

Rajasekar Nagarajan, M. Pharmacy, Ph.D.
(Last updated: June 2023)

Personal Information

Senior Postdoctoral Researcher
University of Illinois at Urbana-Champaign
Department of Comparative Biosciences, Room 3631
Urbana, IL, USA- 61802-6178

Phone: (217) 693-9547

e-mail: rajbestyouth@gmail.com & raja786@illinois.edu<https://scholar.google.com/citations?user=P3po1qkAAAAJ&hl=en><https://www.linkedin.com/in/rajasekar-nagarajan-ph-d-2b140a9a/>**Educational background:**

Course	University/Board	Year of Acquiring
Ph.D. (Neuropharmacology)	CSIR- Central Drug Research Institute (CDRI), Lucknow, India; Ph.D. Thesis title: Study on the Role of Astrocytic Insulin Receptor Signaling in Neuroinflammation and Memory Impairment.	2016
M. Pharmacy (Pharmacology)	S.R.M. University, Chennai, India	2009
B. Pharmacy	Tamil Nadu Dr. M.G.R Medical University, India	2007

Employments:

Institution and location	Position title	MM/YY	Department
CSIR-CDRI, Lucknow, India.	M.Pharmacy Project (Trainee)	10.2008-04.2009	Pharmacology
Prasad Institute of Technology, Jaunpur, U.P. India	Lecturer	06.2009-12.2009	Pharmacology
Northern India Engineering College, Lucknow, India	Assistant Professor	12.2009-08.2010	Pharmacology
CSIR-CDRI, Lucknow, India.	Project Assistant	09.2010-09.2012	Pharmacology
CSIR- CDRI, Lucknow, India.	Project Junior Research Fellow	09.2012-05.2013	Pharmacology
CSIR-CDRI, Lucknow, India.	CSIR- Senior Research Fellow	05.2013- 11.2016	Pharmacology
University of Verona, Italy	Postdoctoral Research Fellow Project title: The pathogenic role of immune cells in Alzheimer's disease (IMMUNOALZHEIMER). Specifically worked on: To study the impact of neutrophils, and T cell subpopulations during disease course in mice with Alzheimer's-like disease.	12.2016- 04.2019	Medicine
University of Illinois at Urbana-Champaign, IL, USA	Senior Postdoctoral Researcher Project title: Cellular mechanisms for age-related cognitive dysfunction and its pharmacological reversal: a strategy towards prevention and treatment of postoperative cognitive deficits	05.2019-To date	Comparative Biosciences

Skills and Techniques:

- Animal breeding, genotyping, rodent behavior, rodent surgery, and drug administration (IP, ICV, PO, SC, IM, IV).
- Development and validation of *in-vivo* models for cognitive impairment and aging.
- Cell culture techniques with various cell lines, including rat astrocytoma cell line (C6), murine microglial cell line BV-2, Neuro-2a cell line, THP-1 cells, primary neuronal and 3D cell culture.
- Proficient in biochemical and molecular techniques: Western blotting, Real-time PCR, siRNA transfection, immunohistochemistry, immunofluorescence staining, ELISA, FACS analysis.
- Surgical techniques: Stereotaxic injections and administration of drugs into different brain regions.
- Neuronal cell separation from adult rodent's brain.
- Well-versed with *in vitro* cell adhesion assays.
- Mouse neutrophils isolation, mouse naïve CD4+ T cell isolation, and *in vitro* differentiation into T cell subsets.
- Purification of lymphocytes, monocytes, and neutrophils from Buffy Coats.
- Softwares: ANY-maze™, EthoVision XT, EndNote, Image J, GraphPad Prism, Adobe Photoshop, MS Office.

Training/Workshops undergone:

- One-month (April 28, 2005- May 28, 2005) Hospital training in Pharmacy, Lab and General Hospital Services at Seahorse Hospitals Ltd., Trichy, Tamil Nadu, India.
- Two Week (May 22, 2006- June 03, 2006) Industrial training at Sai Mirra Innopharm Pvt. Ltd., Chennai, Tamil Nadu, India.
- Attended workshop on “Advanced Experimental Techniques in Pharmacology” on July 11, 2008 organized by Department of Pharmacology, JIPMER, Pondicherry, India.
- Participated in the DBT Sponsored “Scientific Communication & Grant Writing Workshop” held on Oct 24, 2013 during XXXI Annual Conference of Indian Academy of Neurosciences, Allahabad, India.
- Participated in the Training program entitled “Statistical Concepts and Data Analysis used in Research” held on March 11-13, 2015, NIPGR, New Delhi organized by Clinical Development Services Agency (CDSA), an extramural unit of Translational Health Science & Technology Institute (THSTI), Dept. of Biotechnology, Ministry of Science and Technology, Govt. of India.

List of publications:

Total Citations: 652

h-index: 14

- E. Zenaro, S. Ghasemi, **Rajasekar Nagarajan** G. Constantin. Pathogenic signature of $\gamma\delta$ T cells promotes neutrophil responses and neuropathological features of Alzheimer's disease. **Nature Neuroscience** (Submitted–Manuscript no: NN-A74172B).
- **Nagarajan, R.**, et al. (2022) Genetic ablation of dentate hilar somatostatin-positive GABAergic interneurons is sufficient to induce cognitive impairment. bioRxiv preprint doi: <https://doi.org/10.1101/2022.11.01.514756>.
- **Nagarajan, R.**, et al. (2022). Chronic intermittent propofol attenuates surgery-induced neuroinflammation, apoptosis, and cognitive impairment in aged mice. bioRxiv. doi: <https://doi.org/10.1101/2022.10.26.513964>.
- Lyu J, **Nagarajan, R.**, et al., Selective inhibition of somatostatin-positive dentate hilar interneurons induces age-related cellular changes and cognitive dysfunction. PNAS Nexus. 2023 Apr 13;2(5):pgad134. doi: 10.1093/pnasnexus/pgad134.
- Zhu M, **Nagarajan, R.**, et al., Control of contextual memory through interneuronal α 5-GABAA receptors. PNAS Nexus. 2023 Apr 11;2(4):pgad065. doi: 10.1093/pnasnexus/pgad065.
- Kambali, M., **Nagarajan, R.**, et al., (2023). A marker chromosome in psychosis identifies glycine decarboxylase (GLDC) as a novel regulator of neuronal and synaptic function in the hippocampus. bioRxiv. doi: <https://doi.org/10.1101/2023.05.29.542745>.

- E. Pietronigro, **Rajasekar Nagarajan** et al., 2019. Blockade of $\alpha 4$ integrins reduces leukocyte-endothelial interactions in cerebral vessels and improves memory in a mouse model of Alzheimer's disease. *Sci. Rep.*, 9, 1–15.
- **Rajasekar, N.**, Nath, C., Hanif, K., Shukla, R., 2017. Intranasal insulin exerts beneficial effects by improving cerebral blood flow, Nrf-2 expression and BDNF in STZ (ICV) induced memory impaired rats. *Life Sciences*, Mar 15;173:1-10.
- **Rajasekar, N.**, Nath, C., Hanif, K., Shukla, R., 2017. Intranasal insulin administration ameliorates streptozotocin (ICV) - induced insulin receptor dysfunction, neuroinflammation, amyloidogenesis and memory impairment in rats. *Molecular neurobiology*, 54:6507–6522.
- **Rajasekar, N.**, Nath, C., Hanif, K., Shukla, R., 2016. Inhibitory Effect of Memantine on Streptozotocin-Induced Insulin Receptor Dysfunction, Neuroinflammation, Amyloidogenesis, and Neurotrophic Factor Decline in Astrocytes. *Molecular neurobiology*, 53:6730–6744.
- **Rajasekar, N.**, Dwivedi, S., Nath, C., Hanif, K., Shukla, R., 2014. Protection of streptozotocin induced insulin receptor dysfunction, neuroinflammation and amyloidogenesis in astrocytes by insulin. *Neuropharmacology* 86, 337-352.
- Dwivedi, S., **Rajasekar, N.**, Hanif, K., Nath, C., Shukla, R., 2016. Sulforaphane Ameliorates Okadaic Acid-Induced Memory Impairment in Rats by Activating the Nrf2/HO-1 Antioxidant Pathway. *Molecular neurobiology*, 53:5310–5323.
- Goel, R., Bhat, S.A., **Rajasekar, N.**, Hanif, K., Nath, C., Shukla, R., 2015. Hypertension exacerbates predisposition to neurodegeneration and memory impairment in the presence of a neuroinflammatory stimulus: Protection by angiotensin converting enzyme inhibition. *Pharmacology, biochemistry, and behavior* 133, 132-145.
- Dwivedi, S., **Rajasekar Nagarajan**, Hanif, K., Siddiqui, H.H., Nath, C., Shukla, R., 2014. Standardized Extract of *Bacopa monniera* Attenuates Okadaic Acid Induced Memory Dysfunction in Rats: Effect on Nrf2 Pathway. *Evid Based Complement Alternat Med* 2013, 294501.
- Niranjan, R., **Rajasekar Nagarajan**, Hanif, K., Nath, C., Shukla, R., 2014. LPS induces mediators of neuroinflammation, cell proliferation, and GFAP expression in human astrocytoma cells U373MG: the anti-inflammatory and anti-proliferative effect of guggulipid. *Neurol Sci* 35, 409-414.
- **Rajasekar, N.**, Dwivedi, S., Tota, S.K., Kamat, P.K., Hanif, K., Nath, C., Shukla, R., 2013. Neuroprotective effect of curcumin on okadaic acid induced memory impairment in mice. *Eur J Pharmacol* 715, 381-394.
- Tota, S., Goel, R., Pachauri, S.D., **Rajasekar, N.**, Najmi, A.K., Hanif, K., Nath, C., 2013. Effect of angiotensin II on spatial memory, cerebral blood flow, cholinergic neurotransmission, and brain derived neurotrophic factor in rats. *Psychopharmacology (Berl)* 226, 357-369.
- Ishola, I.O., Chaturvedi, J.P., Rai, S., **Rajasekar, N.**, Adeyemi, O.O., Shukla, R., Narender, T., 2013. Evaluation of amentoflavone isolated from *Cnestis ferruginea* Vahl ex DC (Connaraceae) on production of inflammatory mediators in LPS stimulated rat astrocytoma cell line (C6) and THP-1 cells. *J Ethnopharmacol* 146, 440-448.
- Niranjan, R., **Rajasekar, N.**, Nath, C., Shukla, R., 2012. The effect of guggulipid and nimesulide on MPTP-induced mediators of neuroinflammation in rat astrocytoma cells, C6. *Chem Biol Interact* 200, 73-83.

Abstract Published:

- **Rajasekar Nagarajan**, Jinrui Lyu, Maltesh Kambali, Muxiao Wang, Robert A Pearce, Uwe Rudolph 2022. Reduction of Postoperative Cognitive Deficits in Aged Mice by Chronic Intermittent Propofol." *FASEB journal*: official publication of the Federation of American Societies for Experimental Biology 36. <https://doi.org/10.1096/fasebj.2022.36.S1.R4256>.
- Constatin G., **Rajasekar Nagarajan** et al., 2017. TIM-1 controls neutrophil trafficking and contributes to the induction of cognitive decline and neuropathological changes in animal models of Alzheimer's disease. *Alzheimer's and Dementia*. DOI: <https://doi.org/10.1016/j.jalz.2017.07.113>.

- Constatin G., **Rajasekar Nagarajan** et al., 2017. Treatment with calcium dobesilate reduces neuroinflammation and improves cognition in a mouse model of Alzheimer's disease. *Alzheimer's and Dementia*. DOI: <https://doi.org/10.1016/j.jalz.2017.06.025>.
- Constatin G., **Rajasekar Nagarajan**, Thompson P., 2017. Inhibition of protein arginine deiminases improves cognition and reduces neuropathological changes in mouse models of Alzheimer's disease. *Alzheimer's and Dementia*. DOI: <https://doi.org/10.1016/j.jalz.2017.06.712>.
- **N. Rajasekar**, K Hanif, C Nath, R Shukla., 2013. Ppar-gamma Agonist Ameliorates Streptozotocin induced Neuroinflammation and insulin Resistance in Astroglial Cells. *Indian Journal of Pharmacology* 45, S33-S33.
- Dwivedi, S., **Rajasekar, N.**, Hanif, K., Siddiqui, H.H., Nath, C., Shukla, R 2013. Activation of Nrf2-antioxidant signaling protects memory impairment in rats. *Alzheimer's & Dementia*. DOI: <http://dx.doi.org/10.1016/j.jalz.2013.05.238>.
- IO Ishola, OO Adeyemi, **Rajasekar, N.**, S Rai , T Narender, R Shukla, 2011 Bioactivity Guided Evaluation of Antinociceptive and Anti-inflammatory Properties of *Cnestis ferruginea* Vahl ex DC (Connaraceae), *Planta Med*; 77, DOI: 10.1055/s-0031-1282394.

Oral Paper Presented at International Meeting:

- **Rajasekar. N.**, C. Nath, K. Hanif, R. Shukla* (2014), Protective effects of memantine in streptozotocin induced insulin receptor dysfunction and neuroinflammation in astrocytes, International Symposium on Neurosciences & XXXII Annual Conference of the Indian Academy of Neurosciences (IAN), NIMHANS Convention Centre, Bengaluru, India. **(Nominated for D.M. Kar Prize)**.
- **Rajasekar. N.**, K. Hanif, C. Nath, R. Shukla* (2013), PPAR- γ agonist ameliorates streptozotocin induced neuroinflammation and insulin resistance in astroglial cells. 46th Annual Conference of Indian Pharmacological Society, NIMHANS Convention Centre, Bengaluru, India.

Abstract presented/co-authored at International Meeting:

- **R. Nagarajan**, J. Lyu, M. Kambali, M. Wang, C. R. A. Pearce., U. Rudolph. Propofol attenuates surgery-induced neuroinflammation, apoptosis, and cognitive impairment in aged mice. Poster presentation at Neuroscience 2022, San Diego, CA, USA -November 12-16.
- **R. Nagarajan**, J. Lyu, M. Kambali, M. Wang, C. R. A. Pearce., U. Rudolph. Reduction of Postoperative Cognitive Deficits in Aged Mice by Chronic Intermittent Propofol. Poster presentation at Experimental Biology 2022, Philadelphia, Pennsylvania, USA- April 2-5, 2022.
- M. Kambali, **R. Nagarajan**, et al., *Increased copy number of the glycine decarboxylase (GLDC) gene differentially modulates hippocampal subregions in a mouse model of the pathophysiology of psychosis*. Poster presentation at Neuroscience 2022, San Diego, CA, USA -November 12-16.
- *J. Lyu, **R. Nagarajan** et al., *Cognitive Impairment and Reduced Dendritic Spine Density after Chronic Chemogenetic Inhibition of Somatostatin-Positive Interneurons in the Dentate Hilus*. Poster presentation at Neuroscience 2022, San Diego, CA, USA -November 12-16.
- **R. Nagarajan**, J. Lyu, M. Kambali, M. Wang, C. D. Courtney, C. A.Christian-Hinman, U. Rudolph. Genetic ablation of dentate hilar somatostatin-positive GABAergic interneurons is sufficient to induce cognitive impairment. Poster presentation at the Society for Neuroscience Annual Meeting – Chicago (USA)- Nov. 13-17, 2021.
- J. Lyu, **R. Nagarajan**, M. Kambali, M. Wang, U. Rudolph. Cognitive dysfunction induced by chronic chemogenetic inhibition of somatostatin-positive interneurons in the dentate gyrus hilus. Poster presentation at the Society for Neuroscience Annual Meeting – Chicago (USA)- Nov. 13-17, 2021.

- A. Abdulzahir, **R. Nagarajan**, U.Rudolph, R. A. Pearce. α 5-GABA_A receptors located on inhibitory interneurons mediate contextual memory suppression by etomidate in mice. Poster presentation at the Society for Neuroscience Annual Meeting – Chicago (USA)- Nov. 13-17, 2021.
- **M. Kambali, Rajasekar Nagarajan** et al., Evidence for a potential role of an increased copy number of the gene encoding glycine decarboxylase (GLDC) in the pathophysiology of psychosis. Poster presentation at the Society for Neuroscience Annual Meeting – Chicago (USA)- Nov. 13-17, 2021.
- **M.Wang, Rajasekar Nagarajan** et al., Reversal of schizophrenia-like phenotypes in mice engineered to harbor additional copies of the glycine decarboxylase (Gldc) gene. Poster presentation at the Society for Neuroscience Annual Meeting – Chicago (USA)- Nov. 13-17, 2021.
- Elena Zenaro, **Rajasekar Nagarajan** et al., Blockade of alpha4 integrins ameliorates cognitive dysfunction and neuropathological changes in transgenic animals with alzheimer's-like disease. Poster presentation at the 13th International Conference on Alzheimer's and Parkinson's diseases, Vienna (Austria), March 29 – April 2, 2017.
- Enrica Caterina Pietronigro, **Rajasekar Nagarajan** et al., LFA-1 integrin mediates neutrophil trafficking in the brain in mouse models of alzheimer's disease and contributes to disease pathology. Poster presentation at the 13th International Conference on Alzheimer's and Parkinson's diseases, Vienna (Austria), March 29 – April 2, 2017.
- **Giulia Iannoto, Rajasekar Nagarajan** et al., A tridimensional (3D) model studying the pathogenesis of Alzheimer disease *in vitro*. Poster presentation at the International retreat of PhD students in Immunology, Verona, (Italy), October 6-7, 2017.
- **Giulia Iannoto, Rajasekar Nagarajan** et al., Role of inflammation in Alzheimer's disease: A 3D model for the study of leukocyte-neural cell interactions. Poster presentation at the Keystone symposia "Organs- and Tissues-on-Chips", Big Sky (Montana, USA), April 8-12, 2018.
- **Giulia Iannoto, Rajasekar Nagarajan** et al., A role for T cells in the induction of memory deficit in mice with Alzheimer's-like disease. Poster presentation at the XXVII AINI Congress, Trieste (Italy), May 7-10, 2018.
- **Anna Slanzi, Rajasekar Nagarajan** et al., TIM-1 controls neutrophil trafficking and contributes to the induction of memory decline in animal models of Alzheimer's disease. Poster presentation at the XXVII AINI Congress, Trieste (Italy), May 7-10, 2018.
- **Vittorina Della Bianca, Rajasekar Nagarajan** et al., Calcium dobesilate inhibits neutrophil adhesion and improves memory in a mouse model of Alzheimer's Disease. Poster presentation at the 14th International Conference on Alzheimer's and Parkinson's diseases, Lisbon (Portugal), March 26-31, 2019.
- **Giulia Iannoto, Rajasekar Nagarajan** et al., A role for T cells in the induction of memory deficit in mice with Alzheimer's-like disease. Poster presentation at the 14th International Conference on Alzheimer's and Parkinson's diseases, Lisbon (Portugal), March 26-31, 2019.
- **Anna Slanzi, Rajasekar Nagarajan** et al., Inhibition of TIM-1 glycoprotein rescues memory and reduces neuropathological changes in Alzheimer's like Disease. Poster presentation at the 14th International Conference on Alzheimer's and Parkinson's diseases, Lisbon (Portugal), March 26-31, 2019.
- **Eleonora Terrabuio, Rajasekar Nagarajan** et al., CD8⁺ T cells contribute to memory impairment and neuropathological changes in transgenic mice with Alzheimer's-like disease. Oral presentation at the XXVIII AINI Congress, Camogli (Italy), May 6-9, 2019.
- Elena Zenaro, **Rajasekar Nagarajan** et al., . Calcium dobesilate blocks integrin-dependent neutrophil adhesion and improves memory in a mouse model of Alzheimer's disease. XXVI AINI Congress and 16th ESNI Course Program, San Servolo, Venice, Italy June 26-30, 2017.

- **Rajasekar. N.**, C. Nath, K. Hanif, R. Shukla* (2016), Neuroprotective effect of intranasal insulin in streptozotocin (ICV) - induced memory impairment in rats. VI International Symposium on “CURRENT TRENDS IN DRUG DISCOVERY & RESEARCH” (CTDDR-2016)” at CSIR-CDRI, Lucknow, India.
- **Rajasekar. N.**, S. Dwivedi, K. Hanif, C. Nath, R. Shukla* (2013), Insulin ameliorates insulin resistance and amyloidogenic protein expression in streptozotocin stimulated astroglial cells. International Symposium on Neurosciences & XXXI Annual Conference of Indian Academy of Neurosciences (IAN) & Local Chapter of IAN, Allahabad, India.
- S. Dwivedi, **Rajasekar. N.**, K. Hanif, C. Nath, R. Shukla* (2013), Protective effect of Melatonin in Streptozotocin induced memory impairment in Rats: effect on Nrf2 pathway. International Symposium on Neurosciences & XXXI Annual Conference of Indian Academy of Neurosciences (IAN) & Local Chapter of IAN, Allahabad, India.
- **Rajasekar. N.**, S. Dwivedi, K. Hanif, C. Nath, R. Shukla* (2012), Insulin modulates neuroinflammation and oxidative stress in streptozotocin stimulated astroglial cells. XXX Annual Conference of Indian Academy of Neurosciences (IAN) & International Symposium on Translational Neurosciences: Unraveling Mysteries of Brain in Health and Disease, GNDU, Amritsar, India.
- S. Dwivedi, **Rajasekar. N.**, K. Hanif, C. Nath, R. Shukla* (2012), Anti-dementic drugs affects Nuclear factor erythroid-2-related factor-2 (Nrf2) in Streptozotocin induced memory impairment in Rats. XXX Annual Conference of Indian Academy of Neurosciences (IAN) & International Symposium on Translational Neurosciences: Unraveling Mysteries of Brain in Health and Disease, GNDU, Amritsar, India.

Research Support and/or Scholastic Performance

Senior Research fellowship (CSIR-SRF): CSIR- Central Drug Research Institute (CDRI), Lucknow, India during 2013-2016

Awards

- Incentive Awards for Publications – (CSIR-CDRI, Lucknow, India) 2018.
- Best poster award at the Carl R. Woese Institute for Genomic Biology (IGB) Fellows Symposium on May 4, 2023.

Memberships in Professional Societies

Society for Neuroscience (2019- 2023)

Indian Academy of Neurosciences (2012-2014)

Topic Editor

- Frontiers in Bioengineering and Biotechnology - Journals
Topic: Cell Membrane-Coated Nanoparticles: an Emerging Drug Delivery System for Various Disease Treatments

Editorial Board member

- Brain Research Bulletin - Journals – Elsevier

Peer Reviewer:

- Scientific Reports – Nature Portfolio
- Molecular Neurobiology - Springer Science
- Chemico-Biological Interactions - Elsevier
- Frontiers in Pharmacology- Frontiers Media
- Frontiers in Aging Neuroscience – Frontiers Media
- Environmental Health Insights – SAGE Publications
- Brain Research Bulletin – Elsevier
- PLOS ONE
- Clinical Interventions in Aging – Dove Medical press
- Neurodegeneration
- Neuropsychiatric Disease and Treatment - Dove Medical press

Leadership and Mentorship**University of Illinois at Urbana-Champaign***Senior Undergraduate Research Mentees:*

- Ms. Praerona Murad - Aug-2019-May-2020
 - Mr. Muhammad Kishta – Aug 2021-May 2022
 - Ms. Rhea Akhaur - Aug 2021-May 2022
 - Ms. Jennifer Huan – Jan 2022-May 2023.
 - Mr. Santino Martinez – URAP Mentee – Jan 2022- April 2022.
- ✦ Title : Postoperative Cognitive Dysfunction in Aged Mice: Creating a Model Brain

Extracurricular activities:

- Regular **Blood Donor**
- Participated in many **Free Medical Camp** as a Volunteer
- Conducted in many disease awareness Camp like **HIV-AIDS, TB, Alcoholic and Drug Abuser's Rehabilitation Camp** etc.,
- Selected for "**Dr. Ambedkar Fellowship award – 2005**" - New Delhi, India
- Selected for "**District level Best Youth Consolation award**" in 2005-06 and "**District level Best youth award**" in 2006-07 – Perambalur District, Tamil Nadu, India.

References:**1. Dr. Uwe Rudolph MD, PhD**

Professor and Head
Department of Comparative Biosciences
College of Veterinary Medicine
University of Illinois at Urbana-Champaign
IL, USA – 60802.
Email: urudolph@illinois.edu
Phone: +1 (217) 300-6391

2. Dr. Robert A. Pearce MD, PhD

Professor, Department of Anesthesiology
UW School of Medicine and Public Health
Madison, WI 53792-327, USA
Email: rapearce@wisc.edu
Phone: +1 (608) 263-0208

I hereby state that the above statement is true to the best of my knowledge.

Date: June 27, 2023.

Rajasekar Nagarajan