in human lung cancer afeect *C. elegans* vulva phenotypes in National Seminar on Frontiers in Environmental Research and Applications (FERA 2014). FERA 2014, February 18, 2014 by the Department of Environmental Science, Periyar University.

3. National Seminar on "Current Zoology" held on January 21, 2014 organized by Department of Zoology, Periyar University, Periyar Palkalai Nagar, Salem – 636 011, Tamil Nadu.

4. Seminar on "*Trends in Protein Engineering*" held on November 21, 2013 at Department of Zoology, Periyar University, Periyar Palkalai Nagar, Salem, Tamil Nadu, India.

5. National Workshop on "*Fluorescent Microscopy*" held on October 10, 2013 at Department of Zoology, Periyar University, Periyar Palkalai Nagar, Salem, Tamil Nadu, India.

6. Gaithuilung, R., P. Senthilkumar, P. Jayanthi, **L. Sivakumar** and P. Thangavel (2014) Impact of invasive species on biodiversity. National Seminar on "Current Trends in Biodiversity Conservation and Forest Management (CTBCFM 2014)" held on January 06-07, 2014 organized by Centre for Biodiversity and Forest Studies, Periyar University, Periyar Palkalai Nagar, Salem – 636 011, TN, India. Abstract No. AB-43 Page 69.

7. Book of Abstracts in *"Frontiers in Environmental Research and Applications (FERA 2014)"* edited by S. Venkatesan, P.Thangavel, **L. Sivakumar**, P. Senthilkumar and P. Jayanthi, Printed at Kaandhal Acchu Kalaiyagam, Salem – 4. Total Pages 116

8. Shahid S. Siddiqui, **Sivakumar Loganathan**, Ravi Salgia. Inhibition of TPA-1 protein kinase C by enzastaurin :implications for lung cancer and mesothelioma. 17th International *C. elegans* meeting. June 24-28,2009, University of California, Los Angeles, USA.

9. Rajani Kanteti, **Sivakumar Loganathan**, Soundararajan Krishnaswamy, Leonardo Faoro, Deborah Lang, Everett Vokes, and Ravi Salgia. Expression and Function of PAX5 Transcription Factor and Regulation of c-MET in SCLC-Potential for Novel Biomarkers and Therapeutics. **AACR** Meeting LB-119, April 18-22, 2009, Denver, CO, USA.

10. Sivakumar Loganathan, Shahid S. Siddiqui, Hedy Kindler, Ravi Salgia. *C.elegans* as a model system to evaluate genetic alterations in MPM, and the genetic-environmental interactions/effects of asbestos. **IMIG**, Sep 25-27, 2008, Amsterdam, The Netherlands.

11. Sivakumar Loganathan, Shahid S. Siddiqui, Ravi Salgia. Human MET and juxtamembrane domain mutations in lung cancer affect *C. elegans* vulva phenotypes: role of *C. elegans* as a model organism for *in vivo* screening in cancer. AACR Annual Meeting (Abstract #443). April 18-22, 2009, Denver, CO, USA

12. Sivakumar Loganathan, Ramasamy Jagadeeswaran, Leo Faoro, Ravi Salgia. Inhibition of PKC β in Malignant Pleural Mesothelioma (MPM). Mesothelioma Applied Reasearch Foundation **(MARF)** 2008, Washington DC, USA.

13. Kanteti R, Nallasura V, **Loganathan S**, Krishnaswamy S, Faoro L, Ramasamy Jagadeeswaran Vokes EE, Salgia R. Expression and function of Pax 5 Transcription factor in SCLC. **ASTRO** 2008, Chicago, USA.

14. Sivakumar Loganathan, Shahid S. Siddiqui, Ravi Salgia. Germline c-Met Juxtamembrane domain mutations in lung cancer elicit abnormal vulval phenotypes in *C.elegans* and synergize with nicotine:implications for cancer development. **ASTRO** 2008, USA.

15. Aliya Hussain, **Sivakumar Loganathan** et al. Role of c-Met in lung cancer. Sixth congress of Lung cancer. May 20-24, 2008. Chicago, USA.

16. Leonardo Faoro, **Sivakumar Loganathan**, Ravi Salgia. Protein kinase c beta (PKC β) in malignant pleural mesothelioma. American Society of Clinical Oncology **(ASCO)**. June 1-5, 25:18:25,2007. Chicago, USA.

17. Leonardo Faoro, **Sivakumar Loganathan**, Maria Westerhoff, Aliya Husain, Everett Vokes, Hedy Kindler, Ravi Salgia. Expression of protein kinase C beta (PKC ß) as a prognostic marker in malignant mesothelioma. Mesothelioma Applied Reasearch Foundation **(MARF)** 2007.

18. Ramasamy Jagadeeswaran, Hanna Surawska, Soundararajan Krishnaswamy, Varalakshmi Janamanchi, A Craig Mackinnon, Tanguy Y. Seiwert, **Sivakumar Loganathan**, Rajani Kanteti, Trevor Reichman, Vidya Nallasura, Maria Tritiakova, Salman Ahmed, Osvaldo Zumba, Lioubov Soulii, Vytas P. Bindokas, Livya Szeto, Mark W. Lingen, Thomas Krausz, Wickii Vigneswaran, Viswanathan Natarajan, Everett E. Vokes, Mark K. Ferguson, Aliya Hussain, Ravi Salgia. The focal adhesion paxillin is a target for somatic mutations in lung cancer: implications for enhanced cell growth and invasion. **AACR** Annual Meeting 2007 (Abstract #358). Los Angeles, CA, USA.

19. Nallasura, Vidya; Ramasamy, Jagadeeswaran; Seiwert, Tanguy; Janamanchi, Varalakshmi; **Loganathan, Sivakumar**; Zumba, Osvaldo; Surawska, Hanna; Trevor, Reichman; Krishnaswamy, Soundararajan; Salgia, Ravi. Therapeutic Targeting of c-MET in Lung Cancer Cell Lines and *invivo* Mouse Models. The Fourth International Chicago Symposium on Malignancies of the Chest and Head & Neck, October 25- 28, 2006, Chicago, IL, USA.

20. Krishnaswamy, Soundararajan…… **Sivakumar Loganathan** et al. Mutations and Functional Analysis of c-Met in Lung Cancer. The Fourth International Chicago Symposium on Malignancies of the Chest and Head & Neck, October 25-28, 2006

21. Sivakumar Loganathan, Ruifen Zhang, Jeffrey Richards, Sanjay K. Srivastava. Role of reactive oxygen species in phenethyl isothiocyanate induced apoptosis in human ovarian cancer cells. **AACR** 2006 (Abstract #1314). Anaheim, California, USA.

22. Ruifen Zhang, **Sivakumar Loganathan**, Jeffrey Richards, Sanjay K. Srivastava. Role of Cdc25C phosphatase in benzyl isothiocyanate-mediated G2/M arrest in pancreatic cancer cells. **AACR** 2006 (Abstract #1313). Anaheim, California, USA.

23. Sivakumar L, Ian Humphreys and Sanjay K Srivastava. Antiproliferative effects of phenethyl Isothiocyanate against Human Ovarian Cancer Cells via Inhibition of Epidermal Growth Factor Receptor. **AACR** Annual meeting 2005 (Abstract # 5194), Anaheim, California, USA.

24. Ian Humphreys, **Sivakumar L** and Sanjay K Srivastava. Capsaicin induces apoptosis in human pancreatic cancer cells by activating mitochondrial death pathway. **AACR** Annual meeting 2005 (Abstract #579), Anaheim, California, USA.

25. Sivakumar L, R D Gomathi and M P Balasubramanian. Anticancer potentiating effect of ethanolic extract of *Solanum xanthocarpum* alone and in combination with Cisplatin in N-nitrosodiethylamine induced hepatocellular carcinoma in rats. Indo-Australian Conference on Biotechnology in Medicine, Feb 9-11, 2004. Indian Institute of Science **(IISc)**, Bangalore, India.

26. Sivakumar L and M P Balasubramanian. *Solanum xanthocarpum* extract alone and in combination with Cisplatin on cell membranes and derranged carbohydrate metabolism in N-Nitrosodiethylamine induced hepatocellular carcinoma in rats. International Conference on the role of Indian systems of medicine and Homeopathy in the 21st Century held in Chennai on February 1-2, 2003, Govt. Siddha Medical College and Hospital, Arumbakkam, Chennai, India.

27. Sivakumar L and M P Balasubramanian. Biochemical changes in hepatopancreas and muscle of *Penaeus monodon* exposed to fenvalerate in National Symposium on Physiology and Biochemistry of Cultivable crustaceans. Feb.18-19, 2002, University of Madras, Chennai, India.

<u>Conference/Seminar/Workshop participated:</u>

AACR Annual meeting 2009, Denver, CO, USA.

C. elegans and genomics, workshop, Aug. 10-25, 2009, University of Texas, Denton, USA

International Mesothelioma Interest Group **(IMIG)** meeting, Sep. 25-27, 2008, Amsterdam, The Netherlands.

Aging, stress, pathogenesis and heterochrony *C. elegans* topic meeting #4, Aug. 3-6, 2008, University of Wisconsin, Madison, USA.

AACR Annual meeting 2006, Washington DC, USA

Retreat pharmacology 2005, organized by Dept. of Pharmacology, University of Pittsburgh, USA.

AACR Annual meeting 2005, Anaheim, California, USA

Science-2004 conference organized by the University of Pittsburgh, Oct. 6-8, 2004, USA..

Good Laboratory Practice in Life Sciences Research, Jan, 6-7, 2004, India. Department of Pharmacology and Environmental Toxicology, Dr. ALM PG IBMS, University of Madras, Taramani, Chennai, India.

Training programme (March 2004) to study the plant tissue Culture, HPLC, GLC at Shri A M M Murugappa Chettiar Research Center. Taramani, Chennai, India.

Training Programme (Aug 2003) on the tissue culture, blood and leucocyte culture, chromosomal preparations, G-banding, karyotyping and karyotype analysis from human blood and bone marrow aspirate samples at Cancer Institute (WIA), Adyar, Chennai, India.

Conference organized by Indian Association of Biomedical Scientists **(IABMS).** Nov. 2-5, 2003. Defense Research and Development Organization **(DRDO)** campus, Delhi, India.

Science Fest 2003 – Feb. 11-14. Dhanabagiyam Krishnaswamy Mudaliar College for Women, Vellore, India.

Indian Association of Biomedical Scientists **(IABMS)** 2002, Jawaharlal Institute of Postgraduate Medical Education and Research **(JIPMER)**, Pondicherry, India.

Issues and Problems on Animal Experimentation a challenge to the medical research, (2001). Dr. ALM PG IBMS, University of Madras, Chennai, India.

Herbal sciences conference organized by University Grants Commission **(UGC)** and the University of Madras (2001). Chennai, India.

Invited Talk

1. Advances in Toxicological Research-in National workshop on Techniques in molecular toxicology organized by the Dept. Of Biotechnology, Bharathiar University, Coimbatore, 16-20 December 2013.