

# Karthivashan Govindarajan

📞 780-716-2587; ✉ [karthivashan@gmail.com](mailto:karthivashan@gmail.com);

🌐 <https://tinyurl.com/Kar-linkedin>; <https://tinyurl.com/K-G-scholar>;

<https://tinyurl.com/K-G-researchgate>;

📍 302-10649 85 Avenue Northwest, Edmonton, Alberta, T6E 2K6

## PROFESSIONAL SUMMARY

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Motivated and experienced researcher striving to further understand the molecular mechanisms underlying clinical complications and to address them with viable therapeutic solutions through preclinical research. Organized research works and presentations to educate colleagues and superiors. Analyzed research findings tailoring to possible future applications and published through peer-reviewed journals.

## WORK EXPERIENCE

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### Postdoctoral Fellow (4011)

Mar 2019 - Present

University of Alberta • Edmonton, Alberta

- Conduct research in the field of Alzheimer's – therapeutic evaluation of acidic nanoparticle targeting amyloid/tau pathos in Alzheimer's disease (AD) progression, using 5xFAD transgenic-AD mouse model and publish findings in scholarly journals.
- Independently maintain and manage transgenic animal colonies/databases [genotype them using tail-snips - DNA extraction, PCR, and subsequent 2D gel electrophoresis].
- Autonomously performed stereotaxic surgeries on mice and implanted mini-osmotic pumps, to achieve intracerebroventricular drug administration, followed by cognitive and behavioral testing and necropsies for biochemical and molecular investigations.
- Acquired substantial experience in animal handling, molecular and immunological techniques.
- Actively involved in several collaborative projects – related to therapeutic studies in primary-neuron cells, astrocytes, and Kainic-acid induced seizure in rodent models.
- Direct, educate, and instructed two graduate students with molecular techniques alongside other professors.
- Advised graduate students on the course work and academic matters and career decisions.
- Represented the university as an invited speaker in an Indo-Malaysia joint conference.

### Postdoctoral Fellow (4011)

Dec 2016 - Dec 2018

Konkuk University • Chungju

- Conducted research in the field of neurodegenerative disorder therapeutics and published findings in scholarly journals.
- Independently investigated cognitive/behavioral alterations and therapeutic potential of few bioactive Phyto-candidates using chemical (scopolamine/MPTP)-induced neurodegenerative (Alzheimer's/Parkinson's-like) animal models.
- Cultured, maintained, and worked on glial and neuronal cell lines.
- Acquired extensive hands-on experience in cell culture, animal handling, molecular and immunological techniques.

- Initiated, developed, characterized, and tested the potential of a lipid-based nano-delivery system (SLN/NLC) to deliver native dopamine to the brain, for treatment of PD progression.
- Actively involved in several other collaborative projects – related to nano-therapeutic studies in cell models with other universities.
- Direct research supervisions and taught molecular techniques to 3-5 MSc/Ph.D. graduate students alongside other professors.
- Reported scientific findings in reputable conferences.

### **Clinical trials co-ordinator (4165)**

Jan 2010 - Jan 2012

Associate of Clinical Endocrinology Education and Research Hospital • Chennai

- Coordinated phase II and phase III clinical trials focused on disorders such as diabetes, osteoporosis, and hypertension.
- Initiated and organized study visits, investigator meetings and executed trials in accordance with study timelines and budgets.
- Screened patient records, databases, and physician referrals to identify prospective candidates for research studies.
- Explained the study protocol, including the pros/cons of the study in detail and obtain informed consent from patients abiding by ICH GCP guidelines.
- Organized and conducted patients visits according to the study protocol.
- Maintained, updated, and managed patient's health information databases.
- Assisted clinical investigators (PI) during ethics committee and pharma (i.e., Pfizer, Merck) sponsor meetings, and reviewed the progress of the clinical studies' metadata and patients' demands/health views in the ongoing trials.
- Presented the compiled and organized study data during Sponsor/internal audits.
- Organized and conducted free medical camp check-ups for needy populations, as per the hospital's terms.

## **EDUCATION**

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### **Ph.D. in Medical Biotechnology**

Feb 2012 - Jan 2017

University of Putra Malaysia • Serdang

- Successfully got promoted from Master to Ph.D. Program by passing a comprehensive exam as per the University of Putra Malaysia (UPM) panels' rules and regulations.
- Obtained the International Graduate Research fellowship (IGRF) for my research provided by UPM, Malaysia.
- Conducted doctoral research in the field of therapeutics targeting acetaminophen-induced hepatotoxicity - Thesis title: "*Moringa oleifera* leaves against acetaminophen toxicity - formulation, characterization and hepatoprotective potential of its bio-active fraction loaded soy-phospholipid complex".
- Earned doctorate degree with a CGPA of 3.885.
- Acquired extensive hands-on experience in cell culture, animal handling, molecular, immunological, and chromatographic techniques.
- Organized and facilitated a hands-on workshop on the Western blot technique in my lab by training 10-12 undergrad/master's students.
- Actively helped and guided fellow research students on troubleshooting experiments / instruments.
- Initiated, developed, characterized, and tested the potential of a nano-delivery system to enhance the delivery of bioactive Phyto extract to the liver for treatment of

acetaminophen-induced hepatotoxicity.

- Actively involved in several collaborative projects – involving nano-therapeutic studies in cell models with other labs/departments.
- Published findings in scholarly journals and presented them in several national/international conferences.
- Won silver medal for presenting my research work entitled “Soy-phosphatidylcholine complex encompassing *Moringa oleifera* leaves - prevention and exacerbation of hepatocellular damage” at Pameran Rekacipta, Penyelidikan Dan Inovasi (PRPI) conference, Malaysia.

### **PG. Diploma in Clinical Research**

Jan 2009 - Jan 2010

Institute of Clinical Research India • Bangalore

- Successfully earned PG diploma certificate in clinical research with 7-continuing professional development (CPD) points.
- Acquired knowledge in basic pharmacology and pharmacy in clinical research; ICH-GCP guidelines; Ethical Guidelines; Clinical trial designs; Clinical data documentation and management.

### **Bachelor of Technology in Biotechnology**

Mar 2004 - Sep 2008

Anna university • Chennai

- Earned a “first class” bachelor’s degree with a 74% score on completion of the streamlined course works in a provided timeframe.
- My course works majorly comprises - cell biology; microbiology; molecular biology; industrial biotechnology; biochemistry; genetic engineering; genomic & proteomics.
- Approached passionately, got approved and successfully completed my final year project in a central government research institute of India on brackish water aquaculture (CIBA) – entitled “Studies on the effect of immunostimulant on Tiger shrimps (*Penaeus monodon*)”
- Enthusiastically proposed and completed a mini project entitled “Subcloning and agrobacterium mediated transformation of *hevein* gene in tobacco plant (*Nicotiana tabacum*)” at Sreedhar Bhat’s laboratory, Bangalore.
- Acquired practical knowledge on molecular, immunology proteomics /genomics techniques/its applications.
- Presented scientific findings in five national level symposiums.

### **SKILLS**

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- Animal (rodents) handling - colony and database management.
- Independently perform stereotaxic surgery in rodents and endpoint necropsies.
- Conduct cognitive/behavioral tests (Morris Water Maze, Object recognition, Y-maze, passive avoidance, rota-rod test).
- Cell line cultures - Microglial cells, Primary neurons, Human hepatoma cell lines - HepaRG, HepG2.
- Lipid nanoparticles - formulation, characterization, and evaluation.
- Proficient in Western blot, Immunohistochemistry, ELISA, DNA isolation/PCR-based genotyping, and biochemical assays.
- Data analysis/Manuscript writing/scientific communications.
- Interpersonal and collaborative skills.
- Quick learner.

## AWARDS AND HONOURS

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Ballermann Translational Research Fellowship Award, Alberta, Canada.	2023
SynAD Alzheimer's Disease and Related Dementias postdoctoral grant award, Alberta, Canada.	2019
Won the 1st edition of the Nor-Feed Award, conducted by NOR-FEED SUD, France.	2015

## PATENT

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- **United States Provisional Patent Application Serial No. 63/389,341**  
Title: Unconjugated Poly(D,L-Lactide-Co-Glycolide) Nanoparticles in the Diagnosis of Alzheimer's Disease. Inventors: **Govindarajan Karthivashan**, Satyabrata Kar.  
Reference: 2023012 (USProv)
- **United States Provisional Patent Application Serial No. 63/040,701**  
Title: Unconjugated PLGA Nanoparticles in the Treatment of Alzheimer's Disease. Inventors: **Govindarajan Karthivashan**, Satyabrata Kar, Bibin Anand, Qi Wu Filing Date: June 18, 2020, Our Reference: 2019046 US Prov.

## SELECT PUBLICATIONS

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- **Karthivashan, G.**, & Kar, S. Detection of  $\beta$ -amyloid aggregates/plaques in 5xFAD mice by labelled native PLGA nanoparticles: implication in the diagnosis of Alzheimer's disease (2023). *Journal of Nanobiotechnology*, 21(1), 216. (**Impact Factor- 9.429**).
- Dahal, A., **Karthivashan, G.**, & Kar, S. Administration of kainic acid differentially alters astrocyte markers and transiently enhanced phospho-tau level in adult rat hippocampus (2023). *Neuroscience*, 516, 27-41. (**Impact Factor- 3.590**).
- Wu, Q., **Karthivashan, G.**, Nakhaei-Nejad, M., Anand, B. G., Giuliani, F., & Kar, S. Native PLGA nanoparticles regulate APP metabolism and protect neurons against  $\beta$ -amyloid toxicity: Potential significance in Alzheimer's disease pathology (2022). *International Journal of Biological Macromolecules*, 219, 1180-1196. (**Impact Factor- 8.025**). (\* Co-first author)
- Anand, B\*, G, Wu, Q\*, Maryam Nakhaei-Nejad\*, **Karthivashan, G\***, Doroshc, L, Amidian, S, Dahal, A, Li X, Stepanova M, Wille, H, Giuliani, F, & Kar, S. Significance of native PLGA nanoparticles in the treatment of Alzheimer's disease pathology (2022). *Bioactive Materials*, 17, 506-525. (**Impact Factor- 16.440**). (\* equally contributing first author)
- Paul PS, Cho JY, Wu Q, **Karthivashan, G**, Grabovac E, Wille H, Kulka M, Kar S. Unconjugated PLGA nanoparticles attenuate temperature-dependent  $\beta$ -amyloid aggregation and protect neurons against toxicity: implications for Alzheimer's disease pathology (2022). *Journal of Nanobiotechnology*. Dec;20(1):1-26. (**Impact Factor- 10.435**).
- Anand, B, G, Wu, Q, **Karthivashan, G**, Shejale, K, P, Amidian, S, Wille, H, & Kar, S. Mimosine functionalized gold nanoparticles (Mimo-AuNPs) suppress  $\beta$ -amyloid aggregation and neuronal toxicity (2021). 6(12), 4491-4505. *Bioactive Materials*. (**Impact Factor- 16.440**).
- Wang, Y, Wu, Q, Anand, B, G, **Karthivashan, G**, Phukan, G, Yang, J, Thinakaran, G, Westaway, D, Kar, S. Significance of cytosolic cathepsin D in Alzheimer's disease pathology: Protective cellular effects of unconjugated PLGA nanoparticles against  $\beta$ -amyloid-toxicity. (2020). *Neuropathology and Applied Neurobiology*. (**Impact Factor- 8.090**).
- **Karthivashan, G**, Ganesan P, Park, SY, Lee, HW, Choi, DK. Lipid-based nanodelivery approaches for dopamine-replacement therapies in Parkinson's disease: From preclinical to

- translational studies. (2020). *Biomaterials*.232:119704. (**Impact Factor- 15.304**).
- Kim J, **Karthivashan G**, Kweon MH, Kim DH, Choi DK. The Ameliorative Effects of the Ethyl Acetate Extract of *Salicornia europaea* L. and Its Bioactive Candidate, Irilin B, on LPS-Induced Microglial Inflammation and MPTP-Intoxicated PD-Like Mouse Model. (2019) *Oxid Med Cell Longev*. 2019; 2019:6764756. (**Impact Factor- 6.543**).
  - **Karthivashan, G**, Kweon, MH, Park, SY, Kim, J., Ganesan, P, Choi, D. K et al. Cognitive-enhancing and ameliorative effects of acanthoside B in a scopolamine-induced amnesic mouse model through regulation of oxidative/inflammatory/cholinergic systems and activation of the TrkB/CREB/BDNF pathway. (2019). *Food Chem Toxicol*. (**Impact Factor- 6.023**).
  - Park, S. Y., **Karthivashan, G.**, Ko, H, M., Cho, D, Y., Kim, J., Cho,D, J., Ganesan, P., Kim, I, S., and Choi, D, K. Aqueous extract of *Dendropanax morbiferus* leaves effectively alleviated neuro-inflammation and behavioral impediments in MPTP-induced Parkinson's mice model. (2018). *Oxidative Medicine and Cellular Longevity*, Article ID 3175214. (**Impact Factor- 6.543**).
  - **Karthivashan, G.**, Park, S. Y., Kweon, M. H., Kim, J., Choi, D. K. Ameliorative potential of desalted *Salicornia europaea* L. extract in multifaceted Alzheimer's-like scopolamine-induced amnesic mice model. (2018). *Scientific reports*, 8(1), 7174. (**Impact Factor- 4.379**).
  - **Karthivashan, G.**, Palanivel G.,Shin Young P., Joonsoo K., Choi D.K. Therapeutic strategies and nano-drug delivery applications in management of ageing Alzheimer's disease. (2018). *Drug Delivery 25 (1)*, 307-320. (**Impact Factor- 3.095**).
  - Ganesan, P., Ramalingam, P., **Karthivashan, G.**, Ko, Y.T. and Choi, D.K. Recent developments in solid lipid nanoparticle and surface-modified solid lipid nanoparticle delivery systems for oral delivery of phyto-bioactive compounds in various chronic diseases. (2018). *International journal of nanomedicine*, 13, p.1569. (**Impact Factor- 4.471**).
  - **Karthivashan, G.**, Shin Young P., Joonsoo K., Duk-Yeon C., Palanivel G., Choi D.K. Comparative studies on behavioral, cognitive and biomolecular profiling of ICR, C57BL/6 and its sub-strains suitable for scopolamine induced amnesic model. (2017). *International Journal of Molecular Sciences 18 (8)*, 1735. (**Impact Factor- 3.226**).
  - Barahuie, F., Saifullah, B., Dorniani,D., Fakurazi,S., **Karthivashan, G.**,Hussein, M. Z., Elfghi, F. M. Graphene oxide as a nanocarrier for controlled release and targeted delivery of an anticancer active agent, chlorogenic acid. (2017).*Materials Science and Engineering: C 74*, 177-185. (**Impact Factor- 4.164**).
  - **Karthivashan, G.**, Kura, A.U., Masarudin, M.J., Abas, F., Fakurazi, S. Optimization, formulation and characterization of multi-flavonoids loaded flavanosome by bulk or sequential technique.(2016).*International journal of nanomedicine 11*, 3417. (**Impact Factor- 4.471**).
  - **Karthivashan, G.**, Arulselvan, P., Tan, S.W., Fakurazi, S. The molecular mechanism underlying the hepatoprotective potential of *Moringa oleifera* leaves extract against acetaminophen induced hepatotoxicity in mice. (2015). *Journal of Functional Foods 17*, 115-126. (**Impact Factor- 3.144**).
  - Tan, W.S., Arulselvan, P., **Karthivashan, G.**, Fakurazi, S. *Moringa oleifera* Flower Extract Suppresses the Activation of Inflammatory Mediators in Lipopolysaccharide-Stimulated RAW 264.7 Macrophages via NF-κB Pathway.(2015).*Mediators of Inflammation*. (**Impact Factor- 3.232**).
  - **Karthivashan, G.**, Tangestani Fard, M., Arulselvan, P., Abas, F., Fakurazi, S. Identification of Bioactive Candidate Compounds Responsible for Oxidative Challenge from Hydro-Ethanollic Extract of *Moringa oleifera* Leaves. (2016). *Journal of Food Science 78*, C1368-C1375. (**Impact Factor- 1.815**).

## SELECT CONFERENCE

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- **Govindarajan Karthivashan**, Qi Wu, Shuai Wang, Abhishek Dahal, Xiuju Li, Danny Galleguillos, Simonetta Sipione, Gopal Thinakaran, and S Kar. "The disease-modifying potential of native-PLGA nanoparticles in the treatment of Alzheimer's disease pathology" at Society for Neuroscience conference 2022, San Diego, California.
- **Govindarajan Karthivashan**, Qi Wu, Shuai Wang, Abhishek Dahal, Xiuju Li, Maryam Nakhaei-Nejad, Fabrizio Giuliani, Gopal Thinakaran, and Satyabrata Kar. "A novel disease-modifying potential of native-PLGA nanoparticles in the treatment of Alzheimer's Disease (AD) pathology." Oral presentation at Me2 Majumdar Research & Quality Improvement Day (2022), Department of Medicine, University of Alberta, Canada.
- **Govindarajan Karthivashan** "Potential of Natural Products in Combating Neurodegenerative Disorders". Invited talk at Indo-Malaysian Conference on Recent Trends in Natural Products Research and their Applications (RTNPRA-21) 2021.
- **Govindarajan Karthivashan**, Shin Young Park, Joonsoo Kim, Mi-Hyang Kweon, Eun-Ah Cho, Duk-Yeon Cho, Palanivel Ganesan and Dong-Kug Choi. "Neuroprotective potential of DSH extracts in scopolamine-induced amnesic C57/BL6N mice model via restoration of cognitive, behavioural and cholinergic impairments." Poster presented at Korea International Conference of Korean Society for Molecular and Cellular Biology (KSMCB) 2018, Convention and Exhibition Center, Seoul, South Korea.
- **Govindarajan Karthivashan**, Shin-Young Park, Joon-So Kim, Duk-Yeon Cho, Palanivel Ganesan and Dong-Kug Choi. "SH-EE bioactive extract ameliorates scopolamine-induced memory impairment via modulation of cholinergic, antioxidant, inflammatory systems and CREB/BDNF pathway in C57/BL6N mice." Poster presented at "The role of food scientists & food industries for food security-KoSFoST", ICC Jeju 2017, South Korea.
- **Govindarajan Karthivashan**, Palanisamy Arulselvan, Mas Jafri Masaruddin, Faridah Abas, Sharida Fakurazi. "Soy-phosphotidylcholine complex encompassing Moringa oleifera leaves - prevention and exacerbation of hepatocellular damage" Poster presented and won **silver medal** at Pameran Rekacipta, Penyelidikan Dan Inovasi (PRPI), 2016, Malaysia.

## TRAINING AND CERTIFICATES

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- Trained and certified for "**Introduction to Basic Surgical Techniques in Research**" at Ray Rajotte Surgical Medical Research Institute (SMRI), Edmonton, AB, Canada. 2019.
- Trained and certified for "**Mouse Isoflurane Anesthesia and Subcutaneous Injections**" at Health Science Lab Animal Services (HSLAS), University of Alberta. Edmonton, AB, Canada. 2019.
- Trained and certified for "**Oral Gavage and CO2 Euthanasia**" at Health Science Lab Animal Services (HSLAS), University of Alberta. Edmonton, AB, Canada. 2019.
- Completed certification course for "**Post-Procedure Care of Mice and Rats in Research**" at CITI program, Konkuk University Institutional animal care and use committee (IACUC). South Korea. 2018.
- Completed certification course for "**Animal Welfare and Ethics**" and "**Researcher/Investigator (Animal Subjects Research)**" at CITI program, Konkuk University-IACUC. South Korea. 2018.

## Declaration

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I hereby declare that the particulars furnished above are true to the best of my knowledge.