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Academic Editor: *Journal of Aging Research*



Research Interest

My current research question is mainly focused on exploration of bioactive molecules effective against aging associated neurodegeneration wherein I interrogate the mechanistic understanding behind the therapeutic action of molecules using cell line model. I have also interrogated the serum biomarker in the patients of Alzheimer's disease and Parkinson's disease for early diagnosis.

Research Grants received

1. Research Project Under Grant-In-Aid Scheme entitled "Identification of mitochondria-related proteins as plausible biomarkers and therapeutic targets in Alzheimer's disease" awarded by Department of Health Research, GOI. **(Co-PI)**.
2. Research and Innovation Project entitled "Evaluation of neuroprotective effect and its underlying molecular mechanism by *Costus speciosus*, a traditional medicinal plant of Udaipur district, Rajasthan" awarded by RUSA-MHRD, New Delhi **(PI)**
3. Research and Innovation Project entitled "In-vitro and In-vivo screening of polyherbal formula (PHF-1) in age induced Alzheimer's disease in mice" awarded by RUSA-MHRD, New Delhi. **(Co-PI)**.
4. Startup Grant project entitled "To evaluate the neuroprotective effect of Hydroxychavicol, an active component of Piper betel leaves, using cell line model of neurotoxicity" awarded by UGC, Govt of India. **(PI)**

Research Experience

Ph.D. Degree

Analysis and plausible role of serum sestrin level in Parkinson's disease and Alzheimer's disease and its therapeutic implication.

During my doctoral work, I asked the application based question of timely diagnosis of dementia before the neural damage has become pronounced. In my quest, I tried to develop protein marker for the diagnosis of two most common causes of dementia- Alzheimer's disease & Parkinson disease. I studied the action of one of the most important antiaging and antioxidant protein- sestrin in the patients affected from Alzheimer's disease & Parkinson disease to establish it as diagnostic marker. I interrogated the functional significance of sestrin in Parkinson's disease physiology using neuronal cell line induced with toxic molecules to model pathological hallmark of the disease.

Supervisor: Dr. Sharmistha Dey, All India Institute of Medical Sciences, New Delhi, India.

Abroad Experience: Newton-Bhabha Research placement

Differentiation of Patient-derived induced pluripotent stem cells (iPSCs) to cortical neurons to study the role of sestrin2 in Alzheimer's disease.

At Manchester Metropolitan University, I studied the role of antioxidant protein sestrins using Neural Stem Cells (NSCs) derived from induced pluripotent stem cells (iPSCs) of Alzheimer's disease to get better insights of their function under such condition.

Supervisor: Prof. Tristan McKay, Manchester Metropolitan University, Manchester, United Kingdom.

Selected Publications

1. Rupali S Prasad, Rupesh V Chikhale, Nitish Rai, Natasha S Akojwar, Raksha A Purohit, Pravesh Sharma, Onkar Kulkarni, Damiki Laloo, Shailendra S Gurav, Prakash R Itankar, Satyendra K Prasad. PRutin from *Begonia roxburghii* modulates iNOS and Sep A activity in treatment of *Shigella flexneri* induced diarrhoea in rats: An in vitro, in vivo and computational analysis." *Microbial Pathogenesis* (2023): 106380. IMPACT FACTOR- 3.8
2. Vivek Jain, Saurabh K Sinha, Kajol Rustage, Ashutosh Pareek, Manish Srivastava, Mukesh K Meena, Anshul Shakya, Madan Mohan Gupta, Nitish Rai, Aausi Pareek, Yashumati Ratan,

- Min Hua Chen, Satyendra Kumar Prasad, Ghulam Md Ashraf. Solasodine Containing Solanum torvum L. Fruit Extract Prevents Chronic Constriction Injury-Induced Neuropathic Pain in Rats: In Silico and In Vivo Evidence of TRPV1 Receptor and Cytokine Inhibition. *Molecular Neurobiology* (2023). 1-17 IMPACT FACTOR-5.1
3. Rupali S Prasad, Nikhil Y Yenorkar, Suhas R Dhaswadikar, Saurabh K Sinha, Nitish Rai, Pravesh Sharma, Onkar Kulkarni, Neeraj Kumar, Mahaveer Dhobi, Damiki Laloo, Shailendra S Gurav, Prakash R Itankar, Satyendra K Prasad. A systematic antidiarrhoeal evaluation of a vegetable root *Begonia roxburghii* and its marker flavonoids against nonpathogenic and pathogenic diarrhoea. *Food Bioscience* 53 (2023). 102672 IMPACT FACTOR-5.2
 4. Abhinay Kumar Singh, Masroor Anwar, Rashmita Pradhan, Mohd Suhail Ashar, Nitish Rai, and Sharmistha Dey. Surface plasmon resonance based-optical biosensor Emerging diagnostic tool for early detection of diseases. *Journal of Biophotonics*. (2023) e20220038017 IMPACT FACTOR- 2.8
 5. Nitish Rai, Sheemona Chowdhary, Deepak Kumar, Rajasri Bhattacharyya, and Dibyajyoti Banerjee. Molecular docking analysis of melamine with nuclear factor erythroid 2-related factor 2 and succinate dehydrogenase. *Bioinformatics* 18, no. 8 (2022) 718. IMPACT FACTOR-1.9
 6. Rathore, Rinu, and Nitish Rai. Pharmacological action and underlying molecular mechanism of *Callistemon* A genus of promising medicinal herbs. *Phytomedicine*. 99 (2022) 154013 IMPACT FACTOR- 7.9
 7. Nitish Rai*, Sharmistha Dey. Protective response of Sestrin under stressful conditions in aging. *Ageing Research Reviews*. 2020. 64:101186. IMPACT FACTOR- 13.1
 8. Nitish Rai, Ashish Datt Upadhyay, Vinay Goyal, Sadanand Dwivedi, A.B. Dey, Sharmistha Dey. Sestrin2 as serum protein marker and potential therapeutic target for Parkinson's Disease. *The Journals of Gerontology, Series A: Biological Sciences and Medical Sciences*. 2020. 75(4):690-695. IMPACT FACTOR- 5.1
 9. Nitish Rai, G Venugopalan, Rashmita Pradhan, Akash Ambastha, Upadhyay Ashish Datt, Sadanand Dwivedi, Aparajit B. Dey, Sharmistha Dey. Exploration of Novel Anti-Oxidant Protein Sestrin in Frailty Syndrome in Elderly. *Aging Dis*. 2018. 9(2):220-227. IMPACT FACTOR- 5.402
 10. Shashank Shekhar, Saroj Kumar Yadav, Nitish Rai, Rahul Kumar, Yudhishtir Yadav, Manjari Tripathi, Aparajit B. Dey, Sharmistha Dey. 5-LOX in Alzheimer's Disease: Potential Serum Marker and In Vitro Evidences for Rescue of Neurotoxicity by Its Inhibitor YWCS. *Mol Neurobiol*. 2018. 55(4):2754-2762. IMPACT FACTOR- 5.1

11. Nitish Rai (Corresponding Author) and Dibyajyoti Banerjee. Melamine adulteration of food: detection by point-of-care testing tool. *Current Science*. 2017. 112. IMPACT FACTOR- 0.725
12. Nitish Rai, Rahul Kumar, Md Anzarul Haque, Md Imtaiyaz Hassan, Sharmistha Dey. A Study of Recombinant Human Sestrin 1 and Sestrin 2 Proteins Produced in a Prokaryotic System. *Molecular Biology (Mosk.)* 2017. 51:473-482. IMPACT FACTOR- 1.2
13. Rashmita Pradhan, Rahul Kumar, Shashank Shekhar, Nitish Rai, Aakash Ambashtha, Joyita Banerjee, Mona Pathak, Sadanand Dwivedi, Sharmistha Dey, Aparajit B. Dey. Longevity and healthy ageing genes FOXO3A and SIRT3: Serum protein marker and new roadmap to burst oxidative stress by *Withania somnifera*. *Exp Gerontol*. 2017. 95:9-15. IMPACT FACTOR- 3.9
14. Nitish Rai, Rahul Kumar, Gaurav Rajesh Desai, G. Venugopalan, Shashank Shekhar, Prasun Chatterjee, Manjari Tripathi, Ashish Datt Upadhyay, Sadanand Dwivedi, Aparajit B. Dey, Sharmistha Dey. Relative alterations in Blood-Based Levels of sestrin in Alzheimer's Disease and Mild Cognitive Impairment Patients. *Journal of Alzheimer's disease*. 2016. 54:1147-1155. IMPACT FACTOR- 4
15. Shashank Shekhar, Rahul Kumar, Nitish Rai (Co-first author), Vijay Kumar, Kusum Singh, Ashish Datt Upadhyay, Manjari Tripathi, Sadanand Dwivedi, Aparajit B. Dey and Sharmistha Dey. Estimation of Tau and Phosphorylated Tau 181 in serum of Alzheimer's disease and Mild cognitive impairment patients. *PloS One*. 2016. 11:e0159099. IMPACT FACTOR- 2.74
16. Rahul Kumar, Abhay Kumar Singh, Manoj Kumar, Shashank Shekhar, Nitish Rai, Punit Kaur, Rajinder Parshad and Sharmistha Dey. Serum 5-LOX: A progressive protein marker for breast cancer and new approach for therapeutic target. *Carcinogenesis*. 2016. 37:912-7. IMPACT FACTOR- 4.7
17. Nitish Rai, Dibyajyoti Banerjee, Rajasri Bhattacharyya. Urinary melamine: Proposed parameter of melamine adulteration of food. *Nutrition*. 2014. 30:380–385. IMPACT FACTOR- 4.4

Book Chapters

1. Sharmistha Dey, **Nitish Rai**, Shashank Shekhar, Amrendra Pratap Singh, Vertica Agnihotri. (2019) Molecular Marker and Therapeutic Regimen for Neurodegenerative Diseases Models, In: *Molecules and Mechanisms in Biogerontology*, (ed) Pramod C. Rath, ISBN 978-981-13-3584-6, Springer, Singapore.
2. Namita Ashish Singh, **Nitish Rai**, Avinash Marwal. (2021) Nanosensors for the Detection of Chemical Food Adulterants, In: *Nanotoxicology and Nanoecotoxicology Vol. 2*, (ed) Vineet Kumar, Praveen Guleria, Shivendu Ranjan, Nandita Dasgupta, Eric Lichtfouse, ISBN: 978-3-030-69492-0, Springer, Cham

Invited Lectures

1. Delivered lecture on “**An Account of Gut Microbiota and its Effect on Human Pathophysiology**” organised by Microbiologist’s society of India on 25th January 2021.
2. Delivered Career Counselling lecture in “**Sookshma Alumni Webinar Series**” organised by Department of Microbiology, Swami Shraddhanand College, University of Delhi, Alipur, Delhi on 16th May 2020.

Conference

<i>S.No</i>	<i>Author(s)</i>	<i>Year</i>	<i>Title</i>	<i>Name and Place of Conference</i>
1.	Nitish Rai and Sharmistha Dey	2021	Sestrins: An important player in Aging associated stressors	Keystone eSymposia meeting, Neurodegenerative Diseases: Genes, Mechanisms and Therapeutics
2.	Nitish Rai and Sharmistha Dey	2020	Serum Sestrin2 level in Parkinson's disease patients: A potential therapeutic target.	AAIC Neuroscience Next
3.	Nitish Rai , A.B. Dey, Sharmistha Dey	2019	Novel Antioxidant Molecules in the pathophysiology of Alzheimer’s disease: Diagnostic and Therapeutic Prospects.	19th Biennial Conference of AGI, New Delhi.
4.	Nitish Rai , A.B. Dey, Sharmistha Dey	2019	Identification of elevated levels of sestrin in early MCI and Alzheimer’s disease: An opportunity for a potential marker.	IBRO-APRC Associate school of Neuroscience
5.	Nitish Rai , Rinu Rathore, A.B. Dey, and Sharmistha Dey	2019	Novel Protein in Parkinson’s Disease: Evaluation for a Plausible Serum Diagnostic Marker and Therapeutics	VII- Rajasthan Science Congress (RSC)
6.	Nitish Rai , Amrendra Pratap Singh, Shashank Shekhar, Yudhishtir Yadav, A.B. Dey, Sharmistha Dey.	2017	Sestrin levels in patients diagnosed with Mild Cognitive Impairment and Alzheimer’s disease: A potential marker.	Alzheimer's Association International Conference [®] (AAIC [®]), 2017. London, UK.

7.	Nitish Rai , Shashank Shekhar, Amrendra Pratap Singh, A. B. Dey and Sharmistha	2016	Relative Alterations in Blood-Based Levels of Sestrin in Alzheimer's Disease and Mild Cognitive Impairment Patients.	18th Biennial Conference of AGI and 14th Annual conference of Indian Academy of Geriatrics as Indian Ageing Congress
8.	Nitish Rai , Shashank Shekhar, Vijay Kumar, Manjari Tripathi, A.B. Dey and Sharmistha Dey	2015	Serum SIRT1 protein as a plausible marker for early detection of Alzheimer's Disease.	International Congress on Gerontology And Geriatric Medicine 2015, New Delhi, India
9.	Sharmistha Dey, Nitish Rai , Amrendra Pratap Singh, Shashank Shekhar, Aparajit B. Dey	2017	Evaluation of Serum Sestrin protein in Parkinson's disease: a plausible diagnostic marker	International Congress of Parkinson's Disease And Movement Disorders, Vancouver, BC.
10.	Sharmistha Dey, Amrendra Pratap Singh, Nitish Rai , Shashank Shekhar,	2017	Serum Sirtuins as Novel Protein Markers for Frailty	International Association of Gerontology and Geriatrics (<i>IAGG</i>) World Congress, San Francisco,

Educational Degrees

Degree	Institution	Subject	Percentage of marks
Ph.D.	All India Institute of Medical Science, New Delhi	Biophysics	N/A
MASTER'S DEGREE (M.Sc.)	Postgraduate Institute of Medical Education and Research (PGIMER), Chandigarh	Medical Biotechnology	68% <i>(Institute Topper)</i>
BACHELOR'S DEGREE (B.Sc.)	University of Delhi, Delhi	Microbiology (Hons.)	74 % <i>(College Topper)</i>

Awards/Recognitions

S. No.	Award Name	Awarding Organization	Awarded Work
1.	Young scientist Award 2021	Microbiologists Society, India (MSI)	Research
2.	Newton-Bhabha PhD placement award	Department of Science and Technology, India and British Council, UK	Research Internship
3.	AV Tilak Prize (Biogerontology)	Association of Gerontology and Indian Academy of Geriatrics, India.	Oral Presentation
4.	First Prize (Gold medal)	Gericon 2017, 15th annual Conference of Indian academy of geriatrics.	Oral Presentation
5.	Best Young Scientist Award	Novel Research Academy	Academics
6.	Young achiever award	Institute of Scholars	Research
7.	Award	3rd International congress on Gerontology and Geriatric medicine (ICGGM) 2015.	Oral Presentation
8.	Award	ACBICON- 40 th National Conference of Association of Clinical Biochemists of India, 2013, New Delhi, India.	Poster Presentation

Fellowships

1.	Innovation in Science Pursuit for Inspired Research (INSPIRE) - Junior Research Fellowship	Department of Science and Technology, Government of India.	Research
2.	NET- Junior Research Fellowship	Council of Scientific and Industrial Research (CSIR) – University grant commission Government of India.	Research
3.	NET- Junior Research Fellowship	Indian Council of Medical Research (ICMR), Government of India.	Research
4.	Qualified with an All India Rank of 225 (98.25 percentile).	Graduate Aptitude Test in Engineering (Life Science) 2013, Government of India	Research

Academic events organized

1. Organized (**Organizing Secretary**) National Webinar on “**COVID-19: Key Perspective on Food & Neurosciences**” on 19th May 2021 under Anandam Program, Department of Biotechnology, University College of Science (UCoS), MLSU, Udaipur, Rajasthan.
2. Organized (**Organizing Secretary**) International Webinar on “**Career Prospects in Life sciences: Let’s explore**” on June 7th 2020 under Department of Biotechnology & Department of Microbiology, University College of Science (UCoS), MLSU, Udaipur, Rajasthan. More than 350 participants took part in the event from all across the globe.
3. Organized (**Department Council**) online **E Quiz series on COVID-19 for Spreading Awareness: Level One (Basics)** on 20th May 2020 organized by Department of Biotechnology & Microbiology, University College of Science (UCoS), MLSU, Udaipur, Rajasthan.
4. Organized (**Organizing Committee Member**) in **VII- Rajasthan Science Congress (RSC) (A National Conference on Current Scenario in Science and Technology: Facing the Challenges and Creating Opportunities)** held during October 14-16, 2019 at MLSU, Udaipur.
5. Organized (**Department Council**) **International Virtual Conference on COVID-19: Myths and Facts** on 14th July 2021 at Department of Biotechnology, University College of Science (UCoS), MLSU, Udaipur, Rajasthan.
6. Organized (**Department Council**) **International Virtual Conference on Recent Trends and Innovations in Microbiology** on 15th July 2021 at Department of Biotechnology & Microbiology, University College of Science (UCoS), MLSU, Udaipur, Rajasthan.

Professional Membership

- Alzheimer's Association International Society to Advance Alzheimer's Research and Treatment (ISTAART)
- International Parkinson and Movement Disorder Society (MDS)
- Indian Academy of Neurosciences (IAN) (Life Member)
- Association of Gerontology India (Life Member)
- National Academy of Biological Sciences (Life Member)
- Indian Science Congress (Life Member)