**NIRUPAMA LAL**

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Linkedin Nirupama Lal

**Professional Summary**

* Research Scientist in AceBiotek, Startup which focuses on the development of diagnostics, prognostics and therapeutics against human rare diseases.
* Currently pursuing online Certificate course in Advanced Programme in Digital Health and Imaging from Indian Institute of Science (IISc), Bangalore, Karnataka, India.
* Accomplished Research Scientist and highly effective at molecular biology research and teaching. Dynamic and efficient at explaining the concepts, protocol standardization, team building and documentation. Dedicated to setting and meeting long-term goals.
* Independent, Innovative, Detail-Oriented with a high degree of accuracy, Results-driven and Organized researcher with a background of managing long-term research projects. Strong background in molecular biology, mitochondrial biology, biochemistry, cell/tissue culture and cell signalling researches.
* Admirable in responsible conduct of research with first-rate data analysis statistically. Dependable and adapts easily to changing environments and demands.
* Committed to delivering the highest quality of research when working independently or as a member of multidisciplinary research teams.
* Dynamic Research scientist and highly skilled in assisting Principal Investigator in writing of grants for getting funds and manuscript towards publications.
* Excellent in communication and presentations at seminars and conferences. Outstanding in working with and training the undergraduates and graduates.
* Seeking a position of responsibility as Faculty in Biosciences to leverage my expertise and leadership to take next career step in translational research.

**Skills**

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| --- | --- |
| * **Expert in High-end molecular biology techniques** * PCR, RT-PCR, qPCR, primer designing, blotting * Mitochondrial permeability transition study, atomic absorption spectroscopy (AAA), tetraphenyl phosphonium (TPP+)-selective electrode assay, HPLC, GC, colorimetry, fluorescence spectrophotometer * **Animal handling** * Rats: Sprague dolly, Obese rats WNIN/ob: dissection of vital organs like brain, heart, liver, kidney and muscles * Mice: BALB/c: dissection of heart for perfusion * **Cancer biology** * Tumors progression and metastasis, cancer stem cells (CSCs/TICs), biomarkers analysis, western blotting,DNA/RNA isolation, cloning, sequencing, SNP analysis, ell signalling, pathway analysis * **Trained in:** * ***Next Generation Sequencing (NGS)****,* ***Metagenomics*** * Databases and software usage for molecular biology * Literature based data mining and bio-curation * *Genomics:* whole genome and exome ontology, key genes identification, protein-protein interactions, pathway analysis, functional analysis, homology modelling and docking. * *Metagenomics:* sequencing strategies, data pre-processing and processing, OUT identification and processing. * *Transcriptomic and biomarker discovery:* pre-processing (FASTQ format, depth and coverage of reads, data retrieval using *Sequence* Read Archive (*SRA*) and European Nucleotide Archive (ENA), reference alignment, quality analysis and trimming raw reads), SNP analysis, de-novo assembly | * **Cell/Tissue culture (**HepG2, Hep 3B and H-4-II-E cell lines) * Maintenance through passaging, subculturing & cryopreservation, biomarker establishment, bioenergetics, cell signalling, apoptosis, drug screening, FACS, confocal imaging, 3D cell culture, protein assay * Adult stem cell isolation, biomarker characterization   concepts and annotation using *Sequence* Read Archive (*SRA*) and European Nucleotide Archive (ENA), reference alignment, quality analysis and trimming raw reads), SNP analysis, de-novo assembly concepts and annotation.   * **Schrodinger Cheminformatics** * Chemical docking through Schrodinger informatics and had done one project towards repurposing of some known drugs for the treatment of obesity * **CRISPR Cas9 gene editing** * Through Blenchling.com and Zhang lab protocol. * **Grant/project proposal writing, paper writing and communication** * **Proficient in interactive classroom teaching** * **Computer:** Microsoft office, Adobe photoshop, powerpoint, C++, R and Python programming. * **Soft skills:** includes * High level of autonomy * Strategic planning capability * Analytical thinking * Fast learner * Highly dependable * Excellent attention to details * Strong presentation and communication skills * Capable of Multidisciplinary team collaboration |

**Work History**

**Senior Research Scientist and Head of Research and Development,** 06/2018 to 08/2019

**Atrimed Pharmaceuticals Pvt. Ltd.** - Bangalore, Karnataka, India.

* Established required laboratory infrastructure
* Served as Head of R&D for the design and development of translational research in the field of autoimmune disease like psoriasis and eczema, obesity and diabetes.
* Played a key role in the designing project for the following molecules that are under the process of execution:
* Agonist for Peroxisome Proliferator-activated receptors (PPAR) gamma,

The antagonist for Dipeptidyl peptidase IV (DPP4/CD26), Farnesyl pyrophosphate synthetase (FPPS), platelet P2Y12 receptors, Phosphodiesterase 4.

* Purification of Cell permeable peptides (CPP) and Antimicrobial peptides (AMP) from medicinal plants.
* Assisted lab experiments in troubleshooting to ensure the proper functioning of the protocols.
* Assisted in writing projects for various government fundings such as:
* Oil and Gas PSU grant on Development of topical product from phytomolecules towards photoprotection against UV and skin cancer
* Biotechnology Industry Research Assistance Council (BIRAC) for 'Finding innovative solutions to the growing threat of Antimicrobial resistance (AMR) by supporting the development of new antibiotics and alternatives to antibiotics',
* Bill and Melinda Gates Foundation for 'New approaches for manufacturing gut microbial biotherapeutics'.
* Trained in Schrodinger chemi-informatics, Bioinformatics (NGS), CRISPR CAS9 gene editing, Medicinal Chemistry, and Drug Discovery & Development India (MCADDI) 2019, Regulatory affairs an IP rights towards update in latest scientific technologies and regulations in the interest of company growth.

**Director - Technical,** 10/2016 to 01/2017

**Keystone Knowledge Park, NCR** – Gurgaon, Delhi, India

* Helped in the establishment of Section-8 Company.
* Created the organization's mission and vision statements that would be utilized by all employees.
* Developed and maintained positive relationships with employees.
* Assisted with the creation of the marketing strategy and advertising initiatives that were used to promote the company to the public.
* Organized discussion group (8+ members) focused to support the entrepreneurial talents in researchers or scientists towards the commercialization of their scientific aspirations.

**Guest Faculty,** 08/2015 to 11/2015

**C.S.J.M. University, State University** - Kanpur, UP, India

* Worked directly with the department to achieve its goal.
* Took four lectures per week during semester.
* Areas taught: Cell biology, Microbiology, Ecology and Bioinformatics to M.Sc. postgraduate students.
* Achieved the departmental objective by successful completion of the courses.

**Indian Council of Medical Research (ICMR) – Post Doctoral Fellow,** 01/2012 to 03/2014

**National Institute of Nutrition (NIN), ICMR Lab** – Hyderabad, Telangana, India

* Won research grant and completed studies funded by academic groups. Independently designed and executed the project.
* Established mitochondrial research lab in the institute.
* Successful completion of the self-written project on **'Characterization of mitochondria associated senescence mechanism in obese mutant rat'** through ICMR, New Delhi funding.
* Compared the mitochondrial swelling in female WNIN/Obese (O) rats at different ages to that of WNIN-parental (W) and WNIN/Ob lean (L) rats as controls along with physical and biochemical parameters.
* The obese rats were fed normal rat chow ad libitum and portrayed features of obesity such as higher body weight with hyperinsulinemia, which is similar to the preclinical /clinical features of obesity induced type 2 diabetes in humans.
* The whole body dual energy X-ray absorptiometry (DXA) and biochemical analysis of fasting plasma were performed.
* Liver mitochondria were isolated and subjected to Ca2+ -induced swelling study.
* Obese rats of the designated WNIN/Obese (O) group showed decreased susceptibility to Ca2+ - induced swelling.
* Additionally, it’s drastically worsened physical and biochemical indices compared to WNIN-parental (W) and WNIN/Ob lean (L) suggest that obesity is one of the factors which played active role in the alteration of the permeability of inner mitochondrial membrane.
* Generated and published high-quality professional paper.
* Presented poster at 5th Annual conference of Society for Mitochondrial Research and Medicine (SMRM), India.
* Demonstrated mitochondrial potentials in diagnostics in institutional yearly seminar.

**Research Associate,** 07/2011 to 01/2012

**National Institute of Nutrition (NIN), ICMR Lab** – Hyderabad, Telangana, India

* Designed experiments to study genetics and epigenetics of obesogenecity.
* Provided research support, case writing and data analysis, managed case submission process, edited, redrafted, and commented on working papers.
* Drafted successful project proposal for funding from ICMR, New Delhi, India for Postdoctoral fellowship.
* Co-authored 1 review on 'Genetics and epigenetic approach to Human Obesity'.
* Managed creative projects from concept to completion.
* Trained junior members of research team regarding molecular biology and troubleshooting of the experiments.
* Conducted experiments, data analyses and lab seminars on a regular basis.
* Distilled large amounts of information and produced reports, spreadsheets and documents outlining key details.

**Research Associate,** 04/2009 to 09/2009

**Centre for Cellular and Molecular Biology (CCMB), CSIR Lab** - Hyderabad, Telangana, India

* Initiated the isolation and characterization of adult cardiac stem cell from perfused mice heart.
* Set up equipment, organized inventory and maintained facilities.
* Produced actionable information that improved the perfusion experiments.
* Provided methodologies for the isolation of mono-nuclear cardiomyocytes.

**Postdoctoral Researcher,** 05/2008 to 01/2009

**Ohio State University** – Columbus, Ohio, USA

* Established methods to detect and regulate mitochondrial programmed cell death.
* Demonstrated active participation of complex-III of ETC in apoptosis.
* Presented poster at 2008 VIIth Annual OSUMC Research Day on 'Association of complex-III of electron transport chain in apoptosis'.
* Studied the 'Differential effects of non-steroidal anti-inflammatory drugs on mitochondrial dysfunction during oxidative stress' and got first author publication.
* Produced and managed extensive data for fatty acid analysis under different conditions and provided recommendations to rescue the damage due to ischemic reperfusion in vitro.
* Coordinated with other labs for aid in project completion.
* Conducted cellular studies of mitochondria, which led to the development of other lab projects.
* Developed prototypes for the study of mitochondria in the screening of the toxicity of the drugs.
* Played key role in designing of the project by principal investigator for funding.

**Research Associate/H1-B,** 03/2006 to 04/2008

**Ohio State University** – Columbus, Ohio, USA

* Standardized protocols and conditions for the study of mitochondrial apoptosis.
* Trained in studying mitochondrial biology and physiology at molecular level, isolation of mitochondria from heart, liver, brain and skeletal muscles, its permeability transition study through spectrophotometer, Ca2+ and Mg2+ estimations through atomic absorption spectroscopy (AAA), mitochondrial iPLA2 activity assay through GC, membrane potential measurement with tetraphenyl phosphonium (TPP+)-selective electrode, detection of Cytochrome C (Cyt C) release and reactive oxygen species (ROS) from mitochondria through HPLC and colorimetry/fluorescence spectrophotometer respectively.
* Obtained online certificate for Institutional Animal Care and Use for the research purpose.
* Supported Principal Investigator (PI) with daily research functions.
* Produced data analysis reports for senior team members and PI .
* Researched and updated all required materials needed for the lab.

**Contract Faculty,** 12/2002 to 06/2004

**H.N.B. Garhwal University, Central University** – Srinagar, Garhwal, Uttarakhand, India

* Demonstrated a continued commitment to postgraduate teaching through full participation in the college community.
* Taught Biophysics, Biochemistry, Molecular biology, Microbiology, Immunology in Biotechnology and Biomedical Sciences courses
* Developed courses in line with the curriculum requirements of the Biotechnology Department.
* Organized seminars and conferences related to molecular biology, biochemistry, microbiology, immunology etc. to create awareness in the students for the perspective research areas.
* Established molecular biology and tissue culture lab and supervised and evaluated students' laboratory work.
* Established departmental library for referencing the literature.
* Administered and setup the question papers for midterm and final examinations. Also evaluated and graded students' performances.
* Guided dissertation thesis of the postgraduate students.
* Conducted the required course practicals.
* Invigilated during the university exams.
* Developed new process of teaching through seminars by the students, which resulted in marked improvements in their performances.
* Supported Head of the Department with daily operational functions.
* Responsible for creative designing of the prominent projects on profiling of local flora and fauna towards the diversity details of the country.
* Instructed students in career development techniques including Molecular biology, Biochemistry and Microbiology.
* Coached students on public speaking and presentation skills.

**Senior Research Fellow,** 01/2001 to 12/2002

**C.S.J.M. University in collaboration with Central Institute of Medicinal & Aromatic Plants (CIMAP), CSIR Lab** – Lucknow, UP, India

* Identified species-specific molecular markers in both genera of *Cymbopogon* and *Vetiveria zizanioides*
* Characterized both the genomes through RAPD and AFLP
* Identified novel molecular marker showing sequence similarity with *ndhD* of evolutionary significance
* Sequenced the marker fragment and submitted to Genebank as gbIEU871430.1
* Presented results at departmental seminars and retreats to audiences of 20+ people
* Generated high quality, professional papers for submission to scientific publications.
* Participated actively in molecular biology workshops training for postgraduate students for their dissertations, university teachers, summer trainings, winter workshops etc. conducted by CSIR lab.
* Oversaw studies, documented data and extrapolated the results.
* Standardized protocols for DNA isolation, PCR, southern hybridization, cloning, autoradiography detection which led to the development of departmental research.
* Assisted technical support to department in troubleshooting.
* Provided drafting support to principal investigator and other scientists.

**Junior Research Fellow,** 01/2000 to 12/2000

**C.S.J.M. University in collaboration with Central Institute of Medicinal & Aromatic Plants (CIMAP), CSIR Lab** – Lucknow, UP, India

* Learned and developed molecular biology skills through standardization of the techniques
* Worked on molecular characterization of the medicinal and aromatic grasses.
* Maintained high levels of confidentiality to ensure data quality and project research.
* Performed various scientific duties on a daily basis, including autoclave, DNA isolation, PCR, media preparation, competent cell preparation, cloning and paper writing and presentation.
* Developed and implemented laboratory protocols and modified when needed.

**Project Assistant,** 12/1998 to 12/1999

**Central Institute of Medicinal & Aromatic Plants (CIMAP), CSIR Lab** – Lucknow, UP, India

* Learned molecular biology skills like PCR, RAPD, gel electrophoresis etc., data compilation and literature search
* Learned paper writing and presentations at seminars and conferences
* Participated in organization of seminars and conferences/workshops
* Learned molecular characterization of the medicinal and aromatic grasses.
* Assisted seniors and principal investigators in their research project.

**Education**

**Doctor of Philosophy (Ph.D.):** Life Sciences, December 2008

**C.S.J.M. University Kanpur UP in collaboration with Central Institute of Medicinal & Aromatic Plants (CIMAP), CSIR Lab** – Lucknow, UP, India

My Ph.D. research pertained to the area of 'Molecular diversity analysis among selected aromatic grasses' through various DNA fingerprinting technologies such as RAPD, AFLP, DNA sequencing, cloning, blotting and hybridization. Lab work was done at Central Institute of Medicinal and Aromatic Plants (CIMAP), a Council of Scientific and Industrial (CSIR) Lab, in collaboration with degree award from CSJM University Kanpur, U.P. India. Different species and variants of two plant systems of genus *Cymbopogon* Spreng and *Vetiveria zizanioides* were taken for the study. Both the genus are from *Poaceae* (*gramineae*) family and are known for their production of secondary metabolites as terpenoids, which have great values in medicinal, perfumery and cosmetic industries. Apart from the differences in their chemical constituents of terpenoids, these genus also differ in the site of accumulation of these metabolites also. That is, in *Cymbopogon*, these terpenoids were found in leaves where as in *Vetiveria* it was found in roots. I found a hybrid, which had terpenoids present in both leaves as well as roots. Through DNA fingerprinting techniques of RAPD and AFLP both, the genus was separated quite fairly thereby showing no mixing of genus. However, from RAPD I found a co-migrating fragment in both the genus, which was sequenced and submitted to GenBank as gbIEU871430.1. It was analyzed to be a segment from *ndh* locus of chloroplast DNA coding NADH specific dehydrogenases and showing homology with *ndhD* gene of *Zea mays, Hordeum vulgare, Sorghum bicolor, Nicotiana sylvestris, Allium cepa, Aloe vera*, species etc. Being C4 plant, *ndhD* and *ndhF* genes play a significant role in phylogeny of grass. I took this fragment to know whether similar genes are present in all the *Cymbopogon* species at comparable molecular size position in the amplified profile gel with MAP-10 primer. Interestingly, only the co-migrating fragments for all *Cymbopogon* species along with *Vetiveria* at 1.66 kb position demonstrated hybridization and none of the other fragment in the profile lighted up thereby indicating the existence of considerable synteny between the two genera. Additionally, the hybridization with the comigrating fragment in unidentified *Cymbopogon* species (CS01) positive control and not with unidentified outgroup species (UOS) as negative control further confirms the sequence specificity towards these two genera only. Despite interesting exceptions, this investigation provides an insight into the genome synteny. Consequently, in future, the *ndhD* gene sequences from all the species can be cloned and analysed to have a better understanding about the evolution of these C4 type species in nature.

* Received Junior Research Fellowship (JRF) and Senior Research Fellowship (SRF) for the Ph.D. study.
* Graduated summa cum laude
* Awarded doctor of Philosophy.
* Thesis: 'Molecular diversity analysis among selected aromatic grasses'.

**Master of Science (M.Sc.):** Life Sciences, September 1998

**C.S.J.M. University** - Kanpur, UP, India

* 2nd Position in the University.
* Graduated with 73.75%.
* Coursework in Molecular biology, Biochemistry, Microbiology, Cell biology, Immunology & Immunochemistry, Developmental biology, Biophysics, Genetics, Ecology, Evolutionary biology, Statistics for Life Sciences, Biophysical chemistry & techniques, Bio-organic chemistry, Radiation biology, Plant physiology, Animal physiology.
* Graduated summa cum laude.

**Bachelor of Science (B.Sc.):** July 1994

**Kanpur University** – Kanpur, UP, India

* Coursework in Zoology, Botany and Chemistry.
* Graduated magna cum laude.
* Graduated with 63.33%

**Publications**

Rao K. R., Nirupama Lal and Giridharan N. V. Review: Genetics and epigenetic approach to Human Obesity. *IJMR*, 2014; 140: 33-47. ISSN: 0971-5916., IF: 2.375

Nirupama Lal, Kumar J., Erdahl, W.E., Pfeiffer, D.R., and Gadd, M.E., Graff, G., Yanni, J.M. Differential Effects of non-steroidal anti inflammatory drugs on mitochondrial dysfunction during oxidative stress. *Arch Biochem. Biophy.* 2009; 490: 1-8. ISSN: 0003-9861., IF: 3.017 doi: 10.1016/j.abb.2009.07.005

Khanuja S.P.S., Shasany A.K., Pawar A., Lal R.K., Darokar M.P., Nakvi A.A., Rajkumar S., Sundaresan V., Lal Nirupama and Sushil Kumar. Essential oil constituents and RAPD markers to establish species relationship in *Cymbopogon* Spreng. (Poaceae). *Biochemical Systematics and Ecology*, 2005; 33: 171-186, ISSN: 0305-1978., IF: 1.381

Nirupama Lal, Shasany A. K., Lal R. K., Darokar M. P., Rajkumar S., Sundaresan V. and Khanuja S. P. S. Diversity analysis of Vetiver (*Vetiveria zinziodes*) gene bank accessions using RAPD and AFLP analysis. *JMAP*, 2003; 25:25-32. ISSN: 0253-7125

**Conferences**

* Poster presentation on **‘Mitochondrial associations with early ageing in obesity: evidences from WNIN mutant rats’** at 5th Annual Conference on Society for Mitochondrial Research and Medicine (SMRM) on Mitochondria in Cancer and Neurodegenerative disorder at Aravind Medical Research Foundation, Madurai, Tamil Nadu, 6th-7th November 2015. Nirupama Lal, K. Rajender Rao, Pothani Suresh, Nemani Harishankar, Nappan Veettil Giridharan, Sudhir Kumar Awasthi and Vijayalakshmi Venkatesan.
* Poster presentation on **‘Mitochondrial Independent Phospholipase A2 (iPLA2) associates with super-complex II & III of electron transport chain and is activated maximally by Antimycin A binding to complex III’** at 7th Annual OSUMC Research Day, OSU, Columbus, Ohio, 2008. J. Kumar, Nirupama Lal, Yeong-Renn Chen and Douglas R. Pfeiffer.

**Projects**

* Completed academic project of ICMR-PDF project on **'Characterization of**

**mitochondria associated senescence mechanism in obese mutant rat'** funded by Indian Council of Medical Research (ICMR), Delhi at National Institute of Nutrition, ICMR Lab, Hyderabad, Telangana (2012-2014).

* Written and Consulted Industrial project Oil and Gas PSU grant on **‘Development of**

**topical product from phytomolecules towards photoprotection against UV and skin cancer’** at Atrimed Pharmaceuticals Pvt. Ltd., Bangalore, Karnataka (2018-2019).

**Invited Lectures**

* **‘Next Generation Sequencing and its applications’** at 5 days’ workshopon

Diagnostics and therapeutics development using Sequencing Informatics (SI) and Computer Aided Drug Designing (CADD) at RV College of Engineering, Bengaluru, Karnataka (2019)

**Interests**

Exploration of the world, learning something new, swimming, photography, drawing, origami, crafting, try cooking new recipes, teaching and designing new experiments or ways to study.

**Accomplishments**

* Research: Published papers with 1st author and review in peer reviewed journals. Successfully finished self-written project.
* Teaching: Established the molecular biology lab, tissue culture lab and departmental library. Co-guided some 10+ students in their postgraduate dissertation thesis.
* Collaborated with team of 5 in the development of Psoriasis project.
* Received above-average teaching performance evaluations in all categories every semester.
* Qualified JOINT CSIR-UGC NATIONAL ELIGIBILITY TEST (NET) for LECTURESHIP (LS) in 1999.
* Awarded “2nd position” in 1998 at CSJM University Kanpur, UP, India in Master’s degree.
* Supervised team of 7 staff members.