DIOU **LUO**

Room 303, 504 University Loop, Jonesboro, AR 72401 | C: (870) 9724-4296 | duo@astate.edu

PERSONAL STATEMENT

I am a molecular and translational neuroscientist working at the interface of RNA biology, neurotoxicology, and mechanism-driven therapeutics for neurological and neuromuscular disease. Trained in the laboratory of Dr. Ravindra N. Singh, a pioneer in splicing therapeutics, I discovered and characterized a large repertoire of circular RNAs (circRNAs) generated by the Survival Motor Neuron (*SMN*) genes and defined their biogenesis and genome-wide transcriptomic and proteomic consequences, expanding spinal muscular atrophy (SMA) biology beyond an SMN protein-centric framework. I have also contributed to engineered U1 snRNA splice-correction strategies, transcriptome-wide specificity profiling of RNA-based therapeutics, and mechanistic mapping of SMN protein RNA recognition. In my current translational work on organophosphate-induced epilepsy and neurodegeneration, I integrate multi-omics, phosphoproteomics, histopathology, and behavioral phenotyping to identify actionable signaling nodes and candidate countermeasures, work that has produced two provisional patents. I am an active peer reviewer and journal editor and a dedicated mentor of veterinary, graduate, and undergraduate trainees.

EDUCATION

College of Veterinary Medicine, **Iowa State University**, IA, USA
Doctor of Philosophy in Biomedical Sciences (Cell Biology) Aug 2015 - Dec 2022

Project

Characterization of circular RNAs of Survival Motor Neuron genes
PI, Dr. Ravindra Singh

Focus of research

My pilot study revealed the *Survival Motor Neuron* (*SMN*) genes generate a vast repertoire of circular RNAs (circRNAs). CircRNA is a widely-expressed circularized RNA, which has been implicated in multiple cellular processes, including microRNA sponge, protein sequestration, or scaffold and template for translation. In addition, there is ample evidence that dysregulation of circRNA expression could lead to different pathological manifestations, such as cancers, neurodegenerative disorders, neuromuscular disease, and cardiovascular dysfunction. However, the cellular functions of *SMN* circRNAs remain a mystery. I investigated potential expression, distribution, and functions of SMN circRNAs by using an in vivo model in combination with bioinformatic analysis. My work to reveal the internal introns that promote back-splicing to generate *SMN* circRNAs was published in Genes recently. The latest result of my study revealed that overexpression of *SMN* circRNA had a significant effect on multiple proteins associated with neurological disorders, spermatogenesis, and tumorigenesis.

Impact of the research

Spinal Muscular Atrophy (SMA) is a devastating genetic disease associated with infant and child mortality, with a carrier frequency ~1 in 51 and affecting ~1 in 10,000 live births. Deficiency of the Survival Motor Neuron (SMN) protein owing to homologous disruption or deletion of *SMN1* gene accounts for more than ~90% of SMA cases. So far, most functional studies of the *SMN1/2* genes have been linked to the SMN protein and its isoforms. The discovery of *SMN2/3* circRNAs not only expands the diversity of *SMN1/2* transcripts, but also opens a new research frontier beyond SMN protein-centric point of view in the field of SMA.

Master of Science in Biomedical Sciences Aug 2014 – May 2015

Project Feb 2015 – Apr 2015

Misfolded Protein Induced Cell Death Signaling in Neurodegenerative Diseases
Major Professor, Dr. Anumantha Kanthasamy

Core Courses

Principles of Anatomy, Principles of Physiology, Cell Biology, Principles of Microbiology, Principles of Pharmacology, Principles of Pathology, Methods in Biomedical Sciences, Biochemistry

Chinese Medical Practitioner's Qualification Certificate, China Dec 2012

Medical College, Yanbian University, Jilin, China
Bachelor of Medicine in Anesthesiology Aug 2006 – Jun 2011

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Core Courses

Medical Biology, Medical Cell Biology, Systematic Anatomy, Regional Anatomy, Neurobiology, Immunology and Microbiology, Histology and Embryology, Physiology, Biochemistry, Pathology, Pathophysiology, Epidemiology, infectious Disease, Diagnostics, Surgery, Internal Medicine, Obstetrics and Gynecology, Pediatrics, Medical Imageology, Otolaryngology Head and Neck Surgery, Oral Medicine, Ophthalmology, Medical Psychology, Psychiatry, Dermatology and Venerology, Neurology, Medical Genetics, Anesthesia Anatomy, Anesthesia Pharmacology, Anesthesia Equipment, Anesthesia physiology, Diagnosis and Treatment of Pain, Clinical Anesthesiology, Critical Care Medicine,

PROFESSIONAL EXPERIENCE

Assistant Professor of Foundational Sciences
Arkansas State University, AR, USA — Jul 2026 – Present

Postdoctoral Research Associate
Iowa State University, IA, USA — Dec 2022 – Jun 2026

Research Assistant
Iowa State University, IA, USA — Aug 2017 – Dec 2022

Podium Presentations:
Invited speaker, Society for Neuroscience 49th Annual Meeting, IL, USA — Oct 2019
Presenter, Circular RNA Workshop, IA, USA — Feb 2020

Poster Presentations:
Society for Neuroscience Annual Meeting 2025, CA, USA — Nov 2025
Annual iBIO Seminar, IA, USA — Aug 2020
Annual SMA Conference, CA, USA — Jun 2019
ISU annual Neuroscience Research Day, IA, USA — Sep 2018
Annual SMA Conference, TX, USA — Jun 2018

Anesthesiologist
Guizhou Provincial People's Hospital, China — Jul 2013 – Jun 2014
Participated in administration of anesthesia for over two hundred cases.

Internship
Yanbian University Hospital, China — Jan 2010 – Dec 2010

PATENTS AND INTELLECTUAL PROPERTY

ISURF #05858 – New Molecular Target and Novel Peptide for Use in Treatment of Epilepsy — 2025
(Provisional Patent Application, Iowa State University Research Foundation)
Inventor: Thippeswamy, T.
Co-inventors: **Luo, D.**, Putra, M., Rao, NS.

ISURF #05859 – Roscovitine for Use in Treatment of Epilepsy — 2025
(Provisional Patent Application, Iowa State University Research Foundation)
Inventors: Thippeswamy, T.
Co-inventors: Meyer. C. **Luo, D.**

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PUBLICATIONS

PEER REVIEWED

1. **Luo, D.**, Ottesen, E. W., Lee, J. H., and Singh, R. N. (2024). Transcriptome- and proteome-wide effects of a circular RNA encompassing four early exons of the spinal muscular atrophy genes. *Sci Rep.* 14,10442. https://doi.org/10.1038/s41598-024-60593-7.
2. Ottesen, E. W.[#], Seo, J.[#], **Luo, D.**, Singh, N. N.*, and Singh, R. N.* (2024). A super minigene with a short promoter and truncated introns recapitulates essential features of transcription and splicing regulation of SMN1 and SMN2 genes. *Nucleic Acids Res*. gkad1259. https://doi.org/10.1093/nar/gkad1259
   [#] The authors wish it to be known that, in their opinion, the first two authors should be regarded as Joint First Authors.
   * To whom correspondence should be addressed. Tel: +1 515 294 8505; Email: singhr@iastate.edu. Correspondence may also be addressed to Natalia Singh. Tel: +1 515 294 2451; Email: natalias@iastate.edu
3. Ottesen, E. W., Singh, N. N., **Luo, D.**, Kaas, B., Gillette, B. J., Seo, J., Jorgensen, H. J., and Singh, R. N. (2023). Diverse targets of SMN2-directed splicing-modulating small molecule therapeutics for spinal muscular atrophy. *Nucleic Acids Res*. gkad259. https://doi.org/10.1093/nar/gkad259.
4. **Luo, D.**, Singh, N. N. and Singh, R. N. (2022). Internal Introns Promote Backsplicing to Generate Circular RNAs from Spinal Muscular Atrophy Gene. *Genes*. 13(7), 1145. https://doi.org/10.3390/genes13071145.
5. Ottesen, E. W., **Luo, D.,** Singh, N. N. and Singh, R. N. (2021). High Concentration of an ISS-N1-Targeting Antisense Oligonucleotide Causes Massive Perturbation of the Transcriptome. *Int J Mol Sci*. 22(16), 8378. doi: 10.3390/ijms22168378
6. Lopez Soto, E.J., Gandal, M.J., Gonatopoulos-Pournatzis, T., Heller, E.A., **Luo, D**., and Zheng, S. (2019). Mechanisms of Neuronal Alternative Splicing and Strategies for Therapeutic Interventions. *J Neurosci*. 39(42), 8193–8199. https://doi.org/10.1523/JNEUROSCI.1149-19.2019.
7. Ottesen, E. W.*, **Luo, D.***, Seo, J.*, Singh, N. N., and Singh, R. N. (2019). Human Survival Motor Neuron genes generate a vast repertoire of circular RNAs. *Nucleic Acids Res.* 47(6), 2884-2905. doi: 10.1093/nar/gkz034.
   * The authors wish it to be known that, in their opinion, the first three authors should be regarded as Joint First Authors.
8. Singh, N. N., **Luo, D.**, and Singh, R. N. (2018). Pre-mRNA Splicing Modulation by Antisense Oligonucleotides. *Methods Mol Biol.* 1828, 415-437. doi: 10.1007/978-1-4939-8651-4_26.
9. Ottesen, E. W., Singh, N. N., **Luo, D.**, and Singh, R. N. (2018). High-affinity RNA targets of the Survival Motor Neuron protein reveal diverse preferences for sequence and structural motifs. *Nucleic Acids Res.* 46(20), 10983-11001.doi: .1093/nar/gky770.
10. Feye, K. M., Smith, J. S., Sebbag, L., Hohman, A. E., Acharya, S., … **Luo, D.**, …Carlson, S. A. (2018). Veterinary Considerations for the Theoretical Resurrection of Extinct Species. *J Vet Sci Ani Husb. 6*(3), 306.
11. Singh, N. N., Del Rio-Malewski, J. B., **Luo, D.**, Ottesen, E. W., Howell, M. D., and Singh, R. N. (2017). Activation of a cryptic 5' splice site reverses the impact of pathogenic splice site mutations in the spinal muscular atrophy gene. *Nucleic Acids Res. 45*(21), 12214-12240. doi: 10.1093/nar/gkx824
12. Schmidt-McCormack, G. R., Feye, K. M., Acharya, S., Mlynarczyk, G. S. A., Anderson, S. J., Izbicki, P., **Luo, D.**, . . . Carlson, S. A. (2017). Theoretical Engineering of the Gut Micro biome for the Purpose of Creating Superior Soldiers. *Journal of Medical and Health Sci. 6,* 2319-9865.

13. Puttachary, S., Sharma, S., Verma, S., Yang, Y., Putra, M., Thippeswamy, A., **Luo, D.**, and Thippeswamy, T. (2016). 1400W, a highly selective inducible nitric oxide synthase inhibitor is a potential disease modifier in the rat kainate model of temporal lobe epilepsy. *Neurobiol Dis.* 93, 184-200. doi: 10.1016/j.nbd.2016.05.013.
14. Anderson, S. J., Feye, K. M., Schmidt-McCormack, G. R., Malovic, E., Mlynarczyk, G. S. A., Izbicki, P., **Luo, D.**, . . . Carlson, S. A. (2016). Off-Target drug effects resulting in altered gene expression events with epigenetic and "Quasi-Epigenetic" origins. *Pharmacol Res.* 107, 229-233. doi: 10.1016/j.phrs.2016.03.028.

SCIENTIFIC ABSTRACTS

1. **Luo, D.**, McGeroge, LE., Massey, N., Sundara Vasanthi, S. and Thippeswamy, T. (2025). Chronic dysregulation of Fyn–Tau signaling following GD exposure in a rat model. Society for Neuroscience annual meeting 2025, San Diego, CA, USA
2. Seo, J., Ottesen, E. W., **Luo, D.**, Singh, N. N. and Singh, R. N. (2020). Role of RNA helicases in generation of SMN circular RNAs. The 25th Annual Meeting of the RNA Society, Online May 26-June 1, 2020.
3. Ottesen, E. W., Seo, J., **Luo, D.**, Singh, N. N. and Singh, R. N. (2020). Circular RNAs of human *SMN* genes incorporate novels exons derived from the intronic and intergenic sequences. The 25th Annual Meeting of the RNA Society, Online May 26-June 1, 2020.
4. **Luo, D.** (2019). Novel insights from splicing regulation of spinal muscular atrophy gene. Society for Neuroscience 49th annual meeting, Chicago, IL, USA
5. Ottesen, E. W., **Luo, D.**, Singh, N. N. and Singh, R. N. (2019). Novels exons revealed by circular RNAs expand the size of human *SMN* genes. Cornbelt RNA Meeting, Columbia, MO, USA
6. **Luo, D.**, Ottesen, E. W., Seo, J., Singh, N. N. and Singh, R. N. (2019). Analysis of circular RNAs generated by *Survival Motor Neuron* genes. 23rd International SMA Research Meeting, Anaheim, CA, USA.
7. Singh, R. N., Ottesen, E. W., Luo, D., Seo, J., and Singh, N. N. (2018). Spinal muscular atrophy genes generate a vast repertoire of circular RNAs. 2nd International Caparica Conference in Splicing, Caparica, Lisbon, Portugal.
8. **Luo, D.**, Singh, R. N., Ottesen, E. W., Seo, J., Singh, N. N. and Singh, R. N. (2018). Analysis of circular RNAs generated by spinal muscular atrophy genes. 22nd SMA Researcher Meeting, Dallas, TX.
9. Ottesen, E. W., Singh, N. N., **Luo, D.** and Singh, R. N. (2018). High affinity RNA targets of the survival motor neuron protein. 22nd SMA Researcher Meeting, Dallas, TX.
10. Ottesen, E. W., Singh, N. N., **Luo, D.** and Singh, R. N. (2017). High affinity RNA targets of the survival motor neuron protein. 2017 Eukaryotic mRNA processing, Cold Spring Harbor, New York.
11. Singh, N. N., Del Rio-Malewski, J. B., **Luo, D.**, Ottesen, E. W., Howell, M. D. and Singh, R. N. (2017). Therapeutic splicing correction by U1 snRNP-mediated redefinition of a critical exon of spinal muscular atrophy gene. 2017 Eukaryotic mRNA processing, Cold Spring Harbor, New York.
12. Singh, N. N., Del Rio-Malewski, J. B., **Luo, D.**, Ottesen, E. W., Howell, M. D. and Singh, R. N. (2017). Therapeutic splicing correction by U1 snRNP-mediated redefinition of a critical exon of spinal muscular atrophy gene. 2017 RNA Society meeting, Prague, Czechoslovakia.

MENTORING & TEACHING EXPERIENCE

Teaching Assistant

Methods in Biomedical Sciences (BMS 502), Iowa State University — Spring 2016 & Spring 2017
Principles of Physiology (BMS 538), Iowa State University — Fall 2015 & Fall 2016

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Summer scholarship project Summer 2025
Mentored CVM student McGeorge, L.E. on the project "The effects of soman (GD) exposure on the Fyn–Tau pathway in the thalamus of a rat model", which resulted in a presentation at the National Veterinary Scholar Symposium.

Lab training 2017 – Present
Mentored and trained multiple undergraduate and graduate students, and a lab technician in molecular biology, animal handling, and/or data analysis and presentation.

PROFESSIONAL SERVICE

EDITORIAL SERVICE

Guest Editor, Cells (MDPI) 2026 – Present
Special Issue Title: Mechanisms and Biomarkers of Neurotoxicity: From Molecular Pathways to Therapeutic Interventions
Invited to co-lead a Special Issue focused on how environmental, chemical, pharmacological, and endogenous insults disrupt neural homeostasis and drive acute to chronic neurotoxic outcomes. The issue emphasizes mechanistic pathways (e.g., neuroinflammation, oxidative stress, mitochondrial dysfunction, excitotoxicity, glial dysregulation), multimodal biomarker discovery and validation (molecular, imaging, electrophysiological, behavioral), and translational therapeutic strategies, including life-stage vulnerability and sex-dependent effects. Responsibilities include refining the scope, coordinating manuscript invitations and calls for papers, overseeing peer review, and supporting editorial decisions to attract rigorous, high-impact submissions.

Topic Editor, Frontiers in Genetics (Cytogenomics Section) 2025 – Present
Research Topic: Neuroglial Cell Genetic Background and Disease Susceptibility
Invited by the Specialty Chief Editor and Editorial Office to co-lead a Research Topic focused on the genetic determinants of neuroglial cell biology and disease susceptibility. Responsibilities include organizing the topic scope, managing peer review, coordinating manuscript invitations, and promoting calls for participation to attract high-impact submissions.

JUDGING SERVICE

Judge, College of Veterinary Medicine Research Day, Iowa State University 2025
Evaluated graduate and undergraduate research posters and provided written feedback on study design, data presentation, and scientific communication.

PEER-REVIEWER SERVICE

1. Song X., et al. (2025). Revealing Splicing Factor-Mediated Regulatory Networks and Immunological Characteristics in Dilated Cardiomyopathy Through Integrative Bioinformatics and Machine Learning. Reviewed in Oct. 2025 for Human Genomics (Springer Nature).
2. Du, H., et al. (2025). Super-enhancer-associated LINC00963 promotes metastasis of gastric cancer through epithelial-mesenchymal transition. Reviewed in Jun. 2025 for PLOS One.
3. Chakraborty, R., et al. (2024). Heroin Addiction Modulates Transcription Factor Binding in Regulatory

Regions of the Human Putamen. Reviewed in Jan. 2025 for Frontiers in Neuroscience.
4. Cullen, H., et al. (2024). Common Genetic Variation Associated with Adult Subcortical Brain Volume is also Associated with Subcortical Brain Volume at Birth. Reviewed in Jan. 2025 for Frontiers in Neuroscience.
5. Burns, J. N., et al. (2024). Comparative transcriptomic rhythms in the mouse and human prefrontal cortex. Reviewed in Nov. 2024 for Frontiers in Neuroscience.
6. Case report: A 3' splice site variation in RORB exon 3 associated with idiopathic generalized epilepsy in a Child. Reviewed in Nov. 2024 for Frontiers in Genetics.
7. A Novel Mutation in IQSEC2 Gene Causes Psychomotor Developmental Delay with Intellectual Disability and Comprehensive Mutation Update with Literature Review. Reviewed in Oct. 2024 for Frontiers in Neuroscience.
8. Has_circ_0002360 facilitates immune evasion by enhancing heterogeneous nuclear ribonucleoprotein A1 stability, thereby promoting malignant progression in non-small cell lung cancer. Reviewed in Sep. 2024 for Human Genomics (Springer Nature).
9. The Association of Serum Metabolites with Post-stroke Fatigue in Subacute Phase. Reviewed in Aug. 2024 for Frontiers in Genetics.
10. Clinical, genetic and immunological characterization of a novel XK variant in a patient with McLeod syndrome. Reviewed in May 2024 for Frontiers in Genetics.
11. Non-coding RNAs involved in the molecular pathology of Alzheimer's disease: a systematic review. Reviewed in Apr. 2024 for Frontiers in Neuroscience.
12. Case report: Primary familial brain calcification associated with a rare PDGFRB variant, coexisting with nontraumatic osteonecrosis of the femoral head. Reviewed in Apr. 2024 for Frontiers in Neuroscience.

AWARDS and HONORS

Veterinary Medicine Biomedical Research Graduate Scholarship
Iowa State university, USA 2021

Lora and Russ Talbot Graduate Fellowship in Veterinary Medicine
Iowa State university, USA 2020

Research Excellence Award
Iowa State university, USA 2019

Teaching Excellence Award
Iowa State university, USA 2017

TECHNICAL EXPERTISE

Quantitative proteomics & phosphoproteomics: TMT multiplexing and Olink profiling with reproducible R/Bioconductor analysis pipelines; integrated RNA-seq and proteomic data analysis.
RNA biology: splicing and minigene assays, RNA-protein interaction mapping (SELEX, HITS-CLIP), and in vitro transcription/translation.
In vivo neuroscience: rodent models of seizure and neurodegeneration; CNS-targeted delivery (intracerebroventricular, intrahippocampal), stereotaxic and systemic administration; behavioral phenotyping and histopathology (IHC/ICC).