



Judith Potashkin, Ph.D. Associate Professor

Laboratory of Gene Expression

General Research Interest

Changes in Gene Expression that Occur in Disease

Changes in gene expression that occur in the brain during neurodegeneration and addiction.

Identification of splice variants in blood as biomarkers for Parkinson's disease.

Changes in RNA stability in cervical cancer.

Main Research Techniques

Reverse Transcription Polymerase Chain Reaction

Bioinformatics

Site-directed mutagenesis

RNA-protein cross-linking assays

Microarray screening

Lab Members



Judy Potashkin
Associate Professor
PhD 1985
State University of New York, Buffalo



Kelly Wentz-Hunter
PhD 1996 RFUMS
Now: Associate Professor Roosevelt University



Fran Jodelka
BS 2002
University of Illinois Urbana



Victor Marinescu
PhD 2006, MD 2008 RFUMS
Now: Resident William Beaumont Hospital, MI



Justin Wikle
MD with distinction student

Recent Publications

Potashkin, J. and Meredith, G. The Role of Oxidative Stress in the Dysregulation of Gene Expression and Protein Metabolism in Neurodegenerative Disease. *Antioxidant and Redox Signaling* 8:144-151 (2006).

Aibhai, I.N., Green, T.A., Potashkin, J.A., Nestler, E.J. Regulation of fosB and FosB mRNA Expression: In Vivo and In Vitro Studies. *Mol. Brain Res.* 114:322-33 (2007).

Li, X., Xi, X., Zhou, L., Catera, D., Rote, N., Potashkin, J., Abdul-Karim, F. and Gorodeski, G.I. Decreased Expression of P2X7 in Endometrial Epithelial Pre-Cancerous and Cancer Cells. *Gynecol. Oncol.* 106:233-43 (2007).

Marinescu, V., Ehmann, S., Loomis, P., Beales, M. and Potashkin, J. Regulation of Retention of FosB Intron 4 by PTB, *PLoS One* 2(9): e828 (2007).

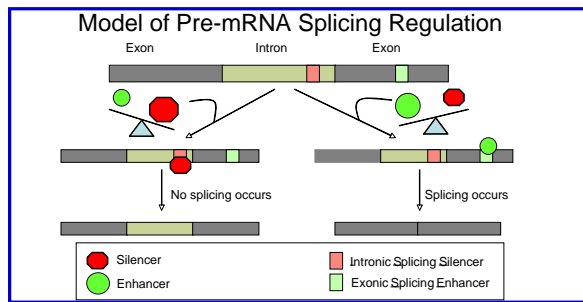
Potashkin, J. A. Kang, U.J. Loomis, P. A. Jodelka, F. D., Ding, Y. and Meredith, G. E. MPTP administration in mice changes the ratio of splice isoforms of fosB and rgs9. *Brain Research* (2007). *Brain Res.* 1182:1-10.

Wu, J.Y. and Potashkin, J.A., Alternative splicing in the nervous system. *The New Encyclopedia of Neuroscience*, edited by Larry Squire et al., Elsevier Limited, Oxford, United Kingdom (2008), in press.

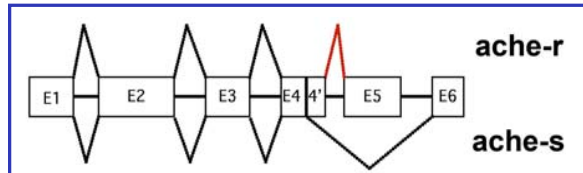
Meredith, G.E., Totterdell, S., Potashkin, J.A., Surmeier, D. S. Modeling PD pathogenesis in mice: Advantages of a chronic MPTP protocol. *Parkinsonism Related Disorders* (2008), 14:S112-S115.

Zhou, L. Qi, Y., Potashkin, J.A., Luo, L., Fu, W., Abdul-Karim, F., D., and Gorodeski, G.I. Micro-RNAs miR-186 and miR-150 downregulate expression of the pro-apoptotic putative P2X7 receptor by activation of instability sites at the 3'-untranslated region of the gene that decrease steady-state levels of the transcript. *J Biol Chem* (2008), in press.

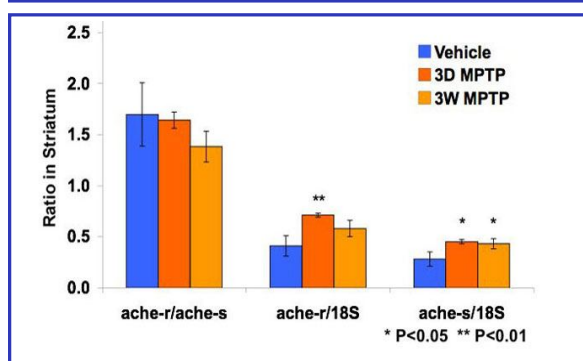
Parkinson's Disease



Goal: Determine if splicing regulation is disrupted in the brain in Parkinson's disease. Identify blood biomarkers to detect pre-symptomatic Parkinson's disease.



The mRNA encoding *ache-s* produces an isoform that composes the canonical synaptic tetrameric form of the enzyme. The mRNA encoding *ache-r* produces a protein that remains a monomer.

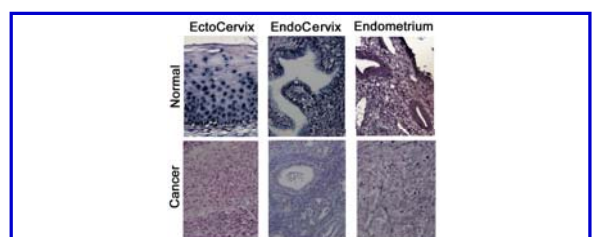


The ratio of *ache-r/18S* and *ache-s/18S* increased in the striatum after 3D and the increase in *ache-s/18S* persisted for 3W after chronic MPTP administration. No change in splicing was observed in the blood after chronic MPTP treatment.

Future Studies: In order to identify biomarkers in blood we will screen microarrays using RNA prepared from human blood.

Cervical Cancer

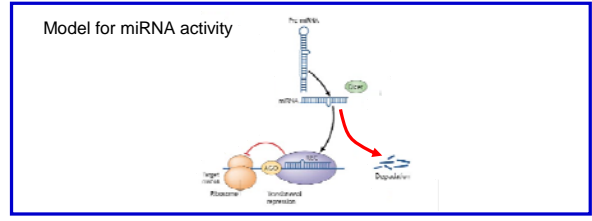
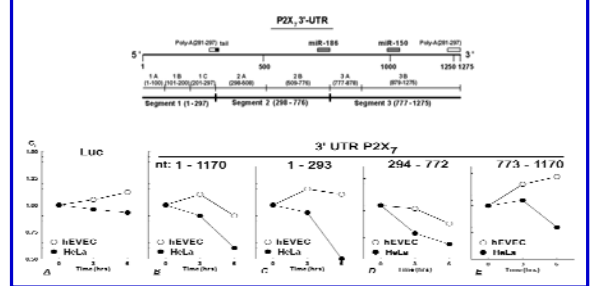
The P2X₇ receptor is a membrane-bound ligand-operated channel. The receptor's function in epithelial cells is to mediate apoptosis.



The amount of P2X₇ mRNA is lower in precancerous and cancer epithelial cells than in normal cells.

Goal: Determine the mechanism regulating P2X₇ mRNA expression.

Several putative miRNA targets sites were identified by bioinformatic analysis, including miR-186 and miR-150 targets. These sequences were cloned adjacent to a luciferase reporter and the results showed that these sites destabilize the 3'-UTR P2X₇ mRNA



Future Studies: Identify additional sites important to the stability of the 3'-UTR P2X₇ mRNA. Determine if the miRNAs that regulate P2X₇ stability are the cause or simply a biomarker of cervical cancer.