Masoud M. Zarei
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EDUCATION

July 1994 Ph.D. in Neuroscience
Baylor College of Medicine
Houston, Texas

1987 B.S. in Biology and Chemistry, *Magna Cum laude*
Incarnate Word College
San Antonio, Texas.

CURRENT POSITION

Tenured Associate Professor. Department of Biomedicine. The University of Texas at Brownsville. Brownsville, Texas 78520.

GRANT SUPPORT

NIH/NIGMS (Mitchell, PI)
02/01/08-01/31/14 (1 year extension)
R25GM083755 Role: Mentor / coordinator
Utah-UTB Bridge to the Doctorate – Biomedical Informatics.
The main goal of this partnership grant is to establish a pathway for UTB students to move toward a doctoral degree in biomedical informatics at the university of Utah.

Completed Research Projects:

NIH/NINDS (Garrido, PI)
09/15/07-08/31/09
R21NS056160 Role: co-investigator (0.9 AY)
Targeted immunoliposomes for cell-type specific gene therapy of epilepsy
The major goal of this project is to develop novel nonviral gene transfer strategies (gene therapy) to selectively transfect and overexpress a 'therapeutic gene' in glutamatergic neurons.

NIH/NCMHD (Martin, PI)
11/08/04-10/31/09
P20MD001091 Role: within a subproject (see below)
"Developing Biomedical Research Infrastructure at UTB/TSC"
The major goal of this program is to increase the biomedical research capacity at UTB/TSC and includes two research projects, a common facility core, and an

administrative core.

*Subproject: Neuronal connectivity in basal forebrain structures*Role: Co-investigator

The major goal of the Neuroscience core project is to facilitate the modeling of normal and age-altered septal connectivity. Dr. Zarei's support from this project includes 2.25 months AY and 1 summer month.

STAC461

09/01/07-08/31/08

South Texas Arthritis Center (Zarei) Role: PI

The Role of Receptors in Autoimmunity

The major goal of this project is to determine whether CD14, and CD36 receptors play a role in interaction between macrophages and apoptotic cells.

NIH/NCMHD (Colom, PD)

02/01/03-01/31/08

P20MD00161 Role: Co-investigator

Creation of a Hispanic Health Research Center in the Lower Rio Grande Valley

NIH/MBRS (Colom, PD)

08/01/04-07/31/07

S06GM068855 Role: PI

"MBRS SCORE Supplement at The University of Texas at Brownsville"

Regulation of MaxiK Protein Trafficking by Signal Sequences

American Heart Association 01/01/03 – 12/31/06

Type: National Scientist Development Grant Role: PI

Molecular Mechanisms Regulating Surface Expression of MaxiK Channel.

My long term goal is to unravel molecular and cellular mechanisms of ion channel trafficking to different regions of plasma membrane in vascular smooth cells. In this research grant, we plan to identify protein trafficking mechanisms that regulate surface expression of voltage-dependent and Ca^{2+}-activated K^+ channels (MaxiK, BK).

STATUS U.S. Citizen

RESEARCH EXPERIENCE

Graduate School:

1988-1994 Baylor College of Medicine. **Structure Function of the NMDA Receptor Channel.**

Under the direction of Dr. John A. Dani I studied factors that influence ion permeation through the N-methyl-D-aspartate (NMDA) receptor channel.

Field of study:

Effect of different open channel blockers on the NMDA receptor channel.

Narrowest region of the pore.

Negative charges in or around the pore.

Occupancy of the channel.

Structure of the pore.
Patch-clamp techniques:
Whole cell recording.
Single channel recording (inside and outside-out patches were used).
Tissue culture: I cultured hippocampal neurons from Sprague-Dawley rats.

Postdoctoral experience:

1994 to 1996 Baylor College of Medicine. **Distribution of NnAChRs in Hippocampal Neurons.**

I studied the surface distribution of the α7 and β2 subunits of neuronal nicotinic Acetylcholine receptors (NnAChRs) under the direction of Dr. John A. Dani, and in close collaboration with Dr. James W. Patrick. In these studies I used different immunocytochemistry (i.e., immunoperoxidase, immunofluorescence) and digital epifluorescence microscopy techniques. My results suggest that the α7 surface expression is time dependent, and this subunit is localized at presynaptic terminals. In contrast, the β2 subunit of NnAChR stays confined to the soma and proximal processes.

1996 to 1998 Vollum Institute. **Sensory-Sensory and Sensory-Mast Cell Interactions.**

I was studying interactions between peripheral sensory neurons (i.e., nociceptors) and cells of the immune system (i.e., mast cells) with Dr. Edwin W. McCleskey. I successfully co-cultured mast cells and DRG explants. Furthermore, I had shown that mast cell degranulation causes an increase in spontaneous activity recorded from nociceptors. I was using micro injection, Electrophysiolgy and fluorescence microscopy techniques to understand the cellular basis for interactions that exist between peripheral sensory neurons and cells of the immune system. I discovered that sensory neurons do not interact with each other in normal conditions but during injury, they may form many synaptic connections that can lead to oversensitivity to pain sensation.

1998 to 2002. UCLA. **Distribution of Ca^{2+} channel Subtypes in the Supraoptic Nucleus and Their Changes During Aging.**

I am investigating the molecular distribution of Ca^{2+} channel subtypes in the SON in Dr. Enrico Stefani laboratory. I am using 30 μm slices from young and old rats and label them with polyclonal antibodies against α_{1A}, α_{1B}, α_{1C}, α_{1D}, and α_{1E} subunits of Ca^{2+} channels, using immunohistochemistry. I discovered that different classes of Ca^{2+} channels are differentially distributed in the supraoptic nucleus and the relative surface expression of them drastically changes during aging.

1998 to 2002. UCLA. **Protein Assembly and Targeting of Voltage-Gated K^+ Channel.**

In collaboration with Dr. Ligia Toro, I studied the protein targeting and assembly in transiently and stabely transfected HEK293 cells. In these studies, we imaged GFP tagged MaxiK potassium channels and traced their movement within living cells. Live-cell images were acquired by a confocal microscope while cells were maintained in a closed chamber system. Our results illustrate the early assembly of the α and β subunits of MaxiK in the endoplasmic reticulum.

2002-Present. UTB/TSC/UTRGV. **Protein Assembly and Targeting of Voltage-Gated K^+ Channel.**

I am continuing my work on protein assembly and targeting in my laboratory in the UTB/TSC. I have established an active collaboration with Dr. Ligia Toro to further study the role of β1-4 auxiliary subunits of MaxiK on protein trafficking of the MaxiK α subunit.

TECHNICAL EXPERIENCES

I have extensive knowledge of **electrophysiology, immunohistochemistry, live cell labeling, tissue culture (primary, cell line and explant), confocal microscopy**. I am also familiar with standard molecular biology techniques.

TEACHING EXPERIENCES

Teaching courses (2003-2016):

1) Advance Physiology (BIOL 3301)
2) Biological Concept I (BIOL 1308)
3) Biological Concept II (BIOL 1309)
4) Biology Seminar (BIOL 4100)
5) Research Methodology (BIOL 4370)
6) Advance Cell Biology (BMED 4250) newly developed (TBL)
7) Introductory Cell Biology (BMED 1103) newly developed (TBL)
8) Intro to Biomed Lab (BMED 1102) newly developed (on Line)
9) Medical Biochemistry (BMED 4310) newly developed (PBL)
10) Adv Med. Neuroscience (BMED 4280) newly developed (PBL)
11) Neurochemistry (BMED 3102) newly developed (PBL)
12) Hybrid Biochemistry (BMED 4310)
13) Hybrid Cell Biology (BMED 4250)

Teaching course (1990):

Medical Neuroscience at Baylor College of Medicine, Houston, TX.

AWARDS

Student Award of the American Institute of Chemists, Student Research and Recognition Foundation.
Award of Merit for Outstanding Achievements in Freshman Chemistry, I.W.C.
CRC Freshman Chemistry Achievement Award.

MEMBERSHIP

Honorary Member of the Texas Institute of Chemists.
Member of the Biophysical Society 1998-2003.
Member of the Society for Neuroscience since 2004.
Member of Public Responsibility in Medicine and Research (PRIM&R) since 2008.

PUBLICATIONS:

Research Papers

1. **Zarei, M. M.**, and J. A. Dani. 1994. Ionic Permeability Characteristics of the N-methyl-D-aspartate Receptor. *Journal of General Physiology.* 103:231-248.

2. **Zarei, M. M.**, and J. A. Dani. 1995. Structural Basis for Explaining Open-Channel Blockade of the NMDA Receptor. *Journal of Neuroscience.* 15(2):1446-1454.

3. Wilkemeyer, M. F., K. L. Smith, **M. M. Zarei**, T. A. Benke, J. W. Swann, K. J. Angelides and R. C. Eisensmith. 1996. Adenovirus-Mediated Gene Transfer into Dissociated and Explanted Cultures of Rat Hippocampal Neurons. *J. Neuroscience Research.* 43(2):161-174.

4. **Zarei, M. M.**, K. A. Radcliffe, D. Chen, J. W. Patrick and J. A. Dani. 1999. Distribution of Nicotinic Acetylcholine Receptor $\alpha 7$ and $\beta 2$ Subunits on Cultured Hippocampal Neurons. *Neuroscience.* 88(3):755-764.

5. **Zarei, M. M.**, N. Zhu, L. Toro and E. Stefani. 2001. A Novel MaxiK splice Variant Exhibits Dominant Negative Properties. *J. Biological Chemistry*. 276(19):16232-16239.

6. Song M., N. Zhu, M. Eghbali, G. Helguera, **M. M. Zarei**, R. Olcese, L. Toro and E. Stefani. 2001. Remodeling of Kv4.3 Potassium Channel Gene Expression under the Control of Sex Hormones. *J. Biological Chemistry*. 276(34):31883-31890.

7. Eghbali, M., R. Olcese, **M. M. Zarei**, L. Toro and E. Stefani. 2002. External Pore Collapse as an Inactivation Mechanism for Kv4.3 K^+ Channel. *J. Membrane Biology.* 188(1):73-86

8. Alioua, A., A. Mahajan, K. Nishimaru, **M. M. Zarei**, E. Stefani, and L. Toro. 2002. Agonist-Induced Contraction via c-Src Pathway Involves the Inhibition of Maxi-K^+ channels by direct c-Src Phosphorylation Process. *Proc. Natl. Acad. Sci. USA.* 99(22): 14560-14565.

9. **Zarei, M. M.**, L. Toro and E. Stefani. Differential Cellular Expression of Ca^{2+} Channel Subtypes of the Supraoptic Nucleus. In preparation.

10. **Zarei, M. M.**, M. Eghbali, A. Alioua, M. Song, Knaus H.-G., E. Stefani, and L. Toro. 2004. An Endoplasmic Reticulum Trafficking Signal Prevents Surface Expression of a Voltage- and Ca2+-activated K+ channel Splice Variant. *Proc. Natl. Acad. Sci. USA.* 101(27):10072-7.

11. **Zarei, M. M.**, B. Toro and E.W. McCleskey. 2004. Purinergic Synapses Formed Between Rat Sensory Neurons in Primary Culture. *Neuroscience.* 126: 195-201.

12. Toro, L., A. Alioua, R. Lu, J. Garcia-Valdes, **M. M. Zarei**, K. Nishimaru, M. Eghbali, and E. Stefani. 2005. Ca^{2+}-Activated, Voltage-dependent K^+ Channels. In Ion Channels in the Pulmonary Vasculature, Lung Biology in Health and Disease. Vol 197. J. X.-J. Yuan, ed. Taylor and Francis Group. Boca Raton, FL. pp. 237-256.

13. Luis F. Pacheco Otalora, Jessica Couoh, Richie Shigamoto, **M. M. Zarei**, Emilio R.

Garrido-Sanabria. 2006. Abnormal mGluR2/3 expression in the perforant path termination zones and mossy fibers of chronically epileptic rats. *Brain Research*. 1098(1):170-85.

14. Toro, B., Cox N., Wilson R.J., Toro L., Stefani E., Garrido-Sanabria, E. and **Zarei M. M.** 2006. KCNMB1 Regulates Surface Expression of a Voltage and Ca^{2+}-Activated K^+ Channel via Endocytic Trafficking Signals. *Neuroscience.* 142:661-669.

15. **Zarei M.M**., Song M., Wilson R.J., Cox N., Colom L., Hans-guenther knaus, Stefani E., and Toro L. 2007. Endocytic Trafficking Signals in KCNMB2 Regulate Surface Expression of a Voltage and Ca^{2+}-activated K^+ Channel. *Neuroscience.* 147:80-89.

16. Pacheco Otalora L.F., Hernandez E.F., Arshadmansab M.F., Lira A., Wilson, R, Willis M., Knaus, HG, **Zarei M.M.**, Garrido-Sanabria, E.R. 2008. Downregulation of BK Channel Expression in the Pilocarpine Model of Temporal Lobe Epilepsy. *Brain Research.* 1200:116-31.

17. Ermolinsky, B., Arshadmansab M.F., Pacheco Otalora L.F., **Zarei M.M.** Garrido-Sanabria, E.R. 2008. Deficit of Kcnma1 mRNA Expression in the Dentate Gyrus of Epileptic Rats. Neuroreport. 19(13):1291-4

18. Ermolinsky, B., Pacheco Otalora L.F, Arshadmansab M.F.,., **Zarei M.M.** Garrido-Sanabria. 2008. Differentil Changes in mGlu2 and mGlu3 Gene Expression Following Pilocarpine-Induced Status Epilepticus: A Comparative Real-Time PCR Analysis. *Brain Research.* 1226:173-180.

19. Ermolinsky, B., Skinner, F., Arshadmansab M.F., Pacheco Otalora L.F., **Zarei M.M.** Garrido-Sanabria, E.R. 2011. Upregulation of STREX splice variant of the large conductance Ca2+-activated potassium (BK) channel in a rat model of mesial temporal lobe epilepsy. *Neuroscience Research*. 69:73-80.

20. Cox N., Toro B., Pacheco-Otalora L.F. Garrido-Sanabria E.R, **and Zarei M. M**. 2014. An Endoplasmic Reticulum Trafficking Signal Regulates Surface Expression of β4 Subunit of a Voltage- and Ca^{2+}-Activated K^+ Channel. *Brain Research*. 1553:12-23.

21. **Zarei M. M**., Song M., Garrido Sanabria E. R., Toro L., and Stefani E. 2016. Ca^{2+} Channel Subtype Expressions and Their Changes During Aging in the Supraoptic Nucleus. Pending.

Scientific Presentation

Biophysical Society 47th Annual Meeting. San Antonio, Texas. A Novel ER Trafficking Signal Prevents Surface Expression of a MaxiK Splice Variant. 733-Plat.

Abstracts

1. **Zarei, M. M.**, and J. A. Dani. 1992. Calcium Permeability of the NMDA Receptor is Influenced by Negative Charges in or Near the Channel. *Biophysical Journal.* 61:A104.

2. **Zarei, M. M.**, and J. A. Dani. 1993. Structural and Permeability Properties of the NMDA Receptor Channel. *Society for Neuroscience.* 19:278.

3. Radcliffe, K. A., A. Rajan, **M. M. Zarei**, M. Yakehiro, J. Y. Hsu and J. A. Dani. 1996. Smoker's Level of Nicotine Acts via Nicotinic Receptors Containing the α7 Subunit to Increase Glutamate Release from Hippocampal Neurons. *Society for Neuroscience.* 22(2):1264.

4. **Zarei, M. M.**, and E.W. McCleskey. 1998. Primary Sensory Neurons Form Functional Synapses. *Society for Neuroscience.* 24(2):2036.

5. **Zarei, M. M.**, L. Toro and E. Stefani. 1999. Differential Cellular Expression of Ca^{2+} Channel Subtypes of the Supraoptic Nucleus. *Society for Neuroscience.* 25(1):287.18.

6. **Zarei, M. M.**, L. Toro and E. Stefani. 1999. Characterization of Ca^{2+} Channel Subtypes in the Supraoptic Nucleus. *Biophysical Journal.* In Press.

7. **Zarei, M. M.**, Zhu N., Alioua A., Eghbali M., E. Stefani and L. Toro. 2001. A novel MaxiK Splice Variant Exhibit Dominant Negative Properties. *Biophysical Journal.* 80(1):887.

8. Eghbali M, Olcese R., **Zarei M. M.**, L. Toro and E. Stefani. 2001. External K^+ Increases the Rate of Inactivation of Kv4.3 K^+ Channels. *Biophysical Journal.* 80(1):1888.

9. Alioua, A., **Zarei M. M.**, and L. Toro. 2001. Inhibition of hSlo Channel by the Non-Receptor Tyrosine Kinase, $PP60^{C\text{-}SRC}$. *Biophysical Journal.* 80(1):1886.

10. Eghbali M, Olcese R., **Zarei M. M.**, L. Toro and E. Stefani. 2002. External Pore Collapse as an Inactivation Mechanism for Kv4.3 K^+ Channel. *Biophysical Journal.* 82(1):1117.

11. Mahajan, A., Alioua, A., Nishimaru, K. **Zarei M. M.**, and L. Toro. 2002. Functional Coupling of MaxiK Channels with Tyrosine Kinase (cSrc) Mediates Human Coronary Vasorelaxation. *Biophysical Journal.* 82(1):1197.

12. Eghbali M, Song, M., **Zarei M. M.**, Helguera, G., E. Stefani and L. Toro. 2002. Different Mechanisms of MaxiK Channel Surface Expression in Rat and Mouse Lead to Diminished Surface Expression in Late-Pregnant Myometrium. *The Endocrine Society.* P1-486.

13. **Zarei, M. M**, M. Eghbali, M. Song, E. Stefani and L. Toro. 2003. A Novel ER Trafficking Signal Prevents Surface Expression of a MaxiK Splice Variant. *Biophysical Journal.* 84(2):733-Plat.

14. **Zarei, M. M**, M. Eghbali, M. Song, E. Stefani and L. Toro. 2003. A New ER Trafficking Signal Identified in a MaxiK Splice Variant Prevents Protein Expression. *American Society for Cell Biology*. 1273-B519.

15. **Zarei, M. M.**, M. Eghbali, A. Alioua, M. Song, Knaus H.-G., E. Stefani, and L. Toro.

2004. A New ER Trafficking Signal Identified in a Smooth Muscle MaxiK Splice Variant Prevents Channel Protien Expression. *American Society of Anesthesiologists*. A671.

16. **Zarei, M. M.**, M. Song, R.J. Wilson, N. Cox, E. Stefani, and L. Toro. 2005. Endocytic Trafficking Signals in KCNMB2 Regulate Surface Expression of a Voltage and Ca^{2+}-activated K^{+} Channel. *American Heart Association Research Symposium.* P22-A53.

17. **Zarei, M. M.**, R.J. Wilson, N. Cox, L. Colom, E. Stefani, and L. Toro. 2006. MaxiK Channel Surface Expression is Downregulated by its Modulatory β2 Subunit (KCNMB2). *American Society of Anesthesiologists*.

18. Hernandez, E. F., L. F. Pacheco, **M. M Zarei**, and E. R. Garrido-Sanabria. 2006. Down-regulation of MaxiK channel expression in hippocampus of chronically epileptic rats: Implication for mossy fiber excitability and epileptogenesis. 176.10/II6

REFERENCES

John A. Dani. (Ph.D.) Baylor College of Medicine, Neuroscience.
Edwin W. McCleskey. (Ph.D.) Vollum Institute.
Enrico Stefani. (M.D., Ph.D.) UCLA.
Ligia Toro. (Ph.D.) UCLA.