

Curriculum Vitae

Felicia M. Michael

Spinal Cord & Brain Injury Research Center (SCoBIRC)

University of Kentucky

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CURRENT POSITION:

2019-2020 Postdoctoral Research Scholar, Spinal Cord & Brain Injury Research Center (SCoBIRC), University of Kentucky, Lexington, KY

EDUCATION:

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| 2008 | B.Sc. | Advanced Zoology & Biotechnology
Department of Zoology
Stella Maris College, University of Madras, Chennai, India |
| 2010 | M.Sc. | Biomedical Genetics
Department of Genetics
University of Madras, Chennai, India |
| 2018 | Ph.D. | Genetics-Anatomy
Department of Anatomy
University of Madras, Chennai, India |

Research Interests:

My research interests center on the impediments to regeneration and repair following spinal cord injury (SCI). I was first introduced to the field during my Ph.D. wherein I used gene manipulation strategies to delineate the factors affecting cell survival after experimental SCI, which further piqued my interest in unraveling the complexity of gene editing in SCI. Therefore, after many exchanges over the web after my thesis defense, I joined Dr. Rabchevsky's lab as a postdoctoral scholar to undertake research on autonomic and mitochondrial dysfunction after SCI. He is a pioneer in the field of preserving mitostasis and autonomic dysreflexia (AD), among other SCI secondary disorders. Under his able guidance and expertise, I am addressing the underlying factors that contribute to the pathophysiology of AD using viral vectors with funding from Craig H. Neilsen Foundation. I am currently involved in employing telemetric hemodynamic studies in colorectal distention to induce AD and delineate the neuronal circuits contributing to its pathophysiology especially the role of interneurons. I am also conducting electromyography in rats with sacral SCI induced tail spasticity following

oligoneucleotide mediated modulation of posttranscriptional gene splicing of 5HT2C receptors and evaluating the changes in gene expression after SCI using qPCR. Moreover, I am also working with his colleague, Dr. Samir Patel, who is an expert in the field of mitochondrial bioenergetics, with whom I am now probing mitochondrial transplantation strategies for contusion SCI.

Awards/Honors:

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| 2008-2010 | University Merit Fellowship , University of Madras, Chennai, Tamilnadu, India |
| 2010 | Gold medal for First Rank in M.Sc. Biomedical Genetics, University Madras |
| 2011-2016 | INSPIRE Research Fellowship (Government of India, Department of Science & Technology); Junior and Senior Research Fellowships – 2 & 3 years, University Madras |
| 2018 | Ph.D (Genetics-Anatomy) , University of Madras
Title: Prospects of gene therapy for spinal cord injury: An experimental study using siRNA and viral vectors as tools for gene manipulation in a rodent model of contusion spinal cord injury |
| 2019-2020 | Research Scholarship , Spinal Cord & Brain Injury Research Center, University of Kentucky |
| 2020- | Postdoctoral Research fellowship , Craig H. Neilsen Foundation |

Grant Support:

Current:

Project Title: Chemogenetic Silencing of Interneurons to Modulate Autonomic Dysreflexia

Principle Investigator: Felicia M. Michael (07-31-2020 to 07-31-2022)

Mentor: Alexander G. Rabchevsky

Co-Mentor: Samir P. Patel

Agency: Craig H. Neilsen Foundation

Program: Neilsen Postdoctoral Fellowship Research Grant (651019) Total costs: \$150,000

This study aims to delineate the role of ascending propriospinal neurons (APN) in the pathophysiology of experimentally induced autonomic dysreflexia (AD) following complete high thoracic (T4) spinal cord injury (SCI) in rats by using designer receptors exclusively activated by designer drugs (DREADDS) which will selectively label and reversibly silence these APN. The impact of selective and reversible APN silencing on cardiophysiological parameters like heart rate and blood pressure in animals experiencing colorectal distension (CRD) induced AD will be evaluated telemetrically to monitor its influence on AD incidence/severity with and without their signaling.

Past:

Project Title: Prospects of gene therapy for spinal cord injury: An experimental study using siRNA and viral vectors as tools for gene manipulation in a rodent model of contusion spinal cord injury

Principle Investigator: Felicia M. Michael (04-01-2011 to 03-31-2016)

Mentor: Sankar Venkatachalam

Agency: Department of Science & Technology (DST), Government of India

Program: INSPIRE Fellowship program (IF110069) Total Cost: 1,909,600 INR

This study aimed to simultaneously modulate the expression of multiple genes after contusion spinal cord injury using siRNA cocktails. We tested the hypothesis that the use of siRNA cocktails for multiple genes will improve the silencing efficiency of siRNA and aid in targeting multiple gene pathways simultaneously. Thereby comparing the effect of silencing cell death genes like caspase3 and sarm1 individually and concurrently after SCI to identify if the combination is better at decreasing the severity of secondary cell death than individual siRNA targets.

Publications:

1. Rabchevsky A.G., **Michael F.M.** and Patel S.P. (2020) Mitochondria focused neurotherapeutics for spinal cord injury. *Experimental Neurology* 330:113332. **PMID: 32353464**
2. **Michael F.M.**, Patel S.P. and Rabchevsky A.G. (2019) Intraspinal Plasticity Associated with the Development of Autonomic Dysreflexia After Complete Spinal Cord Injury. *Frontiers in Cellular Neuroscience* 8: 13:505. **PMID: 31780900 PMCID: PMC6856770**
3. **Michael F.M.**, Chandran P., Chandramohan K., Iyer K., Jayaraj K., Sundaramoorthy R. and Venkatachalam S. (2019) Prospects of siRNA cocktails as tools for modifying multiple gene targets in the injured spinal cord. *Experimental Biology and Medicine*. **PMID: 31461324 PMCID: PMC6775571**
4. Muthaiah V.P.K., **Michael F.M.**, Palaniappan T., Rajan S.S., Chandrasekar K. and Venkatachalam S. (2017) JNK1 and JNK3 play a significant role in both neuronal apoptosis and necrosis. Evaluation based on in vitro approach using tert-butylhydroperoxide induced oxidative stress in neuro-2A cells and perturbation through 3-aminobenzamide. *Toxicology in vitro*. 41:168-178. **PMID: 28257805**
5. Kumar K.M., Aruldhas M.M., Banu S.L., Sadasivam B., Vengatesh G., Ganesh K.M., Navaneethalakrishnan S., Navin A.K., **Michael F.M.**, Venkatachalam S., Stanley J.A., Ramachandran I., Banu S.K. and Akbarsha M.A.(2017) Male reproductive toxicity of CrVI: In-utero exposure to CrVI at the critical window of testis differentiation represses the expression of Sertoli cell tight junction proteins and hormone receptors in adult F1 progeny rats. *Reproductive Toxicology* 69, 84–98 **PMID: 28192182**
6. Nathan J.R., Lakshmanan G., **Michael F.M.**, Seppan P. and Ragunathan M. (2016) Expression of adenosine receptors and vegf during angiogenesis and its inhibition by pentoxifylline—A study using zebrafish model, *Biomedicine & Pharmacotherapy* 84:1406-1418. **PMID: 27802896.**

7. **Michael F.M.**, Mohapatra A.N., Venkitasamy L., Chandrasekar K., Seldon T. and Venkatachalam S. (2015) Contusive spinal cord injury up regulates mu-opioid receptor (mor) gene expression in the brain and down regulates its expression in the spinal cord: possible implications in spinal cord injury research, *Neurological Research* 37(9):788-96. **PMID: 26039701**
8. Muthaiah V.P.K., Venkitasamy V., **Michael F.M.**, Chandrasekar K. and Venkarachalam S., (2013) Neuroprotective Role of Naringenin on Carbaryl Induced Neurotoxicity in Mouse Neuroblastoma cells., *Journal of Pharmacology and Pharmacotherapeutics* 4(3), 192-197 **PMID: 23960424 PMCID: PMC3746302**
9. Bakkiyanathan A., Nathan J.R., Ravikumar S., Gopalakrishnan T.S., **Michael F.M.** and Ragunathan M. (2012) Anti-angiogenic effects of theophylline on developing zebrafish (*Danio rerio*) embryos, *Biomedicine and Preventive Nutrition* 2 (3), 174-178 **PMID: 23960424 PMCID: PMC3746302**

Published/Refereed abstracts for national/international meetings:

1. **Michael F.M.** (2020) Chemogenetic silencing of interneurons to modulate autonomic dysreflexia, Physiology seminar series 2020, University of Kentucky, Lexington, USA
2. **Michael F.M.**, Patel S.P. and Rabchevsky A.G. (2020) Temporal characterization of central and peripheral immune responses following complete high thoracic spinal cord injury, The 2020 Neuroscience Clinical-Translationa Research Symposium, University of Kentucky, Lexington, USA.
3. **Michael F.M.** and Rabchevsky A.G. (2020) Chemogenetic silencing of interneurons to modulate autonomic dysreflexia, Physiology retreat 2020, University of Kentucky, Lexington, USA.
4. Venkatachalam S., **Michael F.M.**, Chandran P., Chandramohan K. and Iyer K. (2019). Gene expression changes in the spinal cord segments following contusion spinal cord injury and its implications in gene therapy. *IBRO Reports*, 6, S433
5. Chandran P., Chandramohan K., **Michael F.M.**, Iyer K., Seppan P and Venkatachalam S. (2019) Effect of *Mucuna pruriens* extract in treating contusion spinal cord injury *IBRO Reports*, 6. S554-S555
6. Iyer K., Chandramohan K., Chandran P., **Michael F.M.**, Daniel J. and Venkatachalam S. (2019). The prospects of dorsal myelotomy in treating contusive spinal cord injury. *IBRO Reports*, 6. S554
7. Chandramohan K., Venkitasamy L., Chandrasekaran K., **Michael F.M.** and Venkatachalam S. (2019). Rescue of axotomized motor cortical neurons from death by bone marrow derived stromal cells transplantation after spinal cord injury in rodent model *IBRO Reports*, 6, S555
8. **Michael F.M.**, Venkitasamy L., Chandrasekaran K. and Venkatachalam S. (2011) Necrotic and Apoptotic Gene Expression Changes in N2a Cells Subjected to tBH Mediated Oxidative Stress, *The 34th Annual conference of the Association of Anatomists* at Melmaruvathur, India. *Received best paper award.*
9. Venkitasamy L., Chandrasekaran K., **Michael F.M.** and Venkatachalam S. (2011) Role of human amniotic epithelial cells in producing motor recovery after

contusive spinal cord injury in Sprague Dawley rats. *The 34th Annual conference of the Association of Anatomists* at Melmaruvathur, India.

10. Chandrasekaran K., Venkitasamy L., **Michael F.M.**, Palaniappan T., Skylab SR. and Venkatachalam S. (2011) Role of bone marrow stem cells in treating spinal cord injury: An experimental study using rat model of spinal cord injury. *The 34th Annual conference of the Association of Anatomists* at Melmaruvathur, India.