

**Patricia A. Loomis, PhD.**  
**Research Assistant Professor**

**RM 2.128**  
**Rosalind Franklin University of**  
**Medicine and Science**  
**3333 Green Bay Road**  
**North Chicago, IL 60064**  
**Phone (847) 578-3000 ex 3574**  
**Email [Patricia.Loomis@rosalindfranklin.edu](mailto:Patricia.Loomis@rosalindfranklin.edu)**

## **RESEARCH INTEREST**

Although great strides have been made in the study of auditory hair cell stereocilia, the molecular mechanisms controlling the assembly and maintenance of this exquisite example of cytoarchitecture are poorly understood. The Espin family of proteins, which have been implicated in deafness and vestibular dysfunction in humans and mice, are an integral component of this actin cytoskeletal regulatory system. Encoded by a single gene (*Espn*), the Espins share a C-terminus that is necessary and sufficient for actin bundling activity. While the C-terminus bestows Espins with the classification of actin bundling proteins, the N-terminus, with its diverse functional domains generated by differential start site selection and alternative splicing, imparts upon Espins the recognition as multifunctional actin cytoskeletal regulatory proteins. Which factors are responsible for the regulation of isoform selection and the downstream significance with regard to isoform localization and the ensuing effects on the organization, dynamics and signaling capabilities of bound F-actin during the development and maturation of the inner ear are still unknown. To begin to understand how Espin gene expression is controlled at the level of RNA processing, I am testing the hypothesis that both regulatory sequences on the pre-mRNA and the trans-acting proteins which bind them act in concert to modulate splice site selection in both a mouse and zebra fish model system.

Once severely damaged, human auditory hair cells cannot regenerate. However, gene therapy has the promise of applying genomics-based treatments to aid these cells and possibly restore hearing. Effective application of gene therapy demands that we understand how genes such as *Espn* are involved in the development of the inner ear and how the proteins encoded by them act in concert to maintain this elaborate cytoarchitecture. Dissection of the processes of alternative splicing of Espin pre-mRNA will further our understanding of how hair cells within the inner ear regulate the complex spatiotemporal patterns of expression of this important family of actin-interacting proteins.

## **EXPERIENCE**

### **Education**

1983 Graduated Hannibal Central High School, Hannibal, NY

1987 B.S. Genetic Engineering Technology, Cedar Crest College, Allentown, PA  
1994 Ph.D. Department of Cell Biology, University of Alabama at Birmingham,

### **Positions and Employment**

1993-2004 Research Associate, Northwestern University, Chicago, IL  
2005-2006 Research Associate, Rosalind Franklin University of Medicine and Science, North Chicago, IL  
2006-Present Research Assistant Professor, Rosalind Franklin University of Medicine and Science, North Chicago, IL

### **SELECTED PEER REVIEWED PUBLICATIONS**

- 1) Loomis, PA; Howard, TH; Castleberry, RP; Binder, LI. (1990) Identification of nuclear tau isoforms in human neuroblastoma cells. *PNAS (USA)* **87**(21):8422-8426.
- 2) Wang, Y; Loomis, PA; Zinkowski, RP; Binder, LI. (1993) A novel tau transcript in cultured human neuroblastoma cells expressing nuclear tau. *J. Cell Biol.* **121**(2):257-267.
- 3) \*Loomis, PA; \*Straube-West, K; Opal, P; Goldman, RD. (1996) Alterations in neural intermediate filament organization: functional implications and the induction of pathological changes related to motor neuron disease. *J. Cell Sci.* **109**(9):2319-2329. \* co-first authors
- 4) Loomis, PA (1998) Isolation of dorsal root ganglia from chick embryos. *Cells – A Laboratory Manual*. Edited by DL Spector, RD Goldman and LA Leinwand. Cold Spring Harbor Laboratory Press, vol 1. pp 9.8-9.13.
- 5) Loomis, PA and Goldman, RD. (1998) Neural intermediate filament systems. *Encyclop. of Neuroscience*. 2<sup>nd</sup> Revised Edition, edited by George Adelman and Barry H. Smith. pp.1313-1316.
- 6) Sekerková Sekerkova, G; Loomis, PA; Changyaleket, B; Zheng, L; Eytan, R; Chen, B; Mugnaini, E; Bartles, JR.(2003) Novel espin actin-bundling proteins are localized to Purkinje cell dendritic spines and bind the Src homology 3 adapter protein insulin receptor substrate p53. *J. Neurosci.* **23**(4):1310-1319.
- 7) \*Loomis, PA; \*Helfand, BT; Yoon, M; Goldman, RD. (2003) Rapid transport of neural intermediate filament protein. *J. Cell Sci.* **116** (11):2345-2359. \*co-first authors
- 8) Loomis, PA; Zheng, L; Sekerková Sekerkova, G; Changyaleket, B; Mugnaini, E; Bartles, JR. (2003) Espin cross-links cause the elongation of microvillus-type parallel actin bundles in vivo. *J. Cell Biol.* **163**(5):1045-1055.
- 9) Shea, TB; Yabe, JT; Ortiz, D; Pimenta, A; Loomis, PA; Goldman, RD; Amin, N; Pant, HC. (2004) Cdk5 regulates axonal transport and phosphorylation of neurofilaments in cultured neurons. *J. Cell Sci.* **117**(6):933-941.
- 10) Sekerková Sekerkova, G; Zheng, L; Loomis, PA; Changyaleket, B; Whitlon, DS; Mugnaini, E; Bartles, JR. (2004) Espins are multifunctional actin

cytoskeletal regulatory proteins in the microvilli of chemosensory and mechanosensory cells. *J. Neurosci.* **24**(23):5445-5456.

**11)** Loomis, P.A., Kelly, A.E., Zheng, L., Changyaleket, B., Sekerková Sekerova, G., Mugnaini, E., Ferreira, A., Mullins, R.D., Bartles, J.R. (2006) Targeted Wild-Type and Jerker Espins Reveal A Novel WH2 Domain-Dependent Way To Make Actin Bundles In Cells. *JCS.* **119**(8):1655-1665.

**12)** Sekerková G, Zheng L, Loomis PA, Mugnaini E., Bartles JR. Espins and the actin cytoskeleton of hair cell stereocilia and sensory cell microvilli. (2006) *Cellular and Molecular Life Sciences.***63**:2329-2341.