

Curriculum Vitae

Samirkumar Pravinbhai Patel, Ph.D.

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CURRENT POSITION:

2014 Research Assistant Professor, Department of Physiology, Spinal Cord & Brain Injury Research Center (SCoBIRC), University of Kentucky, Lexington, KY

EDUCATION AND PROFESSIONAL TRAINING:

1998	B.Sc.	Major: Zoology Minor: Chemistry & Botany Department of Zoology The M. S. University at Baroda, Vadodara, Gujarat, India
2000	M.Sc.	Major: Biochemistry Department of Biochemistry The M. S. University at Baroda, Vadodara, Gujarat, India
2006	Ph.D.	Major: Biochemistry Department of Biochemistry The M. S. University at Baroda, Vadodara, Gujarat, India <i>“Effect of alloxan-diabetes on mitochondrial and microsomal function in rat brain, kidney and liver”.</i> http://ir.inflibnet.ac.in:8080/jspui/handle/10603/60475
2006-11	Post-Doctoral Fellow/Scholar	SCoBIRC & Department of Physiology, University of Kentucky, Lexington, KY
2012-2014	Research Scientist II	SCoBIRC, University of Kentucky, Lexington, KY

SCHOLARSHIPS / AWARDS:

1. Graduate Scholarship from Shri Kanam Patidar Seva Samaj charitable trust, Vadodara, India (June 2000-2005).
2. Anthony Marmarou Award for best presentation, The 25th Annual Neurotrauma Symposium, Kansas City, MO, “Effects of mitochondrial uncoupling agent, 2,4-dinitrophenol, or nitroxide antioxidant, tempol, on mitochondrial integrity following acute contusion spinal cord injury,” July 2007.
3. Post-Doctoral Fellowship: The Craig H. Neilsen Foundation (2008) “Effects of Acetyl-L-Carnitine Treatment Following Spinal Cord Injury”. Declined based on overlap with grant awarded from KSCHIRT # 8-13 (AGR).

4. Travel award from National Neurotrauma Society to attend the 2nd joint symposium of the International and National Neurotrauma Societies, Santa Barbara, CA (2009).

PRESS RELEASES

9/2011

“Commonly Used Supplement May Improve Recovery from Spinal Cord Injuries”

-UK Now – University of Kentucky News, <http://uknow.uky.edu/content/commonly-used-supplement-may-improve-recovery-spinal-cord-injuries>

-Science Daily, <http://www.sciencedaily.com/releases/2011/09/110928185025.htm>

8/2013

“Acetyl-L-Carnitine”

-PN/Paraplegia News Magazine, <http://pvamag.com/pn/article/5680/acetyllcarnitine>

4/2015

“Extraordinary Medicine episode on SCI/TBI.” Documentation of Drs. Rabchevsky & Sullivan’s work on mitochondria-targeted interventions for SCI and TBI. Being sent DVD, FBR licensed the series to Discovery Network in Australia and Latin America. Liz Hodge, Director/Producer, FBR Media

6/2016

“Mentoring a Key Factor in Spinal Cord Researcher's Success”

UK Now- University of Kentucky News

<https://uknow.uky.edu/uk-healthcare/mentoring-key-factor-spinal-cord-researchers-success>

PUBLICATIONS: PEER-REVIEWED JOURNALS:

1. **Patel S.P.**, Katewa S.D. and Katyare S.S. (2005) Effect of antimalarials treatment on rat liver lysosomal function- An in vivo study. *Ind. J. Clin. Biochem.* 20: 1-8.
2. **Patel S.P.** and Katyare S.S. (2005) Differences in kinetic properties of cytochrome oxidase in mitochondria from rat tissues. A comparative study. *Z. Naturforsch.* 60: 785-791. PMID: 16320624.
3. Billimoria F.R., Katyare S.S. and **Patel S.P.** (2006) Insulin status differentially affects energy transduction in cardiac mitochondria from male and female rats. *Dia. Obes. Metab.* 8:67-74. PMID: 16367884.
4. **Patel S.P.** and Katyare S.S. (2006) A comparative study of reactive oxygen species (ROS) related parameters in rat tissues. *Ind. J. Clin. Biochem.* 21:48-53.
<http://www.springerlink.com/content/7160t45260021556/fulltext.pdf>
5. **Patel S.P.** and Katyare S.S. (2006) Effect of alloxan-diabetes and subsequent treatment with insulin on lipid/phospholipid composition of rat brain microsomes and mitochondria. *Neurosci. Lett.* 399:129-134. PMID: 16483714.
6. Katyare S.S. and **Patel S.P.** (2006) Insulin status differentially affects energy transduction in cerebral mitochondria from male and female rats. *Brain Res. Bull.* 69:458-464. PMID: 16624678.
7. **Patel S.P.** and Katyare S.S. (2006) Insulin-status-dependent modulation of FoF₁ ATPase activity in rat liver mitochondria. *Lipids* 41:695-703. PMID: 17069353.

8. **Patel S.P.** and Katyare S.S. (2006) Insulin-status-dependent alterations in lipid/phospholipid composition of rat kidney mitochondria and microsomes. *Lipids*. 41:819-825. PMID: 17152918.
9. **Patel S.P.** and Katyare S.S. (2006) Insulin-status-dependent modulation of FoF₁ ATPase activity in rat kidney mitochondria. *Arch. Physiol. Biochem.* 112:150-157. PMID: 17132540.
10. **Patel S.P.** and Katyare S.S. (2006) Effect of alloxan-diabetes and subsequent insulin treatment on kinetic properties of succinate oxidase activity from rat liver mitochondria. *Z. Naturforsch.* 61:756-762. PMID: 17137125.
11. **Patel S.P.** and Katyare S.S. (2006) Effect of alloxan diabetes and subsequent insulin treatment on temperature kinetics properties of succinate oxidase activity in rat kidney mitochondria. *J. Membr. Biol.* 213:31-37. PMID: 17347780.
12. **Patel S.P.** and Katyare S.S. (2007) Differential pH sensitivity of tissue superoxide dismutases. *Ind. J. Clin. Biochem.* 21:129-133. <http://medind.nic.in/iaf/t06/i2/iaft06i2p129.pdf>
13. Akhileshwer V., **Patel S.P.** and Katyare S.S. (2007) Diabetic cardiomyopathy and reactive oxygen species (ROS) related parameters in male and female rats. A comparative study. *Ind. J. Clin. Biochem.* 22:84-90. <http://medind.nic.in/iaf/t07/i1/iaft07i1p84.pdf>
14. **Patel S.P.**, Patel M.A. Modi H.R. and Katyare S.S. (2007) Improved method for estimation of inorganic phosphate: implications for its application in enzyme assays. *Ind. J. Biochem. Biophys.* 44:88-93. PMID: 17536336.
15. Modi H.R., **Patel S.P.**, Katyare S.S. and Patel M.A. (2007) Thyroid hormone treatments differentially affect kinetic properties of FoF₁ ATPase and succinate oxidase and lipid/phospholipid composition of rat kidney mitochondria. a correlative study. *J. Membr. Biol.* 215:135-145. PMID: 17568978.
16. Katyare S.S., Modi H.R., **Patel S.P.** and Patel M.A. (2007) Thyroid hormone-induced alterations in membrane structure-function relationships: studies on kinetic properties of rat kidney microsomal Na(+),K (+)-ATPase and lipid/phospholipid profiles. *J. Membr. Biol.* 219:71-81. PMID: 17721830.
17. Katyare S.S., **Patel S.P.** and Modi H. R. (2008) Diabetic modulation of the temperature kinetics properties of cytochrome oxidase activity in rat brain mitochondria. *Neurochem Res.* 33:422-429. PMID: 17721819.
18. Modi H.R., Katyare S.S. and **Patel S.P.** (2008) Thyroidal regulation of substrate kinetics properties of cytochrome oxidase in rat liver mitochondria. *Ind. J. Clin. Biochem.* 23(3):272-278. PMID: 17568978.

PUBLICATIONS STEMMING FROM WORK at UNIVERSITY of KENTUCKY

19. Sullivan P.G., Krishnamurthy S., **Patel S.P.**, Pandya J.D. and Rabchevsky A.G. (2007) Temporal characterization of mitochondrial bioenergetics after spinal cord injury. *J. Neurotrauma.* 24:991-999. PMID: 17600515.
20. **Patel S.P.**, Sullivan P.G., Pandya J.D. and Rabchevsky A.G. (2009) Differential effects of the mitochondrial uncoupling agent, 2,4-Dinitrophenol, or the nitroxide antioxidant, Tempol, on synaptic or non-synaptic mitochondria following spinal cord injury. *J. Neurosci. Res.* 87:130-140. PMID: 18709657.

21. **Patel S.P.**, Gamboa J.L., McMullen C.A., Rabchevsky A.G. and Andrade F.H. (2009) Lower respiratory capacity in extraocular muscle mitochondria: evidence for intrinsic differences in mitochondrial composition and function. *Invest. Ophthalmol. Visual Sci.* 50:180-186. PMID: 18791171.
22. **Patel S.P.**, Sullivan P.G., Lyttle T.S. and Rabchevsky A.G. (2010) Acetyl-l-carnitine ameliorates mitochondrial dysfunction following contusion spinal cord injury. *J Neurochem* 114: 291-301. PMID: 20438613.
23. Rabchevsky A.G., **Patel S.P.**, Duale H., Lyttle T.S., O'Dell C.R. and Kitzman P.H. (2011) Gabapentin for spasticity and autonomic dysreflexia after severe spinal cord injury. *Spinal Cord* 49(1):99-105. PMID: 20514053.
24. Rabchevsky A.G., **Patel S.P.** and Springer J.E. (2011) Pharmacological interventions for spinal cord injury: Where do we stand? How might we step forward? *Pharmacol Therapeutics* 132(1):15-29. PMID: 21605594.
25. Zhang X.; **Patel S.P.**, McCarthy J. J., Rabchevsky A. G., Goldhamer D. and Esser K. (2011) A non-canonical e-box within the myod core enhancer is necessary for circadian expression in skeletal muscle. *Nucleic Acids Res.* 40(8):3419-30. PMID: 22210883.
26. **Patel S.P.**, Sullivan P.G., Lyttle T.S., Magnuson D.S.K. and Rabchevsky A.G. (2012) Acetyl-l-carnitine treatment following spinal cord injury improves mitochondrial function correlated with remarkable tissue sparing and functional recovery. *Neuroscience.* 210:296-307. PMID: 22445934.
27. Rabchevsky A.G., **Patel S.P.**, Lyttle T.S., Eldahan K.E., O'Dell C.R., Zhang Y., Popovich P.G., Kitzman P.H. and Donohue K.B. (2012) Effects of gabapentin on muscle spasticity and both induced as well as spontaneous autonomic dysreflexia after complete spinal cord injury. *Front. Physiol.* 3:1-12. PMID: 22934077.
28. ***Patel S.P.**, Sullivan P.G., Pandya J.D., Goldstein G., VanRooyen J. L., Yountas H.M., Eldahan K.C., Morehouse J; Magnuson D.S.K. and Rabchevsky A.G. (2014) N-acetylcysteineamide Promotes Mitochondrial Bioenergetics and Functional Recovery Following Spinal Trauma. *Exp Neurol.* 257:95-105. PMID: 24805071.
29. ***Pandya J.D.**, Readnower R.D., **Patel S.P.**, Yountas H.M., Pauly J.R., Goldstein G., Rabchevsky A.G. and Sullivan P.G. (2014) N-acetylcysteineamide confers neuroprotection, improves bioenergetics and behavioral outcome following TBI. *Exp Neurol.* 257:106-113. PMID: 24792639.
30. **Patel S.P.**, Smith T.D., VanRooyen J.L., Powell D., Cox D.H., Sullivan P.G. and Rabchevsky A.G. (2016) Serial diffusion tensor imaging in vivo predicts long-term functional recovery and histopathology in rats following different severities of spinal cord injury. *Journal of Neurotrauma.* 33(10):917-928. PMID: 26650623.
31. Visavadiya N.P., **Patel S.P.**, VanRooyen J.L., Sullivan P.G. and Rabchevsky A.G. (2016) Cellular and subcellular oxidative stress parameters following severe spinal cord injury. *Redox Biol.* 8:56-67. PMID:26760911, PMCID: PMC4712315.
32. **Patel S.P.**, Cox D.H., VanRooyen J.L., Bailey W.M., Geldenhuys W.J., Gensel J.G., Sullivan P.G. and Rabchevsky A.G. (2017) Pioglitazone Treatment Following Spinal Cord Injury Maintains Acute Mitochondrial Integrity and Increases Chronic Tissue Sparing and Functional Recovery. *Exp Neurol.* 293:74-82.

33. Gollihue J.L., **Patel S.P.**, Mashburn C., Eldahan K.C. and Rabchevsky A.G. (2017) Optimization of mitochondrial isolation techniques for intraspinal transplantation procedures. *J Neurosci Methods* 287:1-12. PMID: 28554833
34. Rabchevsky A.G., **Patel S.P.** and Sullivan P.G. (2017) Targeting mitoNEET with pioglitazone for therapeutic neuroprotection after spinal cord injury. *Neural Regen Res.* 12(11):1807-1808. PMID: 29239323
35. Eldahan K.C., Cox, D.H., Gollihue J.L., **Patel S.P.** and Rabchevsky A.G. (2018) Rapamycin exacerbates cardiovascular dysfunction after complete high-thoracic spinal cord injury. *J Neurotrauma* 35(6):842-853, PMID: 29205090.
36. Gollihue J.L., **Patel S.P.** and Rabchevsky A.G. (2018) Mitochondrial transplantation strategies as potential therapeutics for central nervous system trauma. *Neural Regen Res.* 13(2):194-197. PMID: 29557359
37. Gollihue J.L., **Patel S.P.**, Eldahan K.C., Cox D.H., Donahue R.R., Taylor B.K., Sullivan P.G. and Rabchevsky A.G. (2018) Effects of Mitochondrial Transplantation on Bioenergetics, Cellular Incorporation and Functional Recovery after Spinal Cord Injury. *J Neurotrauma* 35(15):1800-1818. PMID: 29648982
38. **Patel S.P.** and Rabchevsky A.G. (2019) *Animal Models of Acute Neurological Injuries*, 2nd edition, Application of the Infinity Horizon spinal cord contusion injury model. Humana Press, Chen J., Xu Z.C., Xu X.-M. and Zhang J.H. (eds.)
39. Owen A.M., Starr M.E., **Patel S. P.**, Smith J.D., Kuriyama N., Stromberg A. J., Kaneki M., Esser K.A., Rabchevsky A.G., Peterson C.A. and Saito H. (2019) Mitochondrial Myopathy and Oxidative Damage Accompany Chronic Muscle Weakness in Murine Sepsis Survivors. *eLife* 8:e49920. PMID: 31793435 DOI: 10.7554/eLife.49920
40. Eldahan K.C., Williams H.C. Cox, D.H., Gollihue J.L., **Patel S.P.** and Rabchevsky A.G. (2020) Paradoxical effects of continuous high dose gabapentin treatment on autonomic dysreflexia after complete spinal cord injury. *Exp. Neurol.* (Epub) PMID: 31678138.
41. Michael F.M., **Patel S.P.** and Rabchevsky A.G. (2019) Intraspinal plasticity associated with development of autonomic dysreflexia after complete spinal cord injury. *Frontiers in Cellular Neuroscience* , section Cellular Neurophysiology, Epub 2019 Nov 8 PMID: 31780900, PMCID: PMC6856770 DOI: 10.3389/fncel.2019.00505
42. Rabchevsky A.G., Michael F.M. and **Patel S.P.** (2020) Mitochondria focused neurotherapeutics for spinal cord injury. *Exp. Neurol.* 330: 113332. PMID:32353464 DOI: 10.1016/j.expneurol.2020.113332.
43. Stewart A.N., McFarlane K.E., Vekaria H.J., Bailey W.M., Slone S.A., Tranthem L.A., Zhang B., **Patel S.P.**, Sullivan P.G., and Gensel J.C. Mitochondria exert age-divergent effects on recovery from spinal cord injury. *Neurobiology of Aging* (Revision submitted)

* These articles were featured publications in *Experimental Neurology*. Results of these sister publications characterizing NACA treatment in both SCI and TBI were “**highlighted**” in an editorial commentary (**Sample BD, 2014, Exp Neurol**) on the potential impact of NACA and targeting mitochondrial dysfunction to foster neuroprotection.

PUBLISHED, REFEREED ABSTRACTS: NATIONAL/INTERNATIONAL MEETINGS:

1. **Patel S.P.**, Akhileshwer V. and Katyare S.S. (2003) "Role of reactive oxygen species (ROS) in diabetic cardiomyopathy" *29th Annual Conference of Association of Clinical Biochemists of India*, Jaipur, Rajasthan.
2. **Patel S.P.**, Pandya J.D., Sullivan P.G. and Rabchevsky A.G. (2007) "Effects of mitochondrial uncoupling agent, 2,4-dinitrophenol, or nitroxide antioxidant, tempol, on mitochondrial integrity following acute contusion spinal cord injury." Selected for oral presentation, *J. Neurotrauma* 24(7): 1231.
3. Andrade F.H., **Patel S.P.**, Gamboa J., McMullen C.A., Rabchevsky A.G. (2008) "Unexpected constraints of extraocular muscle mitochondrial function: lower respiration rates and enzymatic activity," *Annual meeting of the Association for Research in Vision and Ophthalmology*.
4. **Patel S.P.**, Lyttle T.S., Sullivan P.G. and Rabchevsky A.G. (2008) Effects of Acetyl-L-carnitine on mitochondrial dysfunction following acute contusion spinal cord injury. *J. Neurotrauma* 25(7): 893.
5. **Patel S.P.**, Sullivan P.G., Lyttle T.S. and Rabchevsky A.G. (2009) Mitochondrial targeted interventions following contusion spinal cord injury. *J. Neurotrauma* 26, p.A123.
6. Rabchevsky A.G., **Patel S.P.**, Duale H., Lyttle T.S., O'Dell C.R. and Kitzman P.H. (2009) Gabapentin for spasticity and autonomic dysreflexia after severe spinal cord injury. *J. Neurotrauma* 26, p.A254.
7. **Patel S.P.**, Sullivan P.G., Lyttle T.S., O'Dell C.R. and Rabchevsky A.G. (2010) Effects of acetyl-l-carnitine on functional recovery and tissue sparing following contusion spinal cord injury. *J. Neurotrauma* 26, p.A-66.
8. Rabchevsky A.G., **Patel S.P.**, Lyttle T.S., O'Dell C.R. and Kitzman P.H. (2010) Effects of chronic versus acute gabapentin on spasticity and autonomic dysreflexia after severe spinal cord injury. *J. Neurotrauma* 26, p.A-73.
9. Rabchevsky A.G., **Patel S.P.**, Lyttle T.S., O'Dell C.R. and Kitzman P.H. (2010) Effects of chronic versus acute gabapentin administration on spasticity and autonomic dysreflexia after severe spinal cord injury. *Society for Neuroscience Abstracts, Annual meeting*,
10. **Patel S.P.**, Sullivan P.G., Lyttle T.S. and Rabchevsky A.G. (2010) Acetyl-l-carnitine is neuroprotective and improves functional recovery following contusion spinal cord injury. *The 10th International Conference on Neuroprotective Agents, Pacific Grove, CA*.
11. **Patel S.P.**, Sullivan P.G., Lyttle T.S. and Rabchevsky A.G. (2011) Mitochondrial dysfunction: A critical target for treatment of acute spinal cord injury. *J. Neurotrauma* 28, p. A32-33.
12. Rabchevsky A.G., **Patel S.P.**, Lyttle T.S., O'Dell C.R., Eldahan K.C., Donohue K.D. and Kitzman P.H. (2011) Gabapentin alleviates spasticity and both induced and spontaneous autonomic dysreflexia after severe spinal cord injury. *J. Neurotrauma* 28, p. A31-32.
13. Rabchevsky A.G., **Patel S.P.**, Lyttle T.S., O'Dell C.R., Eldahan K.C., Donohue K.D. and Kitzman P.H. (2011) Gabapentin mitigates both induced and spontaneous autonomic dysreflexia, as well as reflexive spasticity after severe spinal cord injury. *Society for Neuroscience Annual Meeting*.
14. **Patel S.P.**, Sullivan P.G., Lyttle T.S. and Rabchevsky A.G. (2011) Targeting of mitochondrial dysfunction for treatment of spinal cord injury. *Society for Neuroscience Annual Meeting*.

15. **Patel S.P.**, Pandya J.D., Eldahan K.C., Sullivan P.G. and Rabchevsky A.G. (2012) N-acetylcysteine amide (NACA) treatment improved mitochondrial bioenergetics and hindlimb functional recovery following contusion spinal cord injury. Selected for oral presentation, *J. Neurotrauma* 29, p. A-19.
16. Crowdus C., Yu C.G., Singh R., Power R., Pandya J.D., **Patel S.P.**, Sullivan P.G., Rabchevsky A.G. and Geddes J.. (2012) Enhancing endogenous protective mechanisms following spinal cord injury. *J. Neurotrauma* 29, p. A-82-83.
17. **Patel S.P.**, Pandya J.D., Visavadiya N.P., Eldahan K.C., Sullivan P.G. and Rabchevsky A.G. (2012) Neuroprotective effects of N-acetylcysteine amide (NACA) following contusion spinal cord injury in rats. *Society for Neuroscience Annual Meeting*.
18. Rabchevsky A.G., Eldahan K.C., VanRooyen J.L., Kline IV R.H. and **Patel S.P.** (2012) Mitigation of autonomic dysreflexia by gabapentin treatment after complete spinal cord injury: effects on perik expression in spinal cord neurons and neuroglial cells *Society for Neuroscience Annual Meeting*.
19. **Patel S.P.**, Sullivan P.G., Yonutas H.M., VanRooyen J.L., Eldahan K.C. and Rabchevsky A.G. (2013) Effects of continuous subcutaneous delivery of N-acetylcysteine amide (NACA) on acute and chronic pathophysiology after spinal cord injury. *J. Neurotrauma* 30, p. A-18. Selected for oral presentation, *The 31th Annual National Neurotrauma Society Symposium, Nashville, TN*
20. **Patel S.P.**, Sullivan P.G., Yonutas H.M., VanRooyen J.L., Eldahan K.C. and Rabchevsky A.G. (2013) Effects of continuous N-acetylcysteine amide (NACA) treatment on acute and chronic pathophysiology after contusion spinal cord injury. *Society for Neuroscience Annual Meeting, San Diego, CA*
21. Rabchevsky A.G., Eldahan K.C., Nall D.A., VanRooyen J.L., Wang C.Y. and **Patel S.P.** (2013) Influences of systemic inflammation and gabapentin on the severity of autonomic dysreflexia in relation to the expression of inflammatory cytokines in both visceral and neural tissues. *Society for Neuroscience Annual Meeting, San Diego, CA*.
22. **Patel S.P.**, VanRooyen J.L., Visavadiya N.P., Smith T.L., Sullivan P.G. and Rabchevsky A.G. (2014) Treatment with ketone bodies preserves mitochondrial function and reduce oxidative stress following contusion spinal cord injury. *Society for Neuroscience Annual Meeting, Washington, DC*.
23. **Patel S.P.**, VanRooyen J.L., Sullivan P.G. and Rabchevsky A.G. (2015) Synergistic effects of β -hydroxybutyrate and acetyl-l-carnitine on mitochondrial function after spinal cord injury. *J. Neurotrauma*, 32: p A-118. *Santa Fe, NM*.
24. Eldahan K.C., VanRooyen J.L., **Patel S.P.**, Smith T.L., Cox D.H. and Rabchevsky A.G. (2015) Pharmacological manipulation of maladaptive plasticity to prevent autonomic dysreflexia. *International Symposium on Neural Regeneration. Pacific Grove, CA*.
25. VanRooyen J.L., **Patel S.P.**, Eldahan K.C., Smith T.L., Cox D.H. and Rabchevsky A.G. (2015) Mitochondrial supplementation after spinal cord injury maintains cellular bioenergetics. *Kentucky Spinal Cord & Head Injury research Trust, Louisville, KY*.
26. VanRooyen J.L., **Patel S.P.**, Eldahan K.C., Smith T.L., Cox D.H. and Rabchevsky A.G. (2015) Mitochondrial supplementation after spinal cord injury maintains cellular bioenergetics. *Bluegrass Society for Neuroscience Day, Lexington Convention Center, Lexington, KY*

27. VanRooyen J.L., **Patel S.P.**, Eldahan K.C., Smith T.L., Cox D.H. and Rabchevsky A.G. (2015) Mitochondrial transplantation to restore cellular bioenergetics after spinal cord injury. *American Society for Neural Therapy & Repair, Clearwater, FL.*
28. VanRooyen J.L., **Patel S.P.**, Eldahan K.C., Smith T.L., Cox D.H. and Rabchevsky A.G. (2016) Mitochondrial transplantation into the injured spinal cord improves bioenergetic integrity. Keystone Symposium on Mitochondrial Dynamics, Steamboat Springs, CO
29. VanRooyen J.L., **Patel S.P.**, Mashburn C., Eldahan K.C., Cox D.H., Sullivan P. G. and Rabchevsky A.G. (2016) Transplanted mitochondria significantly maintain cellular respiration after acute contusion spinal cord injury. *The 34th Annual National Neurotrauma Society Symposium, Lexington, KY J. Neurotrauma 33(13): A-8, T01-10.*
30. Eldahan K.C., VanRooyen J.L., **Patel S.P.**, and Rabchevsky A.G. (2016) Modulation of the mammalian target of rapamycin to alter maladaptive plasticity associated with autonomic dysreflexia. *The 34th Annual National Neurotrauma Society Symposium, Lexington, KY. J. Neurotrauma 33(13): A-67, PSA-154.*
31. Cox D.H., **Patel S.P.**, VanRooyen J.L., Bailey W., Gensel J.G., Sullivan P. G. and Rabchevsky A.G. (2016) Pioglitazone maintains acute mitochondrial integrity and improves long-term functional neuroprotection after spinal cord injury. *The 34th Annual National Neurotrauma Society Symposium, Lexington, KY J. Neurotrauma 33(13): A-125, PSB-315.*
32. **Patel S.P.**, VanRooyen J.L., Eldahan K.C., Cox D.H. Sullivan P.G. and Rabchevsky A.G. (2017) Mitochondrial transplantation following contusion spinal cord injury. *The 35th Annual National Neurotrauma Society Symposium, Snowbird, UT J. Neurotrauma, 34: p A-18-11.*
33. Eldahan K.C., Cox D.H., VanRooyen J.L., **Patel S.P.**, and Rabchevsky A.G. (2017) Effect of continuous gabapentin administration on the incidence and severity of autonomic dysreflexia. *The 35th Annual National Neurotrauma Society Symposium, Snowbird, UT J. Neurotrauma, 34: p A-142.*
34. VanRooyen J.L., **Patel S.P.**, Eldahan K.C., Cox D.H. Sullivan P.G. and Rabchevsky A.G. (2017) Mitochondrial transplantation following contusion spinal cord injury. *The 19th International Spinal Research Trust Network Meeting, London, UK.*
35. **Patel S.P.**, VanRooyen J.L., Eldahan K.C., Cox D.H. Sullivan P.G. and Rabchevsky A.G. (2017) Transplantation of Mitochondria following spinal trauma. *Society for Neuroscience Annual Meeting, Washington, D.C.*
36. Steele A.M, Starr M.E., **Patel S.P.** and Saito H. (2017) Impairment of Mitochondrial Function in Murine Sepsis Survivors. *IAGG World Congress of Gerontology and Geriatrics. Innovation in Aging 1 Suppl 1:1 P. 1391.*
37. Steele A.M., Starr M.E., Patel S. P., Smith J.D., Kuriyama N., Stromberg A. J., Kaneki M., Esser K.A., Rabchevsky A.G., Peterson C.A. and Saito H. (2017) Mitochondrial Damage and Dysfunction in Skeletal Muscle of Middle-Aged Sepsis Survivors. *Shock 47 Suppl. 1:30.* This Abstract received Presidential Travel Award.
38. Steele A.M., Starr M.E., Patel S. P., Smith J.D., Kaneki M., Esser K.A., Rabchevsky A.G., Peterson C.A. and Saito H. (2017) Mitochondrial Myopathy in Murine Sepsis Survivors with Long-Term Muscle Weakness. *15th Biennial Advances in Skeletal Muscle Health and Disease Conference, Gainesville, FL.*

39. **Patel S.P.**, Cox D.H., Bailey W.M, Williams H.C., Gensel J.C. Sullivan P.G. and Rabchevsky A.G. (2018) Pioglitazone maintains mitochondrial bioenergetics via binding to mitoneet following spinal cord injury. *The 3rd Joint Symposium of the International and National Neurotrauma Societies and AANS/CNS Section on Neurotrauma and Critical Care, Toronto, Canada.*
40. **Patel S.P.**, Cox D.H., Bailey W.M, Williams H.C., Gensel J.C. Sullivan P.G. and Rabchevsky A.G. (2018) Pioglitazone maintains mitochondrial respiration following spinal cord injury via interaction with mitoNEET. *Society for Neuroscience Annual Meeting, San Diego, CA.*
41. **Patel S.P.**, Gollihue, J.L., Williams H.C., Cox D.H., Sullivan P.G. and Rabchevsky A.G. (2019) Effects of mitochondrial transplantation on bioenergetics and neuroprotection following spinal cord injury. *The American Society for Neural Therapy and Repair, Clearwater, FL.*
42. Stamm S., Danyi S.N., **Patel S.P.** and Rabchevsky A.G. (2019) Splice-site changing oligonucleotides targeting the serotonin receptor 2c to reduce spasticity after spinal cord injury. RNA Society.
43. Khan M.A., Marium M.A., Wiegman K., Nuti K., **Patel S.P.**, DeRouchey J.E., Rabchevsky A.G. and Dziubla T.D. (2020) Synthesis and Optimization of Hyaluronic Acid-Methyl Cellulose Thermogel for the Controlled Release of Viable Mitochondria. *The American Institute of Chemical Engineers (AIChE) 2020 annual meeting.*

INVITED PRESENTATIONS:

1. “Effects of Mitochondrial Uncoupling Agent, 2,4-Dinitrophenol, or Nitroxide Antioxidant, Tempol, on Mitochondrial Integrity Following Acute Contusion Spinal Cord Injury.” The 25th Annual Neurotrauma Symposium, Kansas City, MO, July 2007, One of a dozen oral presentations chosen out of 300 total.
2. “Therapeutic Interventions for Spinal Cord Injury: Targeting Mitochondrial Dysfunction.” University of Kentucky, Department of Physiology Seminar Series, April 13, 2011.
3. “N-acetylcysteine amide (NACA) treatment improves mitochondrial bioenergetics and hindlimb functional recovery following contusion spinal cord injury,” National Neurotrauma Society (NNS) meeting, Phoenix, AZ, July 2012 15 “Open Communication Presentations” chosen out of 370 total.
4. “Mitochondrial-targeted therapeutics for SCI.” Annual Kentucky Spinal Cord & Head Injury Research Trust Symposium, Louisville, KY May 2013
5. “Effects of continuous subcutaneous delivery of N-acetylcysteine amide (NACA) on acute and chronic pathophysiology after spinal cord injury.” National Neurotrauma Society (NNS) meeting, Nashville, TN, August 2013 15 “Open Communication Presentations” chosen out of 328 total.
6. “Alternative biofuels as therapeutics for mitochondrial integrity after spinal cord injury:” University of Kentucky, Department of Physiology, Faculty Candidate Seminar, May 19, 2014.
7. “Pioglitazone Improves Functional Neuroprotection Following Spinal Cord Injury:” Clinical-Translational Research Symposium by Kentucky Neuroscience Institute, University of Kentucky, Sept. 23, 2016.
8. “Effects of mitochondrial transplantation on bioenergetics and neuroprotection following spinal cord injury” 26th Annual Conference of the American Society for Neural Therapy & Repair Clearwater, FL, April 26, 2019.

PROFESSIONAL MEMBERSHIPS:

- Kentucky Spinal Cord and Head Research Trust, KY USA (2006-present)
- National Neurotrauma Society, USA (2007-present)
- Blue Grass Society for Neuroscience, Lexington, KY (2007-present)
- Society for Neuroscience, USA (2011 - present)
- The American Society for Neural Therapy & Repair (2013-present)

JOURNAL AD HOC REVIEWER:

- BMC Neuroscience - 2018-present
- Brain Research – 2015-present
- Experimental Biology and Medicine – 2014-present
- Experimental Brain Research – 2016-present
- Experimental Neurology – 2020-present
- FASEB J – 2019-present
- Future Science Open – 2017-present
- International Journal Fertility and Infertility – 2015-present
- International Journal of Fertility & Sterility – 2015-present
- International Journal of Experimental Pathology – 2013-present
- Journal of Applied Physiology – 2015-present
- Journal of Chemical Neuroanatomy – 2020-present
- Journal of Molecular Imaging & Dynamics – 2015-present
- Journal of Neuroimmunology – 2015-present
- Journal of Neuropathology and Experimental Neurology – 2015-present
- Life Sciences – 2017-present
- Mitochondrion – 2016-present
- Molecular Pain – 2019-present
- Neurochem International – 2018-present
- Neuroimmunology & Neuroinflammation – 2019-present
- Neuropharmacology – 2018-present
- Neuroscience – 2014-present
- Neuroscience Letter – 2015-present
- Redox Biology – 2016-present
- Rejuvenation Research – 2019-present
- Restorative Neurology and Neuroscience – 2016-present
- Spinal Cord – 2016-present
- Tissue and Cell – 2015-present

GRANT REVIEWER:

- DoD- SCIRP 2016, Regeneration and Therapies, Teleconference Reviewer
- DoD- SCIRP 2017, Intervention - Secondary Consequences, Scientist Reviewer
- DoD-CCCRP 2019, Brain Trauma, Neuroprotection, and Neuroregeneration, Online Reviewer
- Action Medical Research for Children 2019, United Kingdom, Online Reviewer
- Neurological Foundation Project Grant 2020, New Zealand, Scientific Referee
- DoD- PRMRP 2020, Discovery Metabolic Disease peer review panel (pre-DIA 1), Scientific Reviewer
- DoD-SCIRP 2020, Preservation and Protection 1, Scientific Reviewer

ADVISING /MENTORING: Students & Visiting Scholars

The M. S. University of Baroda:

1. 2000-2004 Taught and supervised a series of experiments on Biomembranes, DNA, RNA, Lipids, Phospholipids, TLC, as well as spectrophotometric and spectrofluorimetric estimations of cytochrome, NADH, flavins etc., for 23 M.Sc. Biochemistry students/year.
2. 2002-03 Supervised dissertation of Masters student, Vidya Akhileshwer, M.Sc. The M. S. University of Baroda, Vadodara, India ().

University of Kentucky

3. 2007: Erica Fleishaker; rotating IBS graduate student
4. 2008-09: Jennifer Evans, undergraduate research, U.K. ANA395 Program
5. 2008: Darren Miller, rotating IBS graduate student
6. 2008: Brent Hackett, rotating IBS graduate student
7. 2009: Alecia Fields, undergraduate research, U.K. BIO395 Program
8. 2010: Dr. Yanling Yang, Foreign Visiting Scholar, Yan'an University Medical School, Yan'an, P.R. China
9. 2010-11: Oksana Zhurbich, undergraduate research, U.K. BIO395 Program and (Fed Work Study)
10. 2011: Jenna VanRooyen; rotating IBS graduate student
11. 2011: Hyein Jang; rotating IBS graduate student
12. 2011: Dr. Rachel Hill, now Senior Research Scientist in the laboratory of Dr. Edward Hall, U.K.
13. 2012: Nathalie Astudillo, undergraduate research, U.K. BIO395 Program
14. 2012-13 Taylor Smith, undergraduate research, U.K. CHEM395 Program
15. 2012-13: Christian Baker, undergraduate research, U.K. BIO395 Program
16. 2013: Catherine Wang, 2nd Year Med Student, Medical Student Research Program (Fed Work-Study)
17. 2013-14: Alicia Kaseta, undergraduate research, U.K. Physiology Scholars Program
18. 2013-14: Jensen Goh, undergraduate research, U.K. Physiology Scholars Program
19. 2013-14: Katherine Spezzano, undergraduate research, U.K. BIO395 Program
20. 2013-15: Ana Bahrami, undergraduate research, U.K. BIO395 Program
21. 2014-15: Catherine Wang, 3rd Year Med Student, Professional Student Mentored Research Fellowship
22. 2014-16: Jonathan Gardner, undergraduate research, U.K. CHEM395 Program
23. 2014-16: Jensen Goh, undergraduate research, U.K. KHP395
24. 2015: Rebecca Joel, undergraduate research, U.K. BIO395 Program
25. 2015: Alex Carter, undergraduate research, U.K. BIO395 Program
26. 2015-16 Tapan Darji, High School research, The Liberal Arts Academy Academic Mentoring Program at Henry Clay High School
27. 2016-17 Meraj Kotwal, undergraduate research, U.K. BIO395 Program
28. 2016-17 Carlee Schreiber, undergraduate research, U.K. BIO395 Program
29. 2018 Archi Patel, STEAM Academy student
30. 2018-19 Lydia Boyd, undergraduate research, U.K. PGY 394 Program
31. 2018-19 Bailee Taylor, undergraduate research
32. 2019-20 Lisa Patel, undergraduate research

Ph.D. Candidates and Post-Docs

27. 2012-17 Jenna VanRooyen, Doctoral Candidate (U.K. Physiology, Rabchevsky lab), Training and supervising
28. 2014-18 Khalid Eldahan, Doctoral Candidate (U.K. Physiology, Rabchevsky lab), Training and supervising
29. 2017-17 Allison Steele, Doctoral Candidate (U.K. Physiology, Saito lab); PhD Dissertation Committee
30. 2019-present Felicia Michel, Post-doctoral scholar (U.K. Physiology & SCoBIRC, Rabchevsky lab) co-mentor.

Teaching/Instructing

31. 2014: Volunteer Instructor for undergraduate students in PGY 207 course, U. K.
Note: In coordination with Dr. Dexter Speck, Course Director.

OUTREACH ACTIVITIES:

- Volunteer as Judge for Science Fair, Veterans Park Elementary, Lexington, KY, November 18-19, 2013.
- Volunteer as Judge, the 30th Annual Kentucky American Water – Fayette County Public School District Science Fair, Bryan Station High School, Lexington, KY February 8, 2014.
- Volunteer as Judge, the 31st Annual Kentucky American Water – Fayette County Public School District Science Fair, Bates Creek High School, Lexington, KY, February 7, 2015.
- Volunteer as Judge, the 32nd Annual Kentucky American Water – Fayette County Public School District Science Fair, Bates Creek High School, Lexington, KY, February 6, 2016.
- Volunteer as Judge, the 33rd Annual Kentucky American Water – Fayette County Public School District Science Fair, Bryan Station High School, Lexington, KY, February 3, 2018.
- Volunteer as Judge, the 34th Annual Kentucky American Water – Fayette County Public School District Science Fair, Frederick Douglass High School, Lexington, KY, February 2, 2019.
- Volunteer as Judge for the Kentucky Science and Engineering Fair, Eastern Kentucky University, Richmond, KY, March 26, 2016.
- Volunteer as Judge for the Kentucky Science and Engineering Fair, Eastern Kentucky University, Richmond, KY, March 24, 2018.
- Volunteer as Judge for the Kentucky Science and Engineering Fair, Eastern Kentucky University, Richmond, KY, March 4, 2019.
- Member of organizing committee for Kentucky Spinal Cord and Head Injury Research Trust meeting 2020 annual conference meeting, Lexington, KY
- Member of Post-COVID 19 restart committee 2020 – SCoBIRC

CURRENT FUNDING SUPPORT

Pioglitazone fosters neuroprotection via specific interaction with mitoNEET

Principle Investigator: A.G. Rabchevsky (07/01/17 – 06/30/21) - NCE 2%
Co-Investigators: **S.P. Patel** 18%
Agency: The Craig H. Nielsen Foundation - Senior Research Grant
Type: Senior Investigator Grant

These studies will directly test whether pioglitazone affords neuroprotection following SCI by directly ameliorating mitochondrial dysfunction via interactions with mitoNEET using a novel transgenic model (mitoNEET null), as well as a novel specific mitoNEET ligand and an antagonist, alone and in tandem, to mechanistically test our hypotheses.

Chronic muscle weakness in sepsis survivors.

Principle Investigator: Saito, H (09/01/17 - 10/31/21) 30%
Co-Investigators: **S.P. Patel**, A.G. Rabchevsky 16% & 2%
Agency: NIH-NIGMS
Type: R01

These studies will establish mitochondrial damage and dysfunction in sepsis-surviving mice, investigate sarcomeric protein damage and its causal mechanisms long after recovery from sepsis, and formulate therapeutic strategies to ameliorate post-sepsis chronic muscle weakness.

Mitochondrial transplantation combined with mitochondrial-targeted pharmaceuticals to treat spinal cord injury.

Principle Investigator: A.G. Rabchevsky (06/01/20 - 05/31/23) 20%
Co-Investigators: S.P. Patel, P.G. Sullivan, T. Dziubla, J. DeRouchey 30%, 8.57%, 2.89%, 2.89%
Agency: Department of Defense (CDMRP/SCIRP) SC190110
Type: Investigator-Initiated Research Award

The proposed experiments are designed to test the protective efficacy of mitochondrial transplantation alone or in combination with neuroprotective agents for long-term functional recovery following contusion SCI. We will 1) establish that transplantation of isolated mitochondria be delivered through diffusible hydrogel polymers subdurally into spinal cords, 2) test the hypothesis that mitochondrial transplantation in combination with mitochondrial -targeted pharmaceuticals will ameliorate acute and sub-acute biochemical and cellular outcome measures compared to individual therapies , and test the hypothesis that combinatorial regimens will maximize long-term functional neuroprotection.

COMPLETED FUNDING SUPPORT

Ketone body administration to treat spinal cord injury

Principal Investigator: **S. P. Patel** (07/01/13 – 06/30/16) 30%
Collaborator: A.G. Rabchevsky 2%
Agency: Craig H. Neilsen Foundation
Type: Neilsen Pilot Research Grant #260771

These studies assessed if early preservation of mitochondrial bioenergetics by ketone body administration following contusion SCI results in chronic tissue sparing and hind limb recovery.

Autologous mitochondrial replacement strategies to promote recovery after spinal trauma

Principle Investigator: A.G. Rabchevsky (09/01/15 – 08/31/16) 2%
Co-Investigator: **S.P. Patel** 15%
Agency: Conquer Paralysis Now
Type: Out of the Box Grant

Experiments are designed to test whether supplementing healthy mitochondria isolated from exogenous sources into the contused rat spinal cord maintains overall cellular bioenergetics and increased functional neuroprotection.

Continuous sensor-based home-cage recordings for SCI research

Principal Investigator: S. Hochman, Emory University (08/31/16–08/30/18)
Co-Investigators: **S.P. Patel** and A.G. Rabchevsky 10% and 2%
Agency: Craig H. Neilsen Foundation
Type: Senior Investigator Award

These studies are designed to leverage affordable miniaturized sensor technologies that report on an individual's physio-behavioral variables to develop an animal-model prototype – in a home-cage – to test its efficacy in assessing physiologic dysfunction after SCI

Mitochondrial transplantation and alternative biofuel administration to treat spinal cord injury

Principle Investigator: **S.P. Patel** (08/15/17 – 02/14/19) 15%
Co-Investigators: A.G. Rabchevsky 2%
Agency: Center for Clinical and Translational Science
Type: CCTS Pilot Award

These studies will determine whether acute administration of an alternative biofuel for maintaining mitochondrial bioenergetics after contusion spinal cord injury (SCI), in combination with acute or delayed intraspinal transplantation of isolated muscle mitochondria into injured spinal cords results in improved cellular respiration and consequent sparing of host tissue.

PI and Co-I salary is not requested on grant.

Mitochondrial transplantation strategies to promote recovery after spinal cord injury

Principle Investigator: A.G. Rabchevsky (04/01/16 – 03/31/19) Extension
Co-Investigators: **S.P. Patel** and P.G. Sullivan Extension
Agency: National Institutes of Health-NINDS
Type: R21

This proposal comparatively assesses transplantation of mitochondria derived from two cell-type sources (autologous muscle vs cultured cells) in order to provide additional analysis and outcome measures for long-term behavioral studies in order to generate robust pre-clinical data.

Changing serotonin receptor 2C splice variants to combat spasticity after spinal cord injury

Principal Investigator (Dual-PI): A.G. Rabchevsky (04/01/17 – 03/31/19) 10%
Principal Investigator (Dual-PI): S. Stamm 10%
Key Personnel: **S.P. Patel** 24%
Agency: National Institutes of Health-NINDS
Type: R21

These studies will employ a single pharmacological intervention to attenuate muscular spasticity in a chronic SCI model. The overall goal will be to use intrathecal injections of oligonucleotides to inactivate constitutively active serotonergic (5HT2C) receptors thought to underlie tail muscle spasticity in chronic stages of SCI utilizing a complete S2 transection SCI model in adult rats.