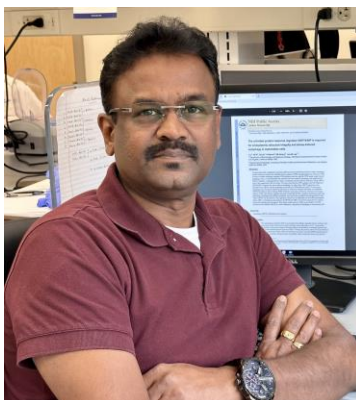


CURRICULUM VITAE



NATARAJASEENIVASAN KALIMUTHUSAMY, PhD

**Professor, Department of Microbiology
Bharathidasan University, Tiruchirappalli, T.N., India**

[23.11.2023]

A. PERSONAL

HOME ADDRESS: 19 Alpha Nagar, III Street, III Cross, Karumandapam
Tiruchirappalli-620001, Tamil Nadu, India

HOME TELEPHONE: +91 6369775298

BUSINESS ADDRESS: Department of Microbiology, Bharathidasan University
Tiruchirappalli-620024, Tamil Nadu, India

BUSINESS TELEPHONE: +91 6369775298

E-MAIL ADDRESS: natarajaseenivasan@bdu.ac.in

BIRTHPLACE: Keelapavoor, Tamilnadu, India

CITIZENSHIP STATUS: Indian

B. EDUCATION AND TRAINING: (Chronological order)

Institution and location	Degree (if applicable)	End date Mm/yyyy	Field of study
Madurai Kamaraj University, India	BS	05/1988	Biology
Madurai Kamaraj University, India	MS	05/1991	Microbiology
TN Dr. MGR Medical University, India	PhD	03/1996	Medical Microbiology

Institution and location	Degree (if applicable)	End date Mm/yyyy	Field of study
University of Kentucky, USA	Postdoctoral	10/2009	Molecular biology
University of Kentucky, USA	Postdoctoral	10/2013	Molecular biology
Temple University, USA	Visiting Scientist	09/2016	Neuroscience & Gene Editing

C. POSITIONS AND HONORS: (Chronological order)

Position and Employment

1995-1996	Research Assistant, Indian Council of Medical Research, Port Blair
1996-2002	Assistant Professor, University of Madras/Kathmandu University/Periyar University
2002-2005	Research Officer, Indian Council of Medical Research, Port Blair
2005-2008	Reader, Bharathidasan University, Tiruchirappalli, India
2008-2011	Associate Professor, Bharathidasan University, Tiruchirappalli
2016-2021	Visiting Scientist, Department of Neural Sciences, Temple University, Philadelphia, USA
2011-present	Professor, Bharathidasan University, Tiruchirappalli, India

Professional and Technical Skills

- Manage NIH (CNAC, R21, R01) and other agencies (DBT, DST, ICMR, UGC) funded projects, to achieve the goals on time and deliver the objectives effectively
- Project preparation with innovative approaches to acquiring funding from NIH (R01s)
- Actively manage multiple projects and ensure the budget for the timely completion with a constructive outcome
- Training graduates (PhDs), undergraduate (BSs), and medical students (MDs) to achieve competence in biomedical research
- Maintenance of SOPs in the laboratory
- Manage the ethical approvals for animal and human studies
- Strong scientific skills and prior experience in assay development and molecular pathways analysis
- Excellent analytical and strategic thinking skills and experiences
- Excellent written and oral communication skills as demonstrated by peer-reviewed publications, patents, and presentations

Molecular Biology

- Construction of genomic and cDNA libraries for immune expressive proteins
- Molecular cloning, expression, and purification of recombinant proteins
- cDNA synthesis and qPCR for gene expression analysis
- Primer designing for the specific genes / DNA fragments
- Sequence analysis and MLST typing for species-level genetic characterization
- Identification of transcription factors (TF) using CHIP assays

Protein Biology and Immunology

- Characterization and purification of bacterial and mammalian proteins using AKTA
- Screening for immune candidates for active vaccination
- Development of Monoclonal Abs and antigen-based bioassay for disease diagnosis
- Peptide engineering and synthesis for diagnosis and vaccine development
- Bioassays and immunoassays for pharmacological compounds and antibodies

- Custom-made antibody engineering for bioassays
- DNA Prime Boost Vaccine development
- Enzyme-linked immunosorbent assays (Multiplex assays for cytokines and enzymes)
- Protein-protein interactions using Co-Ips
- Immunocytochemistry and FACS analysis
- Cell-based Bioenergetics and Mitochondrial Biology**
- Bioenergetic assessment of live cells using Agilent Seahorse XF analysis
- Viral vector management and preparation and purification of virus stocks for *in-vitro* and *in-vivo* analysis
- siRNA-based gene knockdowns and CRISPR-based gene knockout strategies
- Protein translocation and mitochondrial phenotype studies using CLSM imaging
- Specialist in primary cultures-Neurons (Rat/Human), Astrocytes, Glial Cells, Hepatocytes, and Endothelial cells
- Microbiology and Infectious Disease Biology**
- Screening indicator organisms and MDR strain identification
- Pathway-based identification of targeted biomolecules for disease monitoring and therapy as a translational approach
- Biomarkers screening for infectious diseases (microRNA & MIF)
- Small molecule screening as effective therapeutic strategy
- Bioprocess engineering for pharmacologically important compounds

Academic Honors and Awards

Awards (self)

- 2020 **NIH R21 Award** (exploratory/developmental research)
- 2018 **Travel award** from FASEB to attend the FASEB Science Research Conference on Calcium and Cell Function, Tahoe City, California. June 10-15, 2018
- 2014 **Travel award** from Indian Council of Medical Research (ICMR), Department of Science and Technology (DST), Govt. of India to attend Interscience Conference on Antimicrobial Agents and Chemotherapy (ICCAC) ASM held at Washington DC, USA
- 2012 **Long-term fellowship** from the Department of Health Research (DHR), Indian Council of Medical Research (ICMR), and Govt. of India
- 2008 **DBT Associateship for Specialized Training of Young Scientists** in Niche areas of Biotechnology, Department of Biotechnology, Govt. of India
- 2007 Awarded **Fast Track Proposals for Young Scientists Scheme**. Science and Engineering Research Board, Department of Science and Technology (DST), Govt. of India.
- 2002 **IAS-SRF** Fellowship from Indian Academy of Sciences, Bangalore
- 1992 **Research Fellowship** from TN DR. MGR Medical University for PhD program

Awards (trainees)

- 2023 **IAS-SRF** Fellowship from the Indian Academy of Sciences, Bangalore, to Disha Ghosh, Somdatta Chatterjee, and Murugesh C S - MENTOR
- 2022 **IAS-SRF** Fellowship from Indian Academy of Sciences, Bangalore, to Hima Sujit – MENTOR
- 2019 **TNSCST-student research grant** to J. Kousalya – MENTOR (Best Presentation award)
- 2017 **TNSCST-student research grant** to S. Seethalakshmi– MENTOR (Best Presentation award)
- 2017 **DST INSPIRE faculty award** to Dr. Shanmughapriya Santhanam from Science and Engineering Research Board, Department of Science and Technology (DST), Govt. of India. \$130k – MENTOR
- 2017 **IAS-SRF** Fellowship from Indian Academy of Sciences, Bangalore to Karthick G Shanbhag – MENTOR

- 2017 **IAS-SRF** Fellowship from Indian Academy of Sciences, Bangalore, to Soumiya Sankari – MENTOR
- 2016 **National Postdoctoral Fellow** to Dr. Muthu Prasad from the Science and Engineering Research Board, Department of Science and Technology (DST), Govt. of India – MENTOR
- 2016 **IAS-SRF** Fellowship from Indian Academy of Sciences, Bangalore, to Veena Chavan – MENTOR
- 2016 **IAS-SRF** Fellowship from Indian Academy of Sciences, Bangalore to Dhevi – MENTOR
- 2015 **IAS-SRF** Fellowship from Indian Academy of Sciences, Bangalore to Nancy Catherine – MENTOR
- 2015 **IAS-SRF** Fellowship from Indian Academy of Sciences, Bangalore to Selva Mani – MENTOR
- 2014 **IAS-SRF** Fellowship from Indian Academy of Sciences, Bangalore to Anil Kiran – MENTOR
- 2013 **IAS-SRF** Fellowship from Indian Academy of Sciences, Bangalore to Yesu Balan – MENTOR
- 2013 **CSIR-Senior Research Fellowship** to Raja Veerapandian – MENTOR
- 2012 **IAS-SRF** Fellowship from Indian Academy of Sciences, Bangalore to Asif Mohammed – MENTOR
- 2012 **CSIR-Senior Research Fellowship** to Kanagavel Murugesan – MENTOR
- 2011 **IAS-SRF** Fellowship from Indian Academy of Sciences, Bangalore to Abinaya – MENTOR
- 2011 **ICMR-Senior Research Fellowship** to Shanmughapriya Santhanam – MENTOR
- 2011 **UGC Kothari Postdoctoral fellowship** to Dr. Thenmozhi Balachandar – MENTOR
- 2011 **TNSCST-student research grant** to M. Arunkumar – MENTOR (Best Presentation award)
- 2010 **TNSCST-student research grant** to S. Vanaroja and V. Karthick – MENTOR (Best Presentation award)
- 2010 **TNSCST-student research grant** to S. Nagalakshmi – MENTOR (Best Presentation award)
- 2009 **TNSCST-student research grant** to Raja Veerapandian – MENTOR (Best Presentation award)
- 2001 **TNSCST-student research grant** to Kalaiselvi – MENTOR

D. Memberships in Professional and Scientific Societies and Other Professional Activities:

Professional Membership

- 2023 – Biophysical Society (USA)
- 2022 – The Society of Biological Chemists, India
- 2017 – The New York Academy of Sciences (NYAS)
- 2016 – Mitochondrial RAG (MitoRag)
- 2016 – Society on Neuroimmune Pharmacology (SNIP)
- 2016 – International Society for Neurovirology (ISNV)
- 2015 – American Society for Tropical Medicine and Hygiene
- 2015 – American Heart Association (AHA)
- 2011 – International Society of Microbial Ecology
- 2010 – Indian Association for Radiation Protection (IARP)
- 2009 – American Society for Microbiology (ASM)
- 2009 – Indian Association of Medical Microbiologist (IAMM)
- 2002 – Indian Leptospirosis Society
- 1999 – International Leptospirosis Society

Editorial position

- 2016 – **Associate Editor:** Frontiers in cellular and infection Microbiology (Bacteria and host)
- 2016 – **Academic Editor:** PLOS One
- 2021 – **Editor:** Topic Editor-Special Issue: New Insights in Mycobacterium tuberculosis: Frontiers in Cellular and Infection Microbiology
- 2022 – **Guest Editor:** Frontiers in Cardiovascular Medicine (Cardiovascular Genetics and Systems Medicine)
- 2022 – **Guest Editor:** Tropical Medicine and Infectious Disease

Adhoc Reviewer (Manuscripts): PLOS One, Vaccine, BMC-Microbiology, BMC-Research Notes, BMC Infectious Diseases, Infection Genetics Evolution, Journal of Photochemistry and Photobiology, International J of Biological Macromolecules, PLOS Neglected Tropical Diseases, Nanomedicine and Biotechnology, Indian J Medical Microbiology, Indian J Medical Research, Saudi J of Biological Sciences, PNAS India, Plant Omics J, Current Medicinal Chemistry, Pharmaceutical Biology, Vector borne and Zoonotic Diseases, International J Gynecology and Obstetrics, Expert Review of Clinical Immunology, Biofouling, Applied and Environmental Microbiology, Current Microbiology, J Basic Microbiology, Fish and Shellfish Immunology, Food Chemistry, Critical Reviews in Microbiology, Proteomics Genomics and Bioinformatics, Veterinary Microbiology.

Adhoc Reviewer (Grants): Department of Biotechnology (DBT), India; Department of Science and Technology (DST), India; Indian Council of Medical Research (ICMR), India.

Graduate studies external examiner

Bharathidasan University, Periyar University, Pondicherry University, Alagappa University, Shrimati Indira Gandhi College, Maruthu Pandiyar College, Bharath College, Meenakshi Chandrasekar College, Dhanalakshmi Srinivasan College, MS University, Annamalai University, University Putra Malaysia, Vinayaga Mission University, University of Madras, University of Mysore.

Academic and Institutional Committees

- 2015 – 2016 **Chairman**, Board of Studies, BS and MS in Microbiology, Bharathidasan University, India
- 2015 – 2016 **Member**, Board of Studies in Biochemistry, Department of Biochemistry, Bharathidasan University, India
- 2015 – 2016 **Member Secretary**, Institutional Biosafety committee, Bharathidasan University, India
- 2014 – 2016 **University Representative** - Board of Studies in Microbiology, National College (Autonomous), India
- 2014 – 2016 **Member**, Board of Studies in Animal Health and Management, Alagappa University, India
- Member**, Board of Studies in Microbiology, Alagappa University, India
- 2014 – 2016 **Project Review Committee Member**, Indian Council of Medical Research (ICMR), India
- 2013 – 2016 **Member**, Board of Studies in Microbiology (UG & PG) Bharathidasan University, India
- 2012 – 2015 **Radiological Safety Officer Level-I**, Bharathidasan University, India
- 2011 – 2016 **Chair**, Dept of Microbiology, Bharathidasan University, India
- 2011 – 2014 **Senate Member**, Bharathidasan University, India
- 2011 – 2016 **Chairman**, Board of Studies, Department of Microbiology, Bharathidasan University, India
- 2007 – 2016 **Member Secretary**, Institutional Ethical Committee (IEC) for human research, Bharathidasan University, India
- 2006 – 2010 **Member**, Board of Studies in Microbiology, Alagappa University, India
- 2005 – 2008 **Member**, Board of Studies in Microbiology (UG & PG) Bharathidasan University, India

E. MAJOR ACADEMIC AND TEACHING RESPONSIBILITIES

Post-doctoral fellows and other scientists supervised

- 2011-13 Thenmozhi Balachandar, PhD: **UGC Kothari Postdoctoral fellow**
- 2016-18 Muthu Prasad, PhD: **National Postdoctoral Fellow**

Graduate Students Supervised **Doctor of Philosophy (PhD)**

- 2023 **P. Saranya** – Prevalence and molecular epidemiology of leptospirosis from different geographical settings of India.
- 2022 **P. Bothammal** - Lipopolysaccharide imprinted electrochemical biosensor for rapid diagnosis of leptospirosis and to establish leptospiral LPS mediated pathogenesis.
- 2022 **K. Sumaiya** - Perseverance of macrophage migration inhibitory factor (MIF) in pulmonary leptospirosis (*Senior Scientist, WHO Reference Laboratory for Leptospirosis, Portblair, Andaman and Nicobar Islands, India)
- 2022 **C. Akino Mercy** - Mitochondrial targeting leptospiral proteins define pathogenic signals and differential miRNA expression (*Postdoctoral Fellow, Fels Cancer Institute for Personalized Medicine, LKSM, Temple University, USA)
- 2019 **K. Sivasankari** - Antagonistic Activity of Actinomycetes - A Strategy to Counteract Bacterial and Fungal Biofilms (*Assistant Professor, Indira Gandhi College for Women, Tiruchirappalli, India)
- 2018 **T. Arulmozhi** – KAP of leptospirosis from south Chennai and anti leptospiral principles of *Andrographis paniculata* Nees
- 2018 **M. Ganesh** – Sustainable production and biomedical applications of poly(3-hydroxybutyrate) from bioengineered microorganisms (*Postdoctoral Fellow at University of Indianapolis, Indianapolis, Indiana, USA)
- 2017 **S. Vanithamani** – Serogroup specific diagnosis and immunogenic response of leptospiral lipopolysaccharides (LPS)
- 2017 **V. Raja** – In vivo expressed proteins of virulent *Leptospira* in conclusive diagnosis and DNA vaccination (*Postdoctoral Fellow at River Side University, California, USA)
- 2016 **M. Kanagavel** – Immunoglobulin like proteins (Lig) and their immunogenic epitopes in detection and prevention of leptospirosis (*Post-Doctoral Fellow at Stanford University, California, USA)
- 2015 **K. Abdhul** – Antioxidant and bacteriocinogenic potential of probiotic strains (BDU 3 and BDU7) from fermented fish “Nigari” (*Assistant Professor, Nandha College of Science, Bharathiar University, Erode, India)
- 2014 **B. T. Sureshkumar** – Prevalence of human papillomavirus in western part of Tamil Nadu – a population-based study from four districts (*Principal, Vivekanandha Arts and Science College, Periyar University, Tiruchengode, India)
- 2014 **K. Vinodhini** – Prevalence of high-risk human papillomavirus (HR-HPV) types in women with cervical carcinoma (*Assistant Professor, Central University of Tamilnadu, Tiruvarur, India)
- 2013 **S. Shanmughapriya** –Genetic, molecular, and microbiological basis for ovarian carcinoma from a low incidence population (*Assistant Professor, Department of Medicine, HVI, Penn State College of Medicine, USA)
- 2013 **T. Sathiamoorthy** –Prevalence and Molecular characterization of Multidrug resistant *Salmonella* species from Tiruchirappalli District (*Assistant Professor, Department of Microbiology, Alagappa University, Karaikudi, India)
- 2012 **R. Narayanan** – Prevalence of Leptospirosis among human cases with different clinical manifestations from Chennai (*Scientist, Madras Medical College, Chennai, India)
- 2011 **S.G. Prabhakaran** –Epidemiology and Epizootology of Leptospirosis in a rural and urban community of Tiruchirappalli District in Tamilnadu (*Assistant Professor, Vivekananda Institutions, Periyar University, Tiruchengode, India)
- 2011 **K. Vedhagiri** – Genomic DNA expression library construction for *Leptospira interrogans* serovar Autumnalis (N2) and their recombinant proteins for the diagnosis of human leptospirosis (*Deputy Assistant Director, DBT, cGMP facility, Central Research Institute, Ministry of Health and family welfare, Kasauli, India)

*Current position

Master of Philosophy (MPhil)

- 2015 **S. Sobana** - Diagnosis potential of leptospiral recombinase A in human clinical samples using ELISA and real time qPCR.
- 2015 **S.Karthika** - Detection of leptospiral DNA in asymptomatic carriers by real time qPCR assay
- 2014 **A. Princymargreat** - Identification of SCAR markers for the detection of Leptospira from clinical and environmental samples.
- 2013 **K. Sivasankari** – Asymptomatic renal colonization of Leptospira in rural population of Tiruchirappalli, Tamilnadu, india.
- 2013 **M. Arunkumar** - Detection and characterization of Leptospira species from rodents by molecular techniques.
- 2012 **H. Sornakumari** - Essential for amphotericin B replacement drug for vaginal candidiasis among IUD users.
- 2011 **M.Bhuvaneswari** - Detection of Salmonella from rectal swab of broiler and backyard chicken and it is chaperonin (groEI) characterization by insilico analysis.
- 2011 **A. Anisha** - Prevalence and correlation of clinical methicillin resistant Staphylococcus aureus (MRSA) between nasal and diabetic foot ulcers.
- 2011 **A. Lency Francis** - Polyene antibiotic (nystatin) based disruption of biofilm formed by actinomycetes contraception devices.
- 2010 **A. Thilagavathi** - prevalence of HPV infection in self-collected urine samples of adolescent girls and married women.
- 2010 **C. Lakshmipriya** - Seroprevalence of canine leptospirosis and analysis of humoral immune response of vaccinated dogs.
- 2010 **G.B. Artiflavia** - Molecular characterization of methicillin resistant Staphylococcus aureus (MRSA) and their associated virulent genes.
- 2009 **M. Priyadarshini** - Prevalence and molecular analysis of multidrug resistant Salmonella sp., isolated from fish.
- 2009 **R. Archana** - detection of leptospiral 16 s rRNA genes by nested PCR assay in human clinical samples.
- 2009 **S. Devasena** - comparative in-house IgG and IgM ELISA for the detection of leptospirosis in human clinical samples.
- 2008 **G.Gladis Reena** - Production purification and characterization of extracellular thermostable amylase from Nocardiosis dassonvillei MAD04.
- 2008 **G.Jayarani** - Phenotypic and genotypic characterization of Candida Spp. of Pulmonary tuberculosis cases and the efficiency of Centroceras clavulatum for the multidrug resistant (MDR) Candida Strains.
- 2008 **T.Valliamai** - Evaluation of leptospiral OMP LipL32 as a diagnostic marker and the efficiency of Centroceras clavulatum as a potential drug against leptospires.
- 2008 **V. Sivabalan** - Establishment of molecular based transmission dynamics of leptospires in an animal farm in Trichirappalli.
- 2007 **D. Narayanasamy**- Production of vitamin B12 by Pseudomonads isolated from sago waste.
- 2007 **R. Ranjana**- Evaluation of foot and mouth disease virus "O" specific antibody response in convalescent cattle sera using recombinant antigens.
- 2006 **S.R. Mangaladevi**- Preliminary identification of Cryptosporidium oocyst from surface water and amplification of oocyst 18s rRNA by polymerase chain reaction.

Member on Ph.D. thesis committees

- 2023 Thesis committee member, Sakthi, Molecular Microbiology, Madurai Kamaraj Univ., India
- 2018 Thesis committee member, P. Vinay, Animal Science, Bharathidasan University, India
- 2016 Thesis committee member, T. Ramya, Biotechnology, Bharathidasan University, India
- 2016 Thesis committee member, B. Roja, Biotechnology, Bharathidasan University, India

2016	Thesis committee member, R. Anita, Biotechnology, Bharathidasan University, India
2016	Thesis committee member, S. Laskar, Microbiology, Bharathidasan University, India
2016	Thesis committee member, M. Sangeetha, Microbiology, Periyar University, India
2016	Thesis committee member, E. Poongothai, Microbiology, Periyar University, India
2015	Thesis committee member, F.Husain, Microbial Biotechnology, Bharathidasan University
2015	Thesis committee member, S. Pandian, Biotechnology, Alagappa University, India
2014	Thesis committee member, N. Gayathri, Biotechnology, Bharathidasan University, India
2014	Thesis committee member, T. Shanmughasundaram, Biotech., Periyar University, India
2014	Thesis committee member, S.Muthamil, Alagappa University, India
2014	Thesis committee member, J.Thirumalairaj, Microbiology, Periyar University, India
2014	Thesis committee member, R.Srinivasan, Biotechnology, Alagappa University, India
2014	Thesis committee member, S.Santhakumari, Biotechnology, Alagappa University, India
2014	Thesis committee member, K.Ramadevi, Biotechnology, Alagappa University, India
2014	Thesis committee member, L. Satish, Biotechnology, Alagappa University, India
2014	Thesis committee member, J.Sivakumar, Microbial Biotech, Bharathidasan Univ., India
2013	Thesis committee member, L. Vigneshwari, Biotechnology, Alagappa University, India
2013	Thesis committee member, Ramkumar, Microbial Biotech., Bharathidasan Univ., India
2013	Thesis committee member, V.Krishnakumar, Microbiology, Bharathidasan Univ., India
2013	Thesis committee member, G.Kavitha, Microbiology, Bharathidasan University, India

F. RESEARCH

National/International Conferences/Meetings

Technical/Resource Person

2015	Resource person - CME & hands on training in PCR technique, Department of Biochemistry, KAPV Government Medical college, Tiruchirapalli, India
2015	Organizing Secretary - Workshop on Molecular cloning, expression and purification techniques held at Bharathidasan University, Tiruchirapalli, India
2014	Expert – WHO sponsored workshop and cross sectoral meeting zoonoses laboratory diagnosis, IDENTIFY 2014, Institute for vector and reservoir research and development, Indonesia
2013	Resource person – WHO sponsored Hands-on training workshop on laboratory methods in Leptospirosis and mapping of diagnostic laboratories for Zoonoses, Port Blair, Andaman and Nicobar Islands, India

Lectures by invitation

August, 2023	Serological and Molecular approaches for the Diagnosis of Leptospirosis. UGC-Sponsored Online Refresher Course in Life Science (Interdisciplinary), conducted by the UGC-Human Resource Development Centre, Bharathidasan University, Tiruchirappalli.
September, 2022	Paracrine factors from astrocytes modulate neuronal health in the brain. 4 th National Conference on Innovative Research in Life Sciences by Centre for Bioscience and Nanoscience Research (CBNR), Coimbatore, India.
October, 2021	Molecular and molecules for the diagnosis of leptospirosis. Internship program on Techniques in Molecular Diagnosis by Centre for Bioscience and Nanoscience Research (CBNR), Coimbatore, India.
May, 2020	Augmented MCU activity mediated astrocytic metabolic switch: a novel etiology in HAND neurotoxicity. MS University International Webinar series, Manonmanium Sundaranar University, Tirunelveli, India

October, 2019	Transcellular mitochondrial transfer in neurodegeneration. IMMID Workshop Series on Molecular and Translational Medicine Workshop 1: HIV disease, vaccines, and therapies toward a cure. Drexel University Institute for Molecular Medicine & Infectious Disease, College of Medicine, Philadelphia, PA, USA
July, 2016	Diagnostic Advance in Leptospirosis. Madras Veterinary College, Chennai, India
April, 2016	Newer diagnostic modalities of Leptospirosis. International Conference on Recent Trends in Biosciences (ICRTB 2016), Alagappa University, India
March, 2016	Infectious diseases. Bharathidasan University, Trichy, India
February, 2016	Infectious diseases. Karpagam academy of higher education, Coimbatore, India
February, 2016	Infectious diseases. Madurai Kamaraj University, Madurai, India
January, 2016	Recent Research modalities associated with the diagnosis of leptospirosis. Periyar University, Salem, India
July, 2015	Zoonotic Diseases. ASTRA, BDU College, Perambalur, India
March, 2015	Emerging trends in bioprospecting. Hindusthan College of Arts and sciences, Coimbatore, India
February, 2015	Contemporary molecular techniques & their potential application in current applied biology research. M.R. Government College of Arts and sciences, Mannargudi, India
January, 2015	Recent advances in biological Sciences towards Sustainable development. Muthayammal College, Rasipuram, India
January, 2015	Recent transformation for the diagnosis of leptospirosis. M.R. Government College of Arts and sciences, Mannargudi, India
November, 2014	Recent advances in Leptospiral research. Bharathiyar University, Coimbatore, India
August, 2014	Recent advances in Leptospiral research. Bharathidasan University, Trichy, India
February, 2014	Computational Approaches in Microbial Biotechnology. Manonmanium Sundaranar University, Tirunelveli, India
February, 2014	Molecular and Biological Approach for the diagnosis of leptospirosis. Periyar University, Salem, India.
October, 2013	Hands on training in Basic Molecular Biological Techniques. Bharathidasan University, Trichy, India

Poster presentations

1. **Natarajaseenivasan K**, Shanmughapriya S, Langford D. Selective removal of oxidized cargo by cocaine-induced mitochondria-derived vesicular pathways. 67th Biophysical Society Annual Meeting February 18-22, 2023, San Diego, CA, USA.
2. Velusamy P, **Natarajaseenivasan K**, Shanmughapriya S. Mitochondrial magnesium links hepatic insulin resistance and atherosclerotic cardiovascular disease". 40th Annual Conference of the International Society for Heart Research, North American Section, Sept 12th–17th, 2021, Denver, Colorado. (*ISHR NAS-2021 Michael Bristow travel award*)
3. **Natarajaseenivasan K**, Garcia A, Velusamy P, Shanmughapriya S, Langford D. The astrocyte citrate carrier, SLC25A1 protects neurons from toxic peroxidated fatty acids generated by cocaine and HIV. 17th International symposium on Neurovirology, June 2-4, 2021 ISNV virtual Meeting.
4. Yarandi S, Donadoni M, **Natarajaseenivasan K**, Amini S, Langford D, Burdo T, Kashanchi F, Sariyer I. Nef-carrying extracellular vesicles impair mitochondrial metabolism: evidence for Nef-mediated neurotoxicity. 17th International symposium on Neurovirology, June 2-4, 2021 ISNV virtual Meeting.
5. Imbert F, Tice C, Garcia A, **Natarajaseenivasan K**, Langford D. The role of SUMOylation in CTIP2-mediated HIV-1 latency in microglial cells. 17th International symposium on Neurovirology, June 2-4, 2021 ISNV virtual Meeting.

6. Tice C, Imbert F, Garcia A, **Natarajaseenivasan K**, Langford D. HIV induces AQP4 dysfunction via A2aR leading to HAND due to glymphatic failure. 17th International symposium on Neurovirology, June 2-4, 2021 ISNV virtual Meeting.
7. Garcia A, Fergan Imbert F, Tice C, **Natarajaseenivasan K**, Langford D. Post-translational modifications of PINCH contribute to chemotherapeutic resistance in glioblastoma. 17th International symposium on Neurovirology, June 2-4, 2021 ISNV virtual Meetings.
8. Velusamy P, **Natarajaseenivasan K**, Shanmughapriya S. Limiting Mitochondrial Magnesium Uptake Promotes Hepatic Lipid Accumulation by Modulating the MEK/ERK pathway. Penn State 19th Annual Postdoc Research Symposium, Penn State College of Medicine, Hershey, PA-17033. (*Bond and Bradley best poster award in the Penn State 19th Annual Postdoc Research Symposium*)
9. Akino Mercy CS, Shanmughapriya S, **Natarajaseenivasan K**. Leptospiral proteins localizing host mitochondria triggers calcium-mediated apoptosis. 2020 Calcium signaling: Molecular mechanisms to role in health and diseases, EMBO, Bangalore, Karnataka. January 26-29, 2020 (*Best poster presentation award*) - MENTOR
10. Sumaiya K, Akino Mercy CS, Shanmughapriya S, **Natarajaseenivasan K**. Perseverance of Macrophage migration Inhibitory Factor (MIF) in leptospirosis. 2019 World congress meeting on Leptospirosis, Andaman Nirman, Port Blair. November 18-19, 2019 (*Best poster presentation award – I Prize*) - MENTOR
11. Akino Mercy CS, Shanmughapriya S, Bothammal P, Sumaiya K, **Natarajaseenivasan K**. Leptospiral LPS alters innate immune responses and modulating host microRNA profile. 2019 World congress meeting on Leptospirosis, Andaman Nirman, Port Blair. November 18-19, 2019 (*Best poster presentation award – III Prize*) - MENTOR
12. **Natarajaseenivasan K**, Shanmughapriya S, Ahooyi TM, Torkzaban B, Madesh M, Garikapti VNS, Kishore R, Khalili K, Langford D. Transcellular transfer of mitochondria from hypermetabolic astrocytes to neurons during cocaine and HIV-1 exposure. 16th International Symposium on NeuroVirology and 2019 Conference on HIV in the Central Nervous System. Westin Buckhead Atlanta in Atlanta, Georgia, USA. November 12-16, 2019.
13. **Natarajaseenivasan K**, Shanmughapriya S, Gomez NM, Langford D. Inflammation induced-PINCH causes mitochondrial mislocalization and bioenergetic deficit in neurons. 2019 NHLBI Mitochondrial Biology Symposium on Mitochondrial Networks and Energetics. NIH Campus - William H. Hatcher Conference Center (Bldg 45), National Institutes of Health 45 Center Drive, Bethesda, MD 20814, USA. September 26 - 27, 2019.
14. Akino Mercy CS, Shanmugapriya S and **Natarajaseenivasan K**. Leptospiral LPS specific miRNAs for the diagnosis of acute leptospirosis. ASM Microbe, June 20-24, 2019, San Francisco, CA, USA (*Obtained International travel grant from ICMR and CSIR*) - MENTOR
15. **Natarajaseenivasan K**, Shanmughapriya S, Ahooyi TM, Torkzaban B, Madesh M, Garikipati VNS, Kishore R, Khalili K, Langford D. Transcellular transfer of mitochondria from hypermetabolic astrocytes to neurons during neuronal inflammation. Mitochondria in Health and Disease Gordon Research Conference. Mitochondrial Dynamics and Signaling. Ventura Beach Marriott, Ventura, CA. March 17-22, 2019.
16. **Natarajaseenivasan K**, Cotto B, Shanmughapriya S, Lombardi AA, Datta PK, Madesh M, Elrod JW, Khalili K, Langford D. Astrocytic metabolic switch is a novel etiology for Cocaine and HIV-1 Tat-mediated neurotoxicity. 2018 FASEB Science Research Conference on Calcium and Cell Function, Tahoe City, California. June 10-15, 2018 (*Obtained FASEB travel award*).
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19. Cotto B, **Natarajaseenivasan K**, Ferrero K, Langford D. Effects of Cocaine and HIV on Astrocyte Cholesterol Synthesis: Implications for HIV-Associated Neurocognitive Disorders in Cocaine User Patients. Abstract for poster presentation. 15th International Symposium on NeuroVirology and 24th Scientific Conference of the Society on Neuroimmune Pharmacology. Chicago, Illinois April 2018.
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22. Cotto B, **Natarajaseenivasan K**, Ferrero K, Langford D. Effects of Cocaine and HIV on Astrocyte Cholesterol Synthesis: Implications for HIV-Associated Neurocognitive Disorders in Cocaine User Patients. International Symposium on Molecular Medicine & Infectious Disease. Drexel University School of Medicine, Philadelphia, Pennsylvania, October 2017.
23. Prasad M, Chellapandi P, **Natarajaseenivasan K**. Identification of pathogenesis associated Leptospiral Outer Membrane Proteins (OMPs) as Vaccine Candidates for Leptospirosis. 9th National Symposium cum workshop on Recent Trends in Structural Bioinformatics and Computer Aided Drug Design” at Alagappa University, Karaikudi, February 14th to 17th 2017 – *MENTOR*
24. Sivasankari K, Shanmughapriya S, and **Natarajaseenivasan K**. Impairment of MRSA biofilm by active principles of vulvo-vaginal commensal Actinomycetes strains. International Conference on Recent Trends in Biosciences (ICRTB 2016), Alagappa University, Karaikudi. April 7- 9, 2016. (*Best poster presentation award – I Prize*)- *MENTOR*
25. Raja V, Sobana S, Shanmughapriya S, and **Natarajaseenivasan K**. Real time qPCR for detection of leptospiral recA and fliD in acute phase human clinical samples. International Conference on Recent Trends in Biosciences (ICRTB 2016), Alagappa University, Karaikudi. April 7- 9, 2016- *MENTOR*
26. Akino Mercy C and **Natarajaseenivasan K**. Differential expression of Leptospiral outer membrane proteins (OMPs) and their diagnostic potential by enzyme linked immunosorbant assay (ELISA). International Conference on Recent Trends in Biosciences (ICRTB 2016), Alagappa University, Karaikudi. April 7- 9, 2016 – *MENTOR*
27. Asha Parveen SM and **Natarajaseenivasan K**. Proteome analysis of low passaged *Leptospira interrogans* for in vivo expressed proteins. International Conference on Recent Trends in Biosciences (ICRTB 2016), Alagappa University, Karaikudi. April 7- 9, 2016 – *MENTOR*
28. Jageetha R, Raja V and **Natarajaseenivasan K**. Nano-Gold blot immunoassay for the rapid diagnosis of leptospirosis with silver enhancer. International Conference on Recent Trends in Biosciences (ICRTB 2016), Alagappa University, Karaikudi. April 7- 9, 2016 – *MENTOR*
29. Ganesh M and **Natarajaseenivasan K**. Poly (3-hydroxybutyrate) production by recombinant Escherichia coli strain JM 109 using crude glycerol as sole carbon source. International Conference on Recent Trends in Biosciences (ICRTB 2016), Alagappa University, Karaikudi. April 7- 9, 2016 – *MENTOR*
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diagnosis. 13th FIMSA Advanced Immunology Course, PGIMER, Chandigarh. March 17-19, 2016 (*Obtained travel grant from UGC unassigned grant*) - MENTOR

32. **Natarajaseenivasan K**, Shanmughapriya S, Lency A and Sornakumari H. Impairment of candida biofilm by Actinomycetes secreted factors and its therapeutic role in vulvo-vaginal candidiasis. ICAAC Washington DC, September 5-9, 2014 (*Obtained travel grant from ICMR, India*)
33. Abdul K, Ganesh M and **Natarajaseenivasan K**. Antioxidative and exopolysaccharide producing probiotics from fermented fish of Manipur. National conference on New opportunities and challenges in microbial research. Bharathidasan University, Tiruchirappalli, September 5 & 6, 2013 – MENTOR
34. Sivasankari K and **Natarajaseenivasan K**. Asymptomatic renal colonization of *Leptospira* among rural population of Tiruchirappalli district, Tamil Nadu, India. National Seminar on Cutting Edge Microbial Research & Challenges. February 25-26, 2013– MENTOR
35. Vanithamani S, Kanagavel M, Raja V, and **Natarajaseenivasan K**. Evaluation of Lipopolysaccharide (LPS) antigen based serodiagnosis of Leptospirosis in clinical sample. India. National Seminar on Cutting Edge Microbial Research & Challenges. February 25-26, 2013– MENTOR
36. Enthumathi K, Vinodhini K, Shanmughapriya S and **Natarajaseenivasan K**. Prevalence of HPV infection among women with normal cervical cytology from three different districts of Tiruchirappalli, Tamil Nadu, India. India. National Seminar on Cutting Edge Microbial Research & Challenges. February 25-26, 2013 – MENTOR
37. Vinodhini K, Shanmughapriya S, Sumathy S, Balakrishnan K, Das B C and **Natarajaseenivasan K**. Human papillomavirus, cytomegalovirus and *Chlamydia trachomatis* infections in cervical cancer patients from Tiruchirappalli, Tamilnadu. India. National Seminar on Cutting Edge Microbial Research & Challenges. February 25-26, 2013– MENTOR
38. Arun Kumar M and **Natarajaseenivasan K**. Carriage status of reservoir animals for pathogenic *Leptospira* in Tiruchirappalli. India. National Seminar on Cutting Edge Microbial Research & Challenges. February 25-26, 2013– MENTOR
39. Ganesh G and **Natarajaseenivasan K**. Invitro evolution and genetic selection of rubisco hypermorphs for *Synechococcus elongates* strain BDU 001. India. National Seminar on Cutting Edge Microbial Research & Challenges. February 25-26, 2013– MENTOR
40. Kanagavel M, Vanithamani S and **Natarajaseenivasan K**. Recombinant LIG A based ELISA and Dot-blot assay for the sero diagnosis of Leptospirosis from human clinical samples. India. National Seminar on Cutting Edge Microbial Research & Challenges. February 25-26, 2013– MENTOR

Platform presentations

1. **Natarajaseenivasan K**, Shanmughapriya S, Langford D. Cocaine upregulates mitochondria-derived vesicular pathway for selective removal of oxidized cargo. **Plenary Talk** in the 18th International Symposium on NeuroVirology held jointly with the 2022 Conference on HIV in the nervous system. October 11-14, 2022.
2. **Natarajaseenivasan K**, Cotto B, Shanmughapriya S, Lombardi AA, Datta PK, Madesh M, Elrod JW, Khalili K, Langford D. Astrocytic metabolic switch is a novel etiology for Cocaine and HIV-1 Tat-mediated neurotoxicity. 15th International Symposium on NeuroVirology and 2018 Conference on HIV in the Central Nervous System, Chicago, Illinois. April 10-14, 2018.
3. Cotto B, **Natarajaseenivasan K**, Ferrero K, Langford D. Cocaine and HIV Tat Alter Astrocyte Bioenergetics and Essential Neuronal Substrate Supply: Implications for HAND in Cocaine Users. Abstract for poster presentation. American Society of Neurochemistry. Riverside, California, March 2018.
4. Raja V, Shanmughapriya S, and **Natarajaseenivasan K**. Identification of in vivo -expressed proteins of virulent *Leptospira* using genomic library screening for accurate diagnosis. International Conference on Recent Trends in Biosciences (ICRTB 2016), Alagappa University, Karaikudi. April 7- 9, 2016. (*Best oral presentation award – II Prize*) - MENTOR.

5. Prabhakaran S G and **Natarajaseenivasan K**. Development and evaluation of rapid latex agglutination test (Lepto-LAT) for diagnosis of Leptospirosis. International Conference on Recent Trends in Biosciences (ICRTB 2016), Alagappa University, Karaikudi. April 7- 9, 2016 – *MENTOR*
6. Abdul K and **Natarajaseenivasan K**. Isolation of exopolysaccharide producing *Enterococcus faecium* MML 4 from sorghum and their antioxidant properties. International Conference on Recent Trends in Biosciences (ICRTB 2016), Alagappa University, Karaikudi. April 7- 9, 2016 – *MENTOR*
7. Shanmughapriya S, **Natarajaseenivasan K** and Vasanthi N. Genetic and Molecular biomarkers for the early detection of ovarian carcinoma. National conference on Biotechnology, Bioinformatics and Bioengineering. Society for Applied Biotechnology, India, December 17-18, 2010 – *MENTOR*
8. Shanmughapriya S, **Natarajaseenivasan K**, and Vasanthi N. Blockage of cardiolipin synthesis by arsenic and its brunt on carbon dioxide sequestration-A hypothetical and bioinformatical approach. International Conference on Climate Change and Bioresource (ICCCB-2010), February 9-12, 2010, Bharathidasan University, Tiruchirappalli.

Publications

Peer-reviewed articles

1. Sumaiya K, Ponnusamy T, **Natarajaseenivasan K**, Shanmughapriya S. Cadiac metabolism and miRNA interference. *International Journal of Molecular Sciences* 2023, 24: 50. <https://doi.org/10.3390/ijms24010050>.
2. **Natarajaseenivasan K***, Garcia A, Velusamy P, Shanmughapriya S, Langford D. Citrate shuttling in astrocytes is required for processing cocaine-induced neuron-derived excess peroxidated fatty acids. *iScience*, 2022. DOI: <https://doi.org/10.1016/j.isci.2022.105407>.
3. **Natarajaseenivasan K***. Editorial: New insights in Mycobacterium tuberculosis. *Frontiers in Cellular and Infection Microbiology*, 2022. DOI: 10.3389/fcimb.2022.1020267.
4. Sumaiya K, Selvambika P, **Natarajaseenivasan K***. Anti-macrophage migration inhibitory factor (MIF) activity of ibudilast: A repurposing drug attenuates the pathophysiology of leptospirosis. *Microbial Pathogenesis*, 2022. DOI: <https://doi.org/10.1016/j.micpath.2022.105786>.
5. Suriya Muthukumaran N, Velusamy P, Akino Mercy CS, Langford D, **Natarajaseenivasan K***, Shanmughapriya S. MicroRNAs as regulators of cancer cell energy metabolism. *Journal of Personalized Medicine*, 2022, 12: 1329. DOI: <https://doi.org/10.3390/jpm12081329>.
6. Sumaiya K, Akino Mercy CS, Muralitharan G, Hirad AH, Alarfaj AA, **Natarajaseenivasan K***. Assessment of serum macrophage migration inhibitory factor (MIF) as an early diagnostic marker of leptospirosis. *Frontiers in Cellular and Infection Microbiology*, 2022. doi: 10.3389/fcimb.2021.781476
7. Bothammal P, Michelraj S, Venkatachalam G, Verma A, **Natarajaseenivasan K***. Electrochemical biosensor for serogroup specific diagnosis of leptospirosis. *Bioelectrochemistry* 2022, 144: 108005. doi.org/10.1016/j.bioelechem.2021.108005.
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12. Vanithamani S, Akino Mercy CS, Kanagavel M, Sumaiya K, Bothammal P, Saranya P, Prasad M, Ponmurugan K, Muralitharan G, Al-Dhabi NA, Verma A, Vijayachari P, **Natarajaseenivasan K***. Biochemical analysis of leptospiral LPS explained the difference between pathogenic and non-pathogenic serogroups. *Microbial Pathogenesis*, 2021, 152: 104738. doi:10.1016/j.micpath.2021.104738.
13. **Natarajaseenivasan K***, Shanmughapriya S, Velusamy P, Sayre M, Garcia A, Gomez NM, Langford D. Inflammation induced-PINCH expression leads to actin depolymerization and mitochondrial mislocalization in neurons. *Translational Neurodegeneration*, 2020, 9(1):32. doi: 10.1186/s40035-020-00211-4.
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16. Akino Mercy CS, Suriya Muthukumar N, Velusamy P, Bothammal P, Sumaiya K, Saranya P, Langford D, Shanmughapriya S, **Natarajaseenivasan K***. MicroRNAs regulated by the LPS/TLR2 immune axis as bona fide biomarkers for diagnosis of acute leptospirosis. *mSphere*. 2020, 5(4): e00409-20. <https://doi.org/10.1128/mSphere.00409-20.k>.
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18. Prasad M, Bothammal P, Akino Mercy CS, Sumaiya K, Saranya P, Muralitharan G, **Natarajaseenivasan K***. Leptospiral protein LIC11334 display an immunogenic peptide KNSMP01. *Microbial Pathogenesis*, 2020 Aug 4;149:104407. doi: 10.1016/j.micpath.2020.104407.
19. Prabhusaran N, **Natarajaseenivasan K**, Joseph PID. Leptospirosis: Rising nuisance for pets and threat to public health. *Saudi J Pathol. Microbiol.*, 2020. DOI: 10.36348/sjpm.2020.v05i04.002.
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23. Raja V, Muthu Prasad, Bothammal P, Saranya P, Sumaiya K, Akino Mercy CS, **Natarajaseenivasan K***. Silver enhanced nano-gold dot blot immunoassay for leptospirosis. *J Microbiological Methods*, 2018. Doi: 10.1016/j.mimet.2018.11.021.
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cells on rifampicin-induced kidney toxicity. *Regen Ther.* 2018 Sep 25;9:100-110. doi: 10.1016/j.reth.2018.09.001.

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27. **Natarajaseenivasan K***, Cotto B, Shanmughapriya S, Lombardi AA, Datta PK, Madesh M, Elrod JW, Khalili K, Langford D. Astrocytic metabolic switch is a novel etiology for Cocaine and HIV-1 Tat-mediated neurotoxicity. *Cell Death and Disease*, 2018, 9:415. Doi: 10.1038/s41419-018-0422-3.
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Citations – 3805; h-index-33; i10-index-78

Books, monographs, chapters

1. Akino Mercy CS, **Natarajaseenivasan K**. Prognosis and Impact of Recurrent Uveitis the Ophthalmic Infection Caused by *Leptospira* Spp. Leptospiral recurrent uveitis. CRC Press/Taylor & Francis Group. 2018, 204-219.
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Patents

1. **Natarajaseenivasan K**, Shanmughapriya S, Aishwarya KVL, Kanagavel M. B and T cell specific peptides of leptospiral protein LK90 for the diagnosis of leptospirosis (4438/CHE/2015). Ministry of Commerce and Industry, Department of Industrial policy and promotion, Govt. of India.
2. Bothammal P, Natarajaseenivasan K, Michelraj S, Ganesh V. An Electrochemical biosensor for the specific diagnosis of leptospirosis. Filed on August 18, 2023, with Application No. 202311055567. Filed through Indian Council of Medical Research, New Delhi as a joint venture.

G. RESEARCH SUPPORT AND/OR SCHOLASTIC PERFORMANCE

Completed Research Support

1R21DA051798-01, NIH R21

Cocaine upregulates mitochondria-derived vesicular pathway for selective removal of oxidized cargo
Carried out @ Temple University, Philadelphia, USA

Kalimuthusamy (PI)

2020-2022

P30MH092177, CNAC Pilot Grant

Kalimuthusamy (PI)

2018-2022

Mitochondrial and miRNA transfer in astrocyte-derived exosome to CNS cells as a novel mechanism for HIV pathogenesis

Carried out @ Temple University, Philadelphia, USA

Lincoln Memorial Univ., College of Veterinary Medicine, USA Kalimuthusamy (Co-PI) 2018–2019
Development of a biosensor-based rapid diagnostics for leptospirosis

Leptos/34/2013-ECD-I, ICMR, India Kalimuthusamy (PI) 2017-2020
Perseverance of Macrophage Migration Inhibitory Factor (MIF) in pulmonary leptospirosis

Leptos/33/2013-ECD-I, ICMR, India Kalimuthusamy (PI) 2017-2020
Identification of microRNA biomarkers for early diagnosis of leptospirosis

BT/PR 16685/NE/95/249/2015, DBT, India Kalimuthusamy (PI) 2017-2020
Sero-surveillance of *Leptospira* infections in animals of Northeastern region of India

102/IFD/SAN/2302/2016-2017, DBT, India Kalimuthusamy (PI) 2016 - 2019
Construction of genomic library of *Edwardsiella tarda* and identification of in vivo expressed proteins for its immunoprotective potential in Indian common carp (*L. rohita*)

43-465/2014, UGC, India Kalimuthusamy (PI) 2015-2016
Differential expression and characterization of leptospiral proteins associated with pathogenesis

58/9/2011-BMS, ICMR, India Kalimuthusamy (PI) 2012-2015
Potential antileptospiral drug from marine actinomycetes

SR/SO/HS/0027/2010, DST, India Kalimuthusamy (PI) 2011 - 2014
Identification of molecular markers to establish the transmission dynamics of leptospirosis in rural and urban environments

DST/IS-STAC/CO2-SR-75/10, DST, India Kalimuthusamy (PI) 2011 - 2014
Evolution of RuBisCo hypermorphs for enhanced CO₂ sequestration and its utilization for polymer production

BT/PR13502/MED/15/36/2010, DBT, India Kalimuthusamy (PI) 2010-2013
Construction of Genomic Library of *Leptospira interrogans* serovar Autumnalis for the identification of immunogenic proteins and development of DNA vaccine.

BT/PR6872/MED/14/892/2005, DBT, India Kalimuthusamy (PI) 2009-2012
Development of a monoclonal antibody-based dot-blot ELISA for the detection of leptospiral antigens in human clinical samples.

5/13/88/06/NCD-III, ICMR, India Kalimuthusamy (PI) 2009-2012
Prevalence of high-risk human papillomavirus (HR-HPV) types in healthy adolescents and women with cervical carcinoma in Tamilnadu

5/3/3/3/2007-ECD-I, ICMR, India Kalimuthusamy (PI) 2009-2012
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There are no budgetary or scientific overlaps between these ongoing projects and the proposal under consideration.